Regional District of
Kitimat-Stikine

2019 CLOSED THORNHILL LANDFILL ANNUAL REPORT

June 2020

Prepared for:

British Columbia Ministry of
Environment & Climate Change
Strategy
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Thornhill Landfill Overview

The Thornhill Landfill (Landfill) is now undergoing closure. The Thornhill Transfer Station (the transfer station) opened in November 2016 on the site of the closed Landfill, and is owned and operated by the Regional District of Kitimat-Stikine (Regional District or RDKS). The transfer station is located about 10 km southeast of the City of Terrace; access is from Old Lakelse Lake Drive.

Most waste generated in the greater Terrace area is hauled to the transfer station, sorted and consolidated, and then hauled to Forceman Ridge Waste Management Facility for final disposal. This process is conducted in accordance with the Regional District Kitimat-Stikine Solid Waste Management Plan (1995). There is also a residential drop off area for garbage, organics, metal (including large appliances and propane tanks), and clean wood. Waste is no longer discharged at the Thornhill location.

Landfill operations are regulated by the Ministry of Environment and Climate Change Strategy's Operation Certificate MR-4057, most recently amended in June 2014.

Figure 1: Thornhill Transfer Station

The transfer station consists of a scale and scale house, a Z-wall for residential drop-off, a transfer station building for consolidation of commercial loads, and an area to accept and consolidate commercial loads of organics.

Environmental monitoring is being conducted in accordance to the operational certificate. The details of the Facility water quality monitoring program, including groundwater, surface water, and leachate results will be discussed in a document prepared by Golder Associates and can be found in Appendix A.

A landfill gas feasibility study for flaring was completed in September 2018 on the closed Thornhill Landfill, and a solar powered candlestick flare system was installed in the summer of 2019. A Greenhouse Gas Emissions Reduction Report completed by Sperling Hansen Associates (SHA) can be found in Appendix B.

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1.0 Introduction

This annual report covers the period from January to December 2019 and has been prepared to fulfill the requirements of the Thornhill Transfer Station's Operational Certificate MR-4057.

Issued by the Ministry of Environment and Climate Change Strategy and most recently amended in June 2014. The Operational Certificate does not yet reflect the closure of the landfill and transition to waste collection at the Thornhill Transfer Station. Waste is no longer discharged at the Landfill and septage is no longer accepted. Garbage and compostable organics are collected, consolidated, and hauled to the Forceman Ridge Waste Management Facility. Metals (including white goods, scrap metals, and propane tanks) and clean wood including land clearing debris are collected and kept segregated. Clean wood is segregated and hauled to Forceman Ridge, then burned as detailed in Section 11 of the Operational Certificate and metal is sold as scrap.

This report meets the requirements in Section (9.4) of the Operational Certificate by providing the following information:

- Total volume or tonnage of waste collected, consolidated, and hauled to Forceman Ridge during 2019;
- Total volume or tonnage of organics collected and diverted during 2019;
- Total volume or tonnage of metals and clean wood collected and diverted during 2019;
- Occurrences or observations of wildlife attempting to access the facility; and
- The results and evaluation of all the monitoring programs has been undertaken by Golder Associates, shown in Appendix A.

2.0 Waste Disposal

The Thornhill Transfer Station serves as the consolidation location for most of the garbage and all the organics collected in the Terrace Area. There is also a residential drop off area at the transfer station with separate bins for garbage, clean wood, metal, and organics.

2.1 Solid Waste Disposal

Solid waste, with the exception of Controlled Waste hauled directly to Forceman Ridge, is hauled to the Thornhill Transfer Station, sorted, compacted, and hauled to the Forceman Ridge Facility. The annual totals from January through to December 2019 for municipal solid waste, organics, clean wood, and metal received at the Thornhill Transfer Station are shown in Table 1. Details on some of these materials is included below.

Table 1: Waste Discharge Qualities for 2019

Material	2018 Quantity (tonnes)	
Waste Discharge		
Garbage	6771	
Construction and Demolition	1261	
Diverted Materials		
Clean Wood		36
Organics		1601
Metal		120
Total		
Total Consolidated Landfill Waste	8032*	
Total Materials Diverted		1757

Note: * Volume of waste collected at Thornhill Transfer Station and hauled to Forceman Ridge for landfilling.

2.1.1 Garbage

Garbage is defined as discharged materials or substances not including; Controlled Wastes (animal carcasses weighing more than 50 kg, asbestos, contaminated soils, land clearing or construction and demolition wastes over five cubic meters, clean soils, broken concrete, broken asphalt, ash from incinerators, or septage), Restricted Wastes (metal, organics, and recyclable materials) or Prohibited Waste (hazardous or radioactive waste, slaughter waste, smoldering or flammable material, explosive or highly combustible materials, broken concrete or asphalt 300 millimeters in diameter or greater, Extended Producer Responsibility (EPR) materials, tires, and cardboard and paper products, whether or not they fall within the definition of EPR materials).

Garbage is consolidated at the Thornhill Transfer Station and hauled to the Forceman Ridge Waste Management Facility for landfilling. In 2019, 6,771 tonnes of garbage was collected and consolidated at the Thornhill Transfer Station.

2.1.2 Construction and Demolition

Construction and demolition material is mainly wood waste, and construction materials such as dry wall and insulation. It is defined as waste produced from the construction, renovation, and demolition of buildings and other structures, but does not include waste containing or contaminated with asbestos, creosote, polychlorinated biphenyl (PCB's), or any other Hazardous Waste.

In 2019, 1,261 tonnes of construction and demolition waste was collected and consolidated at the Thornhill Transfer Station and hauled to the Forceman Ridge Waste Management Facility for landfilling.

3.0 Diverted Materials

Diverted materials are collected using several methods depending on the material type and/or the producer source; consolidated at the Thornhill Transfer Station, collected in curbside pick-up, collected by commercial haulers, or deposited at designated Extended Producer Responsibility Depots and private recycling facilities.

3.1.1 Metals

In 2019, a total of 120 tonnes of metal was collected at the transfer station, including propane tanks, white goods, and scrap metal. Ozone depleting substances are removed from all pertinent materials prior to collection by scrap metal recycler.

3.1.2 Clean Wood Waste

Clean wood waste is considered any wood product that has not be treated or painted. Clean wood is segregated, and hauled to Forceman Ridge, and is currently burned as outlined in Section 11 of the Operational Certificate.

In 2019, 36 tonnes total of clean wood waste was collected and diverted.

3.1.3 Organic Waste

Organic waste is defined as vegetative matter, food processing waste, garden waste, kitchen scraps, food soiled paper, waxed cardboard, and other organic waste that can be composted. Organic waste is collected curbside for residents, by commercial haulers for businesses, and can also be dropped off directly at the transfer station in designated bins. Organic waste is consolidated at the transfer station and hauled to the Forceman Ridge Compost Facility.

In 2019, 1,601 tonnes of organic waste was collected, diverted, and processed in the Compost Facility.

4.0 Wildlife Occurrences and Observations

The Thornhill Transfer station is located in an area with bears, wolves, coyotes, several species of birds of prey, and many other species of mammals that may attempt access to the facility. To prevent wildlife from gaining access the entire facility is enclosed in an electrified fence. The residential collection area contains wildlife proof bins with lids to prevent bird and rodent access. Commercial garbage is consolidated within the transfer station building, to which there is no bird access. Organics are consolidated in a large wildlife proof bin with lid.

Facility operators are required to inspect the fence line weekly, testing for proper voltage, proper tension on fence stands, overall condition of the fence, and signs of wildlife activity. The results of the inspections are recorded on the Daily Operation Inspection Form.

There were no recorded interactions with wildlife in 2019.

5.0 Environmental Monitoring Report

Environmental monitoring for the Thornhill Transfer Station was conducted by a Regional District of Kitimat-Stikine Environmental Technician, following Ministry of Environment and Climate Change Strategy, 2013 British Columbia Field Sampling Manual. All in-situ and laboratory data for groundwater, surface water, and leachate monitoring results has been analyzed and reviewed by Golder Associates. The complied data, interpretation, and recommendations can be found in Appendix A.

6.0 Landfill Gas Collection

A landfill gas collection feasibility study was completed in September 2018 which indicated potential for a successful gas flaring system. Based on these results, the Regional District installed a solar powered candlestick flare system in summer of 2019. A 2019 Greenhouse Gas Emissions Reduction Report completed by Sperling Hansen Associates (SHA) can be found in Appendix B.

7.0 Landfill Closure Update

The landfill has been capped with a geomembrane cover, with a mixture of gravel and soil applied to shape. The shaped landfill is awaiting the finished compost from the Forceman Ridge facility, which will be applied to the entire site prior to seeding. Seeding is planned for fall 2020.

Site drainage is directed into a two-series wetland for managing and treating any leachate from the closed section of landfill. Surface runoff from the transfer station is also directed to the wetlands.

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Appendix A

REPORT

Thornhill Landfill, Thornhill, BC

2019 Annual Environmental Effects Monitoring Report

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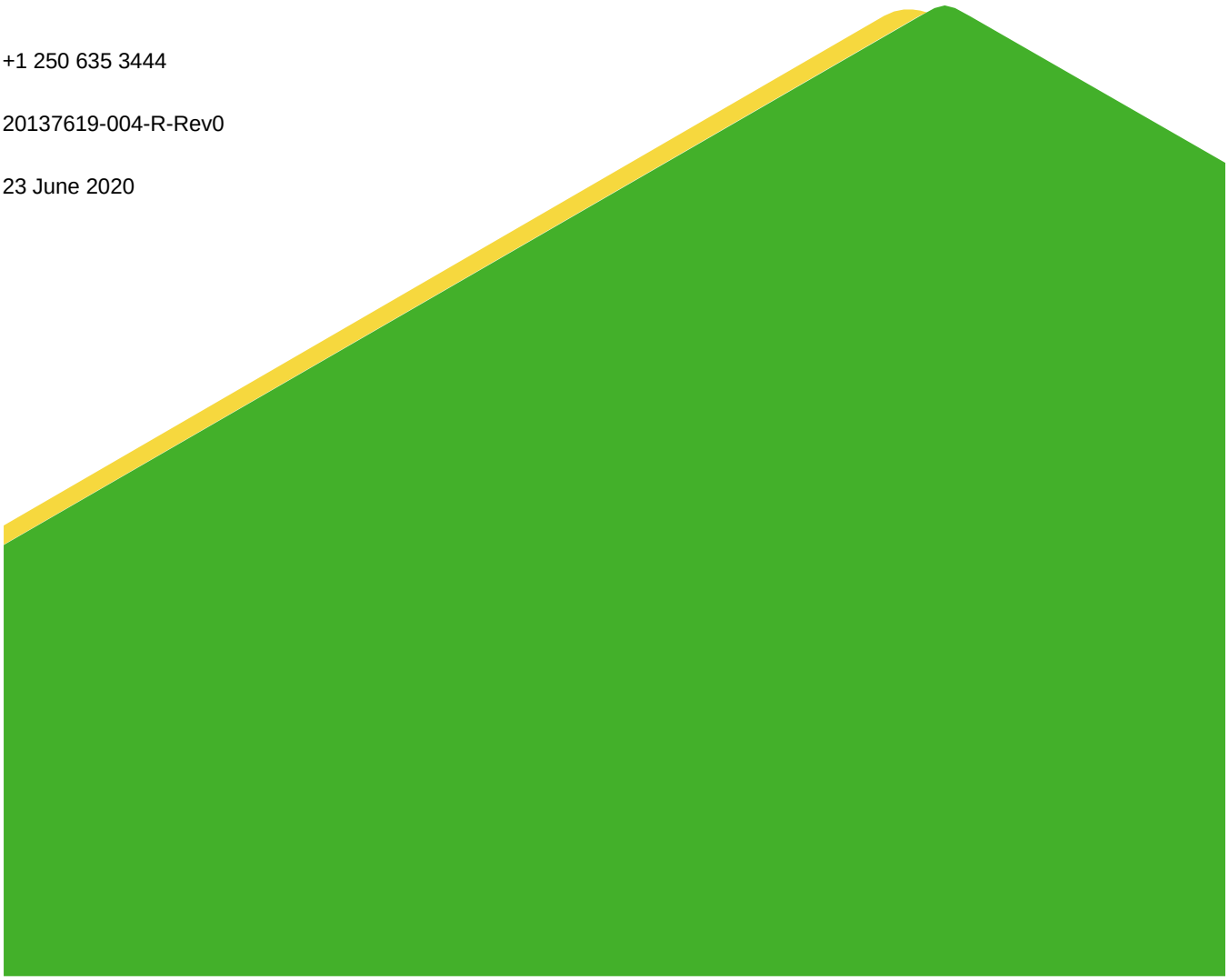

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Executive Summary

The 2019 monitoring program indicates that the 2019 results follow historic trends and confirm previous findings by SHA (2017).

The results of the surface water monitoring indicate that seepage from the leachate pond (SW-3) and surface water immediately downgradient of the Landfill (SW-21) exceeds the Contaminated Sites Regulations (CSR) and BC Water Quality Guidelines (BC WQG) for select constituents. However, concentrations at the downgradient location SW-6 (750 m from the Landfill) appear to be close to background conditions, suggesting that Landfill leachate has attenuated prior to reaching the Thornhill Creek water system. Although surface water from SW-6 exceeded the applicable BC WQG for two metals (total and dissolved aluminum and total iron) for some sampling rounds in 2019, these results are considered to be partly caused by other unknown conditions not directly related to Landfill leachate.

Groundwater quality data is only available for one monitoring well located downgradient of the Landfill (BH96-2). The well is screened in silt and clay, which underlies the majority of the Landfill, and shows little impact of Landfill leachate. Concentrations of all parameters for BH96-2 were less than the applicable BC CSR standards. Chloride, which is a typical indicator of landfill leachate, is rising in groundwater over time, but is present at relatively low concentrations that are well below regulatory criteria.

Groundwater quality associated with the gravel unit that underlies the south corner of the Landfill could not be assessed due to the lack of monitoring wells in this area. Similarly, the water quality in the glacial till unit which underlies both the gravel unit and the silt and clay unit was also not evaluated due to the lack of available monitoring wells in this unit.

While recent water-level measurements are only available for one groundwater monitoring well, the general groundwater flow direction is inferred to be to the north based on historical data (SHA 1997) and topography.

Study Limitations

This report was prepared for the exclusive use of the Regional District of Kitimat-Stikine (RDKS). The report, which includes all tables, figures and appendices, is based on current and historical data and information provided by RDKS to Golder Associates Ltd (Golder) in April 2019. The findings, interpretations and conclusions concerning the Site conditions are based solely on the information provided to Golder.

Golder makes no warranty, expressed or implied, and assumes no liability with respect to the use of the information contained in this report at the subject Site, or any other Site, for other than its intended purpose. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. Golder Associates Ltd. accepts no responsibilities for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

The RDKS has the right to submit this report to the BC Ministry of Environment & Climate Change Strategy (ENV) for review and comment. ENV may rely on the information contained in this report solely to carry out such a review**.**

Golder disclaims responsibility of consequential financial effects on transactions or property values, or requirements for follow-up action and costs, which result from reporting the factual information contained herein.

The services performed as described in this report were conducted in a manner consistent with that level of care and skill normally exercised by other members of the engineering and science professions currently practicing under similar conditions, subject to the time limits and financial and physical constraints applicable to the services. The content of this report is based on information provided by the RDKS to Golder in January 2019, our present understanding of the Site conditions, and our professional judgment in light of such information available at the time of this report. This report provides a professional opinion, and therefore no warranty is either expressed, implied or made as to the conclusions, advice and recommendations offered in this report. This report does not provide a legal opinion regarding compliance with applicable laws. With respect to regulatory compliance issues, it should be noted that regulatory statutes and the interpretation of regulatory statutes are subject to change.

Golder accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report. The findings and conclusions of this report are valid only as of the date of this report. If new information is discovered during future work, including excavations, borings or other activities or studies, Golder should be requested to re-evaluate the conclusions of this report, and to provide amendments as required.

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1.0 INTRODUCTION

Golder Associates Ltd. (Golder) was retained by the Regional District of Kitimat-Stikine (RDKS) to prepare the 2019 Annual Environmental Effects Monitoring (EEM) Report for the Thornhill Landfill (the "Site"). The Site is located approximately 10 km southeast of Terrace, British Columbia, on Old Lakelse Lake Road. Annual reporting is required by Clause 9 of the Landfill Permit No. MR-4057 dated 20 June 2014 (the Permit"). The Thornhill Transfer Station exists on the site of the closed Thornhill Landfill, established in the 1960s and closed in 2015/2016. The monitoring program relates to the closed landfill site.

1.1 Background

The Thornhill Transfer Station was established on the former Thornhill Landfill, which was first constructed in the 1960s, expanded in the late 1990s and closed in 2015/2016. The Thornhill Landfill was closed and capped over the period of 2015 through 2017, and final closure, including application of topsoil and revegetation, is planned to occur in the fall of 2020.

EEM Programs are required for the Thornhill Landfill by the BC Ministry of Environment and Climate Change Strategy (ENV) as part of the Operational Certificate. As outlined in the 20 Jun 2014 ENV letter to the RDKS, the objective of the EEM Program for the Thornhill Transfer Station is to determine the potential effects of the Landfill on the receiving environment. The scope of work for the EEM Programs is to include:

- **Surface Water Monitoring**: Collection and analysis of four surface water samples from upstream and downstream of the Landfill and from the leachate seepage (leachate collection system) and leachate weir, conducted three times per year, in the spring, summer and fall.
- **Groundwater Monitoring**: The Landfill permit calls for the preparation of a groundwater monitoring plan and in the interim, for groundwater monitoring at two locations. The 2019 groundwater monitoring program consisted of the collection and analysis of groundwater samples from one monitoring well, conducted three times per year in the spring, summer and fall.
- **Quality Assurance/Quality Control (QAQC) Program**: The operational certificate holder (RDKS) is required to conduct a QAQC program to determine the acceptability of the data required by the permit.
- **Reporting**: An annual report is to be submitted to BC ENV no later than 30 June of the following year.

1.2 Objective and Scope of Work

The objective of this project was to conduct a desktop analysis of available data to provide the information required by the Permit (APPENDIX A). This includes a summary and interpretation of environmental monitoring conducted at selected monitoring locations to assess potential impacts that the Landfill may be having on the surrounding environment.

The RDKS completed the surface water monitoring and groundwater sampling and quality assurance and control (QAQC) during the 2019 monitoring year. Chemical analysis of surface water and groundwater samples was conducted by ALS Environmental Ltd. The RDKS provided Golder with historic and 2019 data related to sampling and monitoring at the Site. The purpose of this report is to present the following key information to satisfy the requirements presented in the Permit:

- Summary of the regulatory framework and operational permit EEM requirements.
- Methods of field investigations (as provided by RDKS).
- Tabulated surface water and groundwater field parameters and chemistry results, and comparison of these to applicable standards and guidelines.
- Figures showing spatial distribution of key landfill parameters in surface water and groundwater, as well as time series plots for the key landfill parameters at selected monitoring locations.
- Discussion of chemistry and temporal evolution of water quality based on laboratory analyses and field parameters.
- Tabulated depth to groundwater.
- Discussion of the QAQC program.
- Conclusions and recommendations for the current EEM program.
- Appendices including laboratory certificate of analyses.

1.3 Previous Investigations

Previous studies and annual monitoring reporting have been carried out by Sperling Hansen Associates (SHA). Reporting since 2018 has been conducted by Golder. The most recent annual monitoring report was prepared for 2018 (Golder 2019).A hydrogeological and geotechnical investigation was carried out by SHA in 1997 prior to the expansion of the Landfill.

1.4 Site Description

The following summary of the Site's topographic, geologic, and hydrogeologic setting is based on a review of the following maps and Reports:

- GeoBC's web-based mapping tool iMapBC http://maps.gov.bc.ca/ess/sv/imapbc/
- The Surficial Geology Map of the Skeena River and Bulkley River Area (Clague 1983)
- Google Earth
- SHA 1997 and 2017

The Site is located approximately 10 km southeast of Terrace, British Columbia, on Old Lakelse Lake Road (Figure 1). The Thornhill Landfill was closed over the period of 2015 through 2017, and a Transfer Station was constructed. Final closure, including application of topsoil and revegetation of the landfill, is planned to occur in 2020. The Site accepts locally derived refuse, where it is stored until it is transferred to the Forceman Ridge Waste Management Facility, located approximately 30 km south of Terrace, British Columbia. A search of the BC water well atlas identified four domestic water wells located within 500 metres of the Landfill boundary. A list of water well records and locations are presented in APPENDIX B.

The site is located at the base of a local mountain with an approximate elevation of 900 to 1400 metres above sea level (masl). The area surrounding the Site is defined by a rolling topography. The Site slopes to the northwest, with an approximate ground surface elevation of 215 metres (705 feet) above sea level on the southeastern portion of the Site and 185 masl on the northwestern portion of the Site. Surface drainage generally follows the slope of the land and drains towards the northwest. The surrounding area also generally slopes to the northwest towards the Skeena River. The nearest major surface water body to the Site is Thornhill Creek, approximately 600 m northwest of the Site, which drains into the Skeena River, located approximately 5 km northwest of the Site.

The regional surficial geology in the study area is described as being located near a contact of a glacial outwash gravel deposit and a glaciomarine silt and clay sequence, underlain by glacial till (Clague 1983 and SHA 1997). Test pitting and drilling activities carried out by SHA in 1997 confirmed that the Site is underlain by a glaciomarine silt and clay unit that is up to 16m in thickness. The only portion of the Landfill that is not underlain by this unit is the southern tip of the Landfill encompassing an approximate area of 20 x 50 m (SHA 1997). This area is underlain by glacial outwash gravel. The clay unit underlying the Landfill was tested by SHA (1997) and yielded a reported average hydraulic conductivity $4.2x10^{-10}$ m/s based on grain size and proctor permeability laboratory testing of four silt and clay samples.

Based on available information obtained during drilling and initial sampling of the monitoring wells and nearby domestic wells (SHA 1997), two groundwater flow regimes were inferred to be present at the Site. A shallow groundwater flow system was described as being present in the silt and clay unit. Groundwater was reported to be flowing in a northwest direction and discharging into the Thornhill Creek surface water system. A deeper groundwater flow system was identified by SHA (1997) in the gravel deposit on the southern edge of the Site. Groundwater in this deeper system was inferred by SHA (1997) to flow from the southeast to the northwest until it encounters the interface between the silt and clay unit and the gravel unit. The flow reportedly develops a downward gradient along the contact and enters the glacial till layer that underlies the entire Site.

SHA (1997) inferred that silt and clay lenses extend into the gravel unit to the south along the entire length of the contact zone. Perched aquifers on these clay lenses were observed during drilling activities in 1997. Two monitoring wells that were installed by SHA (1997) are described as follows:

- BH96-3 – installed at the southern edge of the Landfill footprint where the upper silt and clay unit are in contact with the lower gravel unit. The well is screened in a clayey gravel zone.
- BH96-2 – installed in the silt and clay unit at the northern edge of the Site.

A third borehole (BH96-1) was drilled south of BH96-3 to determine the thickness of the gravel unit (greater than 62.8 m, the maximum drilling depth). Borehole logs for all three locations are provided in APPENDIX C.

2.0 GROUNDWATER AND SURFACE WATER MONITORING METHODOLOGY

2.1 Sampling Locations

Table 1 presents a list of historic and current sampling locations. Groundwater and surface water samples have been collected from 1996 to 2019. During the 2019 program, one groundwater monitoring well (BH96-2) and five surface water locations (SW-3, -1, -21, -17, and -6) were sampled. Historically, additional select surface water sampling locations have been sampled. Two nearby domestic water wells were sampled from 1996 to 2017: however, sampling of these domestic wells was discontinued following the 2017 sampling events due to access difficulties and because the water quality at these locations met applicable drinking water quality standards. Sampling locations are shown in Figure 2 and summarized below.

Table 1: Sampling Locations with Spatial and Hydrogeologic Information

Location	Sample Type	Easting *UTM*	Northing *UTM*	Elevation (approximate) *metres above sea level*	Available Sample Period	Inferred Groundwater Gradient
BH96-3 (Destroyed)	Monitoring Well	533314	6038203	202	1996 – 2015	Upgradient
BH96-2	**Monitoring Well**	**533226**	**6038410**	**175**	**1996 – 2019**	**Downgradient**
SW-3	**Surface Water**	**533198**	**6038389**	**-**	**1996 – 2019**	**Downgradient**
SW-1	**Surface Water**	**533702**	**6038575**	**-**	**1996 – 2019**	**Sidegradient**
SW-21	**Surface Water**	**533182**	**6038522**	**-**	**1996 – 2019**	**Downgradient**
SW-17	**Surface Water**	**533031**	**6038804**	**-**	**1996 – 2019**	**Downgradient**
SW-6	**Surface Water**	**532615**	**6039310**	**-**	**1996 – 2019**	**Downgradient**
SW-16	Surface Water	533122	6038801	-	2016 – 2017	Downgradient
SW-18	Surface Water	533006	6038901	-	2016 – 2017	Downgradient
SW-23	Surface Water	531755	6039631	-	2017	Downgradient
SW-22	Surface Water	533152	6038586	-	2016	Downgradient
Goodwin*	Domestic Water Well	-	-	-	1996 – 2017	Upgradient
Reinhart (Well Tag Number 38440)	Domestic Water Well	533636	6038033	-	1996 – 2017	Upgradient

Notes:

Bold indicates sampling locations that were sampled in 2019

Underlined indicates sampling locations that are required once per season (Spring (April), Summer (July and/or August), and Fall (October or November)) as per the Permit (APPENDIX A)

Locations and elevations are approximate

*Coordinates not available. Approximate Location 1.5 km southwest of Site

A description of each surface water sampling location is provided in Table 2 below.

Table 2: Description of Surface Water Sampling Locations

Location	Description
SW-3	**Historically sampled from Landfill leachate seep. Since 2017, seepage from the leachate seep is collected in a leachate pond. As part of the landfill closure in 2017, a leachate and stormwater retention pond was constructed, north of the landfill, to allow leachate to dilute before being discharged to the environment. SW-3 is a sample from this pond.**
SW-1	**Side gradient to the Landfill: Background location.**
SW-21	**Monitoring weir located 200 m downstream of the leachate and stormwater retention pond.**
SW-17	**Located on Thornhill Creek, 100 m downstream of the confluence of Thornhill Creek and leachate outfall (originating from SW-21).**
SW-6	**Located on Thornhill Creek by Ziegler Bridge.**
SW-16	Located on Thornhill Creek, downstream of the Thornhill Creek and leachate outfall (originating from SW-21) confluence and 100 m upstream of SW-17.
SW-18	Located 100 m downstream from SW-17.
SW-23	Located on Thornhill Creek near the Old Lakelse Rd and Miller Rd intersection.
SW-22	Located 60 m downstream of SW-21.

Notes:

Bold indicates sampling locations that were sampled in 2019

Underlined indicates sampling locations that are required once per season (Spring (April), Summer (July and/or August), and Fall (October or November)) as per the Permit (APPENDIX A)

Deviations from Landfill Permit requirements

The following observations were made that deviated from the Landfill Permit:

- The Landfill permit calls for the development of a groundwater monitoring plan, with interim monitoring at two monitoring wells. During the 2019 monitoring year, monitoring was only carried out at one monitoring well location.
- SW-17 was sampled in 2019 although not required in the Landfill Permit

2.2 Groundwater Sampling

The 2019 groundwater monitoring program consisted of groundwater sampling at monitoring well BH96-2 completed in the surficial silt and clay unit. BH96-3 was destroyed during the landfill capping activities in 2016 and was last sampled in 2015. This sampling location has not been replaced. The RDKS is awaiting an updated Operational Certificate from ENV. Golder understands that the RDKS does not anticipate that this well location will be required in an amended OC, given that the landfill has been closed and is planned to receive its final cover in 2020. Monitoring locations are shown in Figure 2.

Groundwater sampling was conducted seasonally (see Section 2.1) by RDKS field staff in April (Spring), July and/or August (Summer) and October or November (Fall) 2019, following established sampling procedures as laid out in the *British Columbia Field Sampling Manual for Continuous Monitoring and the Collection of Air, Air-Emission, Water, Wastewater, Soil, Sediment, and Biological Samples* (BC ENV 2013). Prior to sampling, field instruments were calibrated to manufacturer specifications in the field. Following this, the depth to groundwater in the monitoring well was measured using a water level probe and the monitoring well was purged. During purging, a YSI Professional Plus multi-meter was used to measure in-situ water quality parameters (temperature, electrical conductivity, redox potential, dissolved oxygen, and pH). The field parameter data alongside with analytical results are presented in APPENDIX D. Purging was continued until relatively stable field parameter measurements were obtained and three well volumes were removed, indicating representative formation water was present. Purge water was collected, transported and disposed of at a suitable location at the landfill.

The monitoring well was purged and sampled using dedicated Waterra™ tubing and footvalve with 0.016 m (5/8-inch diameter) polyethylene tubing. Groundwater samples were collected in clean, laboratory-supplied sample bottles. Water samples for dissolved metals were field-filtered using a 0.45 µm in-line filter. As necessary, samples were preserved in the field using chemicals supplied by the laboratory. Standard sampling protocols, as laid out by the *British Columbia Field Sampling Manual* (BC ENV 2013) were followed during groundwater sampling to minimize the possibility of cross-contamination of the monitoring wells and the samples. The groundwater samples were submitted to ALS Environmental Ltd for analysis of the following chemical parameters, as outlined in Table 3, in accordance with requirements of the Permit. Analytical results and laboratory certificates of analysis for 2019 are presented in APPENDIX D and APPENDIX E respectively.

Table 3: Analytical Parameters Selected for BH96-2 in 2019

Parameter	Season		
	Spring	Summer	Fall
Dissolved metals including mercury	✓	✓	✓
Dissolved Hardness	✓	✓	✓
Total metals including mercury	✓	✓	✓
Alkalinity	✓	✓	✓
Chloride (Cl)	✓	✓	✓
Fluoride (F)	✓	✓	✓
Sulphate (SO_4)	✓	✓	✓
pH	✓	✓	✓
Conductivity	✓	✓	✓
Total Dissolved Solids (TDS)	×	✓	✓
Chemical Oxygen Demand (COD)	×	✓	✓
Ammonia (NH_3), Nitrate (NO_3), Nitrite (NO_2), Total Kjeldahl Nitrogen (TKN)	✓	✓	✓
Total Phosphorous	✓	✓	✓

Notes:
Underlined parameters indicate parameters required, in accordance with landfill Permit
× indicates parameter was not analysed in the laboratory
✓ indicates parameter was analysed

Deviations from Landfill Permit requirements

The following samples deviated form the required sampling protocol as follows:

- Spring (April): The sample for BH96-2 was not submitted for Total Dissolved Solids, and Chemical Oxygen Demand.

The omissions of Total Dissolved Solids and Chemical Oxygen Demand for the Spring monitoring round are assumed to have been caused by an oversight during sampling and the subsequent submission of samples to the laboratory.

The Landfill Permit requires that a groundwater monitoring program be developed and that in the interim, groundwater monitoring should be undertaken at downgradient monitoring well BH96-2 and upgradient monitoring well BH96-3. Monitoring well BH96-3 was destroyed during the Landfill capping activities in 2016 and was last sampled in 2015. This sampling location has not been replaced.

2.3 Surface Water Sampling

The surface water monitoring program consisted of water sampling at locations to the northeast and north of the Landfill, as shown in Figure 2. Surface water samples were collected in April (Spring), July (Summer) and October (Fall) 2019, alongside the groundwater samples, by RDKS field staff following established sampling procedures as laid out in the *British Columbia Field Sampling Manual for Continuous Monitoring and the Collection of Air, Air-Emission, Water, Wastewater, Soil, Sediment, and Biological Samples* (BC ENV 2013).

Prior to any sampling activities, field instruments were calibrated to manufacturer specifications in the field. During sampling, a YSI Professional Plus multi-meter was used to collect measurements of in-situ water quality parameters (temperature, electrical conductivity, redox potential, dissolved oxygen, and pH). Field turbidity measurements were obtained using a calibrated LaMotte 2020we field turbidity meter. The field parameter data alongside with analytical results are presented in APPENDIX D.

Surface water samples were collected in clean, laboratory-supplied sample bottles. Water samples were collected by submerging bottles in water and directly filling them. Where submersion of bottles was not appropriate because of the need to add preservatives or filter samples, a sealed and disposable syringe was utilized. Water samples for dissolved metals were field-filtered using a 0.45 µm syringe plate filter. As necessary, samples were preserved in the field using chemicals supplied by the laboratory. Standard sampling protocols, as laid out by the *British Columbia Field Sampling Manual* (BC ENV 2013) were followed during surface water sampling to minimize the possibility of cross-contaminating the samples.

The surface water samples were submitted to ALS Environmental Ltd for analysis of the following physical parameters, as outlined in Table 4, in accordance with requirements of the Permit:

Table 4: Analytical Parameters selected for Surface Water Samples in 2019

Parameter	Season		
	Spring	Summer	Fall
Dissolved metals including mercury	✓	✓	✓
Dissolved Hardness	✓	✓	✓
Total metals including mercury	✓	✓	✓
Total Hardness	✓	✓	✓
Alkalinity	✓	✓	✓
Chloride (Cl)	✓	✓	✓
Fluoride (F)	✓	✓	✓
Sulphate (SO_4)	✓	✓	✓
pH	✓	✓	✓
Conductivity	✓	✓	✓
Total Suspended Solids (TSS)	×	✓	✓
Biological Oxygen Demand (BOD)	×	✓	✓
Chemical Oxygen Demand (COD)	×	✓	✓
Ammonia (NH_3), Nitrate (NO_3), Nitrite (NO_2), Total Kjeldahl Nitrogen (TKN)	✓	✓	✓
Total Phosphorous	✓	✓	✓
Ortho Phosphorous	✓	✓	✓

Notes:
Underlined parameters indicate parameters required, in accordance with landfill Permit
× indicates parameter was not analysed
✓ indicates parameter was analysed

Deviations from Landfill Permit requirements

The following samples deviated form the required sampling protocol as follows:

- Spring (April): Surface water samples were not submitted for Total Suspended Solids, Biological Oxygen Demand, and Chemical Oxygen Demand. This omission is assumed to have been caused by an oversight during sampling and the subsequent submission of samples to the laboratory.

2.4 Quality Assurance and Control

To assess and document that the sampling and analytical data are interpretable, meaningful, and reproducible, conformance to the quality assurance / quality control (QA/QC) program laid out in the Landfill Permit was followed. Standard industry field procedures were used in both the collection (field program) and analysis (laboratory) of the water samples. The following includes a brief summary of the QA/QC measures implemented by the RDKS field staff during the field program and by Golder during review of the data, as well as QA/QC measures implemented by the laboratory.

Quality Control (QC) measures used in the collection, preservation and shipment of samples included the following:

- Sampling methods were consistent with established field protocols and provincial/federal requirements (BC ENV 2013).
- Field notes were recorded during all stages of the investigation and are available upon request.
- Sample locations were recorded and marked in the field.
- Samples were stored in coolers and chilled with ice packs during transport to the analytical laboratory.
- Samples were transported to the laboratory using laboratory Chain-of-Custody procedures.
- Nitrile gloves were worn when handling sampling equipment and samples and were changed between samples.
- Dedicated Waterra™ tubing and footvalve were used to purge and sample monitoring wells.
- Dedicated syringes and plate filters were used during surface water sample collection.
- Dedicated filters were used to filter sample water for analysis of dissolved metals.

The Quality Assurance (QA) measures established for the field program in accordance with the Landfill Permit included:

- Submission of a field blank sample per sampling event. A field blank sample is a sample of laboratory grade distilled and deionized water that is used assess potential sources of contamination that may have been introduced to the sample media during sampling (i.e. dusty conditions, sampling error). The field blank consists of the same bottle set and analysis as a regular sample. The blank is filled in the field near the sampling location using laboratory grade deionized and distilled water. The blank is submitted for the same analytical parameters as all other samples.
- Submission of field duplicate samples for approximately 10% of the total sampling locations per sampling event. A field duplicate sample is a second sample of a certain media (e.g., soil, water) from the same location that is submitted to the analytical lab under a separate label such that the laboratory has no prior knowledge of the corresponding sample.

- The relative percent difference (RPD) between field duplicate sample results was used to assess duplicate sample data. The RPD is a measure of the variability between two outcomes from the same procedure or process and is calculated by:

$$RPD\ (\%) = \left|\left(\frac{(x1 - x2)}{average\ (x1, x2)}\right)\right| x100$$

  where *x*1 is the original sample result and *x*2 is the blind field duplicate result: and

- When the concentration in a sample was less than five times the laboratory reporting limit (LRL), the difference factor (DF) was used to assess duplicate sample data. The DF is also a measure of the variability between two outcomes from the same procedure or process and is calculated by:

$$DF\ (-) = \left|\left(\frac{(x1 - x2)}{LRL}\right)\right|$$

  where *x*1 is the original sample result, *x*2 is the blind field duplicate result and LRL is the laboratory reporting limit.

In 2009, the BC Ministry of Environment updated the British Columbia Laboratory Manual which contains recommended Data Quality Objectives (DQOs) for laboratories duplicate RPDs (MoE 2009). It is recognized that these DQOs are intended for laboratory duplicates and do not include provisions for additional variability in field duplicates: however, these DQOs are considered a conservative screen for assessing the quality of field duplicates. The DQOs applied to this investigation are as follows:

- Water: An RPD of less than 20% was applied for inorganics and 30% for organics.
- For parameters with concentrations less than five times the LRL, the difference factor should be less than two.

In general, an RPD greater than these targets may reflect natural sample variability (which reflects the nature of the water chemistry distribution, or variation in the test procedures). In cases where the DQO is greater than the objective, further examination is conducted on a case-by-case basis.

The following criteria were considered acceptable for laboratory QA/QC samples:

- Analytical blanks should be below the detection limits used for the specific analysis.
- Laboratory duplicates should fall within the DQOs set by the laboratory.
- Analytical results for the reference materials or spiked standards should be within the targets specified by the laboratory.

ALS performed the chemical analysis of the groundwater samples for this investigation. ALS has achieved proficiency certification by the Canadian Association for Laboratory Accreditation Inc. (CALA) for the analyses performed. The analytical laboratory also incorporated and reported the results of their internal laboratory checks to the RDKS. These were used to assess the reliability, accuracy and reproducibility of the data. If laboratory QA/QC problems are encountered, the field samples and laboratory QA/QC samples are re-analyzed. Copies of the original laboratory certificates of analysis are provided in APPENDIX E.

The results of the QA/QC analysis are presented in Section 3.4.

Deviations from Landfill Permit requirements

The 2019 QAQC program at the Site generally followed the requirements described in the Landfill Permit; however, the following deviations occurred with respect to duplicate and blank samples:

- Two field blanks, filled with deionized water using field equipment prior to sampling, were submitted in October and November with a reduced number of parameters.

2.5 Regulatory Framework

In British Columbia, environmental matters pertaining to contaminated sites generally fall under the jurisdiction of the Ministry of Environment & Climate Change Strategy (ENV), pursuant to the Environmental Management Act (EMA, SBC 2003, Chapter 53 assented to 23 October 2003, updated to 10 April 2019). The key regulation under the EMA that relates to the assessment and remediation of contaminated sites is the Contaminated Sites Regulation (CSR: BC Reg. 375/96, O.C. 1480/96 and M271/2004, as updated [includes amendments up to BC Reg. 13/2019, 24 January 2019]).

Drinking Water (Current and Future)

ENV Protocol 21 states "*Future drinking water use applies to all drinking water aquifers below a site whether or not current drinking water use applies*." Based on the available hydrogeological information from previous investigations at the Sites, some of saturated geological materials underneath the Landfill would be considered an aquifer as defined in Protocol 21, and there are four registered water wells located within 500 m of the Landfill. Therefore, future drinking water use (DW) is considered applicable and the CSR drinking water (DW) standards are considered applicable to the Site.

Aquatic Life

The CSR groundwater standards for protection of freshwater aquatic life (AW-F) are considered applicable to the Site based on its proximity to several nearby creeks.

Irrigation and Livestock Watering

The Site is not used for agricultural purposes and is not located with the agricultural land reserve (ALR). Of the four registered water wells located within 500 m of the Landfill (APPENDIX C), two are used for domestic purposes (WTN 51068 and 54323) and the use of the remaining two is unknown. Furthermore, the properties surrounding the Landfill are not used for farming purposes. Based on the available information, CSR irrigation water use (IW) and livestock watering (LW) water use is not considered applicable at the Site.

Other Provincial Groundwater Standards Considerations

The CSR iron and manganese DW standards only apply at sites where specified CSR Schedule 2 activities were or are present (as defined in the footnotes of CSR water standards). Based on the former and current land uses of the Site, the CSR DW standards for iron and manganese do not apply to the Site.

Based on Technical Guidance 15 on Contaminated Sites, the quality of groundwater in monitoring well BH96-2 is not required to adhere to the BC Water Quality Guidelines (BC WQG) as this well is located more than 10 m from aquatic receiving environments.

All surface water samples were compared to BC WQG for the protection of aquatic life in freshwater (AW-F). In 2019, ENV has updated the copper guideline calculation in the BC WQG. The new calculation requires dissolved organic carbon (DOC) analysis alongside other parameters. Because DOC was not required as part of the landfill permit, the copper guideline was calculated using the method provided by ENV prior to the change.

3.0 GROUNDWATER AND SURFACE WATER RESULTS

Analytical results are presented in APPENDIX D, Table D-1 through D-13. Laboratory certificates of analysis for 2019 sampling events are presented in APPENDIX E. Historic analytical results for sampling locations no longer being sampled, as indicated in Section 2.1 (Table 1), are presented in APPENDIX F, Table F-1 through F-14.

3.1 Groundwater Flow

Groundwater elevations were measured from the top of casing of BH96-2 and are provided alongside historic groundwater elevations following the installation of the monitoring wells (Table 5). Given that recent water-level measurements are only available for one groundwater monitoring well, the hydraulic gradient and groundwater flow direction can not be discerned. It may be inferred, based on historical groundwater flow data (SHA 1997) and topography, that groundwater flows to the north.

Table 5: Groundwater Elevations

Monitoring Well	Top of Casing Elevation *mASL*	Depth to Water *mASL (mTOC)*									
		Jun 1996 [1]	Oct 1996 [1]	Jun 1997 [1]	Mar 2018	Jul 2018	Sep 2018	Apr 2019	Jul 2019	Aug 2019	Nov 2019
BH96-2	175	165 (10)	166.3 (8.7)	165.5 (9.5)	-	165.63 (9.37)	165.49 (9.51)	165.42 (9.58)	165.88 (9.12)	165.84 (9.16)	165.83 (9.17)
BH96-3 (Destroyed)	202	189.1 (12.9)	190.4 (11.6)	190.2 (11.8)	-	-	-	-	-	-	-

Notes:

[1] Indicates groundwater elevation data obtained from SHA (1997), and is provided for reference purposes

mASL = metres above sea level

mTOC = metres below top of casing

Water level elevations measured at BH96-2 in 2019 are similar to previous measurements reported by SHA (1997).

3.2 Groundwater Quality

Based on groundwater flow directions inferred from the SHA (1997) report, there are no monitoring wells within the current groundwater monitoring network that represent upgradient or side gradient groundwater conditions. The only monitoring well considered upgradient is BH96-3, which was destroyed during the Landfill capping activities.

Analytical results for the downgradient monitoring well BH96-2 were compared to the applicable BC CSR standards. Concentrations of all parameters for BH96-2 were less than the applicable CSR standards.

3.3 Surface Water Quality

Based on the conceptual model of the surface water flow regime presented in Section 1.4 of this report, there are no surface water monitoring locations within the current monitoring network that represent upstream conditions. Surface water location SW-1 is located hydraulically side gradient to the Landfill and is considered representative of background surface water conditions.

The analytical results for the surface water samples are tabulated and compared against the BC WQG for Freshwater Aquatic Life and Drinking Water. A summary of parameters that were greater than the BC WQG are shown in Table 6.

Table 6: Surface Water Exceedances of BC WQG

Parameter/Guideline			NH_3	Nitrite (as N)	Total					Dissolved			
					Al	As	Fe	Mn	P	Al	Fe	Mn	P
AW-F (Long-term avg.)			0.53 - 1.86	0.1 – 0.2	0.05	-	-	0.70 - 4.13	-	0.05	-	0.70 - 4.13	-
AW -F (Short-term max.)			3.61 - 23.9	0.3 – 0.6	0.1	0.005	1	0.77 – 9.37	-	0.1	0.35	0.77 – 9.37	-
DW			-	1	9.5	0.01	0.3	0.05	0.01	9.5	0.3	0.05	0.01
SW-1	Side gradient	Apr 2019	-	-	-	-	-	-	-	-	-	-	-
SW-3	Downgradient	Apr 2019	58.6	<0.010	0.0560	0.0107	51.5	3.24	0.406	0.0063	36.2	2.93	<0.050
SW-21	Downgradient	Apr 2019	14.7	0.0814	0.118	0.00058	0.134	0.345	*<0.050*	0.0076	0.024	0.405	*<0.050*
SW-17	Downgradient	Apr 2019	0.0099	0.0019	0.126	0.00012	0.150	0.0134	*<0.050*	0.0417	0.067	0.00929	*<0.050*
SW-6	Downgradient	Apr 2019	0.0058	0.004	0.306	0.00017	0.220	0.0166	<0.050	0.0364	0.061	0.0123	<0.050
SW-1	Side gradient	July 2019	<0.0050		0.0542	<0.00010	0.06	0.00951	*<0.050*	0.0265	0.028	0.00761	*<0.050*
SW-3	Downgradient	July 2019	58.9	0.0048	0.533	0.0153	34.4	2.26	0.354	0.0187	36.6	2.19	0.181
SW-21	Downgradient	July 2019	3.95	0.227	0.481	0.00166	1.07	0.310	0.062	0.0203	0.105	0.188	<0.050
SW-17	Downgradient	July 2019	-	-	-	-	-	-	-	-	-	-	-
SW6	Downgradient	July 2019	0.0248	0.0018	1.46	0.00078	1.93	0.114	<0.050	0.0658	0.234	0.0697	<0.050
SW-1	Side gradient	Oct 2019	<0.0050		0.0397	<0.00010	0.030	0.00435	*<0.050*	0.0334	0.024	0.00478	*<0.050*
SW-3	Downgradient	Oct 2019	67.6	<0.010	0.0981	0.0232	47.5	2.70	0.461	0.0201	54.6	2.77	0.236
SW-21	Downgradient	Oct 2019	5.60	0.0256	0.186	0.00072	0.284	0.355	*<0.050*	0.0169	0.048	0.337	<0.050
SW-17	Downgradient	Oct 2019	-	-	-	-	-	-	-	-	-	-	-
SW-6	Downgradient	Oct 2019	<0.0050	<0.0010	0.0677	0.00014	0.103	0.0128	<0.050	0.0328	0.080	0.0123	<0.050

Notes:

All concentrations are given in mg/L

BC WQG = BC Water Quality Guidelines

AW – F = Aquatic Life – Freshwater

DW = Drinking Water

- = parameter without guideline

NA = Parameter not analyzed, NH_3 = Ammonia, Al = Aluminum, As = Arsenic, Fe = Iron, Mn = Manganese, P = Phosphorous

Underlined indicates parameter exceeds BC WQG Long Term

Grey highlight indicates parameter exceeds BC WQG Maximum

Red font indicates parameter exceeds BC WQG DW

Italics indicates a detection limit greater than the guideline

Concentrations were greater than the BC WQG for the following parameters (Table 6):

- Ammonia (SW-3 and SW-21) and nitrite (SW-21).
- Total aluminum (SW-3, SW-21 and SW-6), arsenic (SW-3), iron (SW-3, SW-6 and SW-21), manganese (SW-3 and SW-21) and phosphorous (SW-3 and SW-21).
- Dissolved aluminum (SW-6), iron (SW-3 and SW-21), manganese (SW-1, SW-3 and SW-21) and phosphorous (SW-3).

3.4 Results of Quality Assurance/Quality Control Analysis

Field duplicates, which consist of two samples collected from the same sampling location, were collected for surface samples in April, July and September 2019 to assess variability introduced through sampling and handling procedures. The surface water duplicate samples were collected at surface water station SW-21 (April, July and September 2019). The groundwater duplicate samples were collected at BH96-2 in July, August, October and November 2019. Data for the duplicate analyses are presented in APPENDIX D, Table D-13.

The relative percent difference (RPD) and the difference factor (DF) were calculated in APPENDIX D, Table D-13 for all duplicate sample sets. As stated in Section 2.4, the DQOs applied are: an RPD of less than 20% for inorganics and less than 30% for organics and, for parameters with concentrations less than five times the LRL, a DF less than two.

The surface water duplicate sample at SW-21 indicated the following parameter above the acceptable DQOs:

- Total Kjeldahl Nitrogen
- Phosphorus
- Total Aluminum (exceeds BC WQG)
- Total Iron (exceeds BC WQG)
- Total Manganese (exceeds BC WQG)
- Total Zirconium

The groundwater duplicate sample at BH96-2 indicated the following Parameters above the acceptable DQOs:

- Total dissolved solids
- Ammonia
- Nitrate
- Nitrite
- Phosphorus
- Sulphate

- Total metals including
  - Aluminum, Antimony, Arsenic, Barium, Cadmium, Cesium, Chromium, Cobalt, Copper, Iron, Lead, Lithium, Magnesium, Manganese, Mercury, Nickel, Rubidium, Silicon, Silver, Thallium, Tin, Titanium, Vanadium, Zinc, and Zirconium
- Dissolved metals including
  - Aluminum, Arsenic, Cadmium, Iron, Manganese, Nickel

These results are likely indicative of sample heterogeneity and total suspended solids in each sample pair. With the exception of some of the results for the duplicate pairs from SW-21 for total aluminum, total iron and total manganese, the remaining results were all below applicable standards. Furthermore, for those duplicate pairs from SW-21 which exceeded applicable standards, the corresponding results of each duplicate pair were both above the applicable standards such that the variability did not affect the outcome of the monitoring program. In addition to the field duplicate samples, two trip blank and four field blank samples were submitted in 2019. None of the parameters exceeded the LDL in the blank samples with the exception of one parameter (total phosphorus) which only slightly exceeded the LDL in one field blank sample (November 2019). Therefore, these QAQC results are conservative, and are considered satisfactory for the purpose of this report

In addition to the field QA/QC samples, internal quality control data provided by ALS was reviewed as a quality assurance of the analytical testing procedures. The laboratory quality control tests consisted of method blanks, replicate samples, and analytical spikes for water analysis, and are provided in the Certificate of Analyses included in APPENDIX E.

All laboratory RPDs were within the acceptable range indicating good reproducibility. The percent recovery for the matrix spike and spiked blank were all within the laboratory's internal QC limits. Similarly, no detections were noted for method blanks, laboratory control samples or standard samples.

The results of the laboratory quality control checks met the laboratory's internal criteria for acceptable results. From the QA/QC information provided, the precision and accuracy of the laboratory data is acceptable.

Based on the above QA/QC findings, the results of this monitoring program are considered reliable for the purposes of this report.

4.0 DISCUSSION

The data was examined graphically to evaluate spatial and temporal water quality variations and are shown on Figures 3 through 5. The data set considered covers 1996 through 2019.

4.1 Leachate Indicator Parameters

Typical parameters generally indicative of landfill leachate are listed below (Tchobanoglous, Theisen, and Vigil 1993):

- Biochemical oxygen demand (BOD)
- Total organic carbon (TOC)
- Chemical oxygen demand (COD)
- Total suspended solids (TSS)
- Ammonia nitrogen
- Nitrate
- Phosphorus (total)
- Alkalinity as $CaCO_3$
- pH
- Total hardness as $CaCO_3$
- Calcium
- Magnesium
- Potassium
- Sodium
- Chloride
- Sulphate
- Total iron

A subset of these parameters was chosen to evaluate the potential environmental impact of the Landfill, based on previous work by SHA (2017) and current analysis of the available data. These parameters are listed below:

- Electrical Conductivity (Figure 3-A)
- Ammonia (Figure 3-B)
- Total and Dissolved Aluminum (Figure 3-C)

- Total and Dissolved Iron (Figure 3-D)
- Total and Dissolved Manganese (Figure 3-E)
- Chemical Oxygen Demand (Figure 3-F)
- Chloride (Figure 3-G)
- Sulphate (Figure 3-H)

Concentrations for the above-mentioned parameters were plotted for SW-3, SW-21 and SW-6 in relation to their distance from the Landfill. Background data for each parameter from SW-1 is also provided. Based on these figures, it appears that leachate generated from the Landfill is attenuated beyond SW-21. A strong decrease in concentrations for all parameters is apparent between SW-3 and SW-21. Parameters at SW-6 are generally similar to or slightly above background concentrations (note that the concentrations are mostly shown on log plots for ease of comparison). However, total iron concentrations at SW-6 were higher than at SW-21 in 2019 which suggests that factors other than Landfill leachate may be affecting total aluminum and iron concentrations downgradient of the landfill.

Time series plots for the following parameters were generated to compare groundwater conditions at BH98-2 to leachate affected surface water at SW-3:

- Conductivity (Figure 4-A)
- Ammonia (Figure 4-B)
- Chloride (Figure 4-C)
- Sulphate (Figure 4-D)
- Total Iron (SW-3 only: Figure 4-E)
- Dissolved Iron (BH96-2 only: Figure 4-F)

In general, the figures indicate that parameter values are relatively constant over the monitoring years. Variations are apparent throughout the years, indicative of different sampling conditions (i.e. different levels of precipitation, sample handling and sampling procedures). A trendline for each parameter indicates that most parameters have a relatively stable or constant trend. However, sulphate (Figure 4-D) and total iron (Figure 4-E) for SW-3 show a slightly increasing trend whereas these parameters show a slightly decreasing trend in BH96-2 (Figure 4-F). Chloride, which is typically a good indicator of Landfill influence given that it is conservative in nature and not subject to attenuation along the groundwater flow path, is increasing in groundwater at BH96-2 but appears to be trending slightly downward for SW-3 (Figure 4-C).

Total iron, chloride and sulphate were plotted against time for the furthest downgradient sampling location SW-6 (Figure 5). Chloride and sulphate show relatively constant to slightly decreasing trends over time. Only total iron shows a minor increasing trend over time.

4.2 Evaluation of Groundwater and Surface Water Quality

As described above, the overall spatial and temporal analysis suggests that landfill leachate is attenuated and does not appear to be significantly impacting surface water quality beyond a distance of approximately 200 m from the Landfill. Concentrations at the downgradient location SW-6 (750 m from the Landfill) appear to be close to background conditions suggesting that Landfill leachate is substantially attenuated before reaching the Thornhill Creek water system. Although surface water from SW-6 exceeded BC WQG for total and dissolved aluminum and total iron for some sampling rounds in 2019, these results are considered to be partly caused by other unknown conditions not directly related to Landfill leachate effects. This is because:

- Lower concentrations in total iron and total and dissolved aluminum were observed in surface water closer to the Landfill (at SW-21) for most sampling rounds in 2019 relative to SW-6; and
- In the case of total aluminum, background concentrations (at SW-1) have also sometimes exceeded BC WQG (July 2019).

Groundwater from the one downgradient monitoring well at the Site appears to show little impact from leachate generated by the Landfill. All parameters were below the applicable regulatory standards.

Chloride, which is a typical indicator of landfill leachate, is rising in groundwater from this well over time, but is present at low concentrations (on the order of 7 mg/l or less) that are well below regulatory criteria. None of the other parameters that were assessed for trends at this well location indicate an increasing trend over time.

The landfill was constructed over the contact of a glacial outwash gravel deposit with a glaciomarine silt and clay unit. Both units are underlain by a glacial till layer. The quality of groundwater travelling through the gravel aquifer and the underlying glacial till aquifer could not be assessed because monitoring wells completed in these units no longer exist.

5.0 CONCLUSIONS AND RECOMMENDATIONS

The 2019 monitoring program indicates that leachate emanating from the Landfill appears to be attenuated before it reaches the Thornhill Creek water system. Groundwater quality data is only available for one monitoring well located downgradient of the Landfill. The well is screened in the surficial silt and clay unit, which underlies the majority of the Landfill, and shows little impact of Landfill leachate. Groundwater quality associated with the gravel unit that underlies the south corner (and upgradient side) of the Landfill could not be assessed due to the lack of monitoring wells in this area. Similarly, the water quality in the glacial till unit which underlies both the gravel unit and the silt and clay unit was also not evaluated due to the lack of available monitoring wells in this unit.

All analytical results obtained in 2019 follow historic trends and confirm previous findings by SHA (2017).

Golder presents the following recommendation for future work at the Thornhill Transfer Station:

- Based on the current Landfill permit the Permittee is required to engage a qualified professional, experienced in hydrogeology, to design a groundwater monitoring program, and that two monitoring well locations should be sampled in the interim. Under the current permit, it is recommended that this groundwater monitoring program be developed to include the installation of one to three additional monitoring wells to adequately establish groundwater quality and flow direction in all three stratigraphic units (silt and clay, gravel and glacial till units).
- Should the installation of new monitoring wells be required under the current or an amended Operational Certificate, Golder recommends that a qualified surveying company be hired to obtain ground and top of casing elevations of all monitoring wells to allow accurate assessment of groundwater level elevations and groundwater flow.

6.0 CLOSING COMMENTS

We trust that this report provides the information required at this time. If you have any questions, please feel free to contact the undersigned.

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AK/CR/lih/lmk

https://golderassociates.sharepoint.com/sites/121638/project files/6 deliverables/issued to client_for wp/20137619-004-r-rev0/20137619-004-r-rev0-2019 annual rpt-23jun_20.docx

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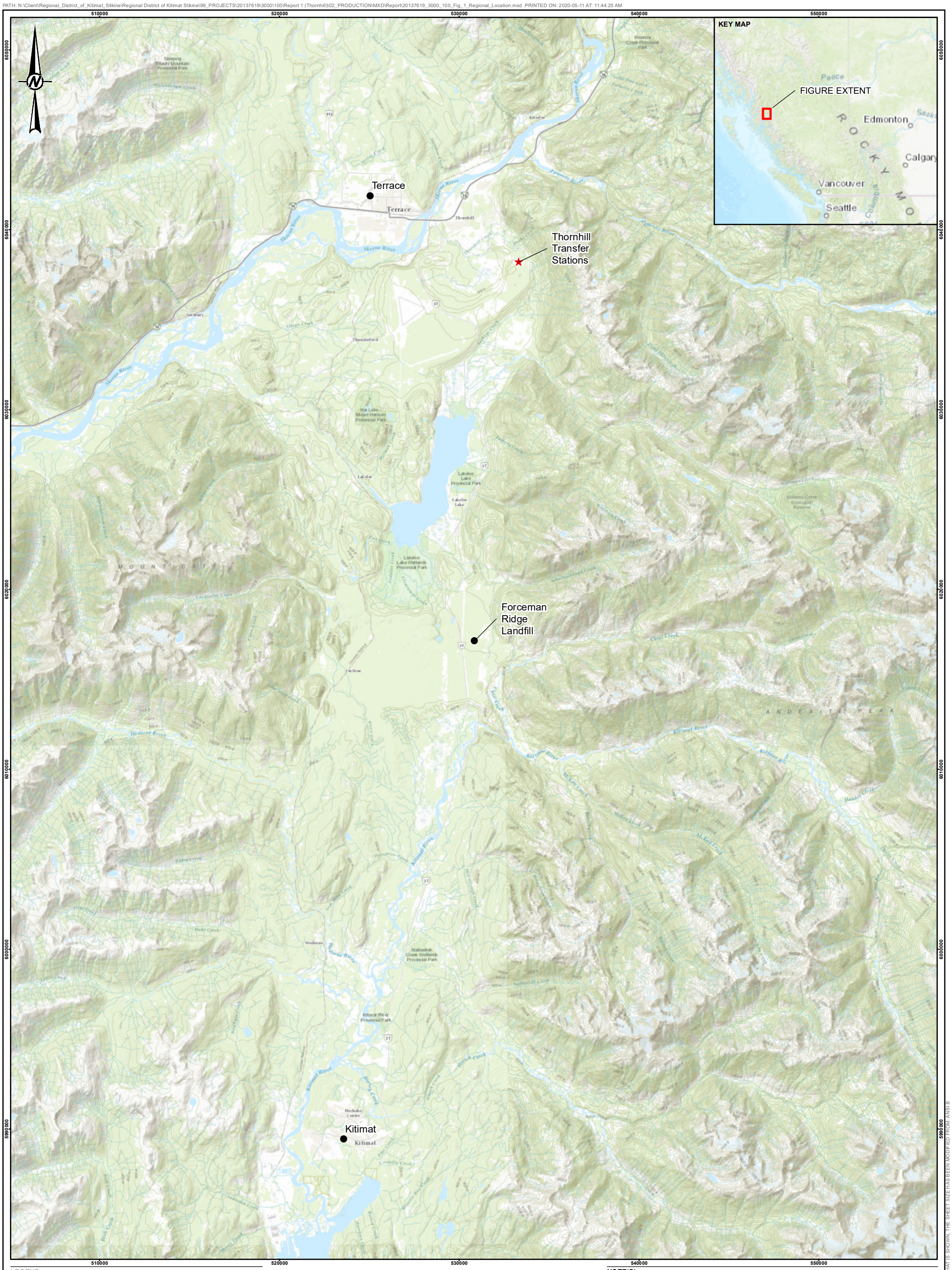

LEGEND

- ★ SITE LOCATION
- ● POINT OF INTEREST

NOTE(S)

REFERENCE(S)
1. BASE MAP: ESRIS (2019)

0 4 8
1:200,000 KM

CLIENT
REGIONAL DISTRICT OF KITIMAT-STIKINE

PROJECT
2019 THORNHILL TRANSFER STATION ANNUAL MONITORING REPORT

CONSULTANT
GOLDER

YYYY-MM-DD	2020-05-11
DESIGNED	AK
PREPARED	CB
REVIEWED	AK
APPROVED	CR

TITLE
REGIONAL LOCATION MAP

PROJECT NO.	CONTROL	REV.	FIGURE
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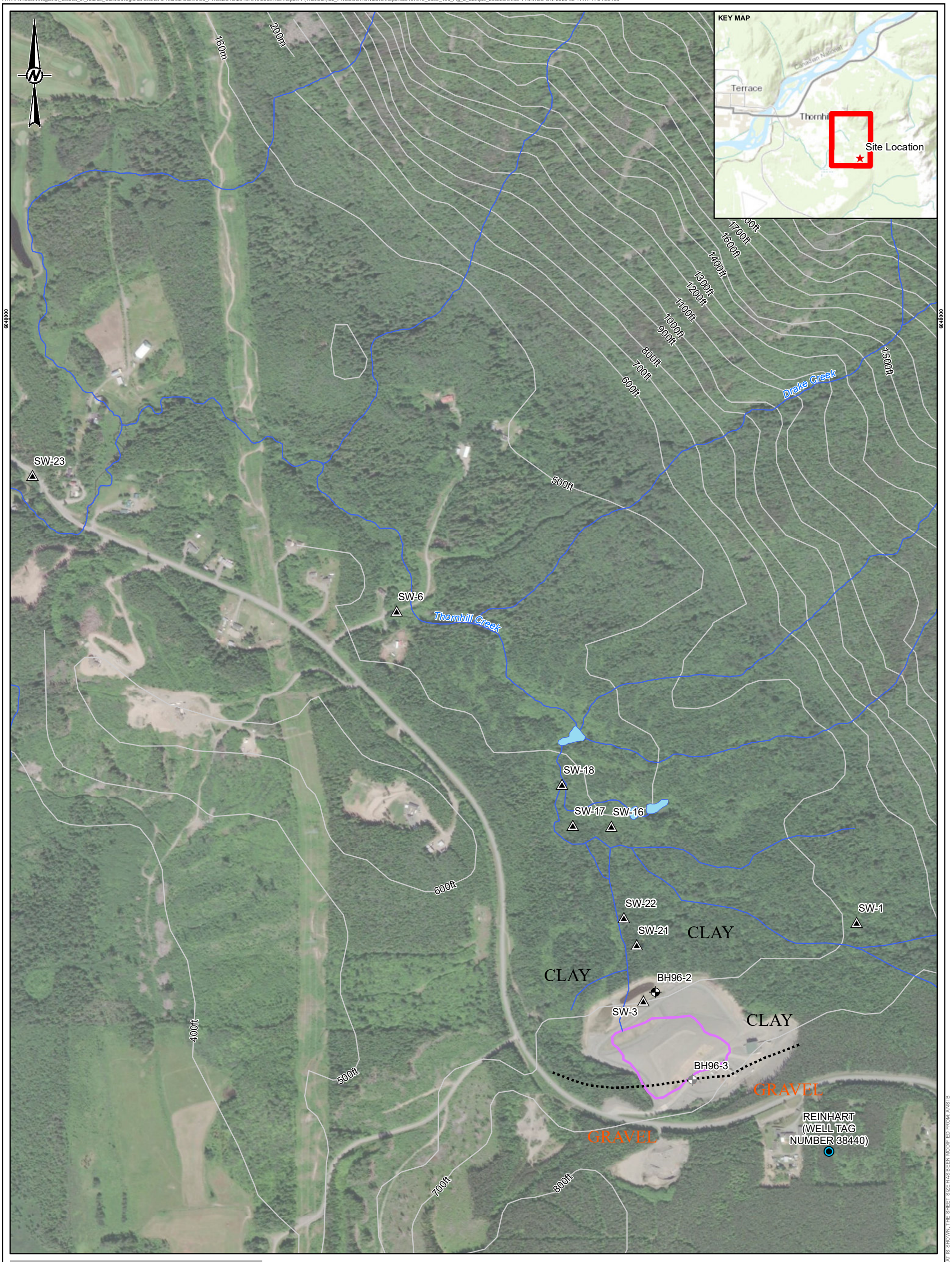


LEGEND

- WATERCOURSE
- CONTOUR
- WATERBODY
- LANDFILL FOOTPRINT
- DEFINES CHANGE IN SURFACE GEOLOGY

SAMPLE LOCATIONS

- MONITORING WELL
- MONITORING WELL (DESTROYED)
- SURFACE WATER
- DOMESTIC WATER WELL

0 170 340
1:8,500 METRES

REFERENCE(S)
1. BASE MAP: ESRIS (2019)
2. BASE DATA: CANVEC, GOVERNMENT OF CANADA (2019)

CLIENT
REGIONAL DISTRICT OF KITIMAT-STIKINE

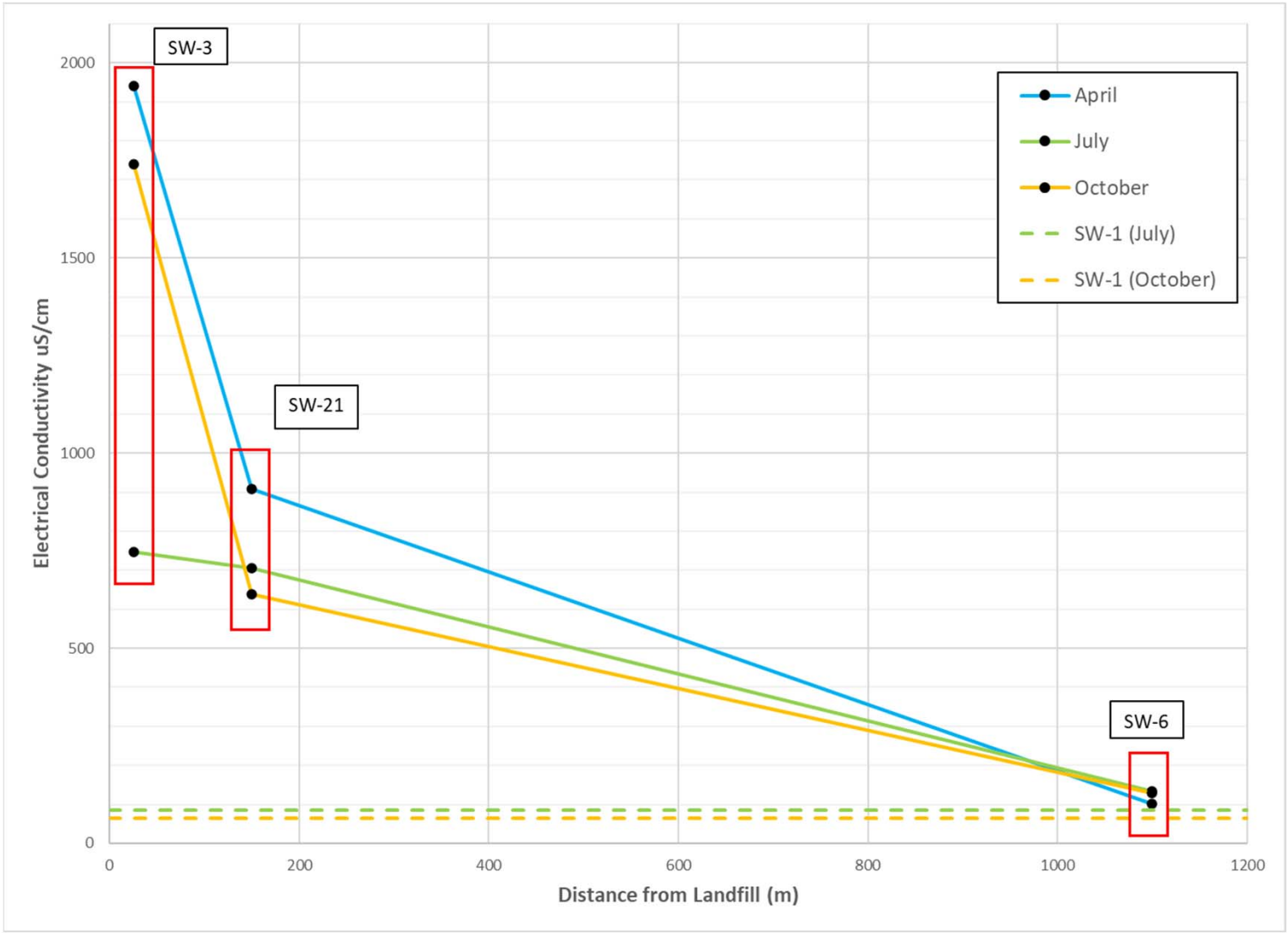
PROJECT
2019 THORNHILL TRANSFER STATION ANNUAL MONITORING REPORT

CONSULTANT
GOLDER

YYYY-MM-DD	2020-05-11
DESIGNED	AK
PREPARED	CB/CN
REVIEWED	AK
APPROVED	CR

TITLE
SAMPLING LOCATIONS

PROJECT NO.	CONTROL	REV.	FIGURE
20137619	3000/100	0	2



CLIENT
REGIONAL DISTRICT OF KITIMAT-STIKINE

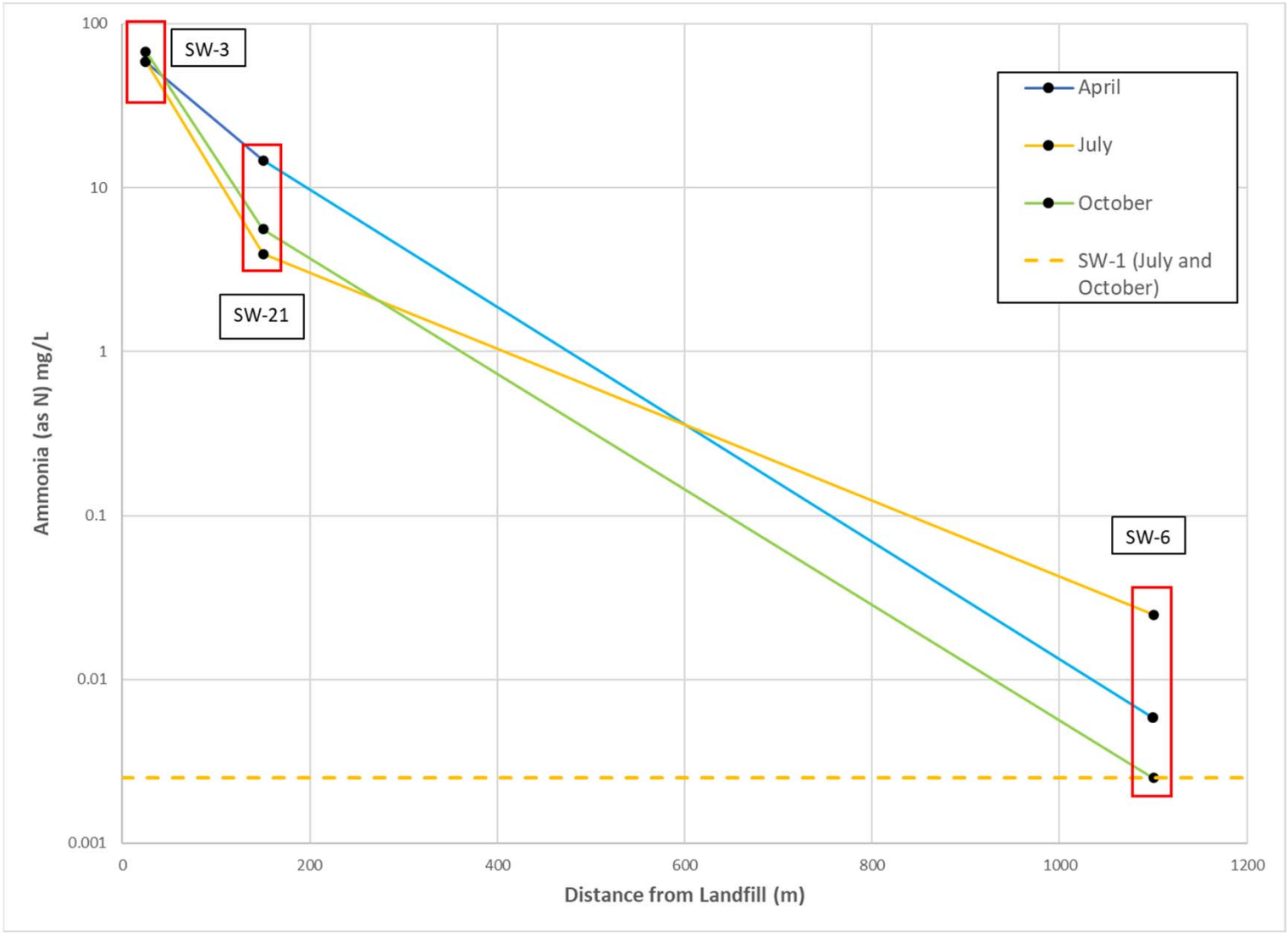
PROJECT
2019 THORNHILL TRANSFER STATION ANNUAL MONITORING REPORT

CONSULTANT
GOLDER

YYYY-MM-DD	2019-06-24
PREPARED	CC
DESIGN	AK
REVIEW	AK
APPROVED	CR

TITLE
PLOT OF ELECTRICAL CONDUCTIVITY VERSUS DISTANCE

PROJECT No.	CONTROL	Rev	FIGURE
20137619	2000	0	3-A



CLIENT
REGIONAL DISTRICT OF KITIMAT-STIKINE

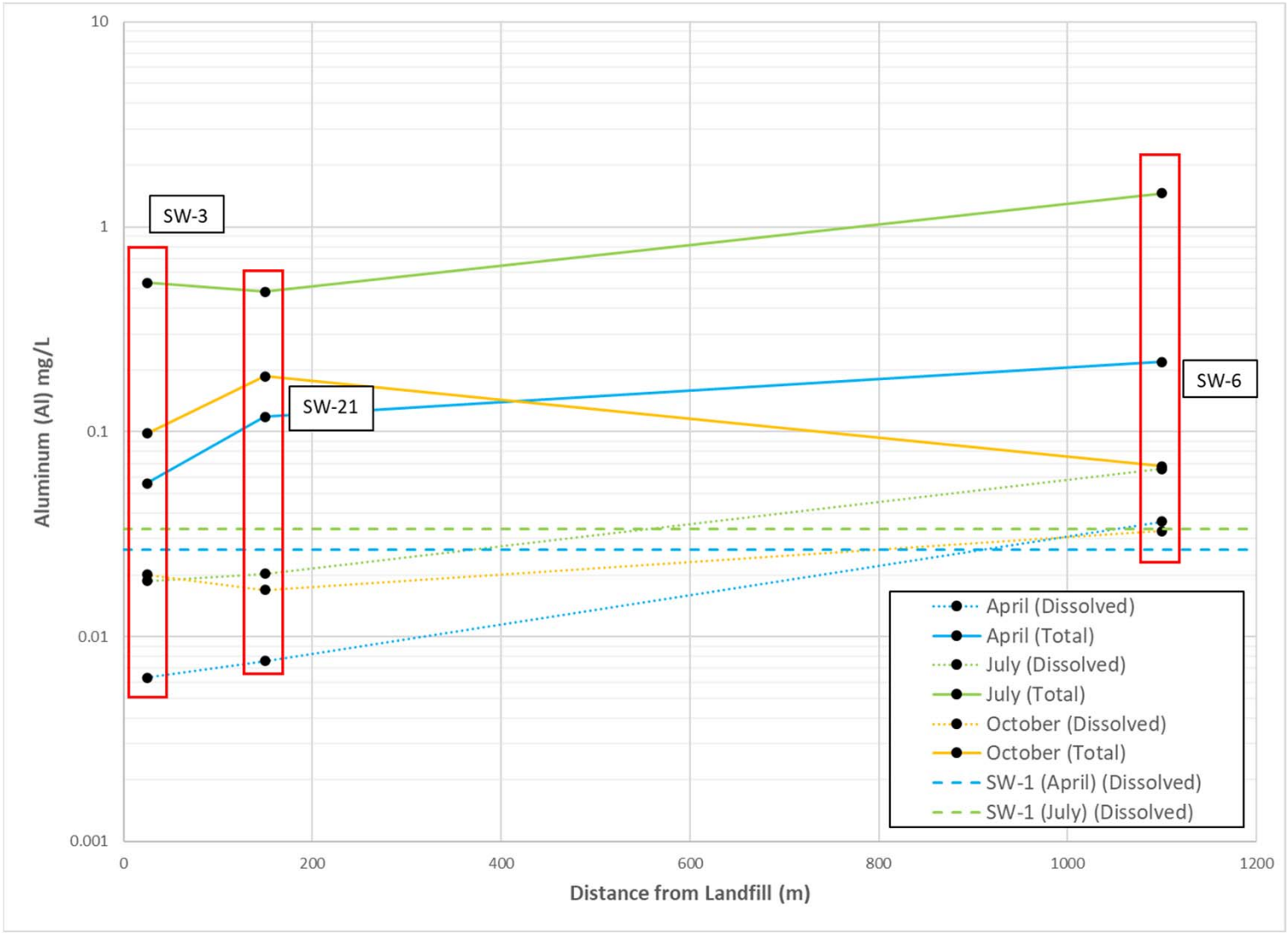
PROJECT
2019 THORNHILL TRANSFER STATION ANNUAL MONITORING REPORT

CONSULTANT
GOLDER

YYYY-MM-DD	2019-06-24
PREPARED	CC
DESIGN	AK
REVIEW	AK
APPROVED	CR

TITLE
PLOT OF AMMONIA CONCENTRATIONS VERSUS DISTANCE

PROJECT No.	CONTROL	Rev	FIGURE
20137619	2000	0	3-B



CLIENT
REGIONAL DISTRICT OF KITIMAT-STIKINE

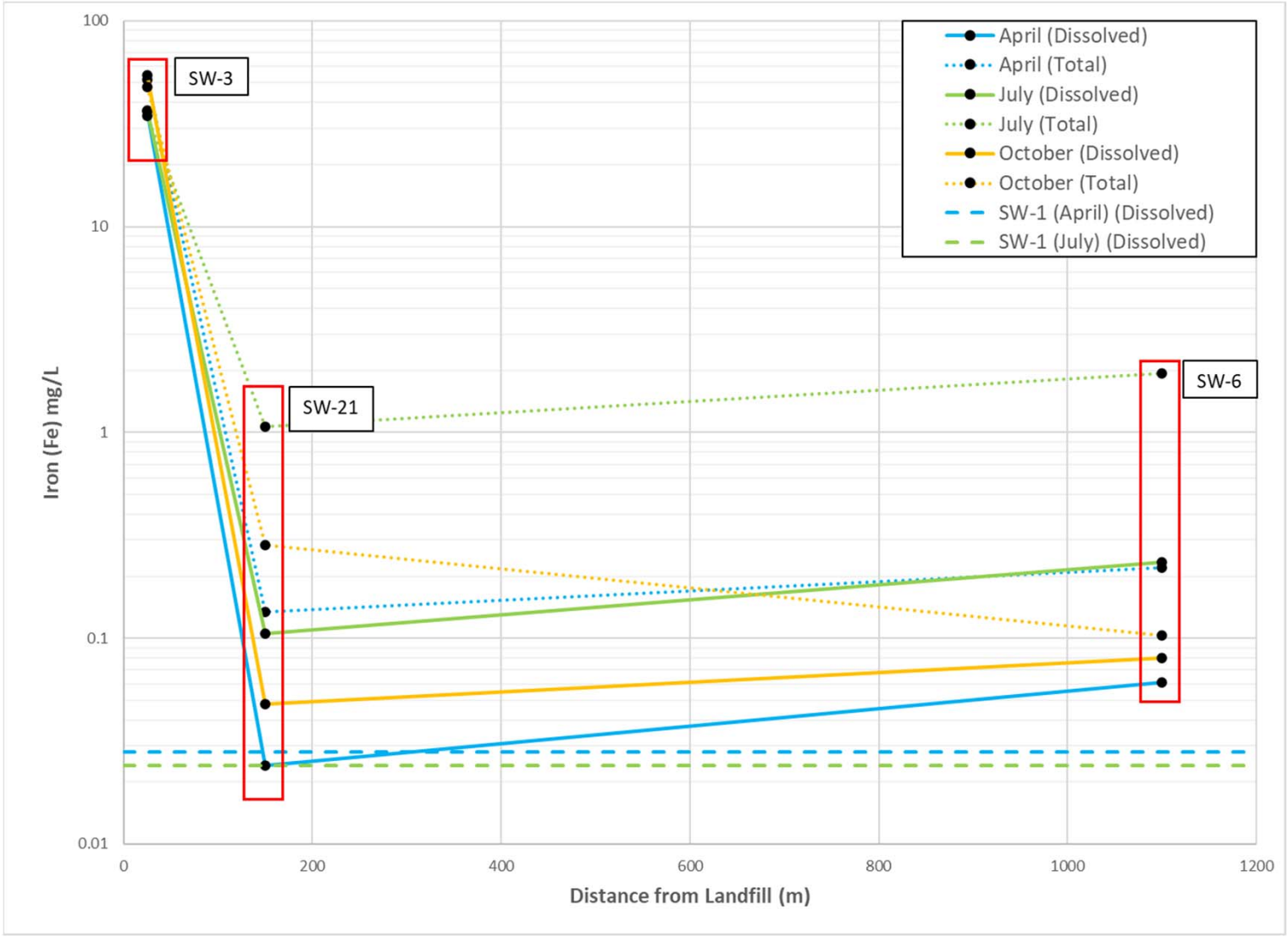
PROJECT
2019 THORNHILL TRANSFER STATION ANNUAL MONITORING REPORT

CONSULTANT
GOLDER

YYYY-MM-DD	2019-06-24
PREPARED	CC
DESIGN	AK
REVIEW	AK
APPROVED	CR

TITLE
PLOT OF ALUMINUM CONCENTRATIONS VERSUS DISTANCE

PROJECT No.	CONTROL	Rev	FIGURE
20137619	2000	0	3-C



CLIENT
REGIONAL DISTRICT OF KITIMAT-STIKINE

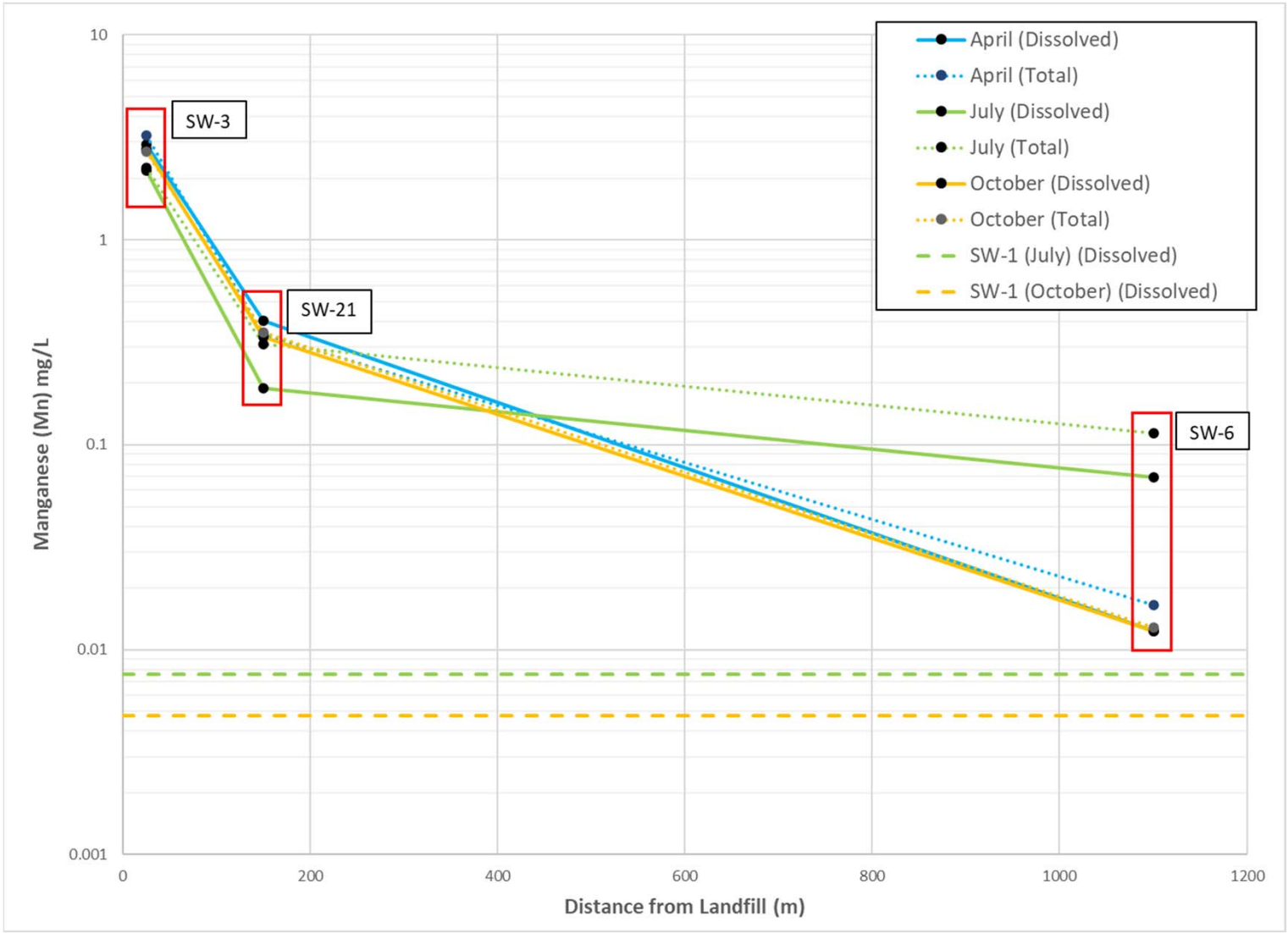
PROJECT
2019 THORNHILL TRANSFER STATION ANNUAL MONITORING REPORT

CONSULTANT
GOLDER

YYYY-MM-DD	2019-06-24
PREPARED	CC
DESIGN	AK
REVIEW	AK
APPROVED	CR

TITLE
PLOT OF IRON CONCENTRATIONS VERSUS DISTANCE

PROJECT No.	CONTROL	Rev	FIGURE
20137619	2000	0	3-D



CLIENT
REGIONAL DISTRICT OF KITIMAT-STIKINE

PROJECT
2019 THORNHILL TRANSFER STATION ANNUAL MONITORING REPORT

CONSULTANT
GOLDER

YYYY-MM-DD	2019-06-24
PREPARED	CC
DESIGN	AK
REVIEW	AK
APPROVED	CR

TITLE
PLOT OF MANGANESE CONCENTRATIONS VERSUS DISTANCE

PROJECT No.	CONTROL	Rev	FIGURE
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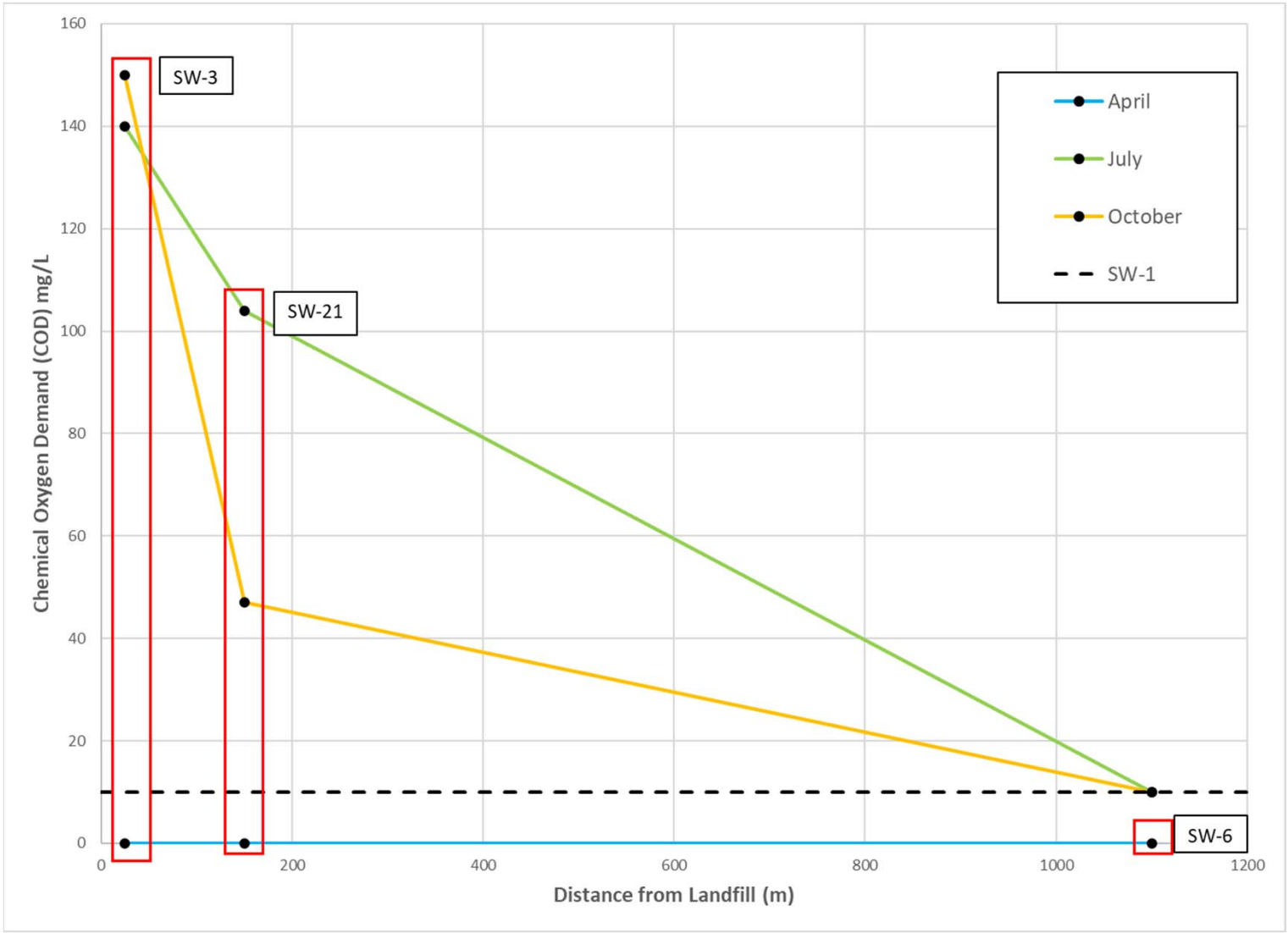


CLIENT
REGIONAL DISTRICT OF KITIMAT-STIKINE

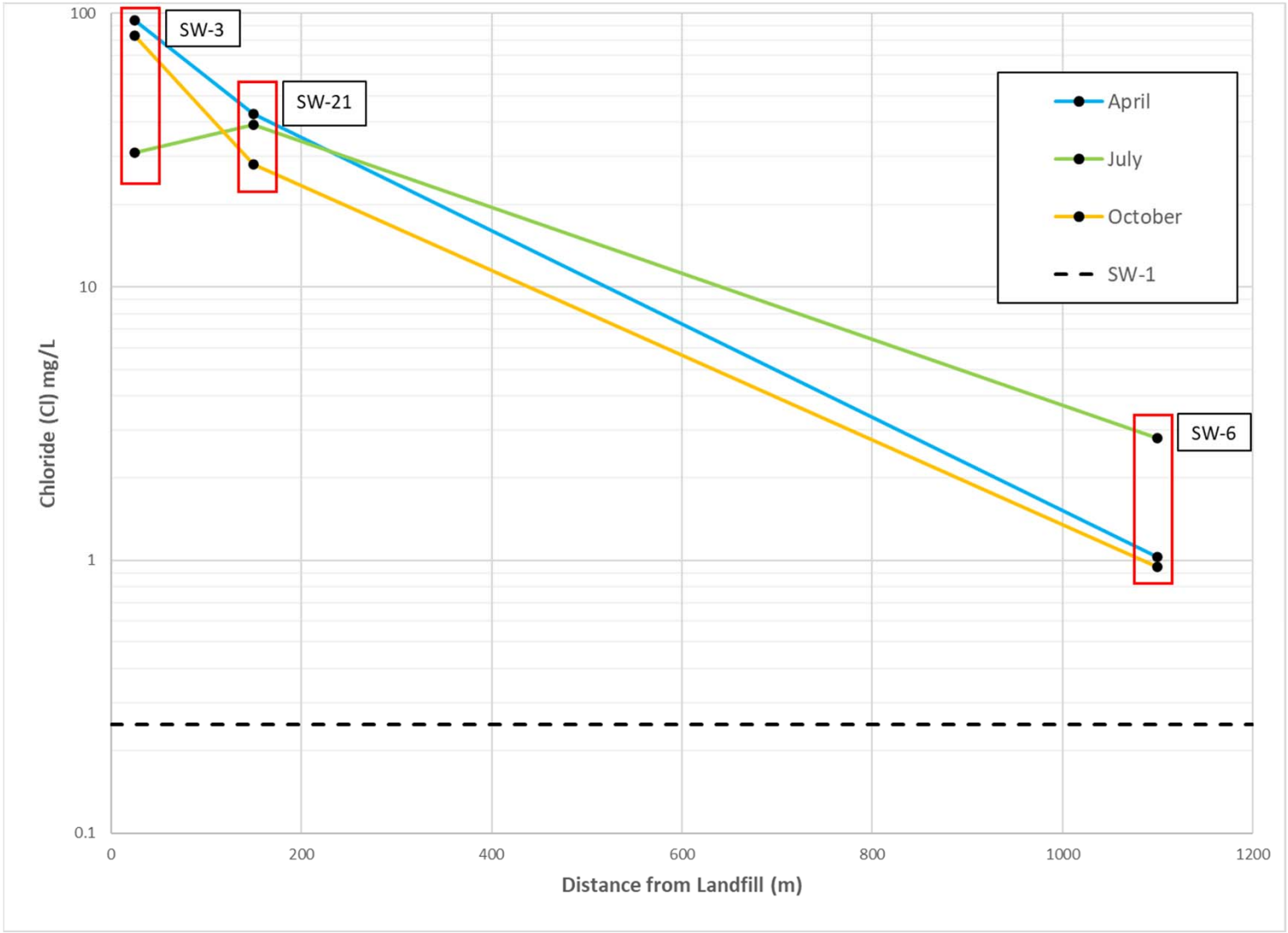
PROJECT
2019 THORNHILL TRANSFER STATION ANNUAL MONITORING REPORT

CONSULTANT
GOLDER

YYYY-MM-DD	2019-06-24
PREPARED	CC
DESIGN	AK
REVIEW	AK
APPROVED	CR

TITLE
PLOT OF CHEMICAL OXIDATION DEMAND VERSUS DISTANCE

PROJECT No.	CONTROL	Rev	FIGURE
20137619	2000	0	3-F



CLIENT
REGIONAL DISTRICT OF KITIMAT-STIKINE

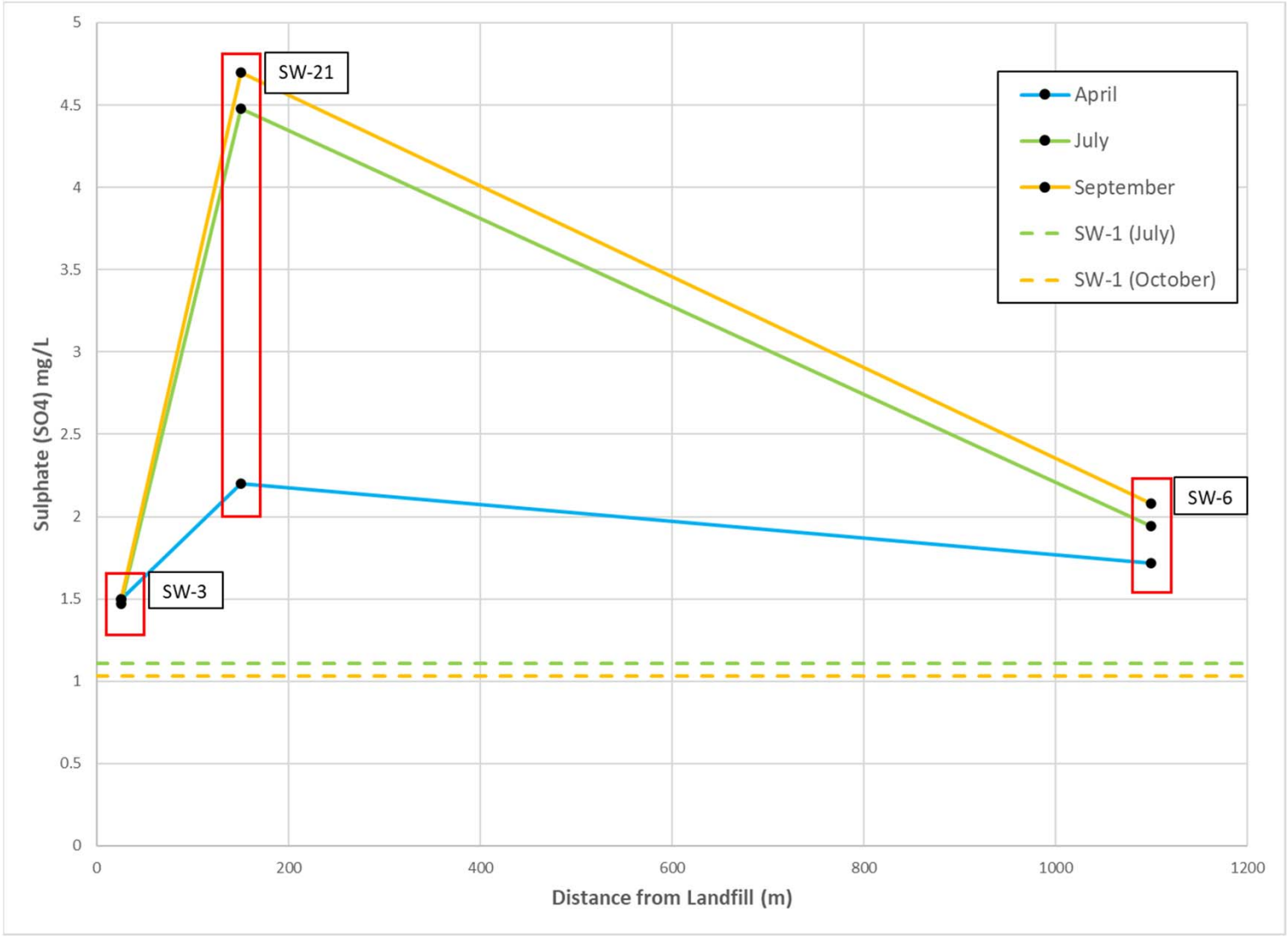
PROJECT
2019 THORNHILL TRANSFER STATION ANNUAL MONITORING REPORT

CONSULTANT
GOLDER

YYYY-MM-DD	2019-06-24
PREPARED	CC
DESIGN	AK
REVIEW	AK
APPROVED	CR

TITLE
PLOT OF CHLORIDE CONCENTRATIONS VERSUS DISTANCE

PROJECT No.	CONTROL	Rev	FIGURE
20137619	2000	0	3-G



CLIENT
REGIONAL DISTRICT OF KITIMAT-STIKINE

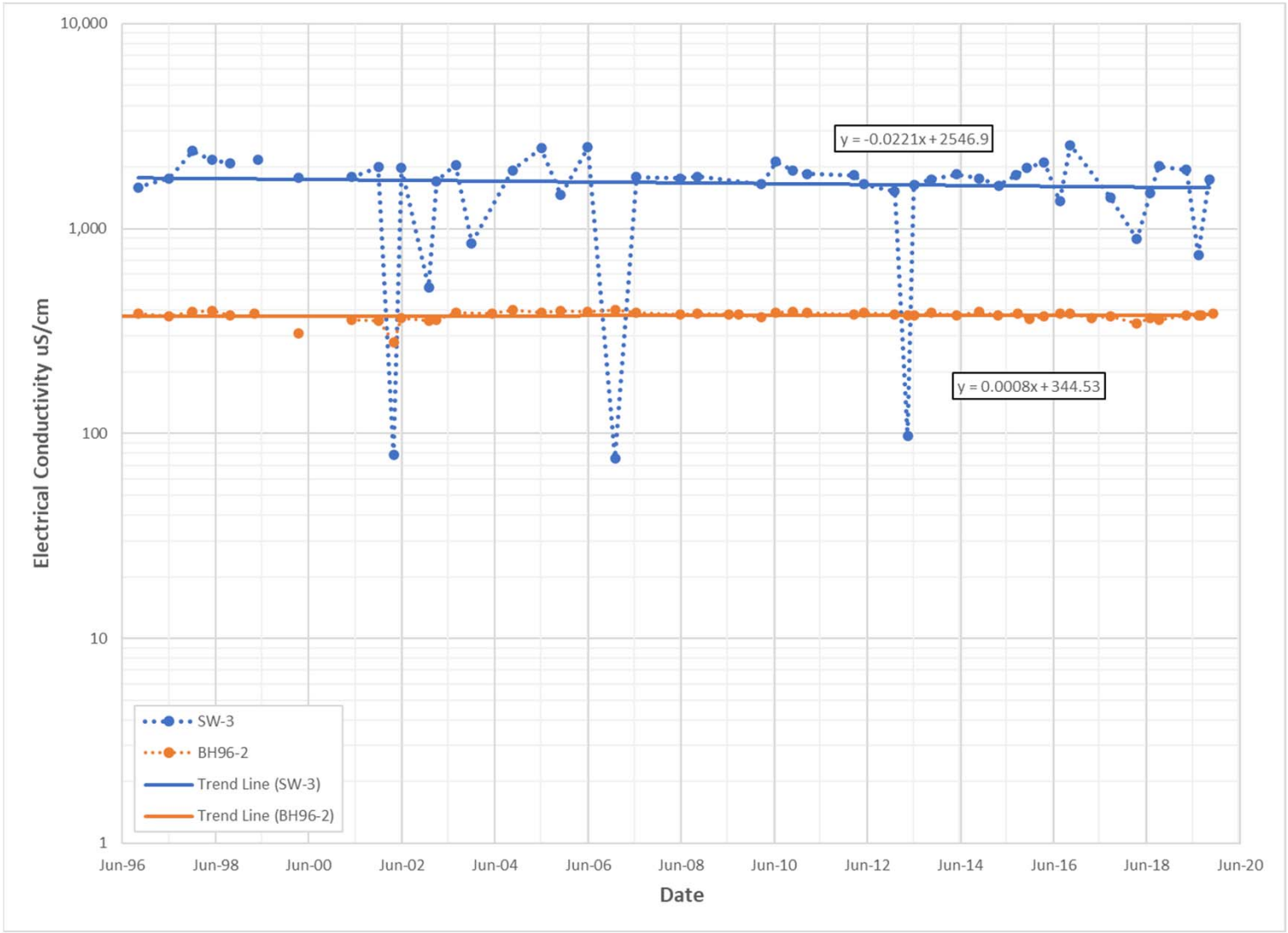
PROJECT
2019 THORNHILL TRANSFER STATION ANNUAL MONITORING REPORT

CONSULTANT
GOLDER

YYYY-MM-DD	2019-06-24
PREPARED	CC
DESIGN	AK
REVIEW	AK
APPROVED	CR

TITLE
PLOT OF SULPHATE CONCENTRATIONS VERSUS DISTANCE

PROJECT No.	CONTROL	Rev	FIGURE
20137619	2000	0	3-H



CLIENT
REGIONAL DISTRICT OF KITIMAT-STIKINE

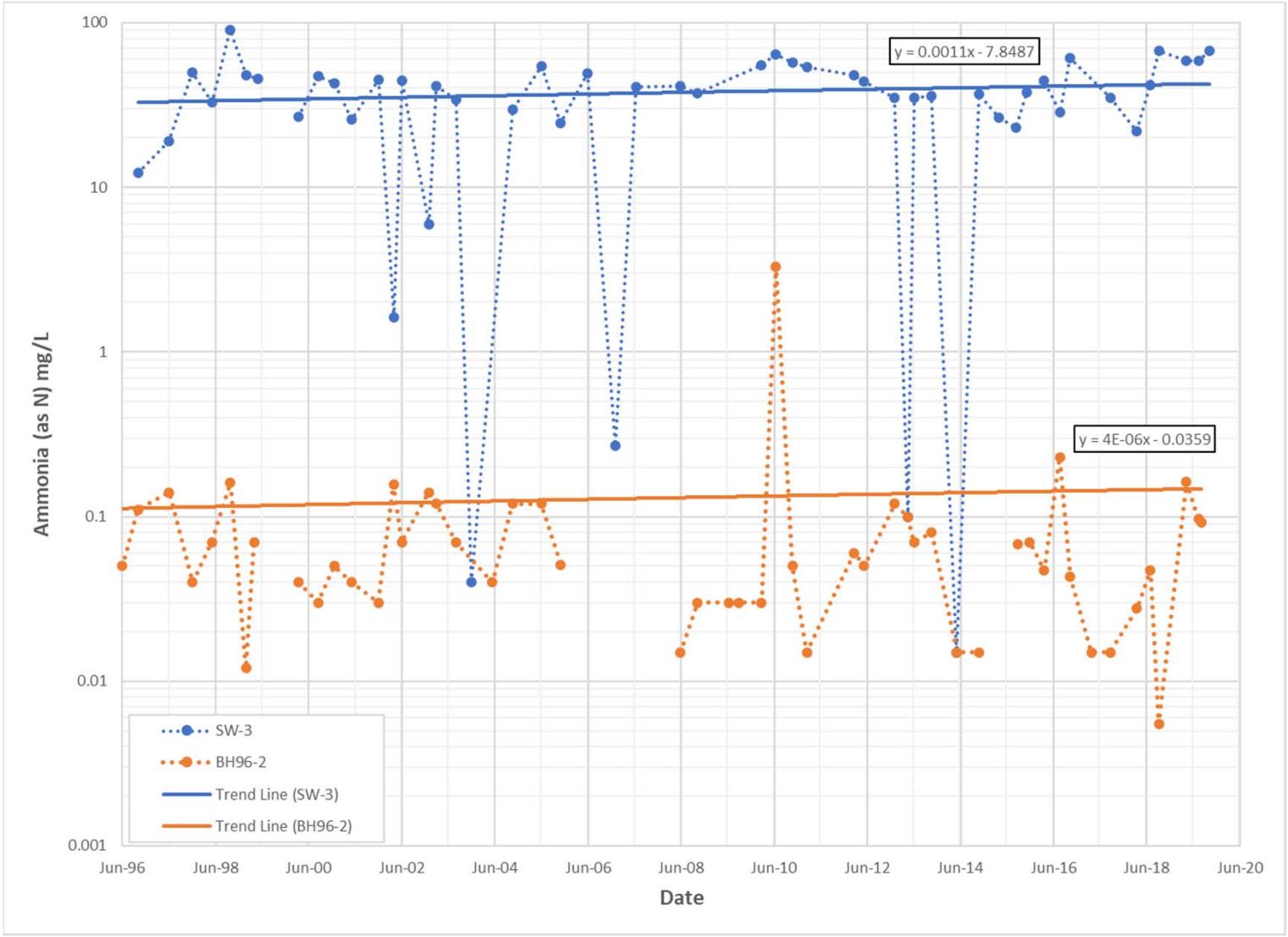
PROJECT
2019 THORNHILL TRANSFER STATION ANNUAL MONITORING REPORT

CONSULTANT
GOLDER

YYYY-MM-DD	2019-06-24
PREPARED	CC
DESIGN	AK
REVIEW	AK
APPROVED	CR

TITLE
TIME SERIES PLOT OF ELECTRICAL CONDUCTIVITY

PROJECT No.	CONTROL	Rev	FIGURE
20137619	2000	0	4-A



CLIENT
REGIONAL DISTRICT OF KITIMAT-STIKINE

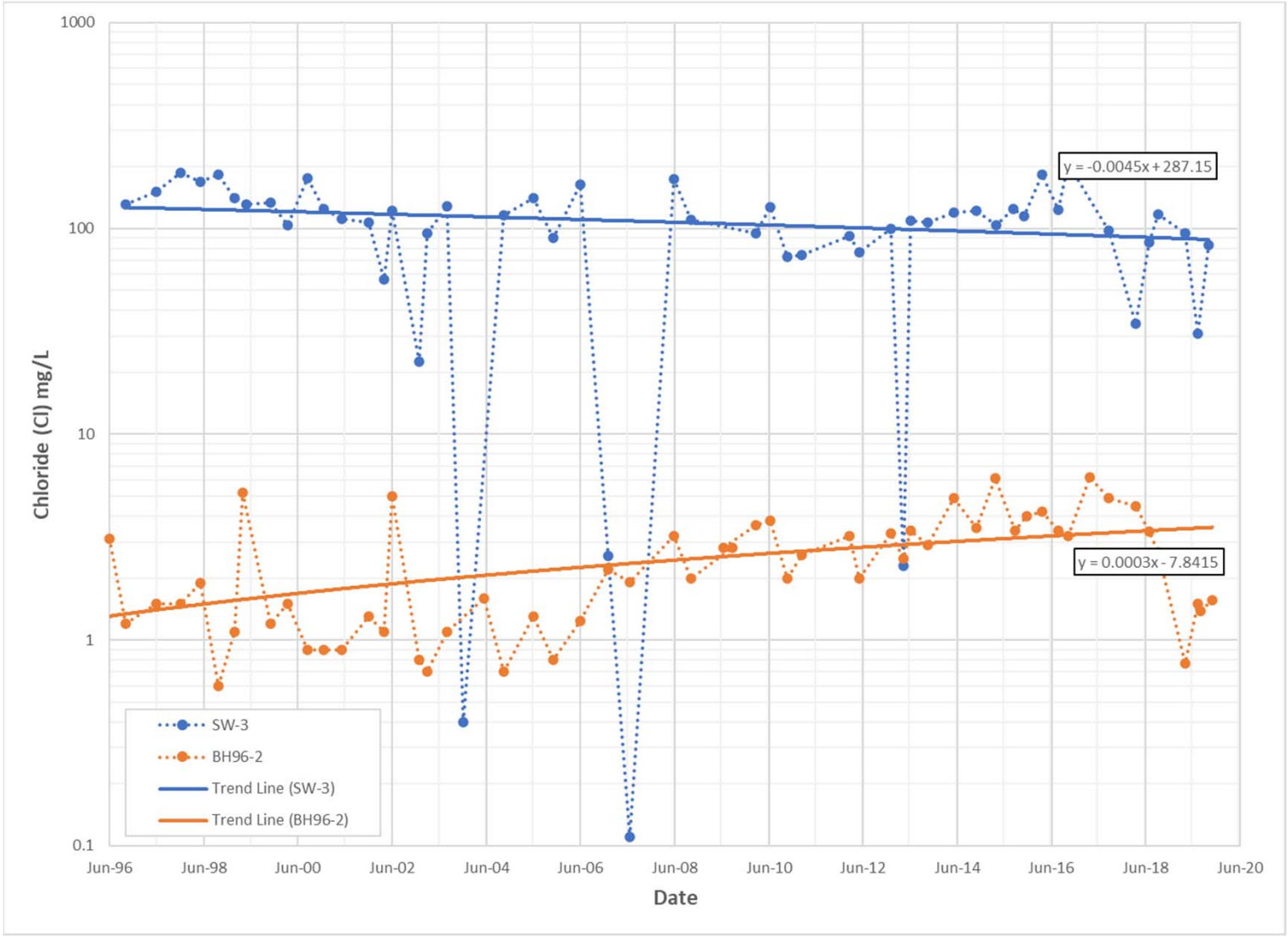
PROJECT
2019 THORNHILL TRANSFER STATION ANNUAL MONITORING REPORT

CONSULTANT
GOLDER

YYYY-MM-DD	2019-06-24
PREPARED	CC
DESIGN	AK
REVIEW	AK
APPROVED	CR

TITLE
TIME SERIES PLOT OF AMMONIA CONCENTRATIONS

PROJECT No.	CONTROL	Rev	FIGURE
20137619	2000	0	4-B



CLIENT
REGIONAL DISTRICT OF KITIMAT-STIKINE

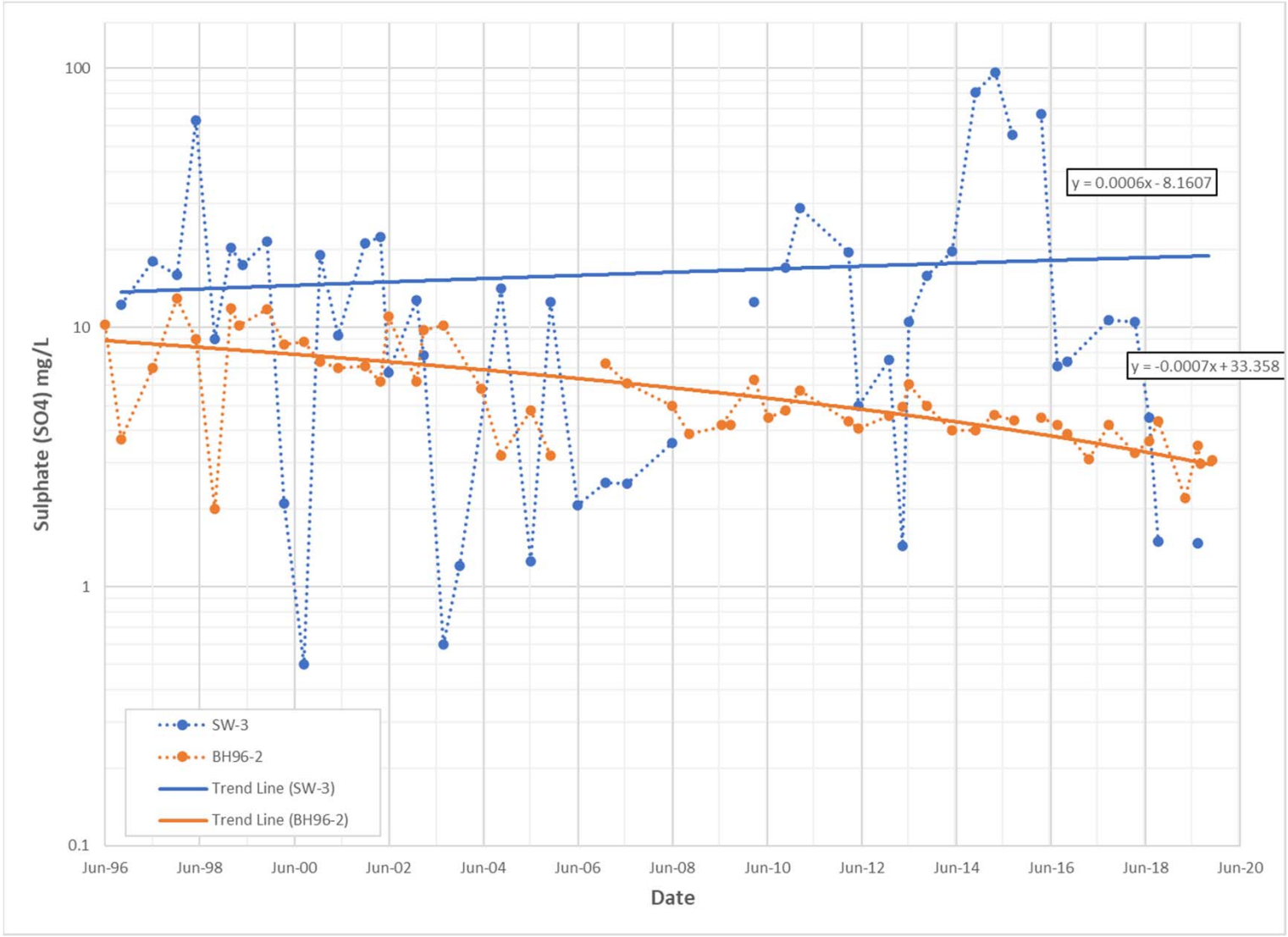
PROJECT
2019 THORNHILL TRANSFER STATION ANNUAL MONITORING REPORT

CONSULTANT
GOLDER

YYYY-MM-DD	2019-06-24
PREPARED	CC
DESIGN	AK
REVIEW	AK
APPROVED	CR

TITLE
TIME SERIES PLOT OF CHLORIDE CONCENTRATIONS

PROJECT No.	CONTROL	Rev	FIGURE
20137619	2000	0	4-C



CLIENT
REGIONAL DISTRICT OF KITIMAT-STIKINE

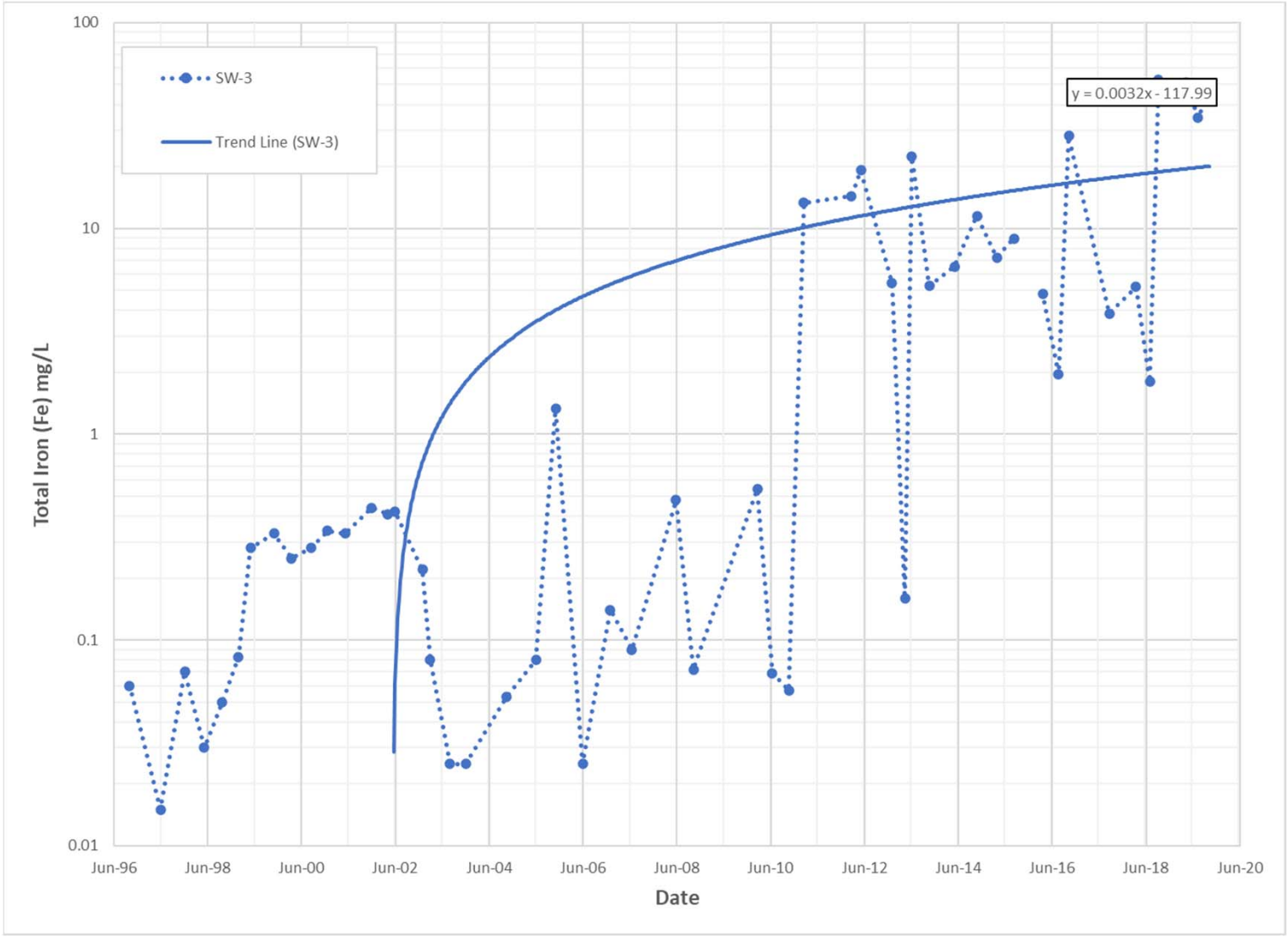
PROJECT
2019 THORNHILL TRANSFER STATION ANNUAL MONITORING REPORT

CONSULTANT
GOLDER

YYYY-MM-DD	2019-06-24
PREPARED	CC
DESIGN	AK
REVIEW	AK
APPROVED	CR

TITLE
TIME SERIES PLOT OF SULPHATE CONCENTRATIONS

PROJECT No.	CONTROL	Rev	FIGURE
20137619	2000	0	4-D



CLIENT
REGIONAL DISTRICT OF KITIMAT-STIKINE

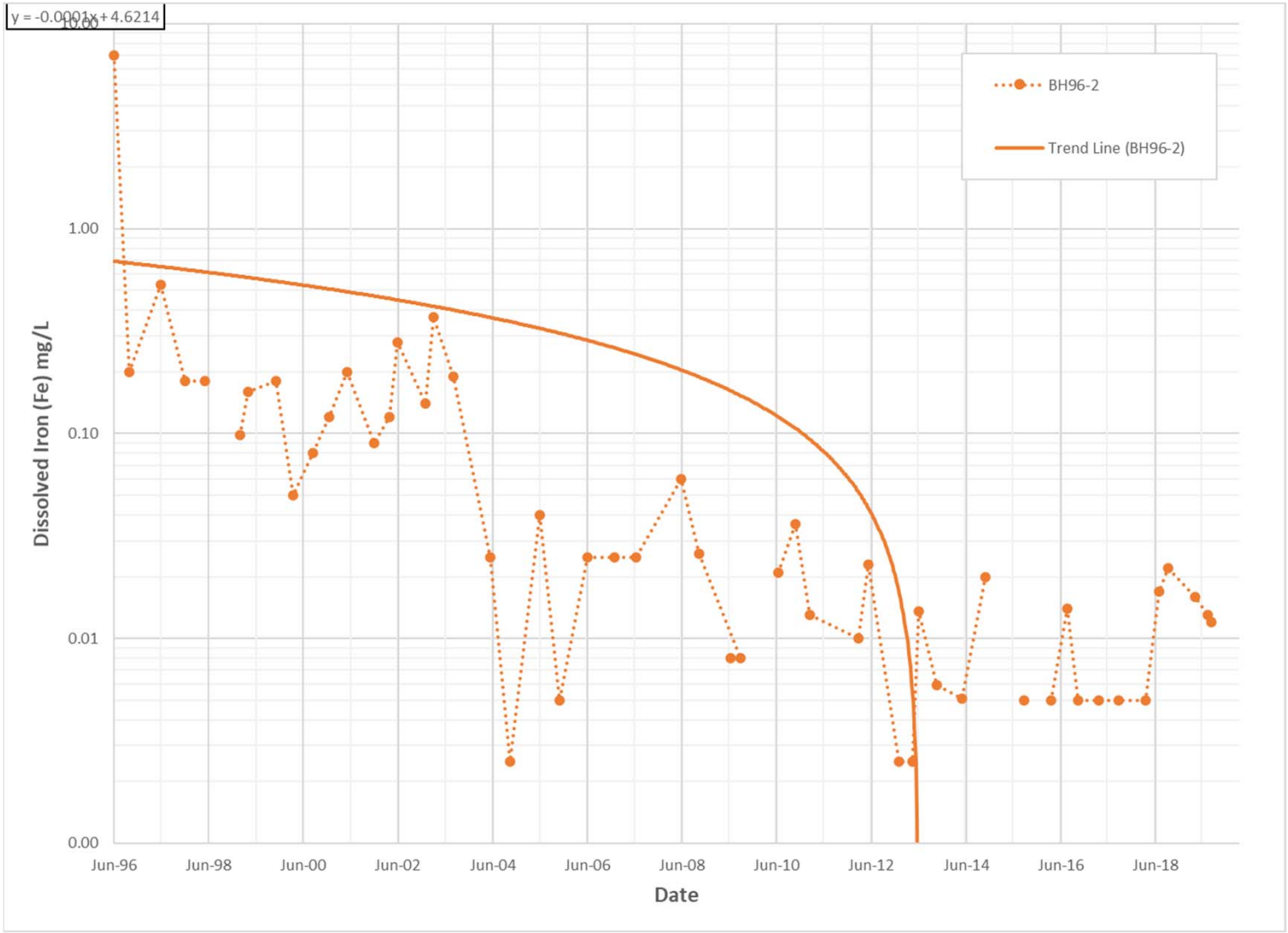
PROJECT
2019 THORNHILL TRANSFER STATION ANNUAL MONITORING REPORT

CONSULTANT
GOLDER

YYYY-MM-DD	2019-06-24
PREPARED	CC
DESIGN	AK
REVIEW	AK
APPROVED	CR

TITLE
TIME SERIES PLOT OF TOTAL IRON CONCENTRATIONS AT SW-3

PROJECT No.	CONTROL	Rev	FIGURE
20137619	2000	0	4-E



CLIENT
REGIONAL DISTRICT OF KITIMAT-STIKINE

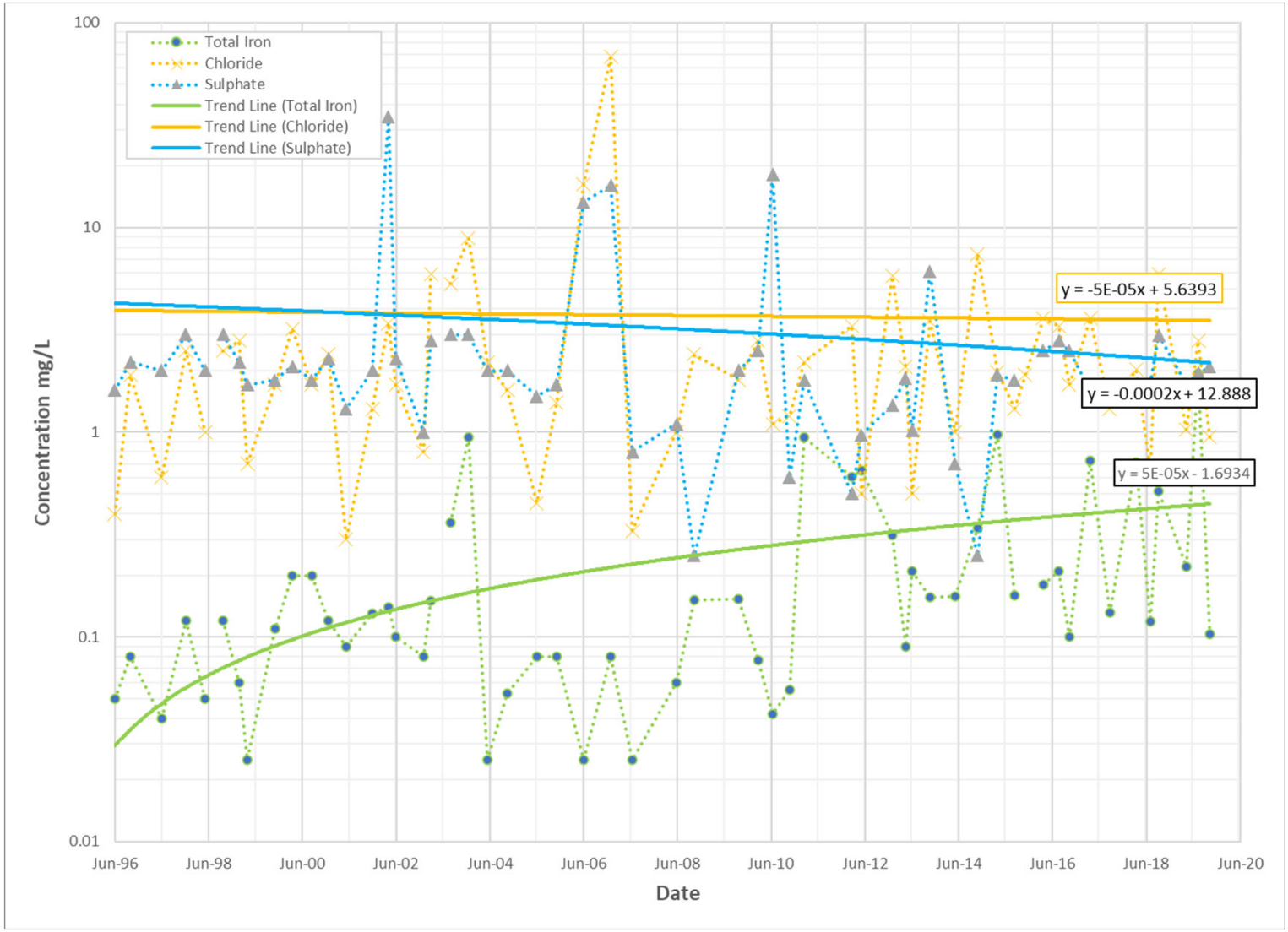
PROJECT
2019 THORNHILL TRANSFER STATION ANNUAL MONITORING REPORT

CONSULTANT
GOLDER

YYYY-MM-DD	2019-06-24
PREPARED	CC
DESIGN	AK
REVIEW	AK
APPROVED	CR

TITLE
TIME SERIES PLOT OF DISSOLVED IRON CONCENTRATIONS AT BH96-2

PROJECT No.	CONTROL	Rev	FIGURE
20137619	2000	0	4-F



CLIENT
REGIONAL DISTRICT OF KITIMAT-STIKINE

PROJECT
2019 THORNHILL TRANSFER STATION ANNUAL MONITORING REPORT

CONSULTANT
GOLDER

YYYY-MM-DD	2019-06-24
PREPARED	CC
DESIGN	AK
REVIEW	AK
APPROVED	CR

TITLE
TIME SERIES PLOT OF SELECTED PARAMETER CONCENTRATIONS AT SW-6

PROJECT No.	CONTROL	Rev	FIGURE
20137619	2000	0	5

APPENDIX A

Landfill Permit

BRITISH COLUMBIA

Date: June 20, 2014

Authorization Number: MR-4057

REGISTERED MAIL

Regional District of Kitimat-Stikine
Suite 300 – 4545 Lazelle Avenue
Terrace, BC
V8G 4E1

Dear Operational Certificate Holder:

Enclosed is Operational Certificate MR-4057 issued under the provisions of the *Environmental Management Act*. Your attention is respectfully directed to the terms and conditions outlined in the operational certificate.

This operational certificate does not authorize entry upon, crossing over, or use for any purpose of private or Crown lands or works, unless and except as authorized by the owner of such lands or works. The responsibility for obtaining such authority rests with the operational certificate holder. It is also the responsibility of the operational certificate holder to ensure that all activities conducted under this authorization are carried out with regard to the rights of third parties, and comply with other applicable legislation that may be in force.

This decision may be appealed to the Environmental Appeal Board in accordance with Part 8 of the *Environmental Management Act*. An appeal must be delivered within 30 days from the date that notice of this decision is given. For further information, please contact the Environmental Appeal Board at (250) 387-3464.

Ministry of Environment
Environmental Protection Division
Bag 5000
Smithers, BC V0J 2N0
Skeena Region
Telephone: (250) 847-7260
Facsimile: (250) 847-7591

Administration of this operational certificate will be carried out by staff from the Skeena Region. Plans, data and reports pertinent to the operational certificate are to be submitted to the Regional Director, Environmental Protection, at Ministry of Environment, Regional Operations, Skeena Region, Bag 5000, Smithers, BC V0J 2N0.

Yours truly,

M. Love

Mark Love
for Director, *Environmental Management Act*
Skeena Region

Enclosure

cc: Environment Canada

MINISTRY OF ENVIRONMENT

OPERATIONAL CERTIFICATE

MR-4057

for the

THORNHILL LANDFILL

Under the Provisions of the Environmental Management Act and in accordance with the approved Regional District of Kitimat-Stikine Solid Waste Management Plan, the

Regional District of Kitimat Stikine

300-4545 Lazelle Avenue

Terrace, British Columbia

V8G 4E1

is authorized to store, handle, treat and discharge municipal solid waste from Thornhill and surrounding areas at the Thornhill landfill subject to the conditions listed below. Contravention of any of these conditions is a violation of the *Environmental Management Act* and may result in prosecution.

1. LOCATION OF LANDFILL PROPERTY

The location of the property where discharges are authorized to occur is described in Land and Water BC License No. 634224 as follows: that part of District Lot 518 and parts of Blocks B and C of District Lot 655, Plan 1304, all of Range 5, Coast District more particularly described as follows:

Commencing at a point 20 metres North and 20 metres East of the Northwest corner of Block C of District lot 518, thence 225 metres North, thence 600 metres West to highway right of way; thence 700 metres Southeast along North side of highway to the point of commencement.

2. DESIGN, OPERATIONS and CLOSURE PLAN

The landfill and associated works shall be designed by qualified professionals [such as engineer(s) and/or geoscientist(s)] registered in the Province of British Columbia who have expertise in the field of landfill design. These details shall be incorporated into a "Design, Operations, and Closure Plan" (DOCP) and submitted to the Director for review

M. Love

Mark Love, P.Ag.
For Director, *Environmental Management Act*

Date Issued: June 20, 2014
Date Amended:
(most recent)

and approval prior to June 30, 2015. The predominant focus of the DOCP shall be on closure aspects, given the intentions to close the landfill in the near future. The landfill shall be operated and closed in accordance with the approved DOCP.

The DOCP shall include the following components:

1. Design and Operations (active landfill remaining life)

    - extent and location of each disposal area, clearly shown on a site plan;
    - quantities of wastes (solid and leachate) discharged annually;
    - works associated with each disposal area;
    - scaled site plan accurately showing legal survey, engineered final design footprint, and final design contours;
    - proposed litter control measures;
    - if applicable, proposed measures to meet the Landfill Gas Regulation and landfill gas health and safety requirements;
    - final lift height of compacted waste;
    - engineered final design footprint delineating the maximum extent of solid waste disposal allowable at the facility horizontally and vertically;
    - groundwater model developed by a qualified professional (experienced in groundwater hydrogeology) that:

        (i) outlines the inferred groundwater flow direction, rate, and shape of leachate plume, etc. beneath and around the landfill as influenced by landfill leachate;

        (ii) appropriately assesses the correct number and location of groundwater wells;

        (iii) estimates the loadings of Potential Contaminants of Concern (PCOC)'s from landfill leachate to the environment.

2. Leachate Management

    - proposed leachate management plan;

M. Love

Mark Love, P.Ag.
For Director, *Environmental Management Act*

- proposed leachate system design including an assessment of the effectiveness of the current collection system and recommendations for improvements;

- proposed leachate treatment

3. Closure

- proposed method, coverage (area) and timing of progressive closure;

- final maximum allowable slopes;

- proposed closure plan including:

  i) intended end-use of the landfill property after closure;

  ii) anticipated final total waste volume and tonnage in place;

  iii) a topographic plan showing the final elevation contours of the landfill and surface water diversion and drainage controls;

  iv) design of the final cover suited to the intended end-use of the site, including the thickness and permeability of barrier layers and drainage layers, and information on topsoil, vegetative cover and erosion prevention controls;

  v) a comprehensive long term monitoring plan including groundwater monitoring, surface water monitoring, landfill gas monitoring (if necessary), leachate monitoring, final cover monitoring, and erosion and settlement monitoring, for a minimum post-closure period of 25 years;

  vi) design, if necessary, for the collection, storage and treatment/use of landfill gas for a minimum 25 year post-closure period

  vii) plan for the operation of any required pollution abatement engineering works such as leachate collection and treatment systems, for a minimum post-closure period of 25 years; and

  viii) an estimated cost to carry out closure and post-closure activities for a minimum period of 25 years.

Date Issued: June 20, 2014
Date Amended:
(most recent)

Mark Love, P.Ag.
For Director, *Environmental Management Act*

3. DISCHARGE OF MUNICIPAL SOLID WASTE

Municipal solid waste is authorized to be discharged to ground in accordance with the DOCP. The site reference number for this discharge is E208844. The authorization to discharge municipal solid waste will cease upon the commissioning of the Forceman Ridge landfill.

4. STORAGE AND HANDLING OF WASTES FOR SALVAGE AND RECYCLING

Wastes are authorized to be stored and handled for salvage and recycling in accordance with the DOCP.

5. DISCHARGE OF AIR CONTAMINANTS FROM OPEN BURNING OF WOOD RESIDUE

Air contaminants are authorized to be released from the open burning of wood residue in accordance with this section and the DOCP. The site reference number for this discharge is E216685.

5.1 Location

Any open burning of selected wastes shall be restricted to the designated open burning area as shown on the attached site plan and as identified on-site. Signs which identify the nature of the waste acceptable at the designated open burning area shall be erected and maintained.

5.2 Quantity, Timing, and Duration of Discharge

The maximum authorized quantity of wood residue to be open burned during each event is that which has accumulated at the time of burn initiation.

The maximum authorized duration of each burn shall be limited to the period between two hours after sunrise on the day of ignition, and sunset on the following day. Each open burn shall be completely extinguished at the end of the authorized burn duration.

Should a condition arise which prevents the burn pile(s) from being burned within this period, the Director shall be notified in accordance with this authorization.

5.3 Nature of Wastes

Acceptable materials for burning may only include dry, unpainted, untreated demolition, construction and packing-related wood residue, clean stumps and brush, but shall exclude nuisance-causing combustibles such as glue-containing

wood, painted and treated wood, sawdust, yard wastes, mulch, wood chips, rubber, plastics, tars, insulation, roofing material, asphalt shingles, etc.

5.4 Favourable Weather for Smoke Dispersion

Open burning shall not proceed unless the recorded Environment Canada Ventilation Index Forecast for Terrace is good for the first day and good or fair for the second day.

The contact number for the forecast is 1-888-281-2992. Ventilation index forecasts can also be obtained after 7:00 a.m. from the following Environment Canada website: http://www.env.gov.bc.ca/epd/epdpa/venting/venting.html

A burn registration number shall be obtained from the Ministry of Forests (1-888-797-1717) prior to ignition.

Open burning of wood residue shall not be initiated or continued if the local air flow will cause the smoke to negatively impact a nearby population or cause pollution. No burning shall occur during periods of fire hazard or when burning is prohibited by other agencies.

5.5 Minimization of Smoke

Each burn shall be tended in a manner that ensures minimization of smoke emissions. Measures to minimize smoke shall include, but not necessarily be limited to: stacking of waste in a manner that eliminates inclusion of dirt; waiting to burn until wastes are reasonably dry after any significant precipitation event; and using adequate equipment and staff.

5.6 Extinguishment Contingency Plan

Prior to burning, a contingency plan shall be in place detailing how the open burn will be extinguished in the event of any of the following occurring:

i) Inadequate smoke dispersion in the surrounding environment;

ii) wood continues to smoulder after the authorized burn period; and,

iii) the Director requires that the open burn be extinguished for environmental protection reasons

5.7 Extinguishment

All combustion shall be completely extinguished at the end of the authorized period as set out in Section 5.2

Mark Love, P.Ag.
For Director, *Environmental Management Act*

Date Issued: June 20, 2014
Date Amended:
(most recent)

6. GENERAL REQUIREMENTS

6.1. Prohibited Wastes

No wastes as defined by the Hazardous Waste Regulation shall be treated or disposed of at this site except as authorized by the Director.

6.2. Waste Asbestos

Notwithstanding Section 6.1 of this operational certificate, the disposal of waste asbestos under Section 3 of this operational certificate and in compliance with the requirements of Section 40 of the Hazardous Waste Regulation is hereby authorized.

6.3. Contaminated Soil

Soil that contains contaminants in concentrations less than "Hazardous Waste" as defined by the Hazardous Waste Regulation may be disposed at the landfill site. Disposal shall not include use as final cover material.

6.4. Waste Measurement

The quantity of waste material landfilled at the site shall be measured or estimated on an annual basis. This data shall be made available for inspection upon request.

6.5 Groundwater and Surface Water Quality

The landfill must be operated and maintained so that the applicable groundwater or surface water use is not compromised beyond the landfill site boundary, or 150 metres from the landfill footprint, whichever is closer. Any surface water quality must also meet standards for applicable water use(s). The applicable water use is determined on the basis of existing land use and possible future uses for one or more of aquatic life, irrigation, livestock or drinking water. Protocols and/or guidance under the *Environmental Management Act* Part 4 (Contaminated Site Remediation) shall be followed by a qualified professional in determining the applicable water use (i.e. Contaminated Sites Regulation Section 12; Technical Guidance 6 on Contaminated Sites; etc.).

The director may specify other numerical water quality standards and objectives that the operator of the landfill facility must meet.

6.5.1 Consequence of Exceedance

Where monitoring shows contaminant concentrations exceed the applicable water use, or other standards, the operator shall notify the Director and take one of the following corrective actions:

- Mitigation to meet standards or
- Based on the results of a risk assessment carried out in accordance with Contaminated Sites Regulation guidance (i.e. Technical Guidance 7), undertake the warranted mitigation measures to achieve acceptable risk.

7.6 Electric Fencing

7.6.1 Design, Construction and Maintenance

Wherever required, electric fencing and gate systems at the landfill shall be designed, constructed, and maintained such that bears are prevented from entering into the landfill through any portion of the fence or gates at any time of the day. The electric fence shall be operational for at least 2 years beyond the date of last putrescible waste acceptance.

7.6.2 Fence Type

Fencing may be either high tensile smooth wire or fence fabric (e.g., mesh-wire, page-wire, chainlink or the like). The configuration of a high tensile smooth wire fence shall consist of a minimum of eight strands, with four energized strands alternating with four grounded strands as follows: the bottom strand shall be a grounded (-) strand and shall not be more than 10 cm from the earth at any location; and thence starting from the bottom strand, the other seven strands shall be spaced 15 ± 2 cm, 15 ± 2 cm, 15 ± 2 cm, 20 ± 2 cm, 20 ± 2 cm, 20 ± 2 cm, and 25 ± 2 cm. Additional strands to this minimum configuration may be used.

A fence fabric may be used instead of high tensile smooth wire. The fence fabric shall: be a minimum of 1.22 metre high; be constructed of a minimum wire thickness of 11 gauge, and have a maximum mesh size of 15 cm. The bottom of the fabric shall not be more than 10 cm from the earth at any location. Any uncharged fence fabric shall have a minimum of four strands of charged wires on an outrigger system, spaced as follows: the first strand shall not be higher than 25 cm from the earth; and each of the remaining three strands shall be spaced approximately 25 cm apart from adjacent charged strands.

7.6.3 Wire Tension

For a high tensile smooth wire fence construction, all strands shall be tightened to a minimum of 125 lbs tension at 20°C. The required tension is to be corrected for temperature by use of the following formula for 12-½ gauge high tensile steel wire:

$$Tension = 125 - 2.5(Temperature - 20)$$

where: *Tension* is in lbs force

Temperature is in °C

7.6.4 Post Spacing

Fence posts shall be spaced a maximum of 7.5 metres apart.

7.6.5 Grounding System

A grounding system shall be installed consisting of solid grounding rods (i.e., not pipe) with a minimum diameter of 16 mm (5/8 inch) that have a buried length of at least 2 metres. A minimum of three grounding rods (spaced at least 3 metres apart) shall be installed and connected to the energizer. Alternative energizer grounding systems (e.g., grounding plates, or a deep-driven grounding system) may be used provided the grounding is equivalent to or better than three grounding rods. A grounding rod (or equivalent) shall be installed at least once every 450 metres along the fence and connected to the grounded wire strands or uncharged fence fabric. Additional grounding may be required for dry sites or if other conditions affect proper grounding.

7.6.6 Period of Operation

Electric fencing shall be fully operational during the period of April 1 to October 31 inclusive each year and at any other time of year when there is bear activity in the immediate surrounding area. If snow is present during this period, any electrified strands above the snow line shall be isolated from the remainder of the system and energized.

7.6.7 Minimum Voltage

Electric fencing shall be operated with a minimum voltage of 6,000 volts.

7.6.8 Gate(s)

Any access through electric fencing for vehicles, equipment and personnel shall consist of an electrified gate system that is closed during non-operating hours. The gate system shall be electrified to a minimum voltage of 6,000

volts at all times except when being opened or closed. Any gate that is open during operating hours shall be periodically checked by the attendant for bear activity during hours of operation. Gaps between the gate and the fence and the earth, and between gate panels (for a double-hung gate), shall not exceed 10 cm.

7.6.9 Fence Inspections

The perimeter of the electric fencing shall be inspected on every day that the site is open to the public and the voltage of the fencing measured at several points and at each gate using a proper electric fence voltmeter. Post landfill closure, fence inspections may be reduced to once every two weeks. The results of voltage testing shall be recorded in a log book. Any results less than the minimum 6,000 volts shall be immediately investigated for the cause of the low voltage (e.g., low battery, litter, vegetation, loose or crossed wires, broken insulators, breaks in the grounding system, etc.). Corrective actions to restore proper voltage shall be immediately undertaken.

Any penetrations through electric fencing by bears shall be immediately reported to the Conservation Officer Service at 1-877-952-7277 and to the Director at 1-250-847-7260.

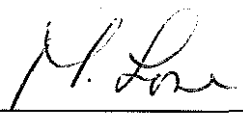
In cases of low voltage or signs of penetration attempts, inspections shall be increased from once per week to once per day until proper voltage is fully restored and until there are no new signs of penetration attempts, respectively.

7.7 Dead Animal Disposal

Dead animals and animal parts shall be disposed of in the solid waste disposal area and covered as soon as practicable with a minimum of 60 centimetres of soil and/or waste material such that flies and scavenging animals are prevented from accessing the carrion. Disposal of Specified Risk Material from cattle shall only be done in accordance with Canadian Food Inspection Agency requirements and procedures.

8. ENVIRONMENTAL EFFECTS MONITORING

The Permittee shall undertake Environmental Effects Monitoring (EEM) to determine the effects of the landfill on the receiving environment, both during operation and post closure. EEM studies may include surface water, biological and sediment components and shall be performed using documented and validated methods, and their results interpreted and reported on in accordance with generally accepted standards of good scientific practice. The Permittee shall submit the results of the studies, including analysis and interpretation, to the Director, by June 30 of each following year.



Mark Love, P.Ag.
For Director, *Environmental Management Act*

Date Issued: June 20, 2014
Date Amended:
(most recent)

8.1 Surface Water Monitoring

The following surface water monitoring program shall be carried out:

Locations	Parameters	Frequency
SW-1 Thornhill Creek upstream E231882 SW-3 Leachate seepage E231883 SW-6 Thornhill Creek downstream E231884 SW-21 Leachate Weir E231886	Inorganics Dissolved metals, total metals, alkalinity (as $CaCO_3$), total and dissolved hardness (as $CaCO_3$), ammonia, fluoride, chloride, conductivity, nitrate, nitrite, total kjeldahl nitrogen, pH, total phosphorus, ortho-phosphorus, total suspended solids, sulphate. Organics Biological oxygen demand (BOD_5), chemical oxygen demand (COD) Field Parameters Conductivity, pH, temperature, dissolved oxygen, turbidity	Once per Season: Spring (March- April) Summer(July –August) Fall (October – Nov.)

8.2. Groundwater Monitoring

For the purpose of supporting groundwater modeling and to detect any significant impacts on the environment from leachate in the groundwater, the Permittee shall engage a qualified professional, experienced in groundwater hydrogeology, to design a groundwater monitoring program. The groundwater monitoring program shall be submitted for the written approval by the Director on or before June 30, 2015, and shall be implemented by September 30, 2015 (implementation shall be considered to include installation of any additional wells specified in the final groundwater monitoring program design). The Director may specify, from time to time, that the groundwater monitoring program be revised and updated for his/her written approval. The program shall consider the use of existing and if necessary, new groundwater wells.

In the interim, the following groundwater monitoring program shall be carried out:

Locations	Parameters	Frequency
BH 96-2 E231889 HB 96-3 E231890	Inorganics Dissolved metals, total metals, alkalinity (as $CaCO_3$), dissolved hardness (as $CaCO_3$), ammonia, chloride, fluoride, conductivity, nitrate, nitrite, total kjeldahl nitrogen, pH, total phosphorus, total dissolved solids, sulphate. Organics Chemical oxygen demand (COD), Field Parameters Conductivity, pH, water elevation, temperature, dissolved oxygen	Once per Season: Spring (March- April) Summer(July –August) Fall (October – Nov.)

Date Issued: June 20, 2014
Date Amended:
(most recent)

Mark Love, P.Ag.
For Director, *Environmental Management Act*

8.3 Ground and Surface Water Monitoring Procedures

8.3.1 Sampling

Sampling is to be carried out in accordance with the procedures described in the most recent edition of the "British Columbia Field Sampling Manual for Continuous Monitoring and the Collection of Air, Air-Emission, Water, Wastewater, Soil, Sediment, and Biological Samples", or by suitable alternative procedures as authorized by the Director.

A copy of the above manual may be purchased from the Queen's Printer Publications Centre, P.O. Box 9452, Stn. Prov. Gov't. Victoria, British Columbia, V8W 9V7 (1-800-663-6105 or (250) 387-6409). A copy of the manual is also available for inspection at all Environmental Protection offices.

8.3.2 Analyses

Analyses are to be carried out in accordance with procedures described in the most recent edition of the "British Columbia Environmental Laboratory Methods Manual for the Analysis of Water, Wastewater, Sediment, Biological Materials and Discrete Ambient Air Samples", or by suitable alternative procedures as authorized by the Director.

A copy of the above manual may be purchased from the Queen's Printer Publications Centre, P.O. Box 9452, Stn. Prov. Gov't. Victoria, British Columbia, V8W 9V7 (1-800-663-6105 or (250) 387-6409). A copy of the manual is also available for inspection at all Environmental Protection offices.

8.3.3 Quality Assurance/Quality Control (QA/QC)

The operational certificate holder is required to conduct the following Quality Assurance and Control Program to determine the acceptability of data required by this permit and Section 2(d) of the Environmental Data Quality Assurance Regulation.

a) Obtain and keep current, the laboratory precision, accuracy and blank quality control criteria for each laboratory analysed parameter from the analytical laboratory(ies).

b) Collect one duplicate sample during each sampling session from one of the discharge points.

c) Each duplicate sample shall be submitted to the laboratory; one of the pair identified as the regular sample, and the other, as a blind sample identified

by a fictitious site-name established solely to identify the duplicate sample.

d) For each parameter, report the results of the field duplicates in terms of the degree of variation as the relative percent difference.

e) A sample collection blank shall be prepared, containing distilled water, and preservative if required, and submitted as a blank sample with one sample set per session. If any result for any parameter indicates detectable concentrations, then efforts shall be made to determine and control the source of contamination.

9. REPORTING REQUIREMENTS

9.1. Reporting

Reports, drawings, data, studies and the like that are specified in this operational certificate shall be submitted in hardcopy and electronic formats unless otherwise specified by the Director.

9.2. Non-compliance Reporting

The Director shall be immediately notified of any non-compliance with the requirements of this operational certificate and take appropriate remedial action. Written confirmation of all non-compliance events, including available test results, is required by facsimile or email to Environmental Protection Staff within 24 hours of the original notification unless otherwise directed by the Director.

9.3. Non-compliance Follow-up

Upon request, the operational certificate holder shall submit to the Director a written report within 30 days of the non-compliance occurrence. The report shall include, but not necessarily be limited to, the following:

i) All relevant information and test results related to the non-compliance;

ii) an explanation of the most probable cause(s) of the non-compliance; and,

iii) remedial action planned and/or taken to prevent similar non-compliance(s) in the future.

9.4. Annual Report

An annual report shall be submitted to the Director on or before June 30 each year for the previous calendar year.

Mark Love, P.Ag.
For Director, *Environmental Management Act*

Date Issued: June 20, 2014
Date Amended:
(most recent)

The annual report shall contain at a minimum:

i) the type and tonnage or volume of waste received, recycled, and landfilled for the year;

ii) occurrences or observations of wildlife attempting to access the facility; and,

iii) the results of any monitoring programs undertaken by the operational certificate holder for this site. Trend analysis, as well as an evaluation of any identified impacts of the discharges on the receiving environment in the previous year shall be carried out by a qualified professional, if determined to be necessary by the Director.

10 CLOSURE REQUIREMENTS

10.1 Notification of Closure

The Permittee shall notify the Director in writing of intentions to close the landfill site.

10.2 Closure Plan

An updated closure plan shall be submitted to the Director upon request. The closure plan shall, at a minimum, include the following:

i) Proposed end-use of the landfill property after closure;

ii) anticipated total waste volume, tonnage, and life remaining of the landfill;

iii) a topographic plan showing the final elevation contours of the landfill and surface water diversion and drainage controls;

iv) design of the final cover suited to the intended end-use of the site, including the thickness and permeability of barrier layers and drainage layers, and information on topsoil, vegetative cover and erosion prevention controls;

v) procedures for notifying the public about the closure and about alternative waste disposal facilities;

vi) rodent and nuisance wildlife control procedures;

vii) a comprehensive monitoring plan if determined to be necessary by a qualified professional, including groundwater monitoring, surface water monitoring, landfill gas monitoring, leachate monitoring, final cover monitoring, and erosion and settlement monitoring, for a minimum post-closure period of 25 years;

viii) a plan and accompanying design for the collection, storage and treatment/use of landfill gas for a minimum 25 year post-closure period (if required;

ix) a plan for operation of any required pollution abatement engineering works such as leachate collection and treatment systems, for a minimum post-closure period of 25 years; and

x) an estimated cost, updated annually, to carry out closure and post-closure activities for a minimum period of 25 years.

10.3 Closure Funding

The Permittee shall ensure that sufficient funds will be available to provide for all closure and post-closure requirements as outlined in the closure plan required by Section 9.2, plus a reasonable contingency for any remediation which may be required.

10.4 Final Cover

The final cover system shall be designed by a qualified professional to match the intended end-use of the landfill site and to match the needs of any required environmental management systems (leachate minimization or recirculation, as the case may be, landfill gas collection and treatment, etc.). Generally, the final cover shall consist of a layer of 1 metre of low permeability ($<1 \times 10^{-5}$ cm/s) compacted soil followed by a layer of topsoil suitable for establishment of vegetation. Use of higher permeability soil must first be approved by the Director. The final cover shall be constructed with minimum and maximum slopes as specified by a qualified professional (see Section 2) to promote runoff and minimize erosion, with appropriate runon/runoff drainage controls, erosion controls, and gas venting controls. The site shall be seeded with a grass/legume mixture suited to the local climate.

10.5 Progressive Application of Final Cover

Completed portions of the landfill shall progressively receive final cover during the active life of the landfill. The maximum area of disposed refuse that has not yet received final cover shall not exceed 25% of the total final footprint area.

Final cover is to be applied according to the specifications identified in Section 9.4.

11. ENVIRONMENTAL IMPACT

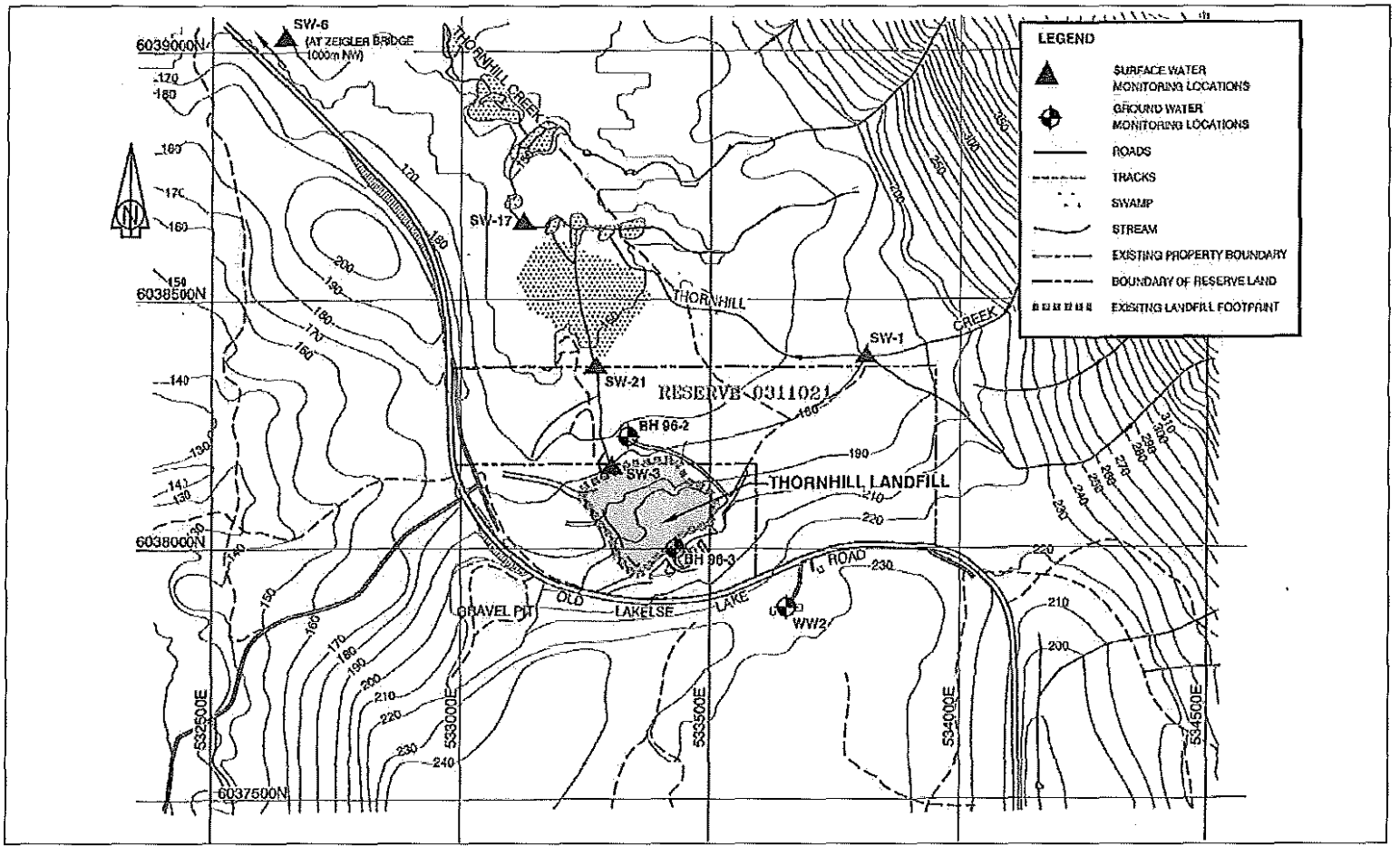
Inspections of the discharge will be carried out by Environmental Protection personnel as a part of the routine operational certificate inspection procedure. Based on these inspections and any other information available to the Director on the effect of the discharge on the receiving environment, the operational certificate holder may be required to undertake additional monitoring, undertake additional studies, install additional pollution control works, or change the method of operation.

Date Issued: June 20, 2014
Date Amended:
(most recent)

Mark Love, P.Ag.
For Director, *Environmental Management Act*

Site Plan A

N



OPERATIONAL CERTIFICATE: MR-4057
Date: June 20, 2014

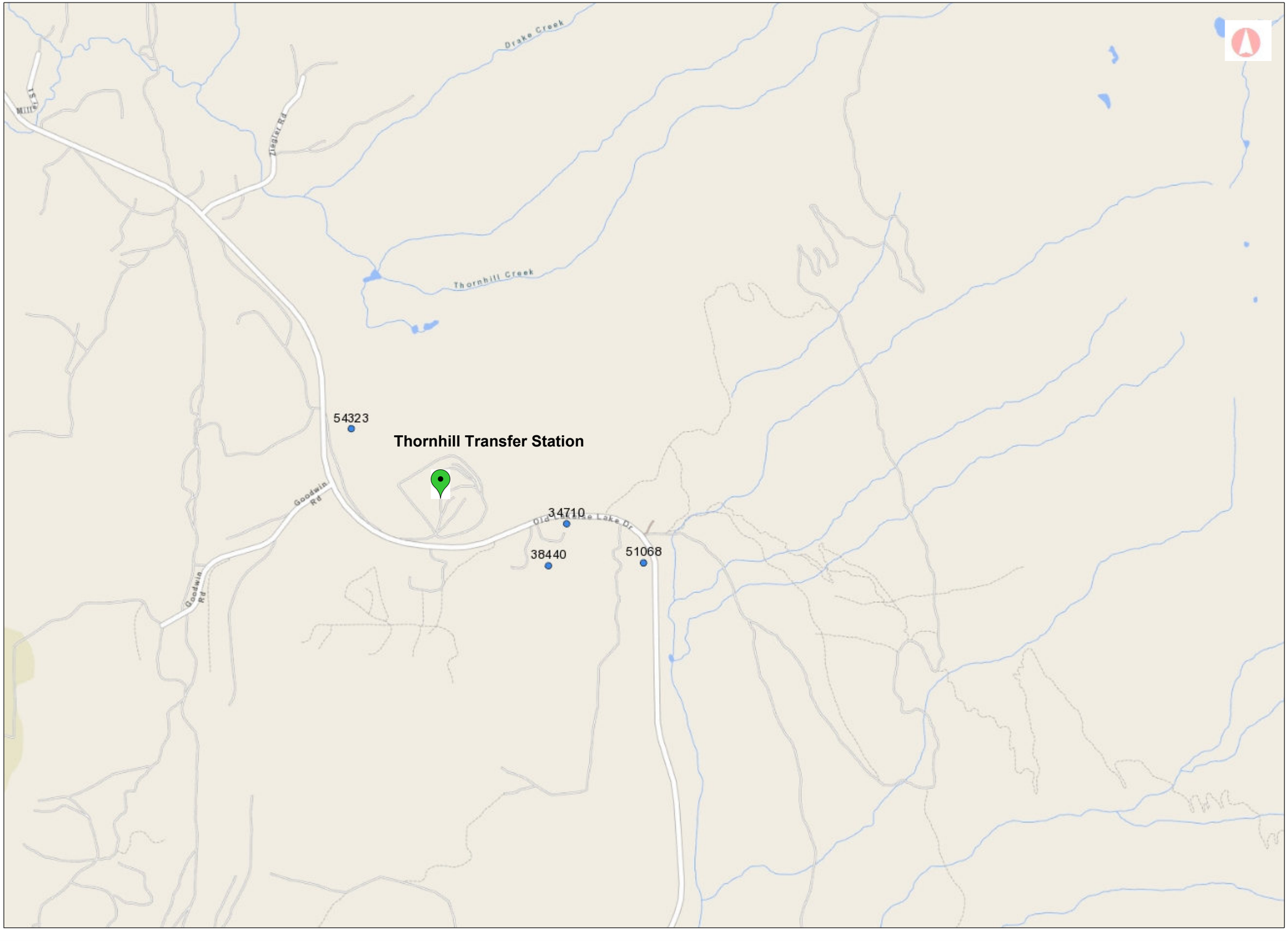
(Office Use Only)

M. Love

Mark Love, P. Ag.
for Director, Environmental Management Act
Skeena Region
(Office Use Only)

APPENDIX B

BC Water Atlas – Water Well Records



iMapBC Mapping

Legend

- Water Wells - All

0 0.44 0.9 km

1: 21,557

Copyright/Disclaimer

Datum:	NAD83
Projection:	WGS_1984_Web_Mercator_Auxiliary_Sphere

Key Map of British Columbia

BRITISH COLUMBIA Groundwater Wells and Aquifers

Log in

Well Summary

Well Tag Number: 34710
Well Identification Plate Number:
Owner Name: JIM KARDAMY LAKIS
Licenced Status: UNLICENSED

Well Status: NEW
Well Class:
Well Subclass:
Intended Water Use: Unknown Well Use

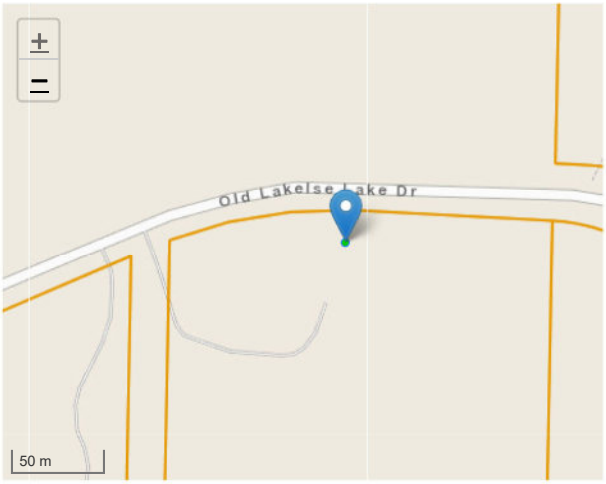
Observation Well Number:
Observation Well Status:
Environmental Monitoring System (EMS) ID:
Aquifer Number: 572
Alternative specs submitted (if required): No

Location Information

Street Address:
Town/City:
Legal Description:

Lot	
Plan	
District Lot	518
Block	
Section	
Township	
Range	
Land District	14 COAST RANGE 5
Property Identification Description (PID)	

Description of Well Location:
BCGS Mapsheet Number: 103I048433



Leaflet | Powered by Esri | Government of British Columbia, DataBC, GeoBC

Geographic Coordinates - North American Datum of 1983 (NAD 83)

Latitude: 54.490089
Longitude: -128.479799
UTM Northing: 6038176
UTM Easting: 533697
Zone: 9
Location Accuracy Code: (50 m accuracy)
Digitized from 1:20,000 mapping

Well Activity

Construction Date (YYYY-MM-DD)	Alteration Date (YYYY-MM-DD)	Decommission Date (YYYY-MM-DD)	Drilling Company
1976-05-01			Skeena Valley Water Wells

Well Completion Data

Total Depth Drilled:
Finished Well Depth: 237 feet
Final Casing Stick Up:
Depth to Bedrock:
Ground Elevation: 0 feet
Elevation Determined By:

Static Water Level (BTOC): 214 feet
Estimated Well Yield: 12 GPM
Artesian Flow:
Artesian Pressure:

Well Cap:
Well Disinfected: No
Drilling Method: UNK
Orientation of Well: vertical

Lithology

From (feet)	To (feet)	Lithology Raw Data	Description	Material Description	Relative Hardness	Colour	Water-Bearing Estimated Flow	Observations
0	52	gravel to 3" with sand						
52	54	boulder						
54	122	gravel to 3" with sand						
122	123	boulder						
123	237.10	gravel to 3" with sand						

Casing Details

No casing information available.

Surface Seal and Backfill Details

Surface Seal Material: Other
Surface Seal Installation Method:
Surface Seal Thickness:
Surface Seal Length:
Backfill Material Above Surface Seal:
Backfill Depth:

Screen Details

No screen assembly information available.

Intake Method:
Type:
Material: Other
Opening:
Bottom:

Well Development

Developed By:
Development Total Duration:

Well Yield

Estimation Method:
Estimation Rate:
Estimation Duration:

Well Decommissioning

Reason for Decommission:
Method of Decommission:
Decommission Details:
Sealant Material:
Backfill Material:

Comments

Disclaimer

The information provided should not be used as a basis for making financial or any other commitments. The Government of British Columbia accepts no liability for the accuracy, availability, suitability, reliability, usability, completeness or timeliness of the data or graphical depictions rendered from the data.

BRITISH COLUMBIA Groundwater Wells and Aquifers

Log in

Well Summary

Well Tag Number: 38440
Well Identification Plate Number:
Owner Name: HELMUT REINHART
Licenced Status: UNLICENSED

Well Status: NEW
Well Class:
Well Subclass:
Intended Water Use: Unknown Well Use

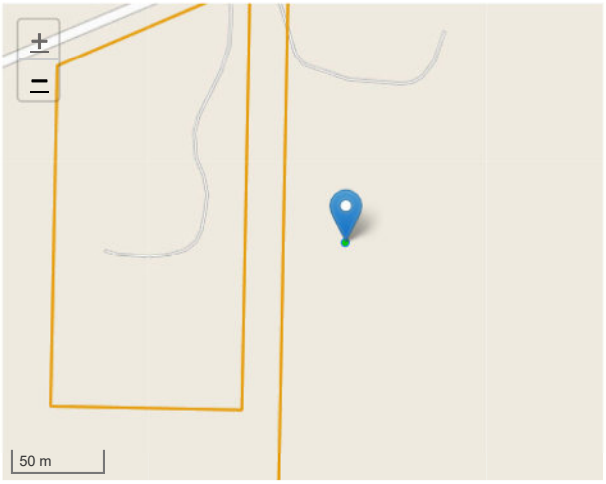
Observation Well Number:
Observation Well Status:
Environmental Monitoring System (EMS) ID:
Aquifer Number: 572
Alternative specs submitted (if required): No

Location Information

Street Address:
Town/City:
Legal Description:

Lot	
Plan	
District Lot	518
Block	
Section	
Township	
Range	5
Land District	14 COAST RANGE 5
Property Identification Description (PID)	

Description of Well Location:
BCGS Mapsheet Number: 103I048433



Leaflet | Powered by Esri | Government of British Columbia, DataBC, GeoBC

Geographic Coordinates - North American Datum of 1983 (NAD 83)

Latitude: 54.488808
Longitude: -128.480757
UTM Northing: 6038033
UTM Easting: 533636
Zone: 9
Location Accuracy Code: (50 m accuracy)
Digitized from 1:20,000 mapping

Well Activity

Construction Date (YYYY-MM-DD)	Alteration Date (YYYY-MM-DD)	Decommission Date (YYYY-MM-DD)	Drilling Company
1977-10-25			Skeena Valley Water Wells

Well Completion Data

Total Depth Drilled:
Finished Well Depth: 270 feet
Final Casing Stick Up:
Depth to Bedrock:
Ground Elevation: 0 feet
Elevation Determined By:

Static Water Level (BTOC): 235 feet
Estimated Well Yield: 0
Artesian Flow:
Artesian Pressure:

Well Cap:
Well Disinfected: No
Drilling Method: UNK
Orientation of Well: vertical

Lithology

From (feet)	To (feet)	Lithology Raw Data	Description	Material Description	Relative Hardness	Colour	Water-Bearing Estimated Flow	Observations
0	85	gravel to 4" with medium to coarse sand						
0	0	loose material.						
85	100	med to coarse, sand loose material						
100	236	gravel to 4" with med to coarse sand,						
0	0	loose material, started to drive easier.						
236	270	gravel to 3" with medium to coarse sand,						
0	0	water bearing.						

Casing Details

No casing information available.

Surface Seal and Backfill Details

Surface Seal Material: Other
Surface Seal Installation Method:
Surface Seal Thickness:
Surface Seal Length:
Backfill Material Above Surface Seal:
Backfill Depth:

Screen Details

No screen assembly information available.

Intake Method:
Type:
Material: Other
Opening:
Bottom:

Well Development

Developed By:
Development Total Duration:

Well Yield

Estimation Method:
Estimation Rate:
Estimation Duration:

Well Decommissioning

Reason for Decommission:
Method of Decommission:
Decommission Details:
Sealant Material:
Backfill Material:

Comments

LOTS OF WATER, HARD

Disclaimer

BRITISH COLUMBIA Groundwater Wells and Aquifers

Log in

Well Summary

Well Tag Number: 51068
Well Identification Plate Number:
Owner Name: COPPERVIEW ENTERPRIS
Licenced Status: UNLICENSED

Well Status: NEW
Well Class:
Well Subclass:
Intended Water Use: Private Domestic

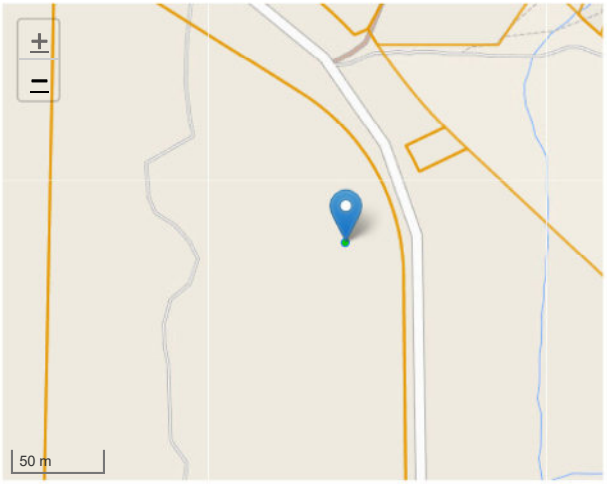
Observation Well Number:
Observation Well Status:
Environmental Monitoring System (EMS) ID:
Aquifer Number: 572
Alternative specs submitted (if required): No

Location Information

Street Address:
Town/City: JACK PINE FLATS
Legal Description:

Lot	
Plan	
District Lot	518
Block	
Section	
Township	
Range	5
Land District	14 COAST RANGE 5
Property Identification Description (PID)	

Description of Well Location:
BCGS Mapsheet Number: 103I048433



Leaflet | Powered by Esri | Government of British Columbia, DataBC, GeoBC

Geographic Coordinates - North American Datum of 1983 (NAD 83)

Latitude: 54.488895
Longitude: -128.475754
UTM Northing: 6038045
UTM Easting: 533960
Zone: 9
Location Accuracy Code: (50 m accuracy)
Digitized from 1:20,000 mapping

Well Activity

Construction Date (YYYY-MM-DD)	Alteration Date (YYYY-MM-DD)	Decommission Date (YYYY-MM-DD)	Drilling Company
1982-09-28			Industrial Drillers

Well Completion Data

Total Depth Drilled:
Finished Well Depth: 360 feet
Final Casing Stick Up:
Depth to Bedrock: 270 feet
Ground Elevation: 0 feet
Elevation Determined By:

Static Water Level (BTOC):
Estimated Well Yield: 20 GPM
Artesian Flow:
Artesian Pressure:

Well Cap:
Well Disinfected: No
Drilling Method: UNK
Orientation of Well: vertical

Lithology

From (feet)	To (feet)	Lithology Raw Data	Description	Material Description	Relative Hardness	Colour	Water-Bearing Estimated Flow	Observations
0	40	silt						
40	225	silt, sand, gravel						
225	270	clay , sand, boulders						
270	360	bedrock						

Casing Details

No casing information available.

Surface Seal and Backfill Details

Surface Seal Material: Other
Surface Seal Installation Method:
Surface Seal Thickness:
Surface Seal Length:
Backfill Material Above Surface Seal:
Backfill Depth:

Screen Details

No screen assembly information available.

Intake Method:
Type:
Material: Other
Opening:
Bottom:

Well Development

Developed By:
Development Total Duration:

Well Yield

Estimation Method:
Estimation Rate:
Estimation Duration:

Well Decommissioning

Reason for Decommission:
Method of Decommission:
Decommission Details:
Sealant Material:
Backfill Material:

Comments

DRY HOLE

Disclaimer

BRITISH COLUMBIA Groundwater Wells and Aquifers

Log in

Well Summary

Well Tag Number: 54323
Well Identification Plate Number:
Owner Name: WALTER BOURELLE
Licenced Status: UNLICENSED

Well Status: NEW
Well Class:
Well Subclass:
Intended Water Use: Private Domestic

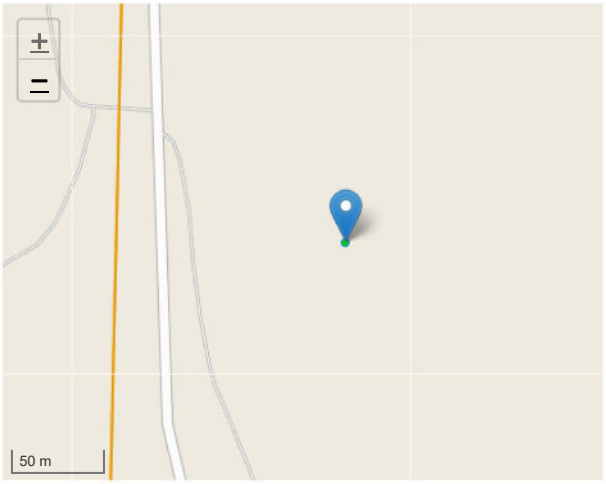
Observation Well Number:
Observation Well Status:
Environmental Monitoring System (EMS) ID:
Aquifer Number: 572
Alternative specs submitted (if required): No

Location Information

Street Address: GARBAGE DUMP THORNHILL
Town/City: TERRACE
Legal Description:

Lot	
Plan	1304
District Lot	665
Block	
Section	
Township	
Range	
Land District	14 COAST RANGE 5
Property Identification Description (PID)	

Description of Well Location:
BCGS Mapsheet Number: 103I048433



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Geographic Coordinates - North American Datum of 1983 (NAD 83)

Latitude: 54.492996
Longitude: -128.491125
UTM Northing: 6038494
UTM Easting: 532961
Zone: 9
Location Accuracy Code: (50 m accuracy)
Digitized from 1:20,000 mapping

Well Activity

Construction Date (YYYY-MM-DD)	Alteration Date (YYYY-MM-DD)	Decommission Date (YYYY-MM-DD)	Drilling Company
1984-12-14			Industrial Drillers

Well Completion Data

Total Depth Drilled:
Finished Well Depth: 200 feet
Final Casing Stick Up:
Depth to Bedrock:
Ground Elevation: 0 feet
Elevation Determined By:

Static Water Level (BTOC):
Estimated Well Yield:
Artesian Flow:
Artesian Pressure:

Well Cap:
Well Disinfected: No
Drilling Method:
Orientation of Well: vertical

Lithology

From (feet)	To (feet)	Lithology Raw Data	Description	Material Description	Relative Hardness	Colour	Water-Bearing Estimated Flow	Observations
0	122	clay, rocks, boulders						
122	200	clay gravel layers, some sand						

Casing Details

No casing information available.

Surface Seal and Backfill Details

Surface Seal Material:
Surface Seal Installation Method:
Surface Seal Thickness:
Surface Seal Length:
Backfill Material Above Surface Seal:
Backfill Depth:

Screen Details

No screen assembly information available.

Intake Method:
Type:
Material:
Opening:
Bottom:

Well Development

Developed By:
Development Total Duration:

Well Yield

Estimation Method:
Estimation Rate:
Estimation Duration:

Well Decommissioning

Reason for Decommission:
Method of Decommission:
Decommission Details:
Sealant Material:
Backfill Material:

Comments

DRY HOLE

Disclaimer

APPENDIX C

Borehole Logs

BOREHOLE LOG

PROJECT: PRJ96020

BOREHOLE: BH96-1
PAGE 1 OF 4

Thornhill Landfill
Hydrogeotechnical Study
For R.D. Kitimat-Stikine

DATE: 11 June 1996
GEOLOGIST: Bryony Hansen
ELEVATION: n/a

DEPTH (m)	STRATIGRAPHY	STRATIGRAPHIC DESCRIPTION	MONITOR DETAILS & NUMBER	SAMPLE NUMBER	T.O.P. = 0.75 m above ground WATER LEVEL	COMMENTS
		Coarse SAND. Dark grey-brown. Some gravel Trace cobbles. Loose. Moist			hole dry to 62.50 m below ground	AIR ROTARY DRILLING Drilling Contractor: Double D Drilling, Terrace, BC
2.00						
4.00						
6.00						
7.62						
8.00		GRAVEL and Coarse SAND Grey-brown Trace cobbles Loose Damp				
9.14						
10.00		GRAVEL and Coarse SAND Grey. Some cobbles Trace silt Loose Dry				
12.00						
14.00						
15.21						
16.00		GRAVEL and Coarse SAND Grey-brown Some cobbles Trace silt Loose Damp				
18.00						
18.29		GRAVEL Some sand Some cobbles Loose Dry				
20.00						

BOREHOLE LOG

PROJECT: PRJ96020

BOREHOLE: BH96-1

Thornhill Landfill
Hydrogeotechnical Study
For R.D. Kitimat-Stikine

DATE: 11 June 1996
GEOLOGIST: Bryony Hansen
ELEVATION: n/a

DEPTH (m)	STRATIGRAPHY	STRATIGRAPHIC DESCRIPTION	MONITOR DETAILS & NUMBER	SAMPLE NUMBER
		GRAVEL. Some sand. Some cobbles. Loose. Dry.		
22.00				
22.86		GRAVEL and Coarse SAND. Some cobbles. Trace silt. Loose. Damp.		
24.00				
24.38		GRAVEL. Some sand. Some cobbles. Loose. Dry.		
26 00				
27 43		GRAVEL and Coarse SAND. Some cobbles. Trace silt. Loose. Damp.		
28 00				
30 00				
3232.00		Coarse gravely SAND Loose Moist		
34 00				
36 00				
38 00				
39 62				
10 00				

BOREHOLE LOG

PROJECT: PRJ96020

BOREHOLE: BH96-1

Thornhill Landfill
Hydrogeotechnical Study
For R.D. Kitimat-Stikine

DATE: 11 June 1996
GEOLOGIST: Bryony Hansen
ELEVATION: n/a

DEPTH (m)	STRATIGRAPHY	STRATIGRAPHIC DESCRIPTION	MONITOR DETAILS & NUMBER	SAMPLE NUMBER
42.00		Medium and Coarse SAND. Dark grey-brown. Loose. Moist.		
44 00				
46 00				
46 64				
		Medium SAND Dark grey-brown. Loose. Moist.		
48 00				
48 76				
		Silty SAND Grey-brown. Trace gravel. Trace clay. Loose. Moist.		
50 00				
51 82				
52 00				
		SAND and GRAVEL Trace silt. Trace clay. Loose. Moist.		
53 64				
54 00				
		Fine silty SAND Some clay. Loose. Moist.		
56 00				
57 92				
58 00				
		Gravely Coarse Medium SAND Trace silt. Loose. Moist.		
60.00				

BOREHOLE LOG

PROJECT: PRJ96020

BOREHOLE: BH96-1
PAGE 4 OF 4

Thornhill Landfill
Hydrogeotechnical Study
For R.D. Kitimat-Stikine

DATE: 11 June 1996
GEOLOGIST: Bryony Hansen
ELEVATION: n/a

DEPTH (m)	STRATIGRAPHY	STRATIGRAPHIC DESCRIPTION	MONITOR DETAILS & NUMBER	SAMPLE NUMBER
		Gravely Coarse-Medium SAND. Trace silt. Loose. Moist.		
62.00				
62.8		BOTTOM OF HOLE AT 62.80 m		
64.00				
66.00				
68.00				
70.00				
72.00				
74.00				
76.00				
78.00				
80.00				

BOREHOLE LOG

PROJECT: PRJ96020

BOREHOLE: BH96-2

Thornhill Landfill
Hydrogeotechnical Study
For R.D. Kitimat-Stikine

DATE: 12 June 1996
GEOLOGIST: Bryony Hansen
ELEVATION: n/a

DEPTH (m)	STRATIGRAPHY	STRATIGRAPHIC DESCRIPTION	MONITOR DETAILS & NUMBER	SAMPLE NUMBER	SAMPLE INTERVAL	T.O.P = 1.02 m above ground WATER LEVEL	COMMENTS
0.91		SAND and GRAVEL FILL		S1			AIR ROTARY DRILLING
2.00		CLAY Brown. Occasional rounded gravel. Soft. Moist. Stiff below 1.52 m.					DRILLING CONTRACTOR DOUBLE D DRILLING, TERRACE, BC
4.27		CLAY Grey-brown. Occasional red-brown mottling. Stiff. Moist.					
6.00							
8.00							
10.00						▽ 10.00 m 13/06/96	
12.00							
14.00				S2			
16.15		BOTTOM OF HOLE AT 16.15 m					
16.00							
18.00							
20.00							

BOREHOLE LOG

PROJECT: PRJ96020

BOREHOLE: BH96-3

Thornhill Landfill
Hydrogeotechnical Study
For R.D. Kitimat-Stikine

DATE: 12 June 1996
GEOLOGIST: Bryony Hansen
ELEVATION: n/a

DEPTH (m)	STRATIGRAPHY	STRATIGRAPHIC DESCRIPTION	MONITOR DETAILS & NUMBER	SAMPLE NUMBER	SAMPLE INTERVAL	T.O.P. = 1.18 m above ground / WATER LEVEL	COMMENTS
		GRAVEL FILL Dark grey-brown Some silt Loose Moist					AIR ROTARY DRILLING
1.52							
2.00		SAND and GRAVEL FILL Dark grey-brown Some silt Some clay Occasional pieces of wood, plastic, glass and cloth Loose Moist Leachate odour.					
2.44							
4.00		CLAY FILL Dark grey-brown Some gravel Some pieces of wood and glass Stiff Moist		S1			
4.57							
6.00		CLAY Dark grey-brown Some gravel Some sand Stiff Moist					
8.00							
9.14							
10.00		Clayey GRAVEL Brown Loose Wet Saturated below 11.58 m Strong diesel odour below 10.36 m		S2			S2 submitted for analysis of hydro carbon content
12.00						▽ 12.94 m 13/06/96	
13.72							
14.00		BOTTOM OF HOLE AT 13.72 m					
16.00		Drilling Contractor: Double D Drilling, Terrace, B.C.					
8.00							
25.00							

APPENDIX D

Analytical Results

Table D-1: Surface Water Analytical Results
2019 Thornhill Transfer Station Annual Monitoring Program
Regional District of Kitimat-Stikine

Sample ID	CSR Aquatic Life Standard, Freshwater (AW-F)	CSR Drinking Water Standard (DW)	Units	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2
Location																																		
Monitoring Well																																		
Laboratory ID				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sample Date				1996-Jun-01	1996-Oct-01	1997-Jun-01	1997-Dec-04	1998-May-04	1998-Sep-24	1999-Jan-27	1999-Apr-01	1999-Nov-01	2000-Mar-17	2000-Aug-15	2000-Dec-19	2001-May-07	2001-Dec-01	2002-Apr-01	2002-Jun-01	2003-Jan-01	2003-Mar-01		2003-Aug-01	2004-May-14	2004-Oct-18	2005-Jun-01	2005-Nov-01	2006-Jun-01	2007-Jan-02	2007-Jun-18	2008-May-27	2008-Oct-10		2009-Aug-26
QAQC				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	FDA	FD	-	-	-	-	-	-	-	-	-	FDA	FD	-
Field Observations																																		
pH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Temperature	-	-	°C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conductivity	-	-	uS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Oxygen	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation Reduction Potential	-	-	mV	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Water level	-	-	m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conventional Parameters																																		
Conductivity	-	-	uS/cm	-	384	372	392	396	376	-	385	-	309	-	-	359	357	279	368	356	359	414	390	387	401	389	398	394	402	391	381	387	387	383
Hardness (Total as CaCO3)	-	-	mg/L	-	90	77.8	75.7	81.3	96.4	81.6	70	72	60	54	67	73	70	68	68	69	85	-	89	77	108	86	110	78	73	72	88	86	94	92
Hardness (Dissolved as CaCO3)	-	-	mg/L	-	90	77.8	75.7	81.3	96.4	81.6	70	72	60	54	67	73	70	68	68	69	85	-	89	77	108	86	110	78	73	72	88	86	94	92
pH	-	-	-	-	8.1	8.0	7.5	7.9	8.1	-	-	-	8.0	8.0	-	8.0	7.8	6.7	8.0	8.0	7.9	8.1	8.3	7.7	8.1	7.8	8.1	7.8	7.8	7.9	8.0	8.3	8.4	7.8
Total Suspended Solids	-	-	mg/L	60,000	9,450	4,200	5,010	88	123	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	784	-	-	-	-	-	-	-
Total Dissolved Solids	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Alkalinity, Total (as CaCO3)	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ammonia, (as N)	1.3 - 18.5[a]	-	mg/L	<0.1	0.11	0.14	0.04	0.07	0.161	0.012	0.07	-	0.04	0.03	0.05	0.04	0.03	0.157	0.07	0.14	0.12	0.136	0.07	0.04	0.12	0.12	0.051	-	-	-	<0.03	0.03	0.09	0.03
Bromide (Br)	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride (Cl)	1500	-	mg/L	3.1	1.2	1.5	1.5	1.9	0.6	1.1	5.2	1.2	1.5	0.9	0.9	0.9	1.3	1.1	5	0.8	0.7	1.9	1.1	1.6	0.7	1.3	0.8	1.24	2.2	1.92	3.2	2	2	2.8
Fluoride (F)	2.0-3.0[b]	-	mg/L	-	-	-	-	-	-	-	-	-	0.13	0.1	0.09	0.09	0.08	0.11	<0.05	0.13	0.13	-	0.11	0.16	-	<0.05	-	0.14	0.09	0.16	0.16	-	-	0.21
Nitrate (as N)	400	10	mg/L	-	0.135	0.085	0.468	0.314	0.116	0.66	0.2	0.37	-	0.25	0.15	0.16	0.16	0.18	<0.05	0.15	0.49	0.42	0.61	0.22	0.058	0.24	0.123	0.21	0.37	0.00016	0.18	-	-	0.2
Nitrite (as N)	0.2 - 2.0[c]	1	mg/L	-	0.039	0.010	0.057	0.013	0.02	<0.005	<0.002	<0.002	-	<0.002	0.03	0.004	0.004	0.18	0.009	0.008	0.006	0.011	0.002	0.003	0.003	0.003	0.007	0.01	0.01	<0.002	<0.01	0.013	0.016	ND
Nitrate + Nitrite (as N)	400	10	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Kjeldahl Nitrogen	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Phosphorus (P)-Total	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulfate (SO4)	1280 - 4290[b]	500	mg/L	10.3	3.7	7.0	13.0	9	2	11.9	10.2	11.8	8.6	8.8	7.4	7	7.1	6.2	11	6.2	9.8	9.6	10.2	5.8	3.2	4.8	3.2	-	7.29	6.08	5	3.9	3.7	4.2
Biological Oxygen Demand (BOD)	-	-	mg/L	-	-	-	-	<5	<5	-	<10	<10	<10	<10	<10	<10	< 10	<10	<10	<10	<10	<6	<10	<10	<10	4.8	-	<10	<10	<10	<6	<10	<10	ND
Chemical Oxygen Demand (COD)	-	-	mg/L	-	-	-	-	<20	41	11	32	-	<25	<25	<25	<25	30	<25	<25	68	216	23	26	<25	<10	130	16	39	<20	52	<30	<10	15	-
Total Metals																																		
Aluminum	-	9.5	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	0.09	0.006	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	0.05	0.01	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	10	1	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	0.0015	0.008	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bismuth	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	12	5	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	0.0005 - 0.004[b]	0.005	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cesium	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium[d]	0.01	0.05	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	0.04	0.001	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	0.02 - 0.09[b]	1.5	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron	-	6.5	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead	0.04 - 0.16[b]	0.01	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lithium	-	0.008	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Magnesium	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Manganese	-	1.5	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury	0.00025	0.001	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Molybdenum	10	0.25	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel	0.25 - 1.5[b]	0.08	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phosphorus	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rubidium	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	0.02	0.01	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silicon	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver	0.0005 - 0.015[b]	0.02	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	-	200	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Strontium	-	2.5	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulfur	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tellurium	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	0.003	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thorium	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	-	2.5	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	1	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tungsten	-	0.003	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	0.085	0.02	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	-	0.02	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	0.075 - 2.4[b]	3	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zirconium	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Metals																																		
Aluminum	-	9.5	mg/L	**5.00**	1.09	4.54	0.24	0.203	0.025	0.18	0.22	0.24	0.055	0.078	0.095	0.29	0.085	0.11	0.31	0.19	0.67	-	0.15	0.032	0.0046	0.08	0.0114	0.01	0.013	0.012	0.023	0.0288	0.0308	0.003
Antimony	0.09	0.006	mg/L	0.022	-	<0.2	0.00	0.0006	0.0002	0.027	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	< 0.001	<0.0001	<0.0001	<0.0001	<0.0001	-	<0.001	< 0.001	0.000137	0.0002	0.000175	< 0.001	<0.001	<0.001	<0.0006	0.00023	0.00019	ND
Arsenic	0.05	0.01	mg/L	<0.001	0.0051	<0.2	0.00	0.0038	0.0038	<0.04	0.003	0.002	0.002	0.002	0.003	0.002	0.003	0.003	0.002	0.003	0.002	-	0.002	0.001	0.0043	0.0025	0.0044	0.002	0.001	0.002	0.0023	0.0029	0.00298	0.0023
Barium	10	1	mg/L	<0.1	0.03	0.04	0.03	0.03	0.03	0.027	0.02	0.023	0.02	0.016	0.022	0.025	0.019	0.021	0.023	0.021	0.031	-	0.029	0.022	0.0262	0.02	0.0228	0.019	0.02	0.021	0.039	0.0188	0.0182	0.075
Beryllium	0.0015	0.008	mg/L	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.01	< 0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	< 0.001	<0.00002	< 0.0002	0.00002	< 0.001	<0.001	<0.001	<0.0004	<0.00001	<0.00001	ND
Bismuth	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	< 0.001	<0.00002	< 0.0002	0.00002	< 0.001	<0.001	<0.001	-	<0.000005	<0.000005	ND
Boron	12	5	mg/L	-	0.3	-	-	-	-	0.169	0.19	0.15	0.15	0.18	0.14	0.19	0.14	0.17	0.2	0.15	0.18	-	0.19	0.19	0.152	0.17	0.148	0.15	0.15	0.15	0.162	0.165	0.155	0.169
Cadmium	0.0005 - 0.004[b]	0.005	mg/L	<0.001	<0.0002	<0.002	<0.002	<0.0002	0.0002	<0.0001	<0.0002	0.0003	0.0003	<0.0002	<0.0002	0.0005	< 0.0002	<0.0002	<0.0002	<0.0002	<0.0002	-	<0.0002	< 0.0002	0.00003	0.00007	0.00002	< 0.0002	<0.0002	<0.0002	0.00006	0.000037	0.000053	0.00007
Calcium	-	-	mg/L	21	18	15	14	14	16	14	13	12	11	11	11	11	11	10	11	11	13	-	14	12	17	13	18	13	12	12	12	12	13	14
Cesium	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium[d]	0.01	0.05	mg/L	<0.02	0.002	<0.01	<0.001	<0.001	<0.001	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	< 0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	< 0.001	<0.0002	0.0005	0.0002	< 0.001	<0.001	<0.001	<0.001	<0.0001	<0.0001	ND
Cobalt	0.04	0.001	mg/L	<0.02	<0.02	<0.01	<0.01	<0.001	<0.01	<0.003	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	< 0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	< 0.001	0.000042	< 0.0002	0.000018	< 0.001	<0.001	<0.001	0.0001	0.000038	0.000044	ND
Copper	0.02 - 0.09[b]	1.5	mg/L	0.01	0.002	<0.01	0.00	0.002	0.004	0.015	0.002	0.008	0.001	0.001	<0.001	0.002	0.001	<0.001	0.002	0.001	0.003	-	0.001	0.002	0.00024	0.0007	0.00022	< 0.001	0.001	<0.001	0.0095	0.0007	0.00068	0.0053
Iron	-	6.5	mg/L	7.00	0.2	0.53	0.18	0.18	-	0.098	0.16	0.18	0.05	0.08	0.12	0.2	0.09	0.12	0.28	0.14	0.37	-	0.19	< 0.05	<0.005	0.04	0.005	< 0.05	<0.05	<0.05	0.06	0.026	0.029	0.008
Lead	0.04 - 0.16[b]	0.01	mg/L	<0.001	<0.001	<0.01	<0.001	<0.001	<0.001	<0.02	<0.001	0.003	<0.001	<0.001	<0.001	<0.001	< 0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	< 0.001	<0.00001	< 0.0002	0.00001	< 0.001	<0.001	<0.001	0.0002	0.000032	0.000035	ND
Lithium	-	0.008	mg/L	-	0.11	-	-	-	-	-	-	-	-	-	-	0.001	-	-	0.001	0.001	0.002	-	0.001	0.001	0.00132	0.0016	0.00132	0.001	0.002	<0.005	0.0013	0.0013	0.0014	ND
Magnesium	-	-	mg/L	11.5	10.8	10.0	10.0	11.4	13.9	11.2	9.4	10.3	7.9	6.4	9.6	10.9	10.4	10.2	10.0	9.9	12.7	-	13.1	11.2	15.8	13.0	16.2	11.2	10.2	10.4	10.2	9.9	11.6	12.0
Manganese	-	1.5	mg/L	0.28	0.134	0.116	0.044	0.058	0.005	0.01	0.048	0.008	0.004	0.015	0.013	0.042	0.017	0.014	0.006	0.058	0.072	-	0.01	< 0.001	0.0172	0.042	0.0057	0.026	0.0160	0.0330	0.0151	0.0010	0.00205	ND
Mercury	0.00025	0.001	mg/L	-	<0.00005	<0.00005	0.00001	<0.00001	<0.00001	0.00011	<0.00005	<0.00005	<0.00002	<0.00002	<0.00002	<0.00002	< 0.00002	<0.00002	<0.00002	<0.00002	<0.00002	-	<0.00002	< 0.02	<0.00005	< 0.02	0.00005	< 0.02	<0.0002	<0.00002	<0.00006	-	-	ND
Molybdenum	10	0.25	mg/L	<0.01	<0.03	<0.03	<0.03	<0.03	<0.03	0.005	0.008	0.007	0.008	0.008	0.007	0.006	0.007	0.006	0.0043	0.0042	0.007	-	0.0055	0.0052	0.00365	0.0038	0.0034	0.0044	0.0052	0.0062	0.0062	0.0052	0.00502	0.006
Nickel	0.25 - 1.5[b]	0.08	mg/L	<0.01	<0.02	<0.02	<0.02	<0.02	<0.05	<0.008	0.002	<0.001	<0.001	<0.001	<0.001	0.001	0.002	0.001	0.002	<0.001	0.004	-	0.001	0.001	0.00037	0.001	0.00024	< 0.001	<0.001	<0.001	0.001	0.000048	0.00042	ND
Phosphorus	-	-	mg/L	-	-	-	-	-	-	-	-	-	0.13	0.1	0.23	0.18	0.19	0.19	0.2	0.18	0.17	-	0.23	< 0.15	<0.1	0.11	0.1	< 0.15	<0.15	<0.15	-	0.069	0.067	-
Potassium	-	-	mg/L	5	-	-	-	-	-	10.8	8.3	9.07	7.93	6.86	8.83	8.67	9.19	8.1	8.86	9.32	9.93	-	11.1	9.2	11	9.19	11	9.1	8.7	9.6	-	9.08	9.6	10.3
Rubidium	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	0.02	0.01	mg/L	-	<0.0005	<0.01	<0.0005	<0.0005	<0.0005	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	< 0.002	<0.002	<0.002	<0.002	<0.002	-	<0.001	< 0.001	<0.0002	< 0.0002	0.0002	< 0.001	<0.001	<0.001	0.0011	0.0001	0.00006	0.0001
Silicon	-	-	mg/L	-	-	-	-	-	-	-	-	-	4.61	9.08	7.79	7.43	7.78	7.56	7.54	7.06	`	-	9.2	8.4	-	9.63	-	3.5	3.2	3.2	-	3.09	3.47	3.93
Silver	0.0005 - 0.015[b]	0.02	mg/L	<0.01	<0.0001	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	<0.0001	< 0.00025	<0.00002	< 0.00005	0.00002	< 0.00025	<0.00025	<0.00025	<0.00008	<0.000005	<0.000005	ND
Sodium	-	200	mg/L	52	61	-	-	-	-	59.2	48.7	52.4	41.3	34.5	51.7	52	51.6	50.9	52.3	54.2	55.1	-	61.1	55.3	46.9	51	48.8	52.4	51.9	55	49.3	52.4	50.9	52.9
Strontium	-	2.5	mg/L	-	-	-	-	-	-	-	-	-	0.12	0.13	0.13	0.13	0.13	0.12	0.12	0.12	0.14	-	0.16	0.13	0.168	0.143	0.165	0.14	0.13	0.13	-	0.136	0.148	0.16
Sulfur	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tellerium	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	0.003	-	mg/L	-	-	-	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	< 0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	<0.0001	< 0.0001	0.000006	< 0.00002	0.000007	< 0.0001	<0.0001	<0.0001	<0.0001	0.000005	0.000005	ND
Thorium	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	-	2.5	mg/L	-	-	-	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	< 0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	< 0.001	<0.00001	< 0.0002	-	< 0.001	<0.001	<0.001	-	0.00002	0.00002	ND
Titanium	1	-	mg/L	0.02	-	-	<0.01	<0.01	<0.01	<0.003	0.009	0.007	<0.001	0.003	0.003	0.008	0.004	0.003	0.1	0.008	0.019	-	0.004	< 0.001	<0.003	0.0019	0.003	< 0.001	<0.001	<0.001	<0.02	0.0006	0.0007	ND
Tungsten	-	0.003	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	0.085	0.02	mg/L	-	-	-	0.00	0.00605	0.00461	-	0.0046	0.0036	0.0033	0.0029	0.0031	0.0025	0.0027	0.002	0.0029	0.0025	0.0023	-	0.0027	0.0019	0.00271	0.0022	0.00252	0.0023	0.0027	0.0025	0.0026	0.00253	0.00252	0.0026
Vanadium	-	0.02	mg/L	0.01	<0.03	-	<0.03	<0.03	<0.03	<0.003	0.011	0.001	0.002	0.001	0.001	0.002	0.001	0.001	0.003	0.002	0.002	-	0.001	< 0.001	0.00059	0.0007	0.00075	< 0.001	<0.001	<0.001	<0.002	0.0007	0.0007	ND
Zinc	0.075 - 2.4[b]	3	mg/L	0.02	<0.005	0.006	0.007	<0.005	<0.005	<0.002	<0.005	0.005	<0.005	<0.005	<0.005	0.005	< 0.005	0.009	<0.005	<0.005	0.008	-	<0.005	< 0.005	<0.0001	0.001	0.0001	< 0.005	<0.005	<0.005	0.014	0.0004	0.0004	0.039
Zirconium	-	-	mg/L	-	-	-	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	< 0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	< 0.01	<0.005	< 0.002	0.005	< 0.01	<0.01	<0.010	-	-	-	ND

NOTES

BC CSR AW-F — BC Contaminated Sites Regulation Water Quality Guidelines for Protection of Freshwater Aquatic Life
BC CSR LW — BC Contaminated Sites Regulation Water Quality Guidelines for Protection of Livestock
BC CSR DW — BC Contaminated Sites Regulation Water Quality Guidelines for Drinking Water

Italics indicate that the laboratory detection limit exceeds the applicable standard.
Standards shown are from the BC Contaminated Sites Regulation (CSR; BC Reg. 375/96, O.C. 1480/96 and M40/2019, includes amendments up to BC Regs. 11/2019 and 13/2019, updated to 24 Jan 2019)
[a] = pH dependent; [b] = hardness dependent, [c] = chloride dependent
[d] = most conservative standards applied for chromium (between Cr(III) and Cr(VI))
QAQC = quality assurance/quality control; FD = field duplicate;

Table D-1: Surface Water Analytical Results
2019 Thornhill Transfer Station Annual Monitoring Program
Regional District of Kitimat-Stikine

Sample Date	CSR Aquatic Life Standard, Freshwater (AW-F)	CSR Drinking Water Standard (DW)	Units	2009-Jun-15	2010-Feb-22	2010-Jun-15	2010-Oct-25	2011-Feb-15	2012-Feb-22	2012-May-08	2013-Jan-04	2013-Apr-15	2013-Jun-06	2013-Oct-22
Location				Thornhill Landfill										
Monitoring Well				BH96-2										
Sample ID				BH96-2	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2
Laboratory ID				-	-	-	-	-	-	-	-	-	-	-
QAQC				-	-	-	-	-	-	-	-	-	-	-
Field Observations														
pH	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Temperature	-	-	°C	-	-	-	-	-	-	-	-	-	-	-
Conductivity	-	-	uS/cm	-	-	-	-	-	-	-	-	-	-	-
Dissolved Oxygen	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Oxidation Reduction Potential	-	-	mV	-	-	-	-	-	-	-	-	-	-	-
Water level	-	-	m	-	-	-	-	-	-	-	-	-	-	-
Conventional Parameters														
Conductivity	-	-	uS/cm	383	371	390	392	391	383	390	382	377	377	391
Hardness (Total as CaCO3)	-	-	mg/L	92	75	70	76	82	70	82	75	77	77	73
Hardness (Dissolved as CaCO3)	-	-	mg/L	92	75	70	76	82	70	82	75	77	77	73
pH	-	-	-	7.8	7.4	7.7	8.2	8.0	7.9	7.8	8.1	8.0	8.0	8.0
Total Suspended Solids	-	-	mg/L	-	-	-	-	-	-	-	34	-	46	17
Total Dissolved Solids	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Alkalinity, Total (as CaCO3)	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Ammonia, (as N)	1.3 - 18.5[a]	-	mg/L	0.03	0.03	3.3	0.05	<0.03	0.06	0.05	0.12	0.1	0.07	0.08
Bromide (Br)	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Chloride (Cl)	1500	-	mg/L	2.8	3.6	3.8	2	2.6	3.2	2	3.3	2.5	3.4	2.9
Fluoride (F)	2.0-3.0[b]	-	mg/L	0.21	0.17	0.16	0.14	0.13	0.16	0.16	0.15	0.15	0.14	0.14
Nitrate (as N)	400	10	mg/L	0.2	0.23	0.26	0.16	8	0.29	0.2	0.13	0.12	<0.1	4.53
Nitrite (as N)	0.2 - 2.0[c]	1	mg/L	ND	ND	ND	ND	<0.01	<0.01	<0.01	-	0.012	<0.01	<0.01
Nitrate + Nitrite (as N)	400	10	mg/L	-	-	-	-	-	-	-	-	-	-	-
Total Kjeldahl Nitrogen	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Total Phosphorus (P)-Total	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Sulfate (SO4)	1280 - 4290[b]	500	mg/L	4.2	6.3	4.5	4.8	5.7	4.36	4.08	4.57	4.95	6.02	4.97
Biological Oxygen Demand (BOD)	-	-	mg/L	ND	<4	<4	<4	<4	<4	<4	ND	ND	4.6	<4
Chemical Oxygen Demand (COD)	-	-	mg/L	ND	<30	<30	<30	36	<30	<30	38	ND	<20	<20
Total Metals														
Aluminum	-	9.5	mg/L	-	-	-	-	-	-	-	-	-	-	-
Antimony	0.09	0.006	mg/L	-	-	-	-	-	-	-	-	-	-	-
Arsenic	0.05	0.01	mg/L	-	-	-	-	-	-	-	-	-	-	-
Barium	10	1	mg/L	-	-	-	-	-	-	-	-	-	-	-
Beryllium	0.0015	0.008	mg/L	-	-	-	-	-	-	-	-	-	-	-
Bismuth	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Boron	12	5	mg/L	-	-	-	-	-	-	-	-	-	-	-
Cadmium	0.0005 - 0.004[b]	0.005	mg/L	-	-	-	-	-	-	-	-	-	-	-
Calcium	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Cesium	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Chromium[d]	0.01	0.05	mg/L	-	-	-	-	-	-	-	-	-	-	-
Cobalt	0.04	0.001	mg/L	-	-	-	-	-	-	-	-	-	-	-
Copper	0.02 - 0.09[b]	1.5	mg/L	-	-	-	-	-	-	-	-	-	-	-
Iron	-	6.5	mg/L	-	-	-	-	-	-	-	-	-	-	-
Lead	0.04 - 0.16[b]	0.01	mg/L	-	-	-	-	-	-	-	-	-	-	-
Lithium	-	0.008	mg/L	-	-	-	-	-	-	-	-	-	-	-
Magnesium	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Manganese	-	1.5	mg/L	-	-	-	-	-	-	-	-	-	-	-
Mercury	0.00025	0.001	mg/L	-	-	-	-	-	-	-	-	-	-	-
Molybdenum	10	0.25	mg/L	-	-	-	-	-	-	-	-	-	-	-
Nickel	0.25 - 1.5[b]	0.08	mg/L	-	-	-	-	-	-	-	-	-	-	-
Phosphorus	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Potassium	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Rubidium	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Selenium	0.02	0.01	mg/L	-	-	-	-	-	-	-	-	-	-	-
Silicon	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Silver	0.0005 - 0.015[b]	0.02	mg/L	-	-	-	-	-	-	-	-	-	-	-
Sodium	-	200	mg/L	-	-	-	-	-	-	-	-	-	-	-
Strontium	-	2.5	mg/L	-	-	-	-	-	-	-	-	-	-	-
Sulfur	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Tellurium	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Thallium	0.003	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Thorium	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Tin	-	2.5	mg/L	-	-	-	-	-	-	-	-	-	-	-
Titanium	1	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Tungsten	-	0.003	mg/L	-	-	-	-	-	-	-	-	-	-	-
Uranium	0.085	0.02	mg/L	-	-	-	-	-	-	-	-	-	-	-
Vanadium	-	0.02	mg/L	-	-	-	-	-	-	-	-	-	-	-
Zinc	0.075 - 2.4[b]	3	mg/L	-	-	-	-	-	-	-	-	-	-	-
Zirconium	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Dissolved Metals														
Aluminum	-	9.5	mg/L	0.003	0.02	0.025	0.025	0.022	0.019	0.0061	0.0042	0.0068	0.021	0.015
Antimony	0.09	0.006	mg/L	ND	ND	ND	ND	<0.0005	<0.0005	<0.0005	0.0018	0.000159	<0.0005	<0.0005
Arsenic	0.05	0.01	mg/L	0.0023	0.0018	0.0017	0.0017	0.0017	0.0018	0.00274	0.00286	0.00228	0.00239	0.00209
Barium	10	1	mg/L	0.075	0.023	0.083	0.052	0.019	0.016	0.0473	0.0169	0.0169	0.0169	0.0156
Beryllium	0.0015	0.008	mg/L	ND	ND	ND	ND	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Bismuth	-	-	mg/L	ND	ND	ND	ND	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.001	<0.001
Boron	12	5	mg/L	0.169	0.175	0.188	0.201	0.19	0.17	0.158	0.144	0.186	0.163	0.149
Cadmium	0.0005 - 0.004[b]	0.005	mg/L	0.00007	0.00017	0.00033	0.0001	0.00011	0.0002	0.000069	0.000051	0.000132	0.00024	0.000194
Calcium	-	-	mg/L	14	13	-	-	13	11	13	13	12	13	13
Cesium	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Chromium[d]	0.01	0.05	mg/L	ND	ND	ND	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cobalt	0.04	0.001	mg/L	ND	ND	ND	ND	<0.0005	<0.0005	<0.0005	<0.0005	0.000048	<0.0005	<0.0005
Copper	0.02 - 0.09[b]	1.5	mg/L	0.0053	0.0043	0.0047	0.0148	0.0018	0.0017	0.00852	0.00028	0.00028	0.0007	0.00131
Iron	-	6.5	mg/L	0.008	ND	0.021	0.036	0.013	0.01	0.0229	<0.005	<0.005	0.0136	0.0059
Lead	0.04 - 0.16[b]	0.01	mg/L	ND	0.0002	ND	0.0019	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Lithium	-	0.008	mg/L	ND	ND	ND	ND	<0.005	<0.005	<0.005	<0.005	0.00156	<0.005	<0.005
Magnesium	-	-	mg/L	12.0	10.6	10.4	10.0	11.8	9.5	12.2	12.0	10.5	11.1	11.0
Manganese	-	1.5	mg/L	ND	0.01	ND	0.006	0.004	0.005	0.0322	0.0547	0.0246	0.016	0.0039
Mercury	0.00025	0.001	mg/L	ND	ND	ND	ND	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Molybdenum	10	0.25	mg/L	0.006	0.007	0.006	0.006	0.006	0.006	0.0049	0.0046	0.00591	0.0053	0.005
Nickel	0.25 - 1.5[b]	0.08	mg/L	ND	ND	ND	0.003	<0.001	<0.001	<0.001	<0.001	0.00066	<0.001	0.0012
Phosphorus	-	-	mg/L	-	-	-	-	0.079	0.088	0.054	0.044	0.059	0.069	0.101
Potassium	-	-	mg/L	10.3	9.95	10.1	9.85	11.3	9.39	10	9.88	9.88	10	10.1
Rubidium	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Selenium	0.02	0.01	mg/L	0.0001	ND	ND	ND	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Silicon	-	-	mg/L	3.93	3.91	3.92	3.61	4.19	3.53	3.65	3.54	3.79	3.82	3.91
Silver	0.0005 - 0.015[b]	0.02	mg/L	ND	ND	ND	ND	<0.000005	<0.000005	<0.000005	<0.00002	<0.00002	<0.00002	<0.00002
Sodium	-	200	mg/L	52.9	56.6	52.8	56.8	63.7	53.2	51.1	49	54.5	54.6	57.1
Strontium	-	2.5	mg/L	0.16	0.147	0.142	0.141	0.156	0.135	0.159	0.159	0.149	0.155	0.144
Sulfur	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Tellerium	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Thallium	0.003	-	mg/L	ND	ND	ND	ND	<0.00005	<0.00005	<0.00005	<0.00005	0.000003	<0.00005	<0.00005
Thorium	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Tin	-	2.5	mg/L	ND	ND	ND	ND	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Titanium	1	-	mg/L	ND	ND	ND	ND	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Tungsten	-	0.003	mg/L	-	-	-	-	-	-	-	-	-	-	-
Uranium	0.085	0.02	mg/L	0.0026	0.0028	0.0027	0.0024	<0.0001	<0.0001	0.00218	0.00216	0.00244	0.00227	0.00193
Vanadium	-	0.02	mg/L	ND	ND	ND	ND	<0.005	<0.005	<0.005	<0.005	0.00074	<0.005	<0.005
Zinc	0.075 - 2.4[b]	3	mg/L	0.039	0.017	0.023	0.026	<0.005	<0.005	0.007	<0.005	0.0016	<0.005	<0.005
Zirconium	-	-	mg/L	ND	ND	ND	ND	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005

Sample Date	2014-May-06	2014-Oct-29	2015-Mar-28	2015-Aug-29	2015-Nov-29	2016-Mar-22	2016-Jul-25	2016-Oct-13	2017-Mar-28	2017-Aug-24
Location										
Monitoring Well										
Sample ID	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2
Laboratory ID	-	-	-	-	-	-	-	-	-	-
QAQC	-	-	-	-	-	-	-	-	-	-
Field Observations										
pH	-	-	-	-	-	-	-	-	-	-
Temperature	-	-	-	-	-	-	-	-	-	-
Conductivity	-	-	-	-	-	-	-	-	-	-
Dissolved Oxygen	-	-	-	-	-	-	-	-	-	-
Oxidation Reduction Potential	-	-	-	-	-	-	-	-	-	-
Water level	-	-	-	-	-	-	-	-	-	-
Conventional Parameters										
Conductivity	378	392	377	386	361	373	384	387	365	373
Hardness (Total as CaCO3)	90	76	131	83	-	75	103	90	120	102
Hardness (Dissolved as CaCO3)	90	76	131	83	-	75	103	90	120	102
pH	7.9	7.9	8.1	8.0	8.0	7.2	8.0	8.1	8.1	8.2
Total Suspended Solids	32	16	14	24	12	28	11	15	20	17
Total Dissolved Solids	-	-	-	-	-	-	-	-	-	-
Alkalinity, Total (as CaCO3)	-	-	-	-	-	-	-	-	-	-
Ammonia, (as N)	<0.03	<0.03	ND	0.068	0.07	0.047	0.23	0.043	<0.03	<0.03
Bromide (Br)	-	-	-	-	-	-	-	-	-	-
Chloride (Cl)	4.9	3.5	6.1	3.4	4	4.2	3.4	3.2	6.2	4.9
Fluoride (F)	0.14	0.15	0.16	0.15	0.15	0.16	0.15	0.15	0.16	0.15
Nitrate (as N)	0.552	0.496	0.8	0.62	0.96	0.53	0.31	0.26	0.13	0.65
Nitrite (as N)	<0.01	<0.01	ND	0.027	<0.01	0.014	<0.01	<0.01	<0.01	<0.01
Nitrate + Nitrite (as N)	-	-	-	-	-	-	-	-	-	-
Total Kjeldahl Nitrogen	-	-	-	-	-	-	-	-	-	-
Total Phosphorus (P)-Total	-	-	-	-	-	-	-	-	-	-
Sulfate (SO4)	4.01	4.02	4.6	4.4	-	4.5	4.2	3.9	3.1	4.2
Biological Oxygen Demand (BOD)	<4	<4	ND	<0.0001	4.1	<4.0	<4.0	<4.0	<4.0	<4.0
Chemical Oxygen Demand (COD)	<20	<20	ND	<20	<20	<20	<20	<20	<20	<20
Total Metals										
Aluminum	-	-	-	-	-	-	-	-	-	-
Antimony	-	-	-	-	-	-	-	-	-	-
Arsenic	-	-	-	-	-	-	-	-	-	-
Barium	-	-	-	-	-	-	-	-	-	-
Beryllium	-	-	-	-	-	-	-	-	-	-
Bismuth	-	-	-	-	-	-	-	-	-	-
Boron	-	-	-	-	-	-	-	-	-	-
Cadmium	-	-	-	-	-	-	-	-	-	-
Calcium	-	-	-	-	-	-	-	-	-	-
Cesium	-	-	-	-	-	-	-	-	-	-
Chromium[d]	-	-	-	-	-	-	-	-	-	-
Cobalt	-	-	-	-	-	-	-	-	-	-
Copper	-	-	-	-	-	-	-	-	-	-
Iron	-	-	-	-	-	-	-	-	-	-
Lead	-	-	-	-	-	-	-	-	-	-
Lithium	-	-	-	-	-	-	-	-	-	-
Magnesium	-	-	-	-	-	-	-	-	-	-
Manganese	-	-	-	-	-	-	-	-	-	-
Mercury	-	-	-	-	-	-	-	-	-	-
Molybdenum	-	-	-	-	-	-	-	-	-	-
Nickel	-	-	-	-	-	-	-	-	-	-
Phosphorus	-	-	-	-	-	-	-	-	-	-
Potassium	-	-	-	-	-	-	-	-	-	-
Rubidium	-	-	-	-	-	-	-	-	-	-
Selenium	-	-	-	-	-	-	-	-	-	-
Silicon	-	-	-	-	-	-	-	-	-	-
Silver	-	-	-	-	-	-	-	-	-	-
Sodium	-	-	-	-	-	-	-	-	-	-
Strontium	-	-	-	-	-	-	-	-	-	-
Sulfur	-	-	-	-	-	-	-	-	-	-
Tellurium	-	-	-	-	-	-	-	-	-	-
Thallium	-	-	-	-	-	-	-	-	-	-
Thorium	-	-	-	-	-	-	-	-	-	-
Tin	-	-	-	-	-	-	-	-	-	-
Titanium	-	-	-	-	-	-	-	-	-	-
Tungsten	-	-	-	-	-	-	-	-	-	-
Uranium	-	-	-	-	-	-	-	-	-	-
Vanadium	-	-	-	-	-	-	-	-	-	-
Zinc	-	-	-	-	-	-	-	-	-	-
Zirconium	-	-	-	-	-	-	-	-	-	-
Dissolved Metals										
Aluminum	0.0244	0.0132	0.012	0.007	-	0.01	0.009	0.008	0.019	0.0106
Antimony	<0.0005	<0.0005	0.0001	0.0002	-	0.0001	0.0002	0.0003	0.0001	<0.00020
Arsenic	0.00183	0.00219	0.0019	0.0024	-	0.0024	0.0033	0.0024	0.002	0.00222
Barium	0.0165	0.0173	0.019	0.019	-	0.019	0.019	0.021	0.021	0.0186
Beryllium	<0.0001	<0.0001	ND	<0.0001	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.00010
Bismuth	<0.001	<0.001	ND	<0.0001	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.00010
Boron	0.152	0.181	0.13	0.19	-	0.167	0.159	0.178	0.152	0.127
Cadmium	0.00025	0.000168	0.00078	0.00036	-	0.00202	0.00029	0.00028	0.00028	0.00018
Calcium	13	12	23	14	-	16	16	15	21	17.1
Cesium	-	-	-	-	-	-	-	-	-	-
Chromium[d]	<0.001	<0.001	ND	<0.0005	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.00050
Cobalt	<0.0005	<0.0005	0.0001	<0.00005	-	0.00006	0.00009	<0.00005	0.00006	<0.00010
Copper	0.00131	0.00093	0.0054	0.0014	-	0.002	0.0009	0.0007	0.0009	0.00116
Iron	0.0051	0.02	ND	<0.010	-	<0.010	0.014	<0.010	<0.010	<0.010
Lead	<0.0002	<0.0002	ND	<0.0001	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.00020
Lithium	<0.005	<0.005	0.0016	0.0015	-	0.0017	0.0018	0.0016	0.0019	0.00155
Magnesium	11.0	11.0	18	11.1	-	13.8	15.7	12.6	16.7	14.3
Manganese	0.0033	0.0151	0.0212	0.0038	-	0.0482	0.0882	0.0016	0.0025	0.00196
Mercury	<0.00001	<0.00001	ND	<0.00002	-	<0.00002	<0.00002	<0.00002	<0.00002	<0.000010
Molybdenum	0.0052	0.0051	0.0037	0.0057	-	0.0056	0.0052	0.0054	0.0038	0.00429
Nickel	0.0012	ND	0.0017	0.0006	-	0.0013	0.0007	0.0006	0.0006	<0.00040
Phosphorus	0.073	0.063	0.19	0.1	-	0.08	0.05	0.05	<0.05	0.062
Potassium	9.11	9.73	8	11.1	-	10.4	12.2	10	8.22	9.23
Rubidium	-	-	-	-	-	-	-	-	-	-
Selenium	<0.0001	<0.0001	ND	<0.0005	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.00050
Silicon	3.65	3.96	4.5	4.1	-	4.5	4.2	4.1	4.5	4.6
Silver	<0.00002	<0.00002	0.00014	<0.00005	-	<0.00005	<0.00005	<0.00005	<0.00005	<0.000050
Sodium	50.1	53.3	24.9	56.8	-	53.5	58.7	50.1	30.5	41.2
Strontium	0.154	0.149	0.198	0.16	-	0.166	0.173	0.166	0.194	0.173
Sulfur	-	-	ND	<1	-	2	<1	<1	<1	<3.0
Tellerium	-	-	-	-	-	-	-	-	<0.0002	<0.00050
Thallium	<0.00005	<0.00005	ND	<0.00002	-	<0.00002	<0.00002	<0.00002	<0.00002	<0.000020
Thorium	-	-	-	-	-	-	-	-	<0.0001	<0.00010
Tin	<0.005	<0.005	ND	<0.0001	-	<0.0002	<0.0002	<0.0002	<0.0002	0.00022
Titanium	<0.005	<0.005	ND	<0.0002	-	<0.005	<0.005	<0.005	<0.005	<0.0050
Tungsten	-	-	-	-	-	-	-	-	-	-
Uranium	0.00216	0.00233	0.00164	<0.005	-	0.00222	0.00213	0.00229	0.00191	0.00196
Vanadium	<0.005	<0.005	ND	0.00231	-	<0.001	<0.001	<0.001	<0.001	<0.0010
Zinc	<0.005	<0.005	0.005	<0.001	-	0.009	0.005	<0.004	<0.004	<0.0040
Zirconium	<0.0005	<0.0005	ND	0.004	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.00010

Sample Date	2018-Mar-19	2018-Jul-04	2018-Sep-10	2019-Apr-11	2019-Jul-17	2019-Jul-17	2019-Aug-08	2019-Aug-08	2019-Oct-10	2019-Oct-10	2019-Nov-06	2019-Nov-06
Location												
Monitoring Well												
Sample ID	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2	DUP	BH96-2	DUP	BH-96-2	DUP	BH96-2	DUP
Laboratory ID	L2070518-1	L2124909-8	L2163155-1	L2257784-5	L2313873-1	L2313873-2	L2325523-1	L2325523-2	L2364065-1	L2364065-2	L2379806-1	L2379806-2
QAQC	-	-	-	-	FDA	FD	FDA	FD	FDA	FD	FDA	FD
Field Observations												
pH	-	7.8	7.6	7.9	9.1	-	7.7	-	-	-	7.1	-
Temperature	-	7.7	8.0	9.4	7.9	-	11.9	-	-	-	7.9	-
Conductivity	-	355.0	256.7	258.9	255.3	-	285.2	-	-	-	338.0	-
Dissolved Oxygen	-	4.4	4.0	2.5	6.7	-	1.5	-	-	-	4.1	-
Oxidation Reduction Potential	-	386.4	213.5	374.4	263.1	-	382.7	-	-	-	415.8	-
Water level	-	9.37	9.51	9.58	9.12	-	9.16	-	-	-	9.17	-
Conventional Parameters												
Conductivity	345	365	360	377	378	384	379	379	376	381	387	383
Hardness (Total as CaCO3)	133	105	79.6	94.9	85.4	94.4	92.5	92.2	89.2	102	79.7	79.5
Hardness (Dissolved as CaCO3)	133	105	79.6	94.9	85.4		-					
pH	-	8.28	8.38	8.35	8.57	8.56	8.48	8.5	8.49	8.47	8.26	8.27
Total Suspended Solids	15.4	-	-	-	-	-	-	-	-	-	-	-
Total Dissolved Solids	195	-	229	-	262	326	247	257	211	255	249	239
Alkalinity, Total (as CaCO3)	179	194	190	200	201	206	236	238	216	231	219	259
Ammonia, (as N)	0.0276	0.0473	0.0055	0.162	0.0967	0.132	0.0926	0.0979	0.0787	0.0308	0.147	0.154
Bromide (Br)	-	-	-	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	<0.050	<0.050
Chloride (Cl)	4.47	3.36	2.66	0.77	1.5	1.11	1.39	1.44	1.33	0.84	1.56	1.51
Fluoride (F)	0.172	0.165	0.17	0.172	0.166	0.168	0.145	0.146	0.15	0.152	0.146	0.143
Nitrate (as N)	0.762	0.581	0.508	0.0345	0.213	0.15	0.139	0.172	0.139	0.0705	0.0719	0.0579
Nitrite (as N)	0.0068	0.0024	<0.0010	0.007	0.0053	0.0153	0.0211	0.0147	0.0055	0.0126	0.0082	0.0073
Nitrate + Nitrite (as N)	-	-	-	0.0415	-	-	-	-	-	-	-	-
Total Kjeldahl Nitrogen	0.379	0.396	0.277	0.271	0.251	0.195	0.172	0.248	0.172	0.106	0.509	0.478
Total Phosphorus (P)-Total	-	-	0.0962	0.097	0.171	0.182	0.197	0.159	0.0974	0.0396	0.115	0.105
Sulfate (SO4)	3.28	3.65	4.34	2.2	3.5	3.1	2.99	3.18	2.75	2.07	3.08	3.04
Biological Oxygen Demand (BOD)	-	-	-	-	-	-	-	-	-	-	-	-
Chemical Oxygen Demand (COD)	<20	<20	<20	-	<20	-	<20	-	-	-	<20	<20
Total Metals												
Aluminum	0.529	0.411	0.292	2.59	4.16	5.08	7.12	7.12	1.39	6.06	2.23	2.03
Antimony	0.00017	0.00016	0.00016	0.00028	0.00033	0.00036	0.0005	0.00047	0.00018	0.00039	0.00024	0.00022
Arsenic	0.00265	0.00273	0.00239	0.00562	0.00544	0.0065	0.00706	0.00665	0.00391	0.00674	0.00484	0.00482
Barium	0.0239	0.0232	0.0237	0.0405	0.0501	0.0539	0.0698	0.0669	0.0267	0.0632	0.0344	0.032
Beryllium	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00011	0.00014	0.00015	<0.00010	0.00012	<0.00010	<0.00010
Bismuth	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.00005	0.000051	<0.000050	<0.000050	<0.000050	<0.000050
Boron	0.119	0.148	0.147	0.157	0.15	0.143	0.168	0.173	0.177	0.167	0.183	0.184
Cadmium	0.00155	0.00121	0.000812	0.000943	0.00149	0.00166	0.00234	0.00207	0.00067	0.00204	0.00146	0.00143
Calcium	25	17.2	13.5	15.7	15.2	16.3	15.5	15.5	13.9	17	14.9	14.7
Cesium	0.000053	0.00004	0.000023	0.000237	0.00041	0.000474	0.000745	0.000728	0.000134	0.000534	0.000294	0.00026
Chromium[d]	0.00105	0.00057	0.00034	0.00301	0.00558	0.00705	0.00877	0.0086	0.00171	0.00709	0.00271	0.00252
Cobalt	0.00034	0.00035	0.00019	0.00181	0.00322	0.00385	0.00507	0.00485	0.00111	0.00404	0.00191	0.00171
Copper	0.00457	0.00502	0.00293	0.0087	0.0156	0.0177	0.0249	0.0239	0.006	0.0202	0.0144	0.0135
Iron	0.796	0.659	0.332	3.5	6.55	7.99	10.1	9.64	1.99	8.14	2.96	2.61
Lead	0.000387	0.000381	0.000256	0.00135	0.00322	0.00389	0.00441	0.00405	0.000879	0.00334	0.00139	0.00126
Lithium	0.0017	0.002	0.0019	0.0033	0.0051	0.0058	0.0068	0.0069	0.0028	0.0064	0.0036	0.0034
Magnesium	17.5	15.6	11.4	16.9	14.7	16.6	16.5	16.5	12.5	16.2	13.4	13.4
Manganese	0.0674	0.077	0.0298	0.169	0.245	0.27	0.408	0.372	0.155	0.344	0.336	0.306
Mercury	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.000050	<0.000050	0.000019	0.000019	0.000005	0.0000163	0.0000067	0.000008
Molybdenum	0.00364	0.00423	0.00481	0.00424	0.00434	0.00419	0.00489	0.00484	0.00448	0.00376	0.00512	0.00479
Nickel	0.00194	0.00179	0.00113	0.00469	0.00816	0.00992	0.0129	0.0122	0.00289	0.0103	0.00478	0.00424
Phosphorus	0.112	0.09	0.093	0.119	0.179	0.206	0.238	0.258	0.108	0.24	0.125	0.106
Potassium	8.19	9.7	10.1	12.3	11.3	11.7	11	11.2	10.3	11.1	11.9	12.1
Rubidium	0.0008	0.00071	0.00059	0.00155	0.00217	0.00253	0.00375	0.00376	0.00098	0.00297	0.00146	0.0014
Selenium	0.000057	<0.000050	0.000072	<0.000050	0.000065	0.00009	0.000084	0.000071	0.000055	0.000097	0.00005	<0.000050
Silicon	5.7	4.86	4.29	7.66	10.5	11.9	15	15.2	5.96	12.2	7.06	6.85
Silver	0.00001	<0.000010	<0.000010	0.000033	0.000074	0.000092	0.000133	0.000113	0.000018	0.000082	0.000029	0.000025
Sodium	26	44	50.9	48.3	48.3	47.1	49.7	50.7	48.9	46	53.8	54.2
Strontium	0.209	0.181	0.152	0.209	0.176	0.194	0.202	0.191	0.17	0.19	0.186	0.177
Sulfur	0.74	1.39	1.44	1	1	0.78	1.22	1.11	1.12	0.91	1.13	0.96
Tellurium	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Thallium	<0.000010	<0.000010	<0.000010	0.000019	0.000036	0.000042	0.000057	0.00005	0.000011	0.000041	0.00001	<0.000010
Thorium	<0.00010	<0.00010	<0.00010	<0.00010	0.00017	0.00021	0.00026	0.00026	<0.00010	0.00019	<0.00010	<0.00010
Tin	0.00022	0.00073	0.00011	0.00046	0.00046	0.0005	0.00079	0.00072	0.00023	0.00059	0.00276	0.00248
Titanium	0.0155	0.0117	0.00697	0.057	0.102	0.126	0.166	0.162	0.0374	0.126	0.064	0.0569
Tungsten	0.00011	<0.00010	<0.00010	0.00013	0.00014	0.00013	0.00018	0.00016	0.00013	0.00012	0.00021	0.0002
Uranium	0.00184	0.00202	0.00198	0.00212	0.00238	0.00255	0.0025	0.00242	0.00186	0.00206	0.00212	0.00205
Vanadium	0.00208	0.00158	0.00119	0.00741	0.0109	0.0133	0.0177	0.0172	0.00381	0.0145	0.00556	0.00503
Zinc	0.0214	0.0193	0.0105	0.0248	0.0379	0.0448	0.0565	0.0546	0.0135	0.0473	0.024	0.0226
Zirconium	0.000116	0.000082	0.000095	0.000196	<0.00020	<0.00020	0.00069	0.00088	<0.00020	<0.00020	0.0005	0.00045
Dissolved Metals												
Aluminum	0.0153	0.0141	0.0266	0.0054	0.0256	0.0213	0.0164	0.0279	0.0112	0.0178	0.0255	0.0239
Antimony	0.00011	0.00011	0.00012	<0.00010	0.00018	0.00023	0.00013	0.00013	0.00011	<0.00010	0.00011	0.00011
Arsenic	0.00247	0.00258	0.00212	0.00431	0.00272	0.00299	0.00333	0.00339	0.00339	0.00438	0.00335	0.00336
Barium	0.0227	0.0202	0.0194	0.0197	0.0184	0.0194	0.0186	0.0188	0.0178	0.0205	0.0182	0.0181
Beryllium	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron	0.116	0.139	0.139	0.149	0.16	0.159	0.157	0.156	0.16	0.155	0.161	0.163
Cadmium	0.00061	0.000392	0.000342	0.0000198	0.000105	0.000142	0.0000402	0.0000445	0.000173	0.0000417	0.000842	0.000841
Calcium	20.6	17.2	13.5	14.9	13.3	14.1	14.3	14.3	14.2	15.5	12.3	12.1
Cesium	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000052	0.000045
Chromium[d]	<0.00010	<0.00010	0.00011	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Cobalt	<0.00010	<0.00010	<0.00010	0.00012	<0.00010	<0.00010	0.00011	<0.00010	<0.00010	0.00011	<0.00010	<0.00010
Copper	0.00118	0.00224	0.00117	0.00035	0.00046	0.00045	0.00062	0.00061	0.00061	0.00035	0.00706	0.00703
Iron	<0.010	0.017	0.022	0.016	0.013	<0.010	0.012	0.025	0.01	0.077	0.015	0.018
Lead	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium	0.0013	0.0017	0.0016	0.0015	0.0015	0.0015	0.0017	0.0017	0.0016	0.0016	0.0015	0.0016
Magnesium	19.9	15.2	11.1	14	12.7	14.4	13.8	13.7	13.1	15.5	11.9	12
Manganese	0.00228	0.0303	0.00184	0.0853	0.00166	0.0106	0.0619	0.062	0.0453	0.0906	0.11	0.115
Mercury	<0.0000050	<0.0000050	0.0000157	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	0.00381	0.00419	0.00494	0.00442	0.00482	0.00467	0.00465	0.00471	0.00517	0.00456	0.00464	0.00472
Nickel	0.00077	0.00063	<0.00050	<0.00050	<0.00050	0.00055	0.00073	0.00059	0.00062	0.00512	0.00101	0.00103
Phosphorus	0.061	0.059	0.072	<0.050	<0.050	<0.050	<0.050	<0.050	0.06	<0.050	<0.050	<0.050
Potassium	8.98	10.2	9.75	10.7	10.2	10.6	10.9	10.8	11.2	11.5	10.9	11.3
Rubidium	0.00053	0.00055	0.00045	0.00041	0.00034	0.00037	0.00042	0.00039	0.00037	0.00042	0.00054	0.00054
Selenium	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000054	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Silicon	4.63	4.07	3.94	4.08	4.05	4.14	3.95	3.94	4.42	4.64	4.13	4.18
Silver	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium	29	43.4	49.1	46.2	50.2	48.5	51.8	50.8	56	52.2	55.1	56.3
Strontium	0.205	0.186	0.143	0.19	0.16	0.171	0.179	0.18	0.164	0.183	0.148	0.149
Sulfur	0.77	1.25	1.46	0.85	1.29	1.25	1.45	1.34	1.3	0.91	1.34	1.38
Tellerium	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Thallium	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000012	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thorium	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Tin	<0.00010	0.00103	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00395	0.00383
Titanium	<0.00030	0.00032	0.00121	<0.00030	0.001	<0.00090	0.00073	0.00133	0.00046	<0.00090	0.00069	0.00096
Tungsten	0.00011	0.00010	0.00011	0.00013	0.00012	0.00013	0.00012	0.00012	0.00015	0.00014	0.00018	0.00018
Uranium	0.000966	0.00206	0.00192	0.00195	0.00211	0.00229	0.00209	0.00205	0.00194	0.00193	0.00194	0.00192
Vanadium	0.00054	<0.00050	0.00058	<0.00050	0.00119	0.00139	0.0013	0.00112	0.00054	0.0005	<0.00050	0.00051
Zinc	0.0042	0.0073	0.0023	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0073	0.0068
Zirconium	<0.000060	<0.000060	0.000115	<0.000060	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020

NOTES

BC CSR AW-F	BC Contaminated Sites Regulation Water Quality Guidelines for Protection of Freshwater Aquatic Life
BC CSR LW	BC Contaminated Sites Regulation Water Quality Guidelines for Protection of Livestock
BC CSR DW	BC Contaminated Sites Regulation Water Quality Guidelines for Drinking Water

Italics indicate that the laboratory detection limit exceeds the applicable standard.
Standards shown are from the BC Contaminated Sites Regulation (CSR; BC Reg. 375/96, O.C. 1480/96 and M40/2019, includes amendments up to BC Regs. 11/2019 and 13/2019, updated to 24 Jan 2019)
[a] = pH dependent; [b] = hardness dependent, [c] = chloride dependent
[d] = most conservative standards applied for chromium (between Cr(III) and Cr(VI))
QAQC = quality assurance/quality control; FD = field duplicate;

Table D-2: Surface Water Analytical Results
2018 Thornhill Transfer Station Annual Monitoring Program
Regional District of Kitimat-Stikine

Location	BCWQG Aquatic Life - Freshwater (Chronic - Long-term average)	BCWQG Aquatic Life - Freshwater (Short-term maximum)	BCWQG -Drinking Water	Units	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3
Site Name					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sample ID					1996-Oct-01	1997-Jun-01	1997-Dec-04	1998-May-04		1998-Sep-24	1999-Jan-27	1999-Apr-30	1999-Nov-01	2000-Mar-17	2000-Aug-15	2000-Dec-20	2001-May-07	2001-Dec-01	2002-Apr-01	2002-Jun-01	2003-Jan-01	2003-Mar-01		2003-Aug-01	2003-Dec-03	2004-Oct-18	2005-Jun-01	2005-Nov-01	2006-Jun-01	2007-Jan-02
Laboratory ID					-	-	-	FDA	FD	-	-	-	-	-	-	-	-	-	-	-	-	FDA	FD	-	-	-	-	-	-
Sample Date					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
QAQC					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Field Observations																													
pH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Temperature	-	-	-	°C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conductivity	-	-	-	uS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Water level	-	-	-	m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Oxygen	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation Reduction Potential	-	-	-	mV	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conventional Parameters																													
Conductivity	-	-	-	uS/cm	1590	1760	2400	2160	2140	2090	-	2160	-	1780	-	-	1790	2000	79	1980	518	1710	1820	2050	852	1930	2470	1460	2490	76
Hardness (Total as CaCO3)	-	-	-	mg/L	439	460	618	603	696	651	640	611	549	480	529	493	534	551	316	93	156	527	-	601	21	653	573	500	559	28
pH	6.5-9.0	-	6.5 - 8.5	-	8.01	7.81	7.71	7.93	7.91	7.89	-	-	-	7.27	7.21	7.42	7.61	7.06	7.29	7.6	7.26	7.37	7.9	7.54	6.81	7.2	7.42	8.1	7.36	10.2
Total Suspended Solids	-	**25 mg/L (backgr. 25 250 mg/l)) (i)**	-	mg/L	**199**	10	**408**	**183**	-	**515**	-	-	-	-	-	-	-	-	-	-	-	-	**38**	-	-	8	-	10	-	-
Alkalinity, Total (as CaCO3)	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ammonia, Total (as N)	0.53 - 1.86	**3.61 - 23.9**	-	mg/L	**12.2**	**19.1**	**49.9**	**32.8**	**31.8**	**90**	**48**	**45.8**	-	**26.8**	**47.4**	**42.6**	**25.8**	**45**	1.62	**44.4**	6	**41.2**	**31.9**	**34**	0.04	**29.7**	**54.6**	**24.7**	**49.2**	0.27
Bromide (Br)	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride (Cl)	150	**600**	250	mg/L	131	151	187	168	177	183	140	131	134	104	176	125	111	107	56.5	122	22.5	94.6	95.3	128	0.4	116	141	90.4	164	2.56
Fluoride (F)	-	**0.71 - 2.17**	1.5	mg/L	-	-	-	-	-	-	-	-	-	0.37	<0.1	<0.1	<0.25	< 0.05	<0.05	<0.25	<0.05	<0.05	-	<0.05	<0.05	-	<0.25	-	<0.05	<0.25
Nitrate (as N)	3	**32.8**	10	mg/L	9.88	**15.5**	7.38	**10.6**	**13.7**	7.31	2.54	2.3	0.12	-	<0.05	0.31	1.8	0.13	2.4	2.3	2.5	3.4	3.39	0.79	0.2	0.539	1.2	1.32	1.24	<0.25
Nitrite (as N)	0.02 - 0.2	**0.06 - 0.6**	1	mg/L	**0.383**	**0.262**	**0.273**	**0.81**	**0.795**	**0.585**	0.205	**0.245**	0.076	-	<0.002	0.038	0.18	0.011	**2.4**	0.465	0.035	0.34	0.12	0.041	<0.002	0.06	0.013	0.08	<0.002	0.08
Nitrate + Nitrite (as N)	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Kjeldahl Nitrogen	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phosphorus (P)-Total	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Orthophosphate - Dissolved (as P)	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulfate (SO4)	128 - 309	-	500	mg/L	12.2	18	16	63	68	9	20.3	17.4	21.4	2.1	<1	19	9.3	21.1	22.4	6.7	12.7	7.8	7.6	0.6	1.2	14.2	<2.5	12.5	2.06	2.51
Biological Oxygen Demand (BOD)	-	-	-	mg/L	-	27	61	84	116	<5	-	<10	<10	<10	<10	<10	<10	< 10	<10	76	<10	<10	<6	<10	<10	<10	<10	<10	11	<10
Chemical Oxygen Demand (COD)	-	-	-	mg/L	-	95	299	164	136	184	375	104	-	84	88	72	62	86	41	102	38	66	<10	73	<25	110	111	98	134	<20
Total Metals																														
Aluminum	0.05	**0.1**	9.5	mg/L	0.04	<0.05	0.018	0.019	<0.05	0.08	0.05	0.024	0.019	**0.27**	0.012	0.042	0.026	0.011	0.022	<0.005	0.085	0.005	0.01	0.017	0.063	0.0122	0.006	0.0092	< 0.005	0.074
Antimony	-	-	-	mg/L	-	<0.2	<0.001	0.0003	<0.05	<0.001	0.035	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	< 0.001	<0.001	<0.001	<0.001	<0.001	0.000027	<0.001	< 0.001	0.000344	< 0.0002	0.000176	< 0.001	<0.001
Arsenic	-	**0.005**	0.01	mg/L	0.0002	*<0.2*	0.003	0.0006	0.0006	0.002	0.14	0.002	0.002	0.001	0.001	0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	0.001	0.001	< 0.001	0.0016	0.0012	0.0013	0.001	<0.001
Barium	1	-	-	mg/L	0.18	0.17	0.35	0.35	0.374	0.42	0.37	0.34	0.32	0.26	0.26	0.028	0.28	0.43	0.25	0.031	0.13	0.32	0.0195	0.37	0.017	0.453	0.37	0.295	0.39	0.012
Beryllium	0.00013	-	-	mg/L	<0.005	<0.005	<0.005	<0.005	0.003	<0.005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	< 0.001	<0.001	<0.001	<0.001	<0.001	<0.00002	<0.001	< 0.001	<0.00002	< 0.0002	0.00002	< 0.001	<0.001
Bismuth	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.001	<0.001
Boron	1.2	-	5	mg/L	1.8	-	-	-	3.03	-	2.16	2.29	1.48	1.51	2.14	1.46	1.47	1.62	1.04	0.08	0.47	2	-	1.74	< 0.05	1.6	1.89	1.39	2.17	<0.05
Cadmium	0.00013 - 0.00026	**0.00031 - 0.00079**	0.005	mg/L	<0.0002	<0.002	<0.0002	<0.0002	<0.005	0.0003	<0.0001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	< 0.0002	<0.0002	0.0011	< 0.0002	<0.0002	<0.00001	<0.0002	< 0.0002	0.00005	< 0.00004	0.00003	< 0.0002	0.0002
Calcium	-	-	-	mg/L	127	129	175	166	202	183	187	183	160	142	163	137	150	162	91.8	25.4	47.6	148	-	172	7.41	202	171	139	171	9.8
Cesium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	-	-	-	mg/L	0.002	<0.01	0.003	0.003	0.0034	0.002	0.008	0.002	0.002	0.004	0.002	0.002	0.001	0.003	<0.001	<0.001	<0.001	0.002	<0.0002	0.001	< 0.001	<0.002	0.0015	0.0064	0.002	<0.001
Cobalt	0.004	**0.11**	-	mg/L	<0.02	<0.01	<0.01	<0.01	<0.005	<0.01	0.003	0.002	0.002	0.002	0.004	0.003	0.002	0.005	-	0.003	<0.001	0.003	0.000044	0.003	< 0.001	0.00293	0.0026	0.00183	0.002	<0.001
Copper	0.00004	**0.002 - 0.077**	1	mg/L	0.002	<0.01	0.003	0.003	0.0039	<0.001	0.011	0.005	0.001	0.005	<0.001	<0.001	<0.001	0.002	0.007	<0.001	0.004	0.005	0.00075	<0.001	< 0.001	0.00621	0.0021	0.00225	< 0.001	0.001
Iron	-	**1**	0.3	mg/L	0.06	<0.03	0.07	0.03	0.084	0.05	0.083	0.28	0.13	0.25	0.28	0.34	0.33	0.44	0.41	0.42	0.22	0.08	-	<0.05	< 0.05	0.053	0.08	1.33	< 0.05	0.14
Lead	0.0037 - 0.048	**0.011 - 1.15**	0.01	mg/L	<0.001	<0.01	<0.001	0.002	<0.05	<0.001	<0.02	0.002	<0.001	0.002	<0.001	<0.001	<0.001	< 0.001	<0.001	<0.001	<0.001	<0.001	0.00008	<0.001	< 0.001	<0.1	< 0.0002	0.00001	< 0.001	<0.001
Lithium	-	-	-	mg/L	<0.02	-	-	-	-	-	-	-	-	-	-	-	0.002	-	-	<0.001	<0.001	0.003	0.00032	0.003	<0.001	0.00082	0.0025	0.00168	0.003	<0.001
Magnesium	-	-	-	mg/L	29.8	33.8	43.6	45.7	44.8	46.9	42.1	37.3	36.4	30.5	29.4	36.2	28.3	35.4	21	7.27	9.05	38	-	41.6	0.59	36.2	35.1	25.2	31.9	0.8
Manganese	0.70 - 4.13	**0.77 - 9.37**	0.05	mg/L	2.58	2.44	2.1	1.49	2.09	2.09	3.04	3.05	2.88	2.36	2.58	2.63	2.07	2.36	4.82	1.51	0.75	0.53	2.79	2.28	0.004	2.42	2.49	1.56	2.36	0.007
Mercury	0.0001	-	0.001	mg/L	<0.00005	<0.00005	0.00001	<0.00001	-	<0.00001	0.00005	<0.00005	<0.00005	<0.00002	<0.00002	<0.00002	<0.00002	< 0.00002	<0.00002	<0.00002	<0.00002	<0.00002	-	<0.00002	< 0.00002	<0.00005	< 0.02	-	< 0.02	<0.00002
Molybdenum	< 1	**2**	0.25	mg/L	<0.03	<0.03	<0.03	<0.03	<0.01	<0.03	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	< 0.001	<0.001	<0.0005	<0.0005	0.013	0.00064	<0.0005	< 0.0005	0.00075	< 0.0001	0.00016	< 0.0005	<0.0005
Nickel	-	-	-	mg/L	<0.02	<0.02	<0.02	0.02	<0.02	<0.05	<0.008	0.008	0.006	0.006	0.008	0.008	0.006	0.007	0.005	0.01	0.002	0.008	<0.00005	0.006	< 0.001	0.00931	0.0084	0.00523	0.006	<0.001
Phosphorus	-	-	0.01	mg/L	-	-	-	-	-	-	-	-	0.08	0.1	0.11	0.07	0.08	0.1	0.06	0.14	-	0.15	0.36	0.1	0.08	0.1	< 0.15	<0.15
Potassium	-	-	-	mg/L	-	-	-	-	104	-	88.9	91	75.6	61.3	88.8	76.8	68.7	68.4	39.3	2.09	19.3	66.3	-	72.9	0.52	68	70.7	57	69.4	1.2
Rubidium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	0.002	-	0.01	mg/L	<0.0005	<0.01	<0.0005	0.0005	<0.05	0.0005	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	< 0.002	<0.002	<0.001	<0.001	<0.001	<0.0002	<0.001	< 0.001	<0.002	0.0012	0.0006	< 0.001	<0.001
Silicon	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	12	24.9	14.9	21.8	10.9	9.93	7.76	16.8	-	20.5	4.18	-	19.7	-	8.2	2.1
Silver	0.00005, 0.0015	**0.0001, 0.003**	-	mg/L	<0.0001	<0.001	<0.0001	<0.0001	*<0.01*	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	< 0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.00002	<0.0001	< 0.0001	<0.0002	< 0.00005	0.00002	< 0.00025	<0.00025
Sodium	-	-	-	mg/L	133	-	-	-	177	-	141	125	122	102	105	123	114	108	65.2	8.52	26.5	121	-	124	0.8	121	126	97.4	137	2.43
Strontium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	0.9	1.13	0.95	1	1.06	0.63	0.18	0.28	1.03	0.0416	1.13	0.03	1.23	1.13	0.793	1.17	0.028
Sulfur	-	-	-	mg/L	-	-	-	-	21.6	-	8.33	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.9	-	5.3	-	-
Tellurium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	-	-	-	mg/L	-	-	<0.001	<0.0001	-	0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	< 0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.000002	<0.0001	< 0.0001	0.000022	< 0.00002	0.000006	< 0.0001	<0.0001
Thorium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	< 0.001	<0.001	<0.001	<0.001	<0.001	0.00001	<0.001	< 0.001	0.00022	0.0002	-	< 0.001	<0.001
Titanium	-	-	-	mg/L	-	-	<0.01	<0.01	<0.002	<0.01	<0.003	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	< 0.001	<0.001	<0.001	0.002	0.001	-	0.002	0.003	<0.003	0.0007	0.003	< 0.001	0.001
Tungsten	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	-	-	-	mg/L	-	-	0.0003	0.0002	-	0.0001	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	< 0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.000016	<0.0005	< 0.0005	0.000205	< 0.0001	0.000063	< 0.0005	<0.0005
Vanadium	-	-	-	mg/L	<0.03	-	<0.03	<0.03	<0.01	<0.03	<0.003	0.001	0.001	0.004	<0.001	0.002	<0.001	0.005	<0.001	<0.001	<0.001	<0.001	0.0003	<0.001	< 0.001	<0.0006	0.0006	0.00086	0.001	<0.001
Zinc	0.0075 - 0.54	**0.033 - 0.57**	5	mg/L	0.008	0.11	0.007	<0.005	0.003	<0.005	0.013	0.016	<0.005	0.014	<0.005	<0.005	0.011	< 0.005	<0.005	0.007	<0.005	<0.005	0.0046	<0.005	< 0.005	0.0008	0.002	0.0002	< 0.005	<0.005
Zirconium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	<0.01	<0.02	<0.03	<0.04	< 0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	< 0.01	0.005	< 0.002	0.005	< 0.01	<0.01
Dissolved Metals																														
Aluminum	0.05	**0.1**	9.5	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	-	**0.005**	0.01	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	1	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	0.00013	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bismuth	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	1.2	-	5	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	0.00013 - 0.00026	**0.00031 - 0.00079**	0.005	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cesium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	0.004	**0.11**	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	0.00004	**0.002 - 0.077**	1	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron	-	**0.35**	0.3	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead	0.0037 - 0.048	**0.011 - 1.15**	0.01	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lithium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Magnesium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Manganese	0.70 - 4.13	**0.77 - 9.37**	0.05	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury	0.0001	-	0.001	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Molybdenum	< 1	**2**	0.25	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phosphorus	-	-	0.01	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rubidium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	0.002	-	0.01	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silicon	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver	0.00005, 0.0015	**0.0001, 0.003**	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Strontium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulfur	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tellerium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thorium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tungsten	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	0.0075 - 0.54	**0.033 - 0.57**	5	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zirconium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

NOTES

BCWQG AWF Long-term	BC Water Quality Guidelines for Freshwater Aquatic Life - Chronic Long-term Average
BCWQG AWF Short-term	BC Water Quality Guidelines for Freshwater Aquatic Life - Short-term Maximum
BCWQG DW	BC Water Quality Guidelines for Drinking Water

Italics indicate that the laboratory detection limit exceeds the applicable standard.
British Columbia Approved and Working (or interim) Water Quality Guidelines (BC WQG), updated from time to time, for the protection of freshwater aquatic life (AW-F).
H = standard is hardness dependent; pH = standard is pH dependent; Cl = standard is chloride dependent; T = standard varies with temperature
V = Standard is valence dependent VI refers to chromium VI and III refers to chromium III; Ca = standard is calcium dependent
* = for ammonia guideline, an average temperature of 10 degrees Celsius and a pH of 7.5 was chosen where no data was available
MAC = Maximum Acceptable Concentration
AO = Aesthetic Objective
QAQC = Quality Assurance and Control; FDA = Field Duplicate Available; FD = Field Duplicate

Table D-2: Surface Water Analytical Results
2018 Thornhill Transfer Station Annual Monitoring Program
Regional District of Kitimat-Stikine

	BCWQG Aquatic Life - Freshwater (Chronic - Long-term average)	BCWQG Aquatic Life - Freshwater (Short-term maximum)	BCWQG -Drinking Water	Units											
Location					Thornhill Landfill										
Site Name					SW-3										
Sample ID					SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3
Laboratory ID					-	-	-	-	-	-	-	-	-	-	-
Sample Date					2007-Jun-18	2008-May-27	2008-Oct-10	2010-Feb-22	2010-Jun-15	2010-Oct-25	2011-Feb-15	2012-Feb-22	2012-May-08	2013-Jan-04	2013-Apr-16
QAQC					-	-	-	-	-	-	-	-	-	-	-
Field Observations															
pH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Temperature	-	-	-	°C	-	-	-	-	-	-	-	-	-	-	-
Conductivity	-	-	-	uS/cm	-	-	-	-	-	-	-	-	-	-	-
Water level	-	-	-	m	-	-	-	-	-	-	-	-	-	-	-
Dissolved Oxygen	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Oxidation Reduction Potential	-	-	-	mV	-	-	-	-	-	-	-	-	-	-	-
Conventional Parameters															
Conductivity	-	-	-	uS/cm	1790	1760	1800	1645	2120	1930	1850	1820	1650	1520	97.7
Hardness (Total as CaCO3)	-	-	-	mg/L	492	470	592	486	537	541	575	519	462	432	41.1
pH	6.5-9.0	-	6.5 - 8.5	-	7.66	7.5	8	7	6.9	7.6	6.9	6.8	6.7	7.5	7.4
Total Suspended Solids	-	25 mg/L (backgr. 25 250 mg/l)) (i)	-	mg/L	-	-	10	-	-	-	-	-	-	20	-
Alkalinity, Total (as CaCO3)	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Ammonia, Total (as N)	0.53 - 1.86	3.61 - 23.9	-	mg/L	40.6	41	37.1	55.2	64.4	57.2	54.1	48.3	43.7	34.9	0.1
Bromide (Br)	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Chloride (Cl)	150	600	250	mg/L	0.111	173	110	95	127	73	74	92.2	76.8	100	2.3
Fluoride (F)	-	0.71 - 2.17	1.5	mg/L	<0.25	<0.1	-	-	-	-	-	-	-	<0.1	0.025
Nitrate (as N)	3	32.8	10	mg/L	4.15	2	-	1.74	ND	0.71	<0.1	<0.1	0.2	4.39	0.42
Nitrite (as N)	0.02 - 0.2	0.06 - 0.6	1	mg/L	0.178	0.061	0.111	0.013	ND	0.019	<0.01	<0.01	<0.01	0.014	<0.01
Nitrate + Nitrite (as N)	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Total Kjeldahl Nitrogen	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Phosphorus (P)-Total	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Orthophosphate - Dissolved (as P)	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Sulfate (SO4)	128 - 309	-	500	mg/L	2.5	3.6	-	12.5	ND	17	28.9	19.5	5	7.52	1.44
Biological Oxygen Demand (BOD)	-	-	-	mg/L	12	28	<10	ND	9.3	21	6.8	10	10	5.6	<4
Chemical Oxygen Demand (COD)	-	-	-	mg/L	111	140	89	104	132	181	130	90	90	77	<20
Total Metals															
Aluminum	0.05	0.1	9.5	mg/L	< 0.005	0.015	0.006	0.007	0.013	0.007	0.017	0.011	0.0117	0.646	0.0873
Antimony	-	-	-	mg/L	<0.001	<0.0006	0.0001	ND	ND	ND	<0.0005	<0.0005	<0.0005	<0.0005	0.000051
Arsenic	-	0.005	0.01	mg/L	<0.001	<0.001	0.0008	0.0007	0.0009	0.0005	<0.0001	0.0009	0.00072	0.00106	0.000094
Barium	1	-	-	mg/L	0.37	0.403	0.395	0.336	0.324	ND	0.416	0.392	0.37	0.263	0.0202
Beryllium	0.00013	-	-	mg/L	<0.001	<0.0004	<0.00005	ND	ND	ND	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Bismuth	-	-	-	mg/L	<0.001	-	<0.00003	ND	0.381	0.381	<0.001	<0.001	<0.001	<0.001	<0.001
Boron	1.2	-	5	mg/L	0.15	2.2	1.89	1.89	1.85	2.03	2.1	1.5	1.32	1.27	<0.05
Cadmium	0.00013 - 0.00026	0.00031 - 0.00079	0.005	mg/L	<0.0002	0.0003	<0.00003	0.00003	0.000016	0.00009	0.0001	0.00003	<0.00001	0.00002	0.0001
Calcium	-	-	-	mg/L	150	142	180	172	157	166	184	168	149	137	14.6
Cesium	-	-	-		-	-	-	-	-	-	-	-	-	-	-
Chromium	-	-	-	mg/L	0.001	0.005	0.0006	0.001	0.003	0.001	0.002	0.001	<0.001	0.0011	ND
Cobalt	0.004	0.11	-	mg/L	0.002	0.0019	0.00178	0.0015	0.0022	0.0018	0.018	0.0016	0.00095	0.0021	0.000091
Copper	0.00004	0.002 - 0.077	1	mg/L	0.001	0.0176	0.0005	0.0009	0.0506	0.0205	0.0026	0.0011	0.00062	0.00386	0.00107
Iron	-	1	0.3	mg/L	0.09	0.48	0.072	0.54	0.069	0.057	13.3	14.4	19.2	5.41	0.159
Lead	0.0037 - 0.048	0.011 - 1.15	0.01	mg/L	<0.001	0.0002	<0.00003	0.0004	0.0021	0.0002	0.0004	<0.0002	<0.0002	0.00024	0.000098
Lithium	-	-	-	mg/L	<0.005	0.0017	<0.003	ND	0.005	0.006	<0.0005	<0.0005	<0.0005	<0.005	<0.005
Magnesium	-	-	-	mg/L	282	25.1	34.1	28.4	29.1	26.1	28.4	24.4	21.8	22.1	1.14
Manganese	0.70 - 4.13	0.77 - 9.37	0.05	mg/L	2.23	2.17	2.18	2.59	2.72	2.88	3.24	2.98	2.7	2.95	0.0161
Mercury	0.0001	-	0.001	mg/L	<0.00002	<0.00006	-	0.00003	0.00003	0.00004	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Molybdenum	< 1	2	0.25	mg/L	<0.0005	0.0002	<0.0003	ND	ND	ND	<0.001	<0.001	<0.001	<0.001	0.000401
Nickel	-	-	-	mg/L	0.005	0.008	0.0055	0.006	0.005	0.012	0.009	0.006	0.0036	0.0046	0.00024
Phosphorus	-	-	0.01	mg/L	*<0.15*	-	0.032	-	-	-	0.176	0.235	0.229	0.067	<0.01
Potassium	-	-	-	mg/L	64.4	-	69.8	65	71.5	62.5	69.9	57.3	45.7	44.9	1.53
Rubidium	-	-	-		-	-	-	-	-	-	-	-	-	-	-
Selenium	0.002	-	0.01	mg/L	<0.001	<0.001	<0.0002	ND	ND	ND	0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Silicon	-	-	-	mg/L	6.8	-	7.6	11.7	11.7	10.6	12.2	10.6	10.3	8.52	2.76
Silver	0.00005, 0.0015	0.0001, 0.003	-	mg/L	<0.00025	<0.00008	<0.00003	ND	ND	ND	0.00003	<0.000005	<0.000005	<0.000005	<0.000005
Sodium	-	-	-	mg/L	113	98.9	118	99.3	108	102	104	88.8	73.5	77.6	2.39
Strontium	-	-	-	mg/L	1.04	-	1.13	1.12	1.12	1.05	1.08	1.04	0.931	0.857	0.0593
Sulfur	-	-	-	mg/L	-	-	<3	5	5	6	13	<3	6.2	3.4	<3
Tellurium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Thallium	-	-	-	mg/L	<0.0001	<0.0001	<0.00001	ND	ND	ND	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Thorium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Tin	-	-	-	mg/L	<0.001	-	0.00018	ND	ND	ND	<0.005	<0.005	<0.005	<0.005	0.00032
Titanium	-	-	-	mg/L	0.001	<0.02	<0.003	ND	ND	ND	<0.005	<0.005	<0.005	<0.005	<0.005
Tungsten	-	-	-		-	-	-	-	-	-	-	-	-	-	-
Uranium	-	-	-	mg/L	<0.0005	<0.0001	0.00004	ND	ND	ND	<0.0001	<0.0001	<0.0001	<0.0001	0.000046
Vanadium	-	-	-	mg/L	<0.001	<0.002	<0.001	ND	ND	ND	<0.005	<0.005	<0.005	<0.005	0.00062
Zinc	0.0075 - 0.54	0.033 - 0.57	5	mg/L	<0.005	0.014	0.0007	0.026	0.024	0.077	<0.005	<0.005	<0.005	0.0053	0.0025
Zirconium	-	-	-	mg/L	<0.01	-	-	ND	ND	ND	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Metals															
Aluminum	0.05	0.1	9.5	mg/L	-	-	-	-	-	-	-	-	-	-	-
Antimony	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Arsenic	-	0.005	0.01	mg/L	-	-	-	-	-	-	-	-	-	-	-
Barium	1	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Beryllium	0.00013	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Bismuth	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Boron	1.2	-	5	mg/L	-	-	-	-	-	-	-	-	-	-	-
Cadmium	0.00013 - 0.00026	0.00031 - 0.00079	0.005	mg/L	-	-	-	-	-	-	-	-	-	-	-
Calcium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Cesium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Chromium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Cobalt	0.004	0.11	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Copper	0.00004	0.002 - 0.077	1	mg/L	-	-	-	-	-	-	-	-	-	-	-
Iron	-	0.35	0.3	mg/L	-	-	-	-	-	-	-	-	-	-	-
Lead	0.0037 - 0.048	0.011 - 1.15	0.01	mg/L	-	-	-	-	-	-	-	-	-	-	-
Lithium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Magnesium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Manganese	0.70 - 4.13	0.77 - 9.37	0.05	mg/L	-	-	-	-	-	-	-	-	-	-	-
Mercury	0.0001	-	0.001	mg/L	-	-	-	-	-	-	-	-	-	-	-
Molybdenum	< 1	2	0.25	mg/L	-	-	-	-	-	-	-	-	-	-	-
Nickel	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Phosphorus	-	-	0.01	mg/L	-	-	-	-	-	-	-	-	-	-	-
Potassium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Rubidium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Selenium	0.002	-	0.01	mg/L	-	-	-	-	-	-	-	-	-	-	-
Silicon	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Silver	0.00005, 0.0015	0.0001, 0.003	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Sodium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Strontium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Sulfur	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Tellerium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Thallium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Thorium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Tin	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Titanium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Tungsten	-	-	-		-	-	-	-	-	-	-	-	-	-	-
Uranium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Vanadium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Zinc	0.0075 - 0.54	0.033 - 0.57	5	mg/L	-	-	-	-	-	-	-	-	-	-	-
Zirconium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-

Sample ID	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3
Laboratory ID	-	-	-	-	-	-	-	-	-	-	-	L2070515-2	L2124909-2	L2163156-2	L2257784-2	L2313871-2	L2364066-2
Sample Date	2013-Jun-06	2013-Oct-22	2014-May-06	2014-Oct-29	2015-Mar-31	2015-Aug-11	2015-Nov-04	2016-Mar-22	2016-Jul-25	2016-Oct-13	2017-Aug-24	2018-Mar-19	2018-Jul-04	2018-Sep-10	2019-Apr-11	2019-Jul-17	2019-Oct-10
QAQC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Field Observations																	
pH	-	-	-	-	-	-	-	-	-	-	-	-	7.35	6.5	6.6	6.94	6.75
Temperature	-	-	-	-	-	-	-	-	-	-	-	-	19.4	14.2	9.5	14.6	10.3
Conductivity	-	-	-	-	-	-	-	-	-	-	-	-	1458	1877	1511	1877	1532
Water level	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Oxygen	-	-	-	-	-	-	-	-	-	-	-	-	5.7	3.2	0.8	0.2	0.8
Oxidation Reduction Potential	-	-	-	-	-	-	-	-	-	-	-	-	385.6	-102.4	-45.4	-124.5	-18.3
Conventional Parameters																	
Conductivity	1640	1740	1840	1760	1620	1820	1980	2110	1360	2560	1420	890	1500	2020	1940	746	1740
Hardness (Total as CaCO3)	641	631	535	518	516	640	-	801	429	709	386	289	447	540	512	423	531
pH	7.6	7.4	7.4	7.3	7.6	7.5	7.5	7.7	8	7	7.6	8.22	8.16	7.44	7.03	7.91	7.06
Total Suspended Solids	91	460	33	8	35	49	42	10	18	75	31	21.4	21	122	-	57.4	109
Alkalinity, Total (as CaCO3)	-	-	-	-	-	-	-	-	-	-	-	22	717	962	933	347	856
Ammonia, Total (as N)	34.8	36.1	<0.03	36.7	26.5	23.1	37.8	44.6	28.7	60.8	35.1	22	41.7	67.1	58.6	58.9	67.6
Bromide (Br)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.79	0.271	-
Chloride (Cl)	109.1	107	119	122	104	125	115	182	123	206	97.9	34.6	85.6	117	94.4	30.9	83.1
Fluoride (F)	<0.1	<0.1	<0.1	0.11	0.11	0.11	0.13	0.13	0.13	0.11	<0.10	<0.10	0.1	<0.20	<0.22	<0.10	<0.20
Nitrate (as N)	4.48	0.141	2.57	5.09	4.6	4.7	4.4	2.61	1.18	0.62	0.38	2.49	0.546	0.211	0.067	0.0156	0.111
Nitrite (as N)	0.013	0.061	0.045	0.029	0.09	-	0.029	0.017	0.97	<0.01	0.05	0.0179	0.197	0.025	<0.010	0.0048	<0.010
Nitrate + Nitrite (as N)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Kjeldahl Nitrogen	-	-	-	-	-	-	-	-	-	-	-	22.5	41.7	71.7	65.3	58.4	64.3
Phosphorus (P)-Total	-	-	-	-	-	-	-	-	-	-	-	-	0.0318	0.326	0.520	0.422	0.412
Orthophosphate - Dissolved (as P)	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	<0.0010	0.0011	<0.0010
Sulfate (SO4)	10.5	15.8	19.6	80.6	96.7	55.3	-	66.5	7.1	7.4	10.7	10.5	4.5	<3.0	<3.0	1.47	<3.0
Biological Oxygen Demand (BOD)	<4	>220	<4	12	ND	19	16	13	8.9	10	11	2.7	5.8	8.3	-	7.5	6
Chemical Oxygen Demand (COD)	75	230	115	114	120	108	121	152	137	234	93	48	122	155	-	140	150
Total Metals																	
Aluminum	9.56	0.989	0.279	0.923	0.72	0.626	-	0.264	0.654	0.05	0.511	0.203	0.197	0.122	0.0560	0.533	0.0981
Antimony	<0.0005	<0.0005	<0.0005	<0.0005	0.0005	0.0004	-	0.0004	0.0004	0.0006	0.0002	0.0001	0.00021	0.00014	0.00012	0.00013	0.00013
Arsenic	0.00504	0.00175	0.00129	0.00234	0.0018	0.0023	-	0.002	0.0021	0.0071	0.0025	0.00144	0.00205	0.0142	0.0107	0.0153	0.0232
Barium	0.494	1.51	0.334	0.363	0.334	0.409	-	0.452	0.301	1.06	0.369	0.262	0.402	0.902	0.925	0.633	0.898
Beryllium	0.00016	<0.0001	<0.0001	<0.0001	ND	<0.0001	-	<0.0001	<0.0001	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth	<0.001	<0.001	<0.001	<0.001	ND	<0.0001	-	<0.0001	<0.0001	<0.0001	<0.00010	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron	1.88	1.83	1.59	1.93	2.68	3.88	-	3.84	2.21	3.09	1.88	0.945	2.07	2.06	1.99	1.38	2.13
Cadmium	0.000113	0.000079	0.000048	0.00014	0.00009	0.00005	-	0.00004	0.00007	0.00014	0.00005	0.0000322	0.000018	0.000009	0.0000063	0.0000152	0.0000059
Calcium	198	203	173	168	169	204	-	260	115	231	112	80.7	121	162	169	119	164
Cesium	-	-	-	-	-	-	-	-	-	-	-	0.000102	0.000243	0.000329	0.000269	0.000209	0.00026
Chromium	0.0117	0.0019	0.0011	0.0024	0.002	0.0021	-	0.0023	0.0015	0.0022	0.00152	0.00071	0.00097	0.00136	0.00125	0.00129	0.00123
Cobalt	0.00765	0.00341	0.0026	0.00287	0.00286	0.00319	-	0.00307	0.00552	0.0101	0.00353	0.00177	0.00363	0.00373	0.00301	0.00284	0.0029
Copper	0.023	0.00709	0.00309	0.00775	0.0069	0.0051	-	0.003	0.0098	0.0041	0.00366	0.0025	0.00216	0.00051	<0.00050	0.00194	<0.00050
Iron	22.3	5.27	6.53	11.5	7.22	8.94	-	4.82	1.95	28.2	3.86	5.21	1.8	53	51.5	34.4	47.5
Lead	0.00309	0.00034	0.00034	0.00051	0.0003	0.0002	-	<0.0001	0.0002	0.0001	0.00021	0.000058	0.000075	0.000061	<0.000050	0.000131	<0.000050
Lithium	0.0085	<0.005	<0.005	<0.005	0.0029	0.0023	-	0.0033	0.0018	0.0018	0.00166	0.0011	0.0014	0.0029	0.0023	0.0022	0.0031
Magnesium	35.6	30	24.9	24	22.6	31.3	-	36.6	34.2	31.9	25.8	14.1	29.6	33.3	37.1	24.8	32.1
Manganese	4.99	4.95	4.72	3.21	3.36	2.91	-	4.26	2.04	14.1	3.54	2.35	1.98	3.07	3.24	2.26	2.70
Mercury	<0.00001	<0.00001	<0.00001	0.000023	ND	<0.00002	-	<0.00002	<0.00002	<0.00002	<0.000010	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	<0.001	<0.001	<0.001	0.0012	0.0009	0.0007	-	0.0007	0.0023	0.0018	0.00093	0.000319	0.000726	0.000528	0.000366	0.000738	0.000371
Nickel	0.0178	0.0073	0.0059	0.009	0.0076	0.0075	-	0.0079	0.0079	0.0113	0.00531	0.0026	0.00616	0.00553	0.00561	0.00381	0.00454
Phosphorus	0.38	0.413	0.079	0.172	0.139	0.27	-	0.1	*<0.02*	0.12	0.113	0.056	0.068	0.356	0.406	0.354	0.461
Potassium	71.4	63.9	55	53	53.7	64	-	88.4	46	64.9	46.3	23.7	54.6	66.9	72.3	44.6	64.6
Rubidium	-	-	-	-	-	-	-	-	-	-	-	0.0164	0.0382	0.053	0.0507	0.0316	0.0502
Selenium	0.00027	0.00019	0.00016	0.00014	ND	<0.0005	-	<0.0005	0.0008	<0.0005	0.00057	0.000122	0.000245	0.000147	0.000118	0.000139	0.000145
Silicon	23	11.6	10.4	9.8	10.8	13.6	-	14.3	9.3	12	9.8	6.1	8.25	12.2	12.6	9.7	12.1
Silver	0.000026	<0.000005	<0.000005	<0.000005	ND	<0.00005	-	<0.00005	<0.00005	<0.00005	<0.000050	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium	122	114	102	113	115	161	-	187	122	147	98.6	46	108	121	122	75.7	107
Strontium	1.23	1.14	0.988	0.949	0.941	1.2	-	1.39	0.809	1.5	0.797	0.469	0.963	1.15	1.2	0.776	1.12
Sulfur	4.2	9.8	7.9	29.3	37	30	-	33	4	3	4.5	4.19	2.96	1.16	1.6	0.94	1.17
Tellurium	-	-	-	-	-	-	-	-	-	-	<0.00050	<0.00020	<0.00020	0.0002	<0.00020	<0.00020	<0.00020
Thallium	0.000057	<0.00005	<0.00005	<0.00005	ND	<0.00002	-	<0.00002	0.00002	<0.00002	<0.000020	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thorium	-	-	-	-	-	-	-	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Tin	0.00032	<0.005	<0.005	<0.005	ND	0.0004	-	0.0003	0.0002	0.0003	<0.00020	<0.00010	0.00017	0.00022	0.00021	0.00014	0.00025
Titanium	<0.005	0.0331	0.0132	0.0378	0.026	0.021	-	0.011	0.02	<0.005	0.012	0.00534	0.00511	0.00604	0.0034	0.0167	0.00561
Tungsten	-	-	-	-	-	-	-	-	-	-	-	0.00027	<0.00010	0.00013	<0.00010	<0.00010	0.00012
Uranium	0.000046	0.0002	0.00013	0.0002	0.00023	0.0003	-	0.0002	0.00086	0.00061	0.000244	0.000078	0.000226	0.000048	0.000049	0.000065	0.000031
Vanadium	0.00062	<0.005	<0.005	<0.005	0.002	0.002	-	0.002	0.002	0.003	0.0016	0.0008	0.0008	0.00257	0.00208	0.00296	0.00325
Zinc	0.0025	0.223	0.105	0.0776	0.041	0.049	-	0.026	0.007	0.012	0.0065	<0.0030	<0.0030	0.0057	<0.0030	<0.0030	<0.0030
Zirconium	<0.0005	<0.0005	<0.0005	0.00086	0.0005	0.0009	-	0.0008	0.0007	0.0013	0.00096	0.000226	0.000433	0.000532	0.000483	0.00086	0.00062
Dissolved Metals																	
Aluminum	-	-	-	-	-	-	-	-	-	-	-	0.0023	0.0094	0.0086	0.0063	0.0187	0.0201
Antimony	-	-	-	-	-	-	-	-	-	-	-	<0.00010	0.00018	0.00012	<0.00010	0.00012	0.00013
Arsenic	-	-	-	-	-	-	-	-	-	-	-	0.0006	0.00175	0.0123	0.00888	0.017	0.0285
Barium	-	-	-	-	-	-	-	-	-	-	-	0.261	0.378	0.861	0.665	0.657	0.776
Beryllium	-	-	-	-	-	-	-	-	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth	-	-	-	-	-	-	-	-	-	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron	-	-	-	-	-	-	-	-	-	-	-	0.961	2.05	2.11	1.84	1.47	1.89
Cadmium	-	-	-	-	-	-	-	-	-	-	-	0.000021	0.000013	0.000009	0.0000132	0.000007	<0.0000050
Calcium	-	-	-	-	-	-	-	-	-	-	-	88.3	129	162	153	126	155
Cesium	-	-	-	-	-	-	-	-	-	-	-	0.000103	0.000224	0.000325	0.000284	0.000199	0.000265
Chromium	-	-	-	-	-	-	-	-	-	-	-	0.00033	0.00074	0.00109	0.0009	0.00076	0.00126
Cobalt	-	-	-	-	-	-	-	-	-	-	-	0.00173	0.00336	0.00358	0.00281	0.00264	0.00318
Copper	-	-	-	-	-	-	-	-	-	-	-	0.00189	0.00173	<0.00020	<0.00020	0.00077	0.00023
Iron	-	-	-	-	-	-	-	-	-	-	-	0.02	0.062	50.4	36.2	36.6	54.6
Lead	-	-	-	-	-	-	-	-	-	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium	-	-	-	-	-	-	-	-	-	-	-	<0.0010	0.0012	0.003	0.0021	0.002	0.003
Magnesium	-	-	-	-	-	-	-	-	-	-	-	16.8	30.4	33.2	31.7	26.6	35.3
Manganese	-	-	-	-	-	-	-	-	-	-	-	2.64	1.92	3.14	2.93	2.19	2.77
Mercury	-	-	-	-	-	-	-	-	-	-	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	-	-	-	-	-	-	-	-	-	-	-	0.000321	0.000706	0.00054	0.00032	0.00056	0.000394
Nickel	-	-	-	-	-	-	-	-	-	-	-	0.00248	0.00609	0.00574	0.00557	0.00393	0.00501
Phosphorus	-	-	-	-	-	-	-	-	-	-	-	*<0.050*	*<0.050*	0.056	*<0.050*	0.181	0.236
Potassium	-	-	-	-	-	-	-	-	-	-	-	27.6	60.7	72.1	65.6	47.7	65.7
Rubidium	-	-	-	-	-	-	-	-	-	-	-	0.0177	0.0391	0.0529	0.0506	0.0364	0.0519
Selenium	-	-	-	-	-	-	-	-	-	-	-	0.00016	0.000239	0.000217	0.000164	0.000213	0.000223
Silicon	-	-	-	-	-	-	-	-	-	-	-	5.51	7.66	13.7	11.8	10.1	12
Silver	-	-	-	-	-	-	-	-	-	-	-	<0.000010	<0.000010	<0.000010	<0.000020	<0.000010	<0.000010
Sodium	-	-	-	-	-	-	-	-	-	-	-	48.5	115	127	116	82.3	116
Strontium	-	-	-	-	-	-	-	-	-	-	-	0.512	0.964	1.17	1.14	0.908	1.12
Sulfur	-	-	-	-	-	-	-	-	-	-	-	4.08	2.73	1.5	1.02	1.28	1.23
Tellerium	-	-	-	-	-	-	-	-	-	-	-	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Thallium	-	-	-	-	-	-	-	-	-	-	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thorium	-	-	-	-	-	-	-	-	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Tin	-	-	-	-	-	-	-	-	-	-	-	<0.00010	0.00027	0.00021	0.00016	0.00017	0.00021
Titanium	-	-	-	-	-	-	-	-	-	-	-	<0.00030	<0.00030	0.00125	0.00067	0.00231	0.00325
Tungsten	-	-	-	-	-	-	-	-	-	-	-	<0.00010	<0.00010	0.00014	<0.00010	<0.00010	0.00013
Uranium	-	-	-	-	-	-	-	-	-	-	-	0.000078	0.000232	0.000042	0.000052	0.000043	0.000033
Vanadium	-	-	-	-	-	-	-	-	-	-	-	<0.00050	<0.00050	0.00137	0.00064	0.00182	0.00297
Zinc	-	-	-	-	-	-	-	-	-	-	-	0.0012	0.0013	<0.0010	0.0017	0.0012	0.0013
Zirconium	-	-	-	-	-	-	-	-	-	-	-	<0.000060	0.000219	0.000498	0.000349	0.00045	0.00056

NOTES

BCWQG AWF Long-term	BC Water Quality Guidelines for Freshwater Aquatic Life - Chronic Long-term Average
BCWQG AWF Short-term	BC Water Quality Guidelines for Freshwater Aquatic Life - Short-term Maximum
BCWQG DW	BC Water Quality Guidelines for Drinking Water

Italics indicate that the laboratory detection limit exceeds the applicable standard.
British Columbia Approved and Working (or interim) Water Quality Guidelines (BC WQG), updated from time to time, for the protection of freshwater aquatic life (AW-F).
H = standard is hardness dependent; pH = standard is pH dependent; Cl = standard is chloride dependent; T = standard varies with temperature
V = Standard is valence dependent VI refers to chromium VI and III refers to chromium III; Ca = standard is calcium dependent
* = for ammonia guideline, an average temperature of 10 degrees Celsius and a pH of 7.5 was chosen where no data was available
MAC = Maximum Acceptable Concentration
AO = Aesthetic Objective
QAQC = Quality Assurance and Control; FDA = Field Duplicate Available; FD = Field Duplicate

Table D-3: Surface Water Analytical Results
2019 Thornhill Transfer Station Annual Monitoring Program
Regional District of Kitimat-Stikine

Location					Thornhill Landfill																											
Site Name	BCWQG Aquatic Life	BCWQG Aquatic Life	BCWQG -Drinking		SW-1																											
Sample ID	- Freshwater	Freshwater	Water	Units	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Laboratory ID	(Chronic - Long-term	(Short-term			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sample Date	average)	maximum)			1996-Oct-01	1997-Jun-01	1997-Dec-04	1998-May-04	1998-Sep-24		1999-Jan-27	1999-Apr-01	1999-Nov-01	2000-Mar-17	2000-Aug-15	2000-Dec-20	2001-May-07	2001-Dec-01	2002-Apr-01	2002-Jun-01	2003-Jan-01		2003-Mar-01		2003-Aug-03	2004-May-14	2004-Oct-18	2005-Jun-01	2005-Nov-01	2006-Jun-01	2007-Jan-02	2007-Jun-18	2008-May-27
QAQC					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Field Observations																																
pH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Temperature	-	-	-	°C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conductivity	-	-	-	uS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Water level	-	-	-	m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Oxygen	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation Reduction Potential	-	-	-	mV	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conventional Parameters																																
Conductivity	-	-	-	uS/cm	60.3	42	64	31	28	67	-	40.8	-	55	-	-	59	53	1100	35	31	58	65	83	31	58	42	55	41	46	26	19.6
Hardness (Total as CaCO3)	-	-	-	mg/L	25.9	15.9	29.2	14.6	15.1	34.2	29.1	22	27	29	26	27	25	22	25	14	14	24	-	30	16	28.9	17.5	28	<0.05	19	10	13.4
pH	6.5-9.0	-	6.5 - 8.5	-	7.46	6.82	6.95	7.12	7.47	7.04	-	-	-	7.16	7.45	7.53	6.38	6.66	7.54	5.1	6.75	7	7.1	7.49	6.91	6.3	7.25	6.6	6.3	7.6	7.1	7.1
Total Suspended Solids	-	25 mg/L (backgr. 25-250 mg/l)) (i)	-	mg/L	7	2	13	3	-	<1	-	-	-	-	-	-	-	-	-	-	-	-	<4	-	-	<4	-	<4	0.03	<0.01	<0.01	<0.01
Alkalinity, Total (as CaCO3)	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ammonia, Total (as N)	1.57 - 1.86	8.18 - 24.7	-	mg/L	0.02	0.009	0.04	<0.005	<0.005	0.005	<0.005	0.02	-	0.04	0.05	0.2	0.03	0.03	0.087	<0.005	0.03	<0.01	<0.005	0.03	0.02	0.005	0.03	0.005	-	-	-	<0.01
Bromide (Br)	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride (Cl)	150	600	250	mg/L	<0.5	<0.5	0.9	0.8	0.17	1	<1	0.3	0.3	0.4	0.3	0.6	0.3	0.4	0.3	0.3	0.3	0.3	<0.5	0.3	<0.2	0.6	<0.2	0.5	0.24	0.71	0.23	<1
Fluoride (F)	-	0.41 - 0.99	1.5	mg/L	-	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	< 0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.3	-	<0.05	-	<0.05	<0.05	<0.05	<0.05
Nitrate (as N)	3	32.8	10	mg/L	0.029	0.011	0.379	0.018	0.017	0.025	0.08	<0.05	0.1	<0.05	<0.05	<0.05	<0.05	0.06	0.23	<0.05	0.14	0.08	0.06	<0.05	<0.05	0.035	0.08	0.027	<0.05	0.13	<0.05	0.061
Nitrite (as N)	0.02 - 0.2	0.06 - 0.6	1	mg/L	0.001	<0.001	0.005	0.001	<0.005	0.001	<0.005	<0.002	<0.002	<0.002	<0.002	<0.002	0.004	< 0.002	0.23	<0.002	<0.002	<0.002	0.003	<0.002	<0.002	<0.002	<0.002	0.003	<0.002	<0.002	<2	<0.1
Nitrate + Nitrite (as N)	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Kjeldahl Nitrogen	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phosphorus (P)-Total	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Orthophosphate - Dissolved (as P)	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulfate (SO4)	128 - 218	-	500	mg/L	1.4	<1	2	1	0.79	3	<1	1	1.2	1.4	1.3	1.5	1.3	1.3	1.3	1.9	0.7	1.5	1.3	1.4	<0.4	1.6	0.78	1.2	0.8	1.23	0.51	<1.0
Biological Oxygen Demand (BOD)	-	-	-	mg/L	<5	<5	<5	-	<10	<10	<10	<10	<10	<10	< 10	<10	<10	<10	<10	<6	<10	<10	<10	<10	<10	-	-	-	<10	<10	<10	<6
Chemical Oxygen Demand (COD)	-	-	-	mg/L	<20	24	<20	<10	<25	-	<25	<25	<25	-	< 25	<25	<25	<25	<25	<10	<25	<25	11	<20	27	-	-	-	<20	<20	22	<30
Total Metals																																
Aluminum	0.05	0.1	9.5	mg/L	0.026	<0.05	0.024	0.059	0.07	0.016	<0.02	0.028	0.029	2.3	0.017	0.023	0.026	0.019	0.04	0.041	0.068	0.022	0.024	0.018	0.051	0.0322	0.035	0.0349	0.01	0.024	0.049	0.067
Antimony	-	-	-	mg/L	-	<0.2	<0.0001	<0.0001	<0.05	<0.0001	<0.015	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	< 0.001	<0.001	<0.001	<0.001	<0.001	0.000027	<0.001	< 0.001	0.000011	< 0.0002	0.000005	< 0.001	<0.001	<0.001	<0.0006
Arsenic	-	0.005	0.01	mg/L	<0.0001	<0.2	<0.0001	<0.0001	0.0005	<0.0001	<0.04	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	< 0.001	<0.001	<0.001	<0.001	<0.001	0.0001	<0.001	< 0.001	0.0001	< 0.0002	0.0001	< 0.001	<0.001	<0.001	<0.001
Barium	1	-	-	mg/L	0.02	0.01	0.02	0.01	0.009	0.03	0.018	0.013	0.017	0.15	0.015	0.017	0.017	0.013	0.015	0.01	0.01	0.015	0.0195	0.024	0.01	0.017	0.011	0.0152	0.011	0.015	0.007	0.01
Beryllium	0.00013	-	-	mg/L	<0.005	<0.005	<0.005	<0.005	<0..001	<0.005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	< 0.001	<0.001	<0.001	<0.001	<0.001	<0.00002	<0.001	< 0.001	0.00002	< 0.0002	<0.00002	< 0.001	<0.001	<0.001	<0.0004
Bismuth	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	< 0.001	0.00002	< 0.0002	<0.00002	< 0.001	<0.001	<0.001	-
Boron	1.2	-	5	mg/L	<0.1	-	-	-	<0.01	-	<0.008	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	< 0.05	<0.05	0.08	<0.05	<0.005	-	<0.05	< 0.05	0.008	< 0.01	<0.008	< 0.05	<0.05	<0.05	0.004
Cadmium	0.0000388 - 0.00011	0.000055 - 0.00024	0.005	mg/L	<0.0002	<0.002	0.0007	<0.0002	<0.005	<0.0002	<0.0001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0014	<0.0002	<0.0002	<0.00001	<0.0002	< 0.0002	0.00001	< 0.00004	<0.00001	< 0.0002	<0.0002	<0.0002	0.0003
Calcium	-	-	-	mg/L	9.32	5.73	10.4	5.25	5.3	12.3	10.4	7.78	9.45	10.4	9.41	9.38	8.75	7.7	8.72	4.85	4.76	8.46	-	10.5	5.53	10.3	6.08	10.2	5.59	6.54	3.62	11.8
Cesium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	-	-	-	mg/L	<0.001	<0.01	<0.001	<0.001	<0.0005	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	< 0.001	<0.001	<0.001	<0.001	<0.001	<0.0002	<0.001	< 0.001	0.0002	< 0.0002	<0.0002	< 0.001	<0.001	<0.001	0.001
Cobalt	0.004	0.11	-	mg/L	<0.02	<0.01	<0.01	<0.01	<0.005	0.01	0.004	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001	< 0.001	<0.001	<0.001	<0.001	<0.001	0.000044	<0.001	< 0.001	0.000026	< 0.0002	0.000018	< 0.001	<0.001	<0.001	<0.0001
Copper	0.002	0.002	1	mg/L	<0.001	<0.01	<0.001	0.001	0.0012	0.001	0.002	0.001	0.001	0.019	0.001	0.001	<0.001	0.001	0.001	0.001	-	0.008	0.00075	<0.001	< 0.001	0.00077	0.0006	0.00073	< 0.001	0.002	<0.001	0.01
Iron	-	1	0.3	mg/L	<0.03	<0.03	<0.03	<0.03	0.018	<0.03	0.021	<0.05	<0.05	0.06	<0.05	<0.05	<0.05	< 0.05	0.06	0.07	< 0.05	0.05	-	<0.05	< 0.05	0.015	< 0.01	0.014	< 0.05	<0.05	<0.05	0.06
Lead	0.0057 - 0.0079	0.0611 - 0.1174	0.01	mg/L	<0.001	<0.01	<0.001	<0.001	<0.0005	<0.001	<0.02	<0.001	<0.001	0.015	<0.001	<0.001	<0.001	< 0.001	<0.001	<0.001	<0.001	<0.001	0.00008	<0.001	< 0.001	0.00001	< 0.0002	<0.00001	< 0.001	<0.001	<0.001	<0.0002
Lithium	-	-	-	mg/L	<0.02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	<0.001	0.00032	<0.001	< 0.001	0.00005	< 0.0002	<0.00005	< 0.001	<0.001	<0.005	<0.0004
Magnesium	-	-	-	mg/L	0.64	0.39	0.79	0.4	0.4	0.9	0.77	0.59	0.75	0.081	0.59	0.75	0.73	0.64	0.83	0.4	0.45	0.81	-	0.86	0.45	0.77	0.56	0.66	0.39	0.54	0.25	0.38
Manganese	0.649 - 0.79244	0.65 - 1.01	0.05	mg/L	<0.005	<0.005	0.006	<0.005	0.002	<0.005	0.007	0.001	0.004	0.005	0.014	0.001	<0.001	0.004	0.003	0.003	0.018	0.003	0.0028	0.009	0.005	0.0019	0.0042	0.00152	0.001	0.014	< 0.001	0.0074
Mercury	0.0001	-	0.001	mg/L	<0.00005	<0.00005	<0.00001	<0.00001	-	<0.00001	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	< 0.00005	<0.00002	<0.00002	<0.00002	<0.00002	-	<0.00002	< 0.02	0.00005	< 0.02	<0.00005	< 0.02	<0.00002	<0.00002	<0.00006
Molybdenum	< 1	2	0.25	mg/L	<0.03	<0.03	<0.03	<0.03	<0.01	<0.03	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	< 0.001	<0.001	<0.001	<0.001	0.0014	0.00064	<0.0005	< 0.0005	0.00034	< 0.0001	0.00029	< 0.0005	<0.0005	<0.0005	0.0003
Nickel	-	-	-	mg/L	<0.02	<0.02	< 0.02	<0.02	<0.02	<0.05	<0.008	<0.001	<0.001	<0.001	<0.001	0.06	0.002	< 0.001	<0.001	<0.001	<0.001	<0.001	<0.00005	<0.001	< 0.001	0.00023	0.0003	<0.00005	< 0.001	0.001	< 0.001	<0.001
Phosphorus	-	-	0.01	mg/L	-	-	-	-	-	-	-	-	-	<0.01	<0.01	0.06	0.04	0.02	0.05	0.1	0.03	0.06	-	0.09	< 0.15	0.1	< 0.03	<0.1	< 0.15	<0.15	<0.15	-
Potassium	-	-	-	mg/L	-	-	-	-	0.5	-	0.8	0.54	0.67	0.071	0.56	0.68	1.46	0.59	0.76	0.51	0.54	0.8	-	0.98	0.5	2	0.6	<1	0.5	0.8	0.4	-
Rubidium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	0.002	-	0.01	mg/L	<0.0005	<0.01	<0.0005	<0.0005	<0.05	<0.0005	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	< 0.002	<0.002	<0.002	<0.002	<0.002	<0.0002	<0.001	< 0.001	0.0002	< 0.0002	<0.0002	< 0.001	<0.001	<0.001	<0.001
Silicon	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	3.97	5.51	5.41	13.2	5.36	5.11	2.39	0.35	4.57	-	5.16	4.1	-	4.77	-	1.6	1.8	1.1	-
Silver	0.00005	0.0001	-	mg/L	<0.0001	<0.001	<0.0001	<0.0001	<0.01	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	< 0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.00002	<0.0001	< 0.00025	0.00002	< 0.00005	<0.00002	< 0.00025	<0.00025	<0.00025	<0.00008
Sodium	-	-	200	mg/L	<2.0	-	-	-	0.8	-	1.23	0.91	0.96	1.17	1.02	0.57	1.03	0.86	1.1	0.73	0.62	1.29	-	1.07	0.67	1.54	1.05	1.07	0.65	1.4	0.53	0.93
Strontium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	0.042	0.042	0.036	0.17	0.031	0.033	0.2	0.02	0.032	0.0412	0.045	0.021	0.0364	0.025	0.0328	0.021	0.026	0.015	-
Sulfur	-	-	-	mg/L	-	-	-	0.33	-	0.55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5	-	0.4	-	-	-	-	-
Tellurium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	-	-	-	mg/L	<0.0001	-	<0.0001	<0.0001	<0.001	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	< 0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.000002	<0.0001	< 0.0001	0.000002	< 0.00002	<0.000002	0.05	< 0.0002	-	< 0.0001	< 0.0001	< 0.0001	<0.0001
Thorium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	-	-	-	mg/L	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	< 0.001	<0.001	<0.001	<0.001	<0.001	0.00001	<0.001	< 0.001	0.00003	< 0.0002	-	-	< 0.0001	-	< 0.001	< 0.001	< 0.001	-
Titanium	-	-	-	mg/L	<0.01	<0.002	<0.01	<0.003	<0.001	<0.001	0.001	0.001	0.001	0.001	< 0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	< 0.001	0.003	0.0003	<0.003	0.00003	< 0.0002	-	< 0.001	< 0.001	< 0.001	<0.02
Tungsten	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	-	-	-	mg/L	0.00002	-	0.00001	-	<0.0005	<0.001	<0.0005	<0.0005	<0.0005	<0.0005	< 0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.000016	<0.0005	< 0.0005	0.000021	< 0.0001	0.000018	-	-	-	< 0.0005	< 0.0005	< 0.0005	-
Vanadium	-	-	-	mg/L	<0.03	<0.01	<0.03	<0.003	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	< 0.001	<0.001	<0.001	<0.001	<0.001	0.0003	<0.001	< 0.001	0.00029	0.0003	0.00036	-	-	-	< 0.001	< 0.001	< 0.001	<0.002
Zinc	0.0075	0.033	5	mg/L	<0.005	0.002	<0.005	0.006	<0.005	<0.012	0.012	0.006	<0.005	<0.005	< 0.005	0.008	<0.005	<0.005	<0.005	0.0046	<0.005	< 0.005	0.0001	< 0.001	<0.0001	-	-	-	< 0.005	< 0.005	0.011	0.018
Zirconium	-	-	-	mg/L	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	< 0.01	<0.01	0.008	< 0.01	<0.01	-	<0.01	< 0.01	0.005	< 0.002	<0.005	-	-	-	< 0.01	< 0.01	< 0.01	-
Dissolved Metals																																
Aluminum	0.05	0.1	9.5	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	-	0.005	0.01	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	1	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	0.00013	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bismuth	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	1.2	-	5	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	0.0000388 - 0.00011	0.000055 - 0.00024	0.005	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cesium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	0.004	0.11	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	0.002	0.002	1	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron	-	0.35	0.3	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead	0.0048 - 0.0079	0.0373 - 0.1174	0.01	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lithium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Magnesium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Manganese	0.649 - 0.79244	0.65 - 1.01	0.05	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury	0.0001	-	0.001	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Molybdenum	< 1	2	0.25	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phosphorus	-	-	0.01	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rubidium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	0.002	-	0.01	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silicon	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver	0.00005	0.0001	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	-	-	200	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Strontium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulfur	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tellerium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thorium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tungsten	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	0.0075	0.033	5	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zirconium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

NOTES

BCWQG AWF Long-term	BC Water Quality Guidelines for Freshwater Aquatic Life - Chronic Long-term Average
BCWQG AWF Short-term	BC Water Quality Guidelines for Freshwater Aquatic Life - Short-term Maximum
BCWQG DW	BC Water Quality Guidelines for Drinking Water

Italics indicate that the laboratory detection limit exceeds the applicable standard.
British Columbia Approved and Working (or interim) Water Quality Guidelines (BC WQG), updated from time to time, for the protection of freshwater aquatic life (AW-F).
H = standard is hardness dependent; pH = standard is pH dependent; Cl = standard is chloride dependent; T = standard varies with temperature
V = Standard is valence dependent VI refers to chromium VI and III refers to chromium III; Ca = standard is calcium dependent
* = for ammonia guideline, an average temperature of 10 degrees Celsius and a pH of 7.5 was chosen where no data was available
MAC = Maximum Acceptable Concentration
AO = Aesthetic Objective
QAQC = Quality Assurance and Control; FDA = Field Duplicate Available; FD = Field Duplicate

Table D-3: Surface Water Analytical Results
2019 Thornhill Transfer Station Annual Monitoring Program
Regional District of Kitimat-Stikine

Location	BCWQG Aquatic Life - Freshwater (Chronic - Long-term average)	BCWQG Aquatic Life - Freshwater (Short-term maximum)	BCWQG -Drinking Water	Units	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1
Site Name					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sample ID					2008-Oct-10	2009-Aug-26	2010-Feb-22	2010-Jun-15	2010-Oct-25	2011-Feb-15	2012-Feb-22	2012-May-08	2013-Jan-04	2013-Apr-16	2013-Jun-06	2013-Oct-22	2014-May-06	2014-Oct-29	2015-Mar-31	2015-Aug-11	2015-Nov-04	2016-Mar-22	2016-Jul-25	2016-Oct-13	2017-Mar-28	2017-Aug-24	2018-Mar-19	2018-Jul-04	2018-Sep-10	2019-Jul-17	2019-Oct-10
Laboratory ID					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	L2070515-1	L2124909-1	L2163156-1	L2313871-1	L2364066-1
Sample Date					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
QAQC					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Field Observations																														
pH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.2	7.5	7.5	8.3
Temperature	-	-	-	°C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8.7	11.5	11.1	7.5
Conductivity	-	-	-	uS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	37.4	72.6	61.7	43.9
Water level	-	-	-	m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Oxygen	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.8	-	8.1	11.3
Oxidation Reduction Potential	-	-	-	mV	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	442.4	-	241.9	166.8
Conventional Parameters																													
Conductivity	-	-	-	uS/cm	73	75.3	54.3	40	60.4	44.3	58.5	42.6	59.5	62.8	29.1	84.3	42.5	60	55.9	68.6	65.3	70	79.9	83.8	56.5	65.8	66.4	52.8	87.6	85.3	64.8
Hardness (Total as CaCO3)	-	-	-	mg/L	34.8	37.5	21.1	17.1	27.3	22.4	26.1	21.1	27.2	28	18.9	42.6	18.7	27.7	26	34.8	-	39.4	40	35.7	24.6	30.5	30.2	25.8	39.3	38.5	29.6
pH	6.5-9.0	-	6.5 - 8.5	-	7.8	7	7	6.6	7.4	7.1	7.3	7.1	7	7.1	7	7.2	7.2	6.9	7.5	7.3	7.4	7	7.3	7.3	7.2	7.4	7.77	7.63	7.57	7.81	7.69
Total Suspended Solids	-	25 mg/L (backgr. 25-250 mg/l)) (i)		mg/L	<4	-	-	-	-	-	-	-	3.9	-	1	<1	<1	<1	ND	<1.0	2.8	1.5	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0	<3.0	3	5.8	<3.0
Alkalinity, Total (as CaCO3)	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	27.4	55.7	36.9	41.5	29.6
Ammonia, Total (as N)	1.57 - 1.86	8.18 - 24.7	-	mg/L	<0.005	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.03	<0.03	<0.03	ND	<0.03	<0.03	<0.03	<0.03	0.057	<0.03	<0.03	0.0056	<0.0050	0.0137	<0.0050	<0.0050
Bromide (Br)	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.050	-	-
Chloride (Cl)	150	600	250	mg/L	0.8	<1	<1	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	ND	<1.0	<1.0	<1.0	<1.0	1.2	<1.0	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50
Fluoride (F)	-	0.41 - 0.99	1.5	mg/L	-	<0.1	<0.1	<0.1	0.03	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.5	ND	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.020	0.023	<0.020
Nitrate (as N)	3	32.8	10	mg/L	-	ND	0.11	<0.1	<0.1	<0.1	<0.1	<0.1	0.14	<0.1	<0.1	0.11	<0.1	0.021	0.03	0.01	0.02	0.02	0.061	0.053	0.026	0.022	0.172	0.0238	0.999	0.0391	0.0529
Nitrite (as N)	0.02 - 0.2	0.06 - 0.6	1	mg/L	0.002	ND	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	ND	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.0010	<0.0010	0.0018	<0.0010	<0.0010
Nitrate + Nitrite (as N)	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Kjeldahl Nitrogen	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.050	<0.05	0.211	0.085	0.077
Phosphorus (P)-Total	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0023	0.0083	0.0061	0.0024	
Orthophosphate - Dissolved (as P)	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	<0.0010	<0.0010	
Sulfate (SO4)	128 - 218	-	500	mg/L	-	-	1.7	ND	0.6	1.3	<1.0	0.9	0.75	1.01	0.68	0.64	0.9	<0.5	1.1	<1.0	-	1.5	1.1	1.4	1.2	<1.0	1.3	0.77	3.33	1.11	1.03
Biological Oxygen Demand (BOD)	-	-	-	mg/L	<10	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ND	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<2.0	<2.0	<2.0	<2.0	<2.0
Chemical Oxygen Demand (COD)	-	-	-	mg/L	11	<30	<30	<30	<30	31	<30	<30	<20	<20	<20	<20	<20	<20	ND	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Total Metals																														
Aluminum	0.05	0.1	9.5	mg/L	0.0271	0.016	0.025	0.029	0.06	0.129	0.041	0.131	0.0373	0.0342	0.0869	0.0304	0.0511	0.0782	0.083	0.052	-	0.045	0.237	0.029	0.032	0.0528	0.0297	0.0364	0.094	0.0542	0.0397
Antimony	-	-	-	mg/L	<0.00002	ND	ND	ND	ND	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	ND	<0.0001	-	<0.0001	0.0001	0.0002	<0.0001	<0.00020	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic	-	0.005	0.01	mg/L	0.00003	ND	ND	ND	ND	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	ND	<0.0005	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.00050	<0.00010	<0.00010	0.00017	<0.00010	<0.00010
Barium	1	-	-	mg/L	0.0233	0.079	0.059	0.07	0.02	0.017	0.02	0.0109	0.018	0.0177	0.0127	0.0254	0.0114	0.018	0.018	0.024	-	0.022	0.028	0.024	0.018	0.0214	0.0191	0.0207	0.0337	0.0315	0.0206
Beryllium	0.00013	-	-	mg/L	<0.00001	ND	ND	ND	ND	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	ND	<0.0001	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth	-	-	-	mg/L	<0.000005	ND	ND	ND	ND	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	ND	<0.0001	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.00010	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Boron	1.2	-	5	mg/L	<0.05	ND	ND	ND	ND	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.004	0.021	-	0.007	0.019	0.138	0.03	0.178	<0.010	<0.020	<0.010	<0.010	<0.010
Cadmium	0.0000388 - 0.00011	0.000055 - 0.00024	0.005	mg/L	<0.00005	0.00026	0.00003	0.00003	0.00005	<0.00005	0.00017	<0.00001	<0.00001	0.00013	<0.00001	<0.00001	<0.00001	0.000015	ND	<0.00001	-	0.00001	0.00009	<0.00001	<0.00001	<0.000010	<0.0000050	<0.0000050	0.0000065	<0.0000050	<0.0000050
Calcium	-	-	-	mg/L	11.3	14.3	9.86	6.32	8.93	7.85	9.29	7.48	9.61	10.6	6.79	15.4	6.71	9.89	9.3	12.5	-	14	14.3	12.8	8.7	10.9	10.1	8.64	14.2	14.4	10.6
Cesium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Chromium	-	-	-	mg/L	<0.0001	ND	ND	ND	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	ND	<0.0005	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.00050	0.00047	<0.00010	0.00013	0.0001	0.00012
Cobalt	0.004	0.11	-	mg/L	0.000025	ND	ND	ND	ND	<0.0005	<0.0005	<0.0005	<0.0005	<.0005	<.0005	<.0005	<.0005	<.0006	ND	0.00006	-	<0.00005	0.00021	<0.00005	<0.00005	<0.00010	<0.00010	<0.00010	0.00015	<0.00010	<0.00010
Copper	0.002	0.002	1	mg/L	0.00052	0.0065	0.001	0.0148	0.0141	0.0029	0.0021	0.00133	0.00127	0.00063	0.00075	0.00069	0.00074	0.00109	0.0011	0.0011	-	0.0013	0.0033	0.001	0.0011	0.00061	<0.00050	0.00051	0.00164	0.00068	0.00061
Iron	-	1	0.3	mg/L	0.034	0.104	0.01	0.015	0.07	0.135	0.038	0.115	0.0564	0.0394	0.0759	0.0854	0.024	0.049	0.07	0.07	-	0.05	0.34	0.04	0.02	0.057	0.025	0.156	0.196	0.036	
Lead	0.0057 - 0.0079	0.0611 - 0.1174	0.01	mg/L	<0.000005	0.0003	ND	ND	0.0049	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	ND	<0.0001	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.00020	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium	-	-	-	mg/L	<0.0005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.0002	<0.0001	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.00010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Magnesium	-	-	-	mg/L	0.88	0.98	0.74	0.51	0.65	0.67	0.697	0.587	0.778	0.77	0.475	1.05	0.465	0.725	0.65	0.88	-	1.05	1.04	0.88	0.69	0.79	0.735	0.692	1.04	0.987	0.71
Manganese	0.649 - 0.79244	0.65 - 1.01	0.05	mg/L	0.00614	0.023	0.003	0.023	0.006	0.006	0.003	0.0044	0.0067	0.00391	0.0053	0.0164	0.0017	0.0079	0.0044	0.0169	-	0.0064	0.0295	0.0165	0.0013	0.00945	0.00154	0.00345	0.0536	0.00951	0.00435
Mercury	0.0001	-	0.001	mg/L	-	ND	ND	ND	ND	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	ND	<0.00002	-	<0.00002	<0.00002	<0.00002	<0.00002	<0.00010	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	< 1	2	0.25	mg/L	0.00024	ND	ND	ND	ND	<0.001	<0.001	<0.001	<0.001	0.000462	<0.001	<0.001	<0.001	<0.001	0.0015	0.0003	-	0.0006	0.0002	0.0005	0.0001	0.0002	0.000156	0.000151	0.000227	0.000343	0.000186
Nickel	-	-	-	mg/L	0.00008	0.002	ND	0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.0003	<0.0002	-	<0.0002	0.0003	<0.0002	<0.0002	<0.00040	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Phosphorus	-	-	0.01	mg/L	0.003	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	ND	0.07	-	0.03	<0.02	0.02	<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Potassium	-	-	-	mg/L	0.77	0.89	0.62	0.49	0.64	0.64	0.755	0.466	0.686	0.76	0.553	0.977	0.514	0.701	0.7	0.81	-	1.25	0.95	0.82	0.59	0.79	0.609	0.709	1.13	0.91	0.684
Rubidium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00071	0.00085	0.00174	0.00114	0.00089
Selenium	0.002	-	0.01	mg/L	<0.00004	ND	ND	ND	ND	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	ND	<0.0005	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.00050	<0.0000050	<0.0000050	0.000095	0.000081	0.000052
Silicon	-	-	-	mg/L	2.23	3.02	2.7	1.89	2.32	2.72	2.42	2.08	2.31	2.33	1.72	2.71	1.84	2.51	2.5	3.1	-	3.1	3	2.4	2.5	2.6	2.43	2.4	3.03	2.73	2.51
Silver	0.00005	0.0001	-	mg/L	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	0.000006	<0.000005	<0.000005	<0.000005	<0.000006	ND	<0.00005	-	<0.00005	<0.00005	<0.00005	<0.00005	<0.000050	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium	-	-	200	mg/L	1.14	1.67	1.11	1.08	0.93	0.91	1.06	1.02	1.04	1.04	0.733	1.39	0.814	1.13	0.96	1.25	-	2.33	1.43	1.32	0.89	1.11	0.988	1.04	1.34	1.29	1.03
Strontium	-	-	-	mg/L	0.0459	0.056	0.043	0.029	0.037	0.033	0.036	0.0351	0.0413	0.0405	0.026	0.0539	0.0283	0.0414	0.035	0.049	-	0.049	0.056	0.055	0.038	0.0446	0.0417	0.0391	0.0636	0.0564	0.041
Sulfur	-	-	-	mg/L	<3	ND	ND	4	ND	<3	<3	3.2	<3	<3	<3	<3	<3	<4	ND	<1	-	1	<1	<1	<1	<3.0	0.54	<0.50	1.13	<0.50	<0.50
Tellurium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0001	<0.00010	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Thallium	-	-	-	mg/L	<0.000002	ND	ND	ND	ND	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	ND	<0.00002	-	<0.00002	<0.00002	<0.00002	<0.00002	<0.000020	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thorium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Tin	-	-	-	mg/L	<0.00001	ND	ND	ND	ND	<0.05	<0.05	<0.05	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	ND	0.0002	-	<0.0002	0.0003	<0.0002	<0.0002	<0.00020	<0.00010	<0.00010	<0.00010	<0.00010	0.00052
Titanium	-	-	-	mg/L	<0.0005	ND	ND	ND	ND	0.008	<0.0005	0.0056	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	ND	<0.005	-	<0.005	0.013	<0.005	<0.005	<0.0050	0.00092	0.00089	<0.0030	0.00162	0.00075
Tungsten	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00019	<0.00010	<0.00010	<0.00010	<0.00010	
Uranium	-	-	-	mg/L	0.000013	ND	ND	ND	ND	<0.0001	<0.0001	<0.0001	<0.0001	0.000012	<0.0001	<0.0001	<0.0001	<0.0001	0.00003	<0.00002	-	<0.00002	0.00005	0.00002	<0.00002	<0.000020	<0.000010	0.000011	0.000023	0.000017	0.000013
Vanadium	-	-	-	mg/L	0.0003	ND	ND	ND	ND	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	ND	<0.001	-	<0.001	0.001	<0.001	<0.001	<0.0010	<0.00050	<0.00050	0.00066	0.00054	<0.00050
Zinc	0.0075	0.033	5	mg/L	0.0002	0.037	0.02	0.031	0.011	<0.005	<0.005	<0.005	<0.005	0.0013	<0.005	<0.005	<0.005	0.0063	ND	<0.004	-	<0.004	0.007	<0.004	<0.004	0.0066	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Zirconium	-	-	-	mg/L	-	ND	ND	ND	ND	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	ND	<0.0001	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.00010	<0.000060	<0.000060	<0.000060	<0.00020	<0.00020
Dissolved Metals																														
Aluminum	0.05	0.1	9.5	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0023	0.0239	0.043	0.0265	0.0334
Antimony	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic	-	0.005	0.01	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0006	<0.00010	<0.00010	<0.00010	<0.00010
Barium	1	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.261	0.0199	0.0372	0.0294	0.0218
Beryllium	0.00013	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron	1.2	-	5	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.961	<0.010	<0.010	<0.010	<0.010
Cadmium	0.0000388 - 0.00011	0.000055 - 0.00024	0.005	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.000021	<0.0000050	<0.0000050	0.000033	<0.0000050
Calcium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	88.3	9.19	14.1	13.9	10.6
Cesium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.000103	<0.000010	<0.000010	<0.000010	<0.000010
Chromium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00033	<0.00010	<0.00010	<0.00010	<0.00010
Cobalt	0.004	0.11	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00173	<0.00010	0.00014	<0.00010	<0.00010
Copper	0.002	0.002	1	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00189	0.00039	0.00133	0.00141	0.00072
Iron	-	0.35	0.3	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.02	<0.010	0.121	0.028	0.024
Lead	0.0048 - 0.0079	0.0373 - 0.1174	0.01	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Magnesium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16.8	0.682	0.979	0.954	0.779
Manganese	0.649 - 0.79244	0.65 - 1.01	0.05	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.64	0.00217	0.0628	0.00761	0.00478
Mercury	0.0001	-	0.001	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	< 1	2	0.25	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.000321	0.000152	0.000219	0.000333	0.000207
Nickel	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00248	<0.00050	<0.00050	<0.00050	<0.00050
Phosphorus	-	-	0.01	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.050	<0.050	<0.050	<0.050	<0.050
Potassium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	27.6	0.699	1.09	0.856	0.757
Rubidium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0177	0.00098	0.00155	0.00112	0.0009
Selenium	0.002	-	0.01	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00016	<0.000050	0.000083	<0.000050	<0.000050
Silicon	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.51	2.21	2.91	2.8	2.5
Silver	0.00005	0.0001	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium	-	-	200	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	48.5	1.03	1.32	1.26	1.07
Strontium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.512	0.0383	0.0562	0.0533	0.0436
Sulfur	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.08	<0.50	0.94	<0.50	<0.50
Tellerium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Thallium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thorium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Tin	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00030	<0.00030	0.00088	0.00041	0.00031
Tungsten	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Uranium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.000078	0.000011	0.000019	0.000015	0.000013
Vanadium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc	0.0075	0.033	5	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0012	<0.0010	<0.0010	0.0011	<0.0010
Zirconium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.000060	<0.000060	<0.000060	<0.00020	<0.00020

NOTES

BCWQG AWF Long-term — BC Water Quality Guidelines for Freshwater Aquatic Life - Chronic Long-term Average

BCWQG AWF Short-term — BC Water Quality Guidelines for Freshwater Aquatic Life - Short-term Maximum

BCWQG DW — BC Water Quality Guidelines for Drinking Water

Italics indicate that the laboratory detection limit exceeds the applicable standard.

British Columbia Approved and Working (or interim) Water Quality Guidelines (BC WQG), updated from time to time, for the protection of freshwater aquatic life (AW-F).

H = standard is hardness dependent; pH = standard is pH dependent; Cl = standard is chloride dependent; T = standard varies with temperature

V = Standard is valence dependent VI refers to chromium VI and III refers to chromium III; Ca = standard is calcium dependent

* = for ammonia guideline, an average temperature of 10 degrees Celsius and a pH of 7.5 was chosen where no data was available

MAC = Maximum Acceptable Concentration

AO = Aesthetic Objective

QAQC = Quality Assurance and Control; FDA = Field Duplicate Available; FD = Field Duplicate

Table D-4: Surface Water Analytical Results
2019 Thornhill Transfer Station Annual Monitoring Program
Regional District of Kitimat-Stikine

Location		BCWQG Aquatic Life - Freshwater (Chronic - Long-term average)	BCWQG Aquatic Life - Freshwater (Short-term maximum)	BCWQG -Drinking Water	Units	SW-21	SW-21	SW-21	SW-21	SW-21	SW-21	SW-21	SW-21	SW-21	SW-21	SW-21	SW-21	SW-21	SW-21	SW-21	SW-21	SW-21	SW-21	SW-21	SW-21	SW-21	SW-21	SW-21	SW-21
Site Name		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sample ID		-	-	-	-	1997-Jun-01	1997-Dec-04	1998-May-04	-	1998-Sep-24	-	1999-Jan-27	1999-Apr-01	1999-Nov-01	2000-Mar-17	2000-Aug-15	2000-Dec-20	-	2001-May-07	2001-Dec-01	2002-Apr-01	2002-Jun-01	2003-Jan-01	2003-Mar-01	2003-Aug-12	2003-Dec-01	2004-May-14	2004-Oct-18	2005-Jun-01	2005-Nov-01	2006-Jun-01	2007-Jan-02	2007-Jun-18	2008-May-27
Laboratory ID		-	-	-	-	-	-	FDA	FD	FDA	FD	-	-	-	-	-	FDA	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sample Date		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
QAQC		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Field Observations																																	
pH		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Temperature		-	-	-	°C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conductivity		-	-	-	uS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Oxygen		-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation Reduction Potential		-	-	-	mV	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conventional Parameters																																	
Conductivity		-	-	-	uS/cm	1480	1280	1300	1060	1450	1460	-	1235	-	864	-	700	-	1200	1570	725	1310	495	1130	1340	575	1240	1340	1760	920	1490	790	1220	1190
Hardness (Total as CaCO3)		-	-	-	mg/L	399	281	287	395	439	471	441	366	351	277	384	402	440	415	487	219	412	148	281	452	155	377	536	444	320	396	184	361	337
pH		6.5-9.0		6.5 - 8.5	-	7.74	7.82	8.08	8.02	8.07	8.1	-	-	-	7.55	7.96	7.61	7.58	7.82	7.67	7.69	8.04	7.55	7.73	6.94	7.52	7.84	7.7	7.79	8.2	7.93	7.74	7.96	7.9
Total Suspended Solids		-	25 mg/L (backgr. 25-250 mg/l)) (i)	-	mg/L	7	6	5	-	5	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<4	-	25	-	-	-	-
Alkalinity, Total (as CaCO3)		-		-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ammonia, Total (as N)		0.37 - 1.86	1.9 - 21.8	-	mg/L	3.81	11.3	7.61	5.14	11.1	12.5	8.23	15.4	20.6	8.6	6.5	27.5	19.5	1.9	25	1.51	0.54	4	5.3	0.01	4.4	0.74	14.2	0.06	15.1	13.3	13.8	14.4	6.5
Bromide (Br)		-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride (Cl)		150	600	250	mg/L	130	99	96.9	90	146	148	100	71.4	97.1	65.2	144	102	102	81.8	96.3	31.3	104	21.5	80.3	104	33.7	83.4	67.3	100	44.4	113	45	84	134
Fluoride (F)		-	1.49 - 2.50	1.5	mg/L	-	-	-	-	-	-	-	-	-	0.15	<0.05	<0.05	<0.05	0.24	< 0.05	<0.05	<0.25	<0.05	<0.05	<0.05	0.06	<0.05	-	<0.25	-	<0.25	<0.25	<0.25	<0.1
Nitrate (as N)		3	32.8	10	mg/L	17.6	8.27	10.6	10.8	8.8	9.48	14.4	6.5	2.3	-	9	6.1	6.3	13.8	4.1	5.2	11.5	4.6	16.1	9.9	4.65	11.8	3.86	7.9	1.24	8.8	4.4	8.81	9
Nitrite (as N)		0.1 - 0.2	0.3 - 0.6	1	mg/L	0.188	0.056	0.14	0.023	0.18	0.154	0.098	0.09	0.059	-	0.3	0.034	0.028	0.193	0.03	1.39	0.242	0.034	0.084	0.092	0.028	0.146	0.054	0.02	0.03	0.024	0.038	0.002	0.128
Total Kjeldahl Nitrogen		-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phosphorus (P)-Total		-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Orthophosphate - Dissolved (as P)		-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulfate (SO4)		309 - 429	-	500	mg/L	18	56	58	64	19	14	90.6	28.1	21.6	28	3.2	24.6	24.7	20	28.8	2	11.9	25.4	12.7	2.1	10.5	9	33.7	6.6	20.5	4.4	17.2	5.27	5.4
Biological Oxygen Demand (BOD)		-	-	-	mg/L	10	19	8	13	45	58	-	18	<10	<10	<10	<10	<10	<10	< 10	<10	<10	11	<10	<10	<10	<10	<10	<10	<10	<10	27	<10	10	9.4
Chemical Oxygen Demand (COD)		-	-	-	mg/L	62	82	105	77	144	251	75	64	123	58	74	64	61	53	63	31	53	38	46	59	<25	35	69	62	94	94	41	96	82
96 Hr. LC-50 pH adjusted		-		-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
96 Hr. LC-50 standard				-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Metals																																	
Aluminum		0.05	0.1	9.5	mg/L	<0.05	0.051	0.057	0.07	<0.005	<0.005	0.03	0.029	0.047	0.074	0.014	0.037	0.017	0.03	0.015	0.018	0.011	0.042	0.01	0.013	0.072	0.008	0.0128	0.009	0.00186	< 0.005	0.043	0.011	0.012
Antimony		-	-	-	mg/L	<0.2	0.0004	0.00055	<0.05	<0.001	<0.001	0.026	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	< 0.001	<0.001	<0.001	-	< 0.001	<0.001	<0.001	< 0.001	0.0002	< 0.0002	0.000177	< 0.001	<0.001	<0.001	<0.0006
Arsenic		-	0.005	0.01	mg/L	<0.2	0.001	0.0008	<0.0005	0.002	0.002	<0.04	<0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	< 0.001	<0.001	<0.001	-	< 0.001	<0.001	<0.001	< 0.001	0.0006	0.0007	0.0006	< 0.001	0.001	<0.001	<0.001
Barium		1	-	-	mg/L	0.08	0.12	0.11	0.155	0.21	0.23	0.144	0.16	0.16	0.27	0.17	0.17	0.18	0.16	0.21	0.12	0.15	0.072	0.12	0.17	0.084	0.1	0.217	0.104	0.134	0.14	0.11	0.16	0.123
Beryllium		0.00013	-	-	mg/L	<0.005	<0.005	<0.005	0.002	<0.005	<0.005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	< 0.001	<0.001	<0.001	-	< 0.001	<0.001	< 0.001	< 0.001	<0.00002	< 0.0002	0.00002	< 0.001	<0.001	<0.001	<0.0004
Bismuth		-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.001	<0.00002	< 0.0002	0.00002	< 0.001	<0.001	<0.001	-
Boron		1.2	-	5	mg/L	-	-	-	1.56	-	-	1.35	1.27	0.85	0.77	1.66	1.19	1.28	1.08	1.08	0.63	1.35	0.49	1.04	1.82	0.35	1.37	1.12	2.4	0.738	1.68	0.72	1.5	1.55
Cadmium		0.0023 - 0.00083	0.00067 - 0.0040	0.005	mg/L	<0.002	<0.0002	<0.0002	<0.005	<0.0002	<0.0002	0.0001	<0.0002	<0.0002	0.0002	0.0002	0.001	<0.0002	<0.0002	0.0002	<0.0002	<0.0002	-	< 0.0002	<0.0002	< 0.0002	< 0.0002	<0.0001	0.00007	0.00001	< 0.0002	<0.0002	<0.0002	0.00006
Calcium		-	-	-	mg/L	112	79.4	81.6	116	122	131	124	112	98	85.5	115	116	128	122	146	65.9	118	46.1	81.1	121	48.3	112	168	139	104	117	58.5	112	100
Cesium		-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium		-	-	-	mg/L	<0.01	<0.001	<0.001	0.0019	0.002	0.002	0.005	0.001	0.003	0.002	0.0001	0.001	0.002	<0.001	0.002	<0.001	0.001	-	< 0.001	0.001	<0.001	0.001	<0.002	0.001	0.003	0.001	0.003	0.002	0.004
Cobalt		0.004	0.11	-	mg/L	<0.01	<0.01	<0.01	<0.005	<0.01	<0.01	0.003	0.001	0.003	<0.001	0.003	0.002	0.002	0.001	0.002	<0.001	0.002	-	< 0.001	0.002	<0.001	0.001	0.00118	0.0013	0.00145	0.002	<0.001	0.002	0.0017
Copper		0.00004	0.013 - 0.062	1	mg/L	<0.01	0.002	0.004	0.0024	<0.001	<0.001	0.007	0.004	0.002	0.002	0.002	<0.001	<0.001	0.005	0.002	0.002	0.003	0.003	0.002	0.001	0.003	0.002	0.00197	0.0024	0.00099	0.001	0.003	0.002	0.0163
Iron		-	1	0.3	mg/L	<0.03	0.09	0.05	0.069	0.05	0.04	0.045	0.17	0.39	0.12	0.21	0.3	0.31	0.26	0.39	0.24	0.32	0.12	< 0.05	<0.05	0.33	< 0.05	0.022	0.05	0.06	< 0.05	0.3	0.11	0.34
Lead		0.0071 - 0.037	0.096 - 0.87	0.01	mg/L	<0.01	<0.001	<0.001	<0.05	<0.001	<0.001	<0.02	0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	< 0.001	<0.001	<0.001	-	< 0.001	<0.001	< 0.001	< 0.001	<0.0001	< 0.0002	0.00001	< 0.001	<0.001	<0.001	<0.0002
Lithium		-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.002	-	0.001	0.002	-	0.001	0.00058	0.0012	0.00133	0.002	0.001	<0.005	0.0009
Magnesium		-	-	-	mg/L	29.1	20.1	20.2	24.5	32.7	35	31.8	21.1	25.8	15.4	23.7	27.4	29.2	27	29.7	13.1	28.3	7.98	19	36.3	8.44	23.8	28.4	23.4	15.3	25.2	9.24	19.7	18.2
Manganese		1.11 - 3.43	1.8 - 7.6	0.05	mg/L	0.285	1.31	1.23	1.96	2.02	2.3	0.934	2.26	3.42	1.18	2.13	2.06	2.31	1.8	3.32	0.96	0.93	0.47	0.97	0.18	0.58	0.25	1.99	0.054	1.59	1.12	1.16	1.49	1.2
Mercury		0.0001	-	0.001	mg/L	<0.00005	0.00001	<0.00001	-	<0.00001	<0.00001	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	< 0.00002	<0.00002	<0.00002	-	< 0.00002	<0.00002	< 0.00002	< 0.02	<0.00005	< 0.02	<0.00005	< 0.02	<0.00002	<0.00002	<0.00006
Molybdenum		< 1	2	0.25	mg/L	<0.03	<0.03	<0.03	<0.01	<0.03	<0.03	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	0.0012	<0.0005	< 0.0005	< 0.0005	<0.0005	<0.0005	0.0003	0.00032	<0.0005	<0.0005	0.0003
Nickel		-	-	-	mg/L	<0.02	0.02	<0.02	<0.02	<0.05	<0.05	<0.008	0.006	0.005	0.003	0.009	0.007	0.007	0.005	0.005	0.003	0.006	0.002	0.005	0.006	0.002	0.005	0.00579	0.0069	0.00404	0.006	0.004	0.005	0.008
Phosphorus		-	-	0.01	mg/L	-	-	-	-	-	-	-	-	-	0.06	0.06	0.11	0.1	0.11	0.06	0.03	0.18	0.05	0.07	0.17	0.4	< 0.15	<0.1	0.07	0.1	< 0.15	<0.15	<0.15	-
Potassium		-	-	-	mg/L	-	-	-	51.2	-	-	58.6	39.4	51.9	31	52.3	54.6	57.3	46.1	52.5	22.1	47.9	18.7	32.4	61	16.8	43.2	48	47.6	32	52.7	22.4	43.9	-
Rubidium		-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium		0.002	-	0.01	mg/L	<0.01	<0.0005	0.0015	<0.05	0.0005	<0.0005	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	< 0.002	<0.002	<0.002	-	< 0.001	<0.001	<0.001	< 0.001	<0.002	0.0009	0.0004	< 0.001	<0.001	<0.001	<0.001
Silicon		-		-	mg/L	-	-	-	-	-	-	-	-	-	6.59	16.9	12.1	13.1	11.8	15.3	8.28	11.8	7.18	8.72	16.3	6.32	13	-	13.8	-	6.3	3.4	5.2	-
Silver		0.00005, 0.0015	0.0001, 0.003	-	mg/L	<0.001	<0.0001	<0.0001	<0.01	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	< 0.0001	<0.0001	< 0.0001	< 0.0025	<0.0002	< 0.00005	0.00002	< 0.00025	<0.00025	<0.00025	<0.00008
Sodium		-	-	200	mg/L	-	-	-	92.6	-	-	111	64.1	91.1	49.9	84.8	91.2	98.2	78.3	87.9	35.6	85.2	26.6	60.1	106	25.1	81.5	77.6	139	48	99.8	41.4	82	73.3
Strontium		-	-	-	mg/L	-	-	-	-	-	-	-	-	-	0.51	0.89	0.71	0.77	0.75	0.86	0.033	0.75	0.25	0.53	0.94	0.32	0.69	0.915	0.68	0.503	0.87	0.34	0.75	-
Sulfur		-	-	-	mg/L	-	-	-	19.8	-	-	33.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12.7	-	7.2	-	-	-	-
Tellurium		-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium		-	-	-	mg/L	-	<0.0001	<0.0001	-	0.001	0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	< 0.0001	<0.0001	<0.0001	<0.0001	< 0.0001	<0.0001	< 0.0001	< 0.0001	<0.00002	< 0.00002	0.000006	< 0.0001	< 0.0001	<0.0001	<0.0001
Thorium		-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin		-	-	-	mg/L	-	-	-	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	< 0.001	<0.001	<0.001	<0.001	< 0.001	<0.001	< 0.001	< 0.001	0.00012	0.0004	-	< 0.001	< 0.001	<0.001	-
Titanium		-	-	-	mg/L	-	<0.01	<0.01	0.003	<0.01	<0.01	<0.003	<0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	< 0.001	<0.001	<0.001	0.001	< 0.001	0.001	0.003	< 0.001	<0.003	0.0006	0.003	< 0.001	0.002	<0.001	<0.02
Tungsten		-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium		-	-	-	mg/L	-	0.00009	0.0001	-	0.0002	0.0002	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	< 0.0005	<0.0005	<0.0005	<0.0005	< 0.0005	<0.0005	< 0.0005	< 0.0005	0.000083	0.0001	0.000073	< 0.0005	< 0.0005	<0.0005	<0.0001
Vanadium		-	-	-	mg/L	-	<0.03	<0.03	<0.01	<0.03	<0.03	<0.003	<0.001	<0.001	0.003	0.001	0.003	0.001	<0.001	0.002	<0.001	0.003	<0.001	< 0.001	<0.001	< 0.001	< 0.001	<0.0006	0.0004	0.00048	< 0.001	<0.001	<0.001	<0.002
Zinc		0.026 - 0.42	0.051 - 0.45	5	mg/L	0.007	<0.005	<0.005	0.004	<0.005	<0.005	<0.002	0.007	0.012	0.042	0.006	0.005	0.013	0.01	< 0.005	<0.005	0.012	<0.005	< 0.005	0.006	< 0.005	< 0.005	0.0011	0.004	0.0009	< 0.005	0.018	<0.005	0.015
Zirconium		-	-	-	mg/L	-	-	-	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	< 0.01	<0.01	<0.01	<0.01	< 0.01	<0.01	< 0.01	< 0.01	<0.005	< 0.002	0.005	< 0.01	<0.01	<0.01	-
Dissolved Metals																																	
Aluminum		0.05	0.1	9.5	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Antimony		-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic		-	0.005	0.01	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium		1	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium		0.00013	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bismuth		-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron		1.2	-	5	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium		0.0023 - 0.00083	0.00067 - 0.0040	0.005	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium		-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cesium		-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium		-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt		0.004	0.11	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper		0.00004	0.013 - 0.062	1	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron		-	0.35	0.3	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead		0.0071 - 0.037	0.096 - 0.87	0.01	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lithium		-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Magnesium		-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Manganese		1.11 - 3.43	1.8 - 7.6	0.05	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury		0.0001	-	0.001	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Molybdenum		< 1	2	0.25	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel		-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phosphorus		-	-	0.01	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium		-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rubidium		-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium		0.002	-	0.01	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silicon		-		-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver		0.00005, 0.0015	0.0001, 0.003	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium		-	-	200	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Strontium		-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulfur		-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tellerium		-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium		-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thorium		-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin		-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium		-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tungsten		-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium		-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium		-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc		0.026 - 0.42	0.051 - 0.45	5	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zirconium		-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

NOTES

BCWQG AWF Long-term for Freshwater Aquatic Life - Chronic Long-term Average

BCWQG AWF short-term as for Freshwater Aquatic Life - Short-term Maximum

BCWQG DW Quality Guidelines for Drinking Water

Italics indicate that the laboratory detection limit exceeds the applicable standard.

British Columbia Approved and Working (or interim) Water Quality Guidelines (BC WQG), updated from time to time, for the protection of freshwater aquatic life (AW-F).

H = standard is hardness dependent; pH = standard is pH dependent; Cl = standard is chloride dependent; T = standard varies with temperature

V = Standard is valence dependent VI refers to chromium VI and III refers to chromium III; Ca = standard is calcium dependent

* = for ammonia guideline, an average temperature of 10 degrees Celsius and a pH of 7.5 was chosen where no data was available

MAC = Maximum Acceptable Concentration

AO = Aesthetic Objective

QAQC = Quality Assurance and Control; FDA = Field Duplicate Available; FD = Field Duplicate

Table D-4: Surface Water Analytical Results
2019 Thornhill Transfer Station Annual Monitoring Program
Regional District of Kitimat-Stikine

Location / Site Name / Sample ID / Laboratory ID / Sample Date / QAQC	BCWQG Aquatic Life - Freshwater (Chronic - Long-term average)	BCWQG Aquatic Life - Freshwater (Short-term maximum)	BCWQG -Drinking Water	Units	SW-21 - 2008-Oct-10 -	SW-21 - 2009-Sep-24 -	SW-21 - 2010-Feb-22 -	SW-21 - 2010-Jun-15 -	SW-21 - 2010-Oct-25 -	SW-21 - 2011-Feb-15 -	SW-21 - 2012-Feb-22 -	SW-21 - 2012-May-08 -	SW-21 - 2013-Jan-04 -	SW-21 - 2013-Apr-15 -	SW-21 - 2013-Jun-06 -	SW-21 - 2013-Oct-22 -	SW-21 - 2014-May-06 -	SW-21 - 2014-Oct-29 -	SW-21 - 2015-Mar-31 -	SW-21 - 2015-Aug-11 -	SW-21 - 2015-Nov-04 -	SW-21 - 2016-Mar-22 -	SW-21 - 2016-Jul-25 -	SW-21 - 2016-Oct-13 -	SW-21 - 2017-Mar-28 -	SW-21 - 2017-Aug-24 -	SW-21 L2070515-4 2018-Mar-19 -	SW-21 L2124909-4 2018-Jul-04 -	SW-21 L2163156-4 2018-Sep-10 -	SW-21 L2257784-4 2019-Apr-11 FDA	DUP L2257784-6 2019-Apr-11 FD	SW-21 L2313871-4 2019-Jul-17 FDA	DUP L2313871-6 2019-Jul-17 FD	SW-21 L2364066-4 2019-Oct-10 FDA	DUP L2364066-6 2019-Oct-10 FD
Location					Thornhill Landfill																														
Site Name					SW-21																														
Field Observations																																			
pH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.4	7.9	7.4	-	7.8	-	7.8	-
Temperature	-	-	-	°C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13.5	13.6	5.6	-	15.3	-	5.1	-
Conductivity	-	-	-	uS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	774.0	642.0	582.0	-	544.0	-	390.2	-
Dissolved Oxygen	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.3	2	2	-	2.4	-	5.8	-
Oxidation Reduction Potential	-	-	-	mV	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	444.7	104.7	434	-	146.8	-	162.8	-
Conventional Parameters																																			
Conductivity	-	-	-	uS/cm	1200	949	1077	1199	1540	895	1090	1020	1360	1260	1210	1590	1290	1380	1050	1280	1680	1810	1450	1500	373	768	349	954	779	909	903	705	703	638	635
Hardness (Total as CaCO3)	-	-	-	mg/L	363	281	332	358	424	310	283	272	357	394	476	478	361	333	277	418	-	637	641	444	114	212	141	255	165	288	282	199	200	217	218
pH	6.5-9.0	-	6.5 - 8.5	-	8.2	7.9	7.6	7.9	8.1	7.6	7.9	7.8	7.6	7.8	8	7.2	7.8	7.9	8	8	8	8.1	8	7.9	7.8	7.9	8.26	8.37	8.47	8.11	8.05	8.42	8.44	8.42	8.43
Total Suspended Solids	-	25 mg/L (backgr. 25-250 mg/l)) (i)	-	mg/L	4	-	-	-	-	-	-	-	<1	-	7.8	<1	2.6	2.2	2.9	<1.0	1.9	3.8	6.8	10	22	15	<3.0	3.6	35	-	-	9.8	11.2	4.6	4
Alkalinity, Total (as CaCO3)	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	144	399	300	393	399	297	291	289	284
Ammonia, Total (as N)	0.37 - 1.86	1.9 - 21.8	-	mg/L	7.4	0.76	11.2	3.3	29.2	4.7	18.2	14.9	11.4	12.9	1.71	12.3	<0.03	30.5	17.9	0.17	36.9	40.2	10.6	28.2	5.85	9.09	3.91	8.97	4.15	14.7	14.8	3.95	4.84	5.60	5.64
Bromide (Br)	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.37	0.37	0.321	0.321	-	-
Chloride (Cl)	150	600	250	mg/L	87	82	80	110	89	40.6	60.1	58.9	108	74	103.8	143	108	107	75.4	121	119	153	138	118	24.2	53.9	9.6	68.9	65	42.8	42.1	39.3	39.2	28.1	27.8
Fluoride (F)	-	1.49 - 2.50	1.5	mg/L	-	0.11	0.16	0.16	0.04	<0.1	<0.1	<0.1	<0.1	0.069	<0.1	<0.1	<0.1	<0.1	ND	0.1	0.1	0.11	0.11	<0.10	<0.10	0.1	0.061	<0.10	0.1	0.1	<0.10	0.128	0.136	<0.10	<0.10
Nitrate (as N)	3	32.8	10	mg/L	-	6.8	21	9.22	5.45	14.5	9.96	7.74	22.4	15.4	4.48	14	14.5	4.79	8.16	6.9	7.2	7.71	9.8	5.28	0.24	3.2	1.56	4.99	1.66	5.23	5.09	3.12	3.11	2.64	2.56
Nitrite (as N)	0.1 - 0.2	0.3 - 0.6	1	mg/L	0.034	0.109	0.11	0.11	0.047	0.047	0.038	0.057	0.041	0.062	0.013	0.121	0.058	0.08	0.15	-	0.059	0.061	0.15	0.014	0.013	0.12	0.0166	0.22	0.181	0.0814	0.0812	0.227	0.227	0.0256	0.0268
Total Kjeldahl Nitrogen	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.48	12.4	5.9	15.9	14.6	6.29	4.83	7.14	6.56
Phosphorus (P)-Total	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0034	0.146	0.0230	0.0348	0.0548	0.0568	0.0307	0.0012
Orthophosphate - Dissolved (as P)	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	0.0013	0.0011	0.0011	<0.0010	<0.0010	<0.0010	0.0327
Sulfate (SO4)	309 - 429	-	500	mg/L	<0.5	10.8	14.3	4.5	12	18.3	10.7	6.78	8.49	8.83	6.73	19	21.3	29.8	30.6	31.6	-	38.6	36.4	45.4	6.2	11.6	7.19	7.9	8.1	10.4	10.4	4.48	4.48	4.7	4.6
Biological Oxygen Demand (BOD)	-	-	-	mg/L	<10	5.4	ND	17	<4	<4	15	16	5.8	<6	10	13	4.1	10	ND	<4.0	25	33	37	15	<5.0	14	<2.0	5.4	6.4	-	-	7.9	-	2.4	2.4
Chemical Oxygen Demand (COD)	-	-	-	mg/L	81	66	62	198	102	77	54	39	61	59	47	68	89	130	70	98	106	142	130	104	48	48	22	86	113	-	-	51	-	47	52
96 Hr. LC-50 pH adjusted	-		-	mg/L	-	-	-	-	-	-	-	-	-	>100	-	>100	-	61.56	-	-	-	-	-	-	-	-	-	-	-	-		-		-	
96 Hr. LC-50 standard			-		-	-	-	>100	-	-	-	-	70.7	-	-	65.98	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-		-	
Total Metals																																			
Aluminum	0.05	0.1	9.5	mg/L	0.0189	0.014	0.013	0.012	0.019	0.192	0.443	0.163	0.0201	0.033	0.0564	0.0239	0.0367	0.206	0.504	0.051	-	0.109	0.313	0.298	3.52	0.519	0.446	0.129	0.589	0.118	0.161	0.481	0.394	0.186	0.184
Antimony	-	-	-	mg/L	0.00018	ND	ND	ND	ND	<0.0005	<0.0005	<0.0005	<0.0005	<0.0006	<0.0007	<0.0008	<0.0008	<0.0008	0.0003	0.0004	-	0.0004	0.0006	0.0006	0.0002	0.00021	<0.00010	0.00024	0.00032	0.0001	<0.00010	0.00021	0.0002	<0.00010	<0.00010
Arsenic	-	0.005	0.01	mg/L	0.00048	0.0004	0.0004	0.0005	0.0006	0.0002	0.00004	0.00044	0.00032	0.00041	0.00061	0.00064	0.00048	0.00086	0.0007	0.0008	-	0.0013	0.0013	0.0014	0.0018	0.00124	0.00034	0.00117	0.00365	0.00058	0.00054	0.00166	0.00174	0.00072	0.00069
Barium	1	-	-	mg/L	0.0784	0.146	0.178	0.314	0.225	0.079	0.17	0.152	0.14	0.172	0.11	0.233	0.161	0.287	0.236	0.191	-	0.306	0.455	0.545	0.121	0.142	0.0773	0.139	0.131	0.213	0.202	0.129	0.127	0.154	0.153
Beryllium	0.00013	-	-	mg/L	0.00002	ND	ND	ND	ND	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	ND	<0.0001	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth	-	-	-	mg/L	<0.00000	ND	ND	ND	ND	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	ND	<0.0001	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.00010	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron	1.2	-	5	mg/L	1.17	1.37	1.41	1.37	2.15	1.09	1.46	1.23	1.21	1.84	1.59	2.41	1.79	2.44	1.81	3.1	-	3.56	2.8	1.69	0.446	1.29	0.332	1.53	1.31	1.09	1.03	0.971	1.01	0.717	0.703
Cadmium	0.0023 - 0.00083	0.00067 - 0.0040	0.005	mg/L	0.000025	0.00001	0.00008	0.00026	0.00023	0.00005	0.00006	0.000032	0.000036	0.000029	0.000076	0.000041	0.00006	0.000089	0.00004	0.00005	-	0.00003	0.00006	0.00014	0.00006	0.000055	0.0000164	0.0000235	0.0000302	0.0000124	0.0000135	0.0000212	0.0000204	0.0000113	0.0000104
Calcium	-	-	-	mg/L	94.5	90.7	121	94.4	125	97.6	88.3	84.9	109	120	148	145	110	105	86.6	128	-	197	194	135	34.5	57.5	39.2	61.5	35.5	97.3	89.4	60.2	61.3	66.1	67.6
Cesium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.000047	0.00009	0.000089	0.000078	0.00008	0.000082	0.000072	0.000046	0.000044
Chromium	-	-	-	mg/L	0.0008	0.001	0.001	0.001	0.003	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.0011	<0.001	0.0015	0.0014	0.0014	-	0.0021	0.0016	0.0015	0.0039	0.00099	0.00057	0.00058	0.00096	0.00044	0.00045	0.0007	0.00064	0.00044	0.00038
Cobalt	0.004	0.11	-	mg/L	0.00149	0.0013	0.001	0.0015	0.0014	0.0008	0.0011	0.00081	0.00094	0.00112	0.0012	0.00158	0.00147	0.00172	0.00146	0.00225	-	0.00314	0.00397	0.00369	0.00226	0.00163	0.00051	0.00187	0.00192	0.00111	0.00112	0.00125	0.0012	0.00064	0.00064
Copper	0.00004	0.013 - 0.062	1	mg/L	0.00168	0.0032	0.0029	0.0443	0.0804	0.003	0.0038	0.00189	0.00235	0.002	0.00303	0.00231	0.00254	0.00447	0.0049	0.0035	-	0.0027	0.0058	0.0069	0.01	0.00399	0.00201	0.00354	0.00409	0.00266	0.0026	0.00266	0.00249	0.00186	0.0018
Iron	-	1	0.3	mg/L	0.071	0.059	0.056	0.023	0.045	0.258	0.886	0.633	0.0648	0.205	0.153	0.178	0.077	0.642	0.81	0.21	-	0.94	0.82	1.21	4.63	0.821	0.515	0.355	1.91	0.134	0.204	1.07	0.908	0.284	0.278
Lead	0.0071 - 0.037	0.096 - 0.87	0.01	mg/L	0.000006	0.0003	ND	ND	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.002	0.00026	0.0002	<0.0001	-	0.0001	0.0001	0.0002	0.0011	0.00021	0.0001	0.000076	0.000405	<0.000050	<0.000050	0.000188	0.000147	0.000073	0.000071
Lithium	-	-	-	mg/L	0.0008	ND	ND	ND	ND	<0.005	<0.005	<0.005	<0.0005	<0.005	<0.005	<0.005	<0.005	<0.005	0.0018	0.0012	-	0.0022	0.0012	0.001	0.0025	0.00088	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Magnesium	-	-	-	mg/L	17.9	17.3	21.4	21.2	22.5	16.1	15.3	14.5	20.4	22.6	25.7	27.9	20.9	17.3	14.7	23.8	-	35.3	37.7	26.1	6.78	16.6	6.07	20.4	18.7	19.0	17.6	15.7	16.2	13.4	13.2
Manganese	1.11 - 3.43	1.8 - 7.6	0.05	mg/L	0.318	0.389	0.216	0.191	1.27	0.091	0.67	0.877	0.185	0.548	0.417	0.934	0.531	1.04	0.899	0.589	-	2.57	4.23	5.54	0.794	0.562	0.513	0.209	0.303	0.345	0.485	0.310	0.267	0.355	0.353
Mercury	0.0001	-	0.001	mg/L	-	0.00004	0.00004	0.00003	0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	ND	<0.00002	-	<0.00002	<0.00002	<0.00002	<0.00002	<0.000010	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	< 1	2	0.25	mg/L	0.00041	ND	ND	ND	ND	<0.001	<0.001	<0.001	<0.001	0.00035	<0.001	<0.001	<0.001	<0.001	0.0007	0.0011	-	0.001	0.0029	0.0017	0.0004	0.00129	0.000245	0.000948	0.00113	0.000479	0.000486	0.000829	0.000837	0.000439	0.000423
Nickel	-	-	-	mg/L	-	0.006	0.006	0.006	0.01	0.004	0.005	0.0039	0.0044	0.0055	0.0053	0.0078	0.0066	0.0104	0.0076	0.0082	-	0.0085	0.0084	0.0073	0.0055	0.00369	0.00111	0.00509	0.004	0.00295	0.00279	0.00288	0.00281	0.00179	0.00176
Phosphorus	-	-	0.01	mg/L	0.032	-	-	-	-	0.021	0.031	0.025	0.022	*<0.01*	0.107	0.03	0.015	0.033	ND	0.19	-	0.04	0.04	0.03	0.08	0.104	<0.050	0.066	0.167	*<0.050*	<0.050	0.062	0.058	*<0.050*	<0.050
Potassium	-	-	-	mg/L	42.6	40.6	44.4	50.6	51.1	36.7	34.8	30.9	40.7	46.2	57.4	61.4	46.4	45.6	38.2	55.7	-	87.9	57.7	33.3	8.85	27.2	8.29	38.8	34.1	30.5	28.9	26.4	27	18.3	18.1
Rubidium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00478	0.0244	0.0199	0.0178	0.0171	0.0172	0.017	0.0114	0.0115
Selenium	0.002	-	0.01	mg/L	0.00011	0.0001	ND	0.0001	0.0001	<0.0001	<0.0001	<0.0001	<0.00004	<0.00004	0.00016	0.00023	<0.00004	0.00016	ND	<0.0005	-	<0.0005	<0.0005	<0.0005	<0.0005	0.00054	0.000123	0.000217	0.000386	0.000127	0.00017	0.000151	0.00021	0.000146	0.000167
Silicon	-	-	-	mg/L	4.69	5.29	5.96	4.07	6.69	5.88	5.79	5.47	5.08	6.3	7.32	7.63	5.62	6.91	6.9	9	-	11.8	10.5	7.2	7.9	6	3.3	3.84	5.21	5.56	5.24	5.04	4.94	4.81	4.65
Silver	0.00005, 0.0015	0.0001, 0.003	-	mg/L	<0.00005	ND	ND	ND	ND	0.000008	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	ND	<0.00005	-	<0.00005	<0.00005	<0.00005	<0.00005	<0.000050	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium	-	-	200	mg/L	79.5	75.6	82.6	91.9	97.8	55.9	61.1	55	74.1	87.1	104	126	96.6	92.8	73.8	137	-	185	139	90.9	19.5	61.2	14.3	81.7	73.6	61.2	57.3	53.3	55.2	34	35.6
Strontium	-	-	-	mg/L	0.591	0.569	0.723	0.705	0.854	0.572	0.583	0.566	0.729	0.767	0.901	0.938	0.747	0.723	0.571	0.881	-	1.19	1.24	0.983	0.203	0.479	0.214	0.582	0.406	0.567	0.558	0.446	0.455	0.415	0.414
Sulfur	-	-	-	mg/L	3	ND	6	ND	6	7	4.8	4.1	<15	<75	3.5	7.7	<3	12.1	7	16	-	21	32	15	<1	4.3	2.69	3.98	3.64	4.87	4.97	1.98	1.89	2.47	2.47
Tellurium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	<0.00050	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Thallium	-	-	-	mg/L	0.000003	ND	ND	ND	ND	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	ND	<0.00002	-	<0.00002	<0.00002	<0.00002	<0.00002	<0.000020	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thorium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0002	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Tin	-	-	-	mg/L	0.00011	ND	ND	ND	ND	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	ND	0.0004	-	0.0003	0.0002	<0.0002	<0.0002	<0.00020	<0.00010	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	-	-	-	mg/L	0.0014	ND	ND	ND	ND	0.007	0.017	0.0055	<0.005	<0.005	<0.005	<0.005	<0.005	0.0056	0.015	<0.005	-	<0.005	0.008	0.009	0.089	0.0112	0.0111	<0.0036	0.0115	<0.0030	<0.0045	0.0115	0.00954	0.00393	0.00378
Tungsten	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00022	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Uranium	-	-	-	mg/L	0.000151	0.0001	0.0001	0.0002	0.0001	0.0001	<0.0001	<0.0001	0.00014	0.000105	0.00021	0.00017	0.00014	0.00012	0.0001	0.00024	-	0.00021	0.0007	0.00063	0.00014	0.00022	0.000082	0.000395	0.000359	0.000295	0.000293	0.00024	0.000241	0.000161	0.000159
Vanadium	-	-	-	mg/L	0.0002	ND	ND	ND	ND	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.001	<0.001	-	<0.001	0.001	0.001	0.008	0.0013	0.00099	<0.00050	0.00205	<0.00050	<0.00050	0.00134	0.00113	0.00055	0.00055
Zinc	0.026 - 0.42	0.051 - 0.45	5	mg/L	0.0013	0.031	0.03	0.032	0.044	<0.005	0.005	<0.005	<0.005	<0.005	0.0055	<0.005	0.0061	0.0091	0.008	0.005	-	0.01	0.014	0.008	0.014	0.007	<0.0030	<0.0030	0.0046	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Zirconium	-	-	-	mg/L	-	ND	ND	ND	ND	<0.0005	0.0023	0.00054	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0004	0.0002	-	0.0005	0.0005	0.0004	0.001	0.00028	0.000206	0.000145	0.000195	0.000134	0.000127	0.00045	0.00030	<0.00020	<0.00020
Dissolved Metals																																			
Aluminum	0.05	0.1	9.5	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0186	0.0338	0.0346	0.0076	0.0077	0.0203	0.0165	0.0169	0.0183
Antimony	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00010	0.0002	0.00027	0.00012	0.00011	0.00017	0.00017	<0.00010	<0.00010
Arsenic	-	0.005	0.01	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00023	0.00112	0.00258	0.00053	0.00051	0.00134	0.00142	0.00062	0.00059
Barium	1	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0768	0.133	0.115	0.207	0.186	0.111	0.11	0.137	0.14
Beryllium	0.00013	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron	1.2	-	5	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.353	1.56	1.32	0.925	0.971	0.896	0.916	0.665	0.648
Cadmium	0.0023 - 0.00083	0.00067 - 0.0040	0.005	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0000118	0.0000236	0.0000128	0.000013	0.0000103	0.0000107	0.0000117	0.0000072	0.0000108
Calcium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	44.9	64.3	36.1	87.5	86.6	54.8	55.5	63.2	63.5
Cesium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.000019	0.000076	0.000043	0.000083	0.000074	0.000048	0.000051	0.000036	0.000039
Chromium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00018	0.0005	0.00042	0.00031	0.00029	0.00028	0.00028	0.00026	0.00025
Cobalt	0.004	0.11	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00029	0.00184	0.00156	0.00104	0.001	0.00091	0.00094	0.00062	0.00061
Copper	0.00004	0.013 - 0.062	1	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0014	0.00343	0.00235	0.00224	0.00206	0.00174	0.00171	0.00151	0.00163
Iron	-	0.35	0.3	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.027	0.091	0.418	0.024	0.029	0.105	0.107	0.048	0.052
Lead	0.0071 - 0.037	0.096 - 0.87	0.01	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.000050	<0.000050	0.000086	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Magnesium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.08	22.8	18.1	17	15.9	15	15	14.3	14.4
Manganese	1.11 - 3.43	1.8 - 7.6	0.05	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.295	0.194	0.224	0.405	0.35	0.188	0.179	0.337	0.342
Mercury	0.0001	-	0.001	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	< 1	2	0.25	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.000257	0.000894	0.00125	0.000468	0.00045	0.000853	0.000915	0.000485	0.000465
Nickel	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00082	0.00512	0.00364	0.00299	0.00269	0.00232	0.00226	0.00173	0.0019
Phosphorus	-	-	0.01	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*<0.050*	*<0.050*	*<0.050*	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Potassium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9.6	43.8	35.8	30.5	27.5	24.1	24.4	19.1	19
Rubidium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00493	0.0249	0.0195	0.0198	0.0174	0.0157	0.0161	0.0119	0.0122
Selenium	0.002	-	0.01	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.000137	0.000251	0.000347	0.000192	0.000135	0.00015	0.00018	0.000148	0.000156
Silicon	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.75	3.6	4.52	5.01	4.92	4.55	4.64	4.52	4.49
Silver	0.00005, 0.0015	0.0001, 0.003	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium	-	-	200	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15	90.2	74.8	60	56.1	49.5	49	37.5	38
Strontium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.223	0.588	0.386	0.593	0.54	0.411	0.417	0.415	0.412
Sulfur	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.59	3.45	3.42	4.25	4	2.21	2.19	2.45	2.8
Tellurium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Thallium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thorium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Tin	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00010	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00089	0.00098	0.00169	<0.00030	0.00036	0.00068	0.00067	<0.00090	0.00085
Tungsten	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Uranium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.000085	0.000421	0.000342	0.000312	0.000321	0.000218	0.000218	0.000167	0.000163
Vanadium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00050	<0.00050	0.0006	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc	0.026 - 0.42	0.051 - 0.45	5	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0010	0.0013	<0.0010	<0.0010	0.0014	<0.0010	<0.0010	<0.0010	<0.0010
Zirconium	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.000069	0.000107	0.000197	0.000095	0.000093	<0.00020	<0.00020	<0.00020	<0.00020

NOTES
BCWQG AWF Long-term for Freshwater Aquatic Life - Chronic Long-term Average
BCWQG AWF Short-term es for Freshwater Aquatic Life - Short-term Maximum
BCWQG DW Quality Guidelines for Drinking Water
Italics indicate that the laboratory detection limit exceeds the applicable standard.
British Columbia Approved and Working (or interim) Water Quality Guidelines (BC WQG), updated from time to time, for the protection of freshwater aquatic life (AW-F).
H = standard is hardness dependent; pH = standard is pH dependent; Cl = standard is chloride dependent; T = standard varies with temperature
V = Standard is valence dependent VI refers to chromium VI and III refers to chromium III; Ca = standard is calcium dependent
* = for ammonia guideline, an average temperature of 10 degrees Celsius and a pH of 7.5 was chosen where no data was available

MAC = Maximum Acceptable Concentration
AO = Aesthetic Objective
QAQC = Quality Assurance and Control; FDA = Field Duplicate Available; FD = Field Duplicate

Table D-5: Surface Water Analytical Results
2019 Thornhill Transfer Station Annual Monitoring Program
Regional District of Kitimat-Stikine

Location								Thornhill Landfill																
Site Name	BCWQG Aquatic Life - Freshwater (Chronic - Long-term average)	Notes	**BCWQG Aquatic Life - Freshwater (Short-term maximum)**	Notes	BCWQG -Drinking Water	Notes	Units	SW-17	SW-17	SW-17	SW-17	SW-17	SW-17	SW-17	SW-17	SW-17	SW-17	SW-17	SW-17	SW-17	SW-17	SW-17	SW-17	SW-17
Sample ID								SW-17	SW-17	SW-17	SW-17	SW-17	SW-17	SW-17	SW-17	SW-17	SW-17	SW-17	SW-17	SW-17	SW-17	SW-17	SW-17	L2124909-5
Laboratory ID								-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	L225784-8
Sample Date								1996-Nov-01	2010-Oct-25	2011-Feb-15	2012-Feb-22	2012-May-08	2013-Jan-04	2013-Apr-15	2013-Jun-06	2013-Oct-22	2014-May-06	2014-Oct-29	2015-Mar-31	2015-Aug-11	2015-Nov-04	2016-Mar-22	2016-Jul-25	2016-Oct-13	2017-Mar-28	2017-Aug-24	2018-Jul-04	2018-Sep-10	2019-Apr-11
QAQC								-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Field Observations																												
pH	-		-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.66	DRY	7.27
Temperature	-		-		-		°C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11.5	-	4
Conductivity	-		-		-		uS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	80.5	-	45.4
Dissolved Oxygen	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.8	-	13.4
Oxidation Reduction Potential	-		-		-		mV	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	289.6	-	224.6
Conventional Parameters																												
Conductivity	-		-		-		uS/cm	67	108	79.6	119	77.4	155	-	41.7	151	74.3	106	86.9	106	102	119	140	115	77.1	93.4	104	-	80.8
Hardness (Total as CaCO3)							mg/L	-	44.5	34.5	39.6	36.5	52.5	-	24.4	66.1	33.1	40.6	34.9	52	-	56.8	65.1	49.7	31.3	41.1	42.9	-	33.8
pH	6.5-9.0				6.5 - 8.5		-	-	7.7	7.3	7.4	7.4	7.2	-	7.4	7.5	7.4	7.3	7.5	7.7	7.6	7.6	7.7	7.6	7.3	7.6	7.93	-	7.60
Total Suspended Solids	-		**25 mg/L (backgr. 25-250 mg/l)) (i)**		-		mg/L	-	-	-	-	-	-	-	5.1	5.1	2.1	<1	1.4	3.6	1.7	1.8	1.6	1.4	6.6	2.9	<3.0	-	-
Alkalinity, Total (as CaCO3)					-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50.2	-	35.7
Ammonia, Total (as N)	0.9 - 1.86	pH/T*	**6.88 - 17.6**	pH/T*	-		mg/L	-	0.046	<0.03	0.47	0.04	0.56	-	<0.03	0.05	<0.03	<0.03	ND	<0.03	0.3	0.49	<0.03	<0.03	0.29	<0.03	0.0053	-	0.0099
Bromide (Br)	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.050
Chloride (Cl)	150		**600**		250	AO	mg/L	-	1.8	2.1	4.4	<1	7.7	-	<1	5.3	1.1	4.5	2.6	2.3	2.4	4.1	3.3	1.5	2.1	1.2	2.32	-	1.41
Fluoride (F)	-		**0.77 - 1.17**	H	1.5		mg/L	-	0.03	<0.1	<0.1	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	ND	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.022	-	0.027
Nitrate (as N)	3		32.8		10		mg/L	-	0.21	0.4	0.21	0.1	1.16	-	0.041	0.56	0.139	0.404	0.59	0.08	0.38	0.57	0.32	0.11	0.088	0.13	0.384	-	0.493
Nitrite (as N)	0.02 - 0.2	Cl	**0.06 - 0.6**	Cl	1		mg/L	-	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	ND	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.0010	-	0.0019
Total Kjeldahl Nitrogen	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.192	-	0.106
Phosphorus (P)-Total	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0081	-	0.0052
Orthophosphate - Dissolved (as P)	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0011	-	<0.0010
Sulfate (SO4)	128 - 218	H	-		500	AO	mg/L	-	ND	1.8	<1	1.48	1.51	-	0.74	1.88	0.96	<0.5	2.2	1.8	-	2.4	2.6	2.3	1.4	1.6	1.24	-	1.77
Biological Oxygen Demand (BOD)	-		-		-		mg/L	-	<4	<4	<4	<4	<4	-	<4	<4	<4	<4	ND	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	-	<4.0	<2.0	-	-
Chemical Oxygen Demand (COD)	-		-		-		mg/L	-	<30	39	22	22	<20	-	<20	<20	<20	<20	ND	<20	<20	<20	<20	<20	<20	-	<20	<20	-	-
Total Metals																												
Aluminum	0.05	pH	**0.1**	pH	9.5		mg/L	-	0.036	**0.693**	**0.106**	**0.749**	0.0838	-	**0.197**	0.0314	**0.0969**	**0.152**	**0.219**	**0.143**	-	**0.127**	**0.078**	0.045	**0.632**	**0.108**	**0.124**	-	**0.126**
Antimony	-		-		-		mg/L	-	ND	<0.0005	<0.0005	<0.0005	<0.0005	-	<0.0005	<0.0005	<0.0005	<0.0005	ND	<0.0001	-	<0.0001	<0.0001	0.0002	<0.0001	<0.00020	<0.00010	-	<0.00010
Arsenic	-		**0.005**		0.01		mg/L	-	ND	<0.0001	<0.0001	0.00026	<0.0001	-	<0.0001	0.0001	<0.0001	0.00015	ND	<0.0005	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.00050	0.00019	-	0.00012
Barium	1		-		-		mg/L	-	0.02	0.019	0.023	0.0162	0.0258	-	0.0117	0.0246	0.0129	0.0215	0.02	0.021	-	0.023	0.026	0.02	0.021	0.0182	0.0269	-	0.0213
Beryllium	0.00013		-		-		mg/L	-	ND	<0.0001	<0.0001	<0.0001	<0.0001	-	<0.0001	<0.0001	<0.0001	<0.0001	ND	<0.0001	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.00010	<0.00010	-	<0.00010
Bismuth	-		-		-		mg/L	-	ND	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001	<0.001	ND	<0.0001	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.00010	<0.000050	-	<0.000050
Boron	1.2		-		5		mg/L	-	0.052	<0.05	<0.05	<0.05	0.094	-	<0.05	0.067	<0.05	0.066	0.196	0.068	-	0.073	0.051	0.038	0.044	0.0572	0.053	-	0.027
Cadmium	0.0000748 - 0.00016	H	**0.00014 - 0.00038**	H	0.005		mg/L	-	0.00002	0.00001	0.00002	0.000258	<0.00001	-	0.000014	<0.00001	<0.00001	<0.00001	ND	<0.00001	-	<0.00001	0.00002	<0.00001	<0.00001	<0.000010	0.0000069	-	<0.0000050
Calcium	-		-		-		mg/L	-	14.7	11.7	13.4	13.2	17.6	-	8.9	23.8	12.3	14.1	12.2	19.2	-	20.1	23.6	18.2	10.6	14.9	14.5	-	12.2
Cesium	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.000014	-	<0.000010
Chromium	-		-		-		mg/L	-	<0.001	0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001	<0.001	ND	<0.0005	-	<0.0005	<0.0005	<0.0005	0.0007	<0.00050	0.00025	-	0.00017
Cobalt	0.004		**0.11**		-		mg/L	-	ND	<0.0005	<0.0005	<0.0005	<0.0005	-	<0.0005	<0.0005	<0.0005	<0.0005	0.00017	0.00013	-	0.00013	0.00011	0.00007	0.0003	<0.00010	0.00013	-	0.0001
Copper	0.00004	H	**0.002 - 0.0082**	H	1		mg/L	-	0.0029	0.0027	0.0018	0.0007	0.0029	-	0.00116	0.0007	0.00097	0.00159	0.0017	0.0012	-	0.001	0.0011	0.001	0.002	0.00099	0.00104	-	0.00122
Iron	-		**1**		0.3	AO	mg/L	-	0.045	0.745	0.178	0.927	0.163	-	0.242	0.111	0.127	0.164	0.25	0.22	-	0.21	0.24	0.13	0.64	0.161	0.245	-	0.150
Lead	0.0039 - 0.0052	H	**0.014 - 0.048**	H	0.01		mg/L	-	0.0006	0.0002	<0.0002	0.00022	<0.0002	-	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	<0.0001	-	<0.0001	<0.0001	<0.0001	0.0002	<0.00020	<0.000050	-	<0.000050
Lithium	-		-		-		mg/L	-	ND	<0.005	<0.005	<0.005	<0.005	-	<0.005	<0.005	<0.005	<0.005	0.0002	0.0002	-	0.0001	<0.0001	<0.0001	0.0003	<0.00010	<0.0010	-	<0.0010
Magnesium	-		-		-		mg/L	-	1.11	1.26	1.47	0.836	2.06	-	0.523	1.63	0.584	1.34	1.06	1	-	1.62	1.48	1.01	1.16	0.901	1.34	-	1.08
Manganese	0.71 - 0.9	H	**0.81 - 1.27**	H	0.05	AO	mg/L	-	0.004	0.027	0.014	0.0338	0.0187	-	0.0113	0.009	0.0052	0.0108	0.0137	0.0152	-	0.0148	0.0141	0.0142	0.046	0.0111	0.0234	-	0.0134
Mercury	0.0001		-		0.001		mg/L	-	ND	<0.00001	<0.00001	<0.00001	<0.00001	-	<0.00001	<0.00001	<0.00001	<0.00001	ND	<0.00002	-	<0.00002	<0.00002	<0.00002	<0.00002	<0.000010	<0.0000050	-	<0.0000050
Molybdenum	< 1		**2**		0.25		mg/L	-	ND	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001	<0.001	0.0005	0.0005	-	0.0005	0.0007	0.0006	0.0003	0.00048	0.000421	-	0.00035
Nickel	-		-		-		mg/L	-	0.001	<0.001	<0.001	<0.001	0.0012	-	<0.001	<0.001	<0.001	<0.001	0.002	<0.0002	-	0.0003	<0.0002	<0.0002	0.0008	<0.00040	<0.00050	-	<0.00050
Phosphorus	-		-		0.01	AO	mg/L	-	-	0.025	<0.01	0.026	<0.01	-	<0.1	<0.1	<0.1	<0.1	ND	0.09	-	0.03	<0.02	0.02	<0.05	<0.050	<0.050	-	<0.050
Potassium	-		-		-		mg/L	-	1.78	1.68	2.8	0.742	3.41	-	0.64	2.63	0.676	2.23	1.77	1.24	-	2.72	1.97	1.01	1.29	1.03	1.89	-	1.3
Rubidium	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0016	-	0.00105
Selenium	0.002		-		0.01	MAC	mg/L	-	ND	<0.0001	<0.0001	<0.0001	<0.0001	-	<0.0001	<0.0001	<0.0001	<0.0001	ND	<0.0005	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.00050	<0.000050	-	0.000081
Silicon	-		-		-		mg/L	-	2.95	3.71	2.81	3.13	2.78	-	2.21	3.28	2.98	3.03	3.1	3.8	-	3.9	3.7	3	3.7	3.5	2.85	-	2.86
Silver	0.00005	H	**0.0001**	H	-		mg/L	-	ND	<0.000005	<0.000005	<0.000005	<0.000005	-	<0.00002	<0.00002	<0.00002	<0.00002	ND	<0.00005	-	<0.00005	<0.00005	<0.00005	<0.00005	<0.000050	<0.000010	-	<0.000010
Sodium	-		-		200	AO	mg/L	-	3.02	3.01	4.58	1.09	6.29	-	0.935	4.87	1.09	4.17	3.16	2.6	-	5.32	3.84	1.73	2.4	1.8	3.56	-	2.35
Strontium	-		-		-		mg/L	-	0.061	0.042	0.065	0.0321	0.0853	-	0.0316	0.0891	0.0389	0.0623	0.054	0.07	-	0.069	0.085	0.062	0.043	0.0557	0.0642	-	0.0533
Sulfur	-		-		-		mg/L	-	ND	<3	<3	<3	<3	-	<3	<3	<3	<3	ND	<1	-	2	<1	<1	<1	<3.0	<0.50	-	0.6
Tellurium	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	<0.00050	<0.00020	-	<0.00020
Thallium	-		-		-		mg/L	-	ND	<0.00005	<0.00005	<0.00005	<0.00005	-	<0.00005	<0.00005	<0.00005	<0.00005	ND	<0.00002	-	<0.00002	<0.00002	<0.00002	<0.00002	<0.000020	<0.000010	-	<0.000010
Thorium	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0001	<0.00010	<0.00010	-	<0.00010
Tin	-		-		-		mg/L	-	ND	<0.005	<0.005	<0.005	<0.005	-	<0.005	<0.005	<0.005	<0.005	ND	<0.0002	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.00020	<0.00010	-	<0.00010
Titanium	-		-		-		mg/L	-	ND	<0.005	<0.005	0.0319	<0.005	-	0.0092	<0.005	<0.005	<0.005	0.013	0.007	-	<0.005	<0.005	<0.005	0.02	<0.0050	0.00423	-	0.00388
Tungsten	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00010	-	<0.00010
Uranium	-		-		-		mg/L	-	ND	<0.0001	<0.0001	<0.0001	<0.0001	-	<0.0001	<0.0001	<0.0001	<0.0001	0.00004	0.00006	-	0.00006	0.00008	0.00006	0.00004	0.000049	0.000041	-	0.000024
Vanadium	-		-		-		mg/L	-	ND	<0.005	<0.005	<0.005	<0.005	-	<0.005	<0.005	<0.005	<0.005	ND	0.001	-	0.001	<0.001	<0.001	<0.001	<0.0010	0.00076	-	0.00007
Zinc	0.0075	H	**0.003**	H	5	AO	mg/L	-	0.009	<0.005	<0.005	<0.005	<0.005	-	<0.005	<0.005	<0.005	<0.005	ND	<0.004	-	<0.004	<0.004	<0.004	<0.004	<0.0040	<0.0030	-	<0.0030
Zirconium	-		-		-		mg/L	-	ND	<0.0005	<0.0005	<0.0005	<0.0005	-	<0.0005	<0.0005	<0.0005	<0.0005	ND	<0.0001	-	<0.0001	<0.0001	<0.0001	0.0006	<0.00010	0.000095	-	0.000073
Dissolved Metals																												
Aluminum	0.05	pH	**0.1**	pH/T	9.5		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0335	-	0.0417
Antimony	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00010	-	<0.00010
Arsenic	-		**0.005**		0.01		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00013	-	<0.00010
Barium	1		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0255	-	0.0203
Beryllium	0.00013		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00010	-	<0.00010
Bismuth	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.000050	-	<0.000050
Boron	1.2		-		5		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.056	-	0.03
Cadmium	0.0000748 - 0.00016	H	**0.00014 - 0.00038**	H	0.005		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0000323	-	<0.0000050
Calcium	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14.9	-	11.8
Cesium	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.000010	-	<0.000010
Chromium	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00010	-	0.00014
Cobalt	0.004		**0.11**		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00010	-	<0.00010
Copper	0.00004	H	**0.002 - 0.0082**	H	1		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00106	-	0.0008
Iron	-		**0.35**		0.3	AO	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.113	-	0.067
Lead	0.0039 - 0.0052	H	**0.014 - 0.048**	H	0.01		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.000050	-	<0.000050
Lithium	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0010	-	<0.0010
Magnesium	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.41	-	1.07
Manganese	0.71 - 0.9	H	**0.81 - 1.27**	H	0.05	AO	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0171	-	0.00929
Mercury	0.0001		-		0.001		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0000050	-	<0.0000050
Molybdenum	< 1		**2**		0.25		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.000381	-	0.000356
Nickel	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00050	-	<0.00050
Phosphorus	-		-		0.01	AO	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.050	-	<0.050
Potassium	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.09	-	1.30
Rubidium	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00163	-	0.00093
Selenium	0.002		-		0.01	MAC	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.000064	-	<0.000050
Silicon	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.75	-	2.72
Silver	0.00005	H	**0.0001**	H	-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.000010	-	<0.000010
Sodium	-		-		200	AO	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.85	-	2.42
Strontium	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0629	-	0.0522
Sulfur	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.50	-	<0.50
Tellerium	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00020	-	<0.00020
Thallium	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.000010	-	<0.000010
Thorium	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00010	-	<0.00010
Tin	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00010	-	<0.00010
Titanium	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0008	-	0.00128
Tungsten	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00010	-	<0.00010
Uranium	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.000036	-	0.000028
Vanadium	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00050	-	<0.00050
Zinc	0.0075	H	**0.003**		5	AO	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0024	-	<0.0010
Zirconium	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.000060	-	0.000114

NOTES

BCWQG AWF Long-term	BC Water Quality Guidelines for Freshwater Aquatic Life - Chronic Long-term Average
BCWQG AWF Short-term	BC Water Quality Guidelines for Freshwater Aquatic Life - Short-term Maximum
BCWQG DW	BC Water Quality Guidelines for Drinking Water

Italics indicate that the laboratory detection limit exceeds the applicable standard.
British Columbia Approved and Working (or interim) Water Quality Guidelines (BC WQG), updated from time to time, for the protection of freshwater aquatic life (AW-F).
H = standard is hardness dependent; pH = standard is pH dependent; Cl = standard is chloride dependent; T = standard varies with temperature
V = Standard is valence dependent VI refers to chromium VI and III refers to chromium III; Ca = standard is calcium dependent
* = for ammonia guideline, an average temperature of 10 degrees Celsius and a pH of 7.5 was chosen where no data was available
MAC = Maximum Acceptable Concentration
AO = Aesthetic Objective
QAQC = Quality Assurance and Control; FDA = Field Duplicate Available; FD = Field Duplicate

Table D-6: Surface Water Analytical Results
2019 Thornhill Transfer Station Annual Monitoring Program
Regional District of Kitimat-Stikine

Location																																
Site Name	BCWQG Aquatic Life - Freshwater (Chronic - Long-term average)	Notes	BCWQG Aquatic Life - Freshwater (Short-term maximum)	Notes	BCWQG -Drinking Water	Notes	Units	SW-6	SW-6	SW-6	SW-6	SW-6	SW-6	SW-6	SW-6	SW-6	SW-6	SW-6	SW-6	SW-6	SW-6	SW-6	SW-6	SW-6	SW-6	SW-6	SW-6	SW-6	SW-6	SW-6	SW-6	SW-6
Sample ID								-	-	-	-	1998-May-04		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Laboratory ID								-	-	-	-	FDA	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sample Date								1996-Jun-01	1996-Oct-01	1997-Jun-01	1997-Dec-04	-	-	1998-Sep-24	1999-Jan-27	1999-Apr-01	1999-Nov-01	2000-Mar-17	2000-Aug-15	2000-Dec-20	2001-May-07	2001-Dec-01	2002-Apr-01	2002-Jun-01	2003-Jan-01	2003-Mar-01	-	2003-Aug-03	2003-Dec-18	2004-May-14	2004-Oct-18	2005-Jun-01	2005-Nov-01	2006-Jun-01	2007-Jan-02	2007-Jan-18
QAQC								-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Field Observations																																		
pH	-		-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Temperature	-		-		-		°C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conductivity	-		-		-		uS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Water level	-		-		-		m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Oxygen	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation Reduction Potentia	-		-		-		mV	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conventional Parameters																																		
Conductivity	-		-		-		uS/cm	-	131	92	103	75	28	136	-	80	-	77	-	-	60	97	76	76	42	121	127	155	106	97	109	85	92	500	1280	68
Hardness (Total as CaCO3)	-		-		-		mg/L	-	57.6	40.2	43.7	35.3	15.1	63.4	48.5	36	39	34	48	43	42	41	24	31	19	45	-	64	31	37	51.8	37.9	46	40	248	29
pH	6.5-9.0		-		6.5 - 8.5		-	-	7.5	7.35	7.2	7.43	7.59	7.88	-	-	-	7.25	7.65	7.49	8.1	7.1	7.27	7.35	6.94	7.51	7.4	7.85	6.97	7.6	7.1	7.58	6.8	6.42	7.44	7.58
Total Suspended Solids	-		25 mg/L (backgr. 25 250 mg/L) i (i)		-		mg/L	<5	4	5	<1	23	-	19	-	-	-	-	-	-	-	-	-	-	-	-	<4	-	-	-	<4	-	<4	-	17.6	<0.01
Alkalinity, Total (as CaCO3	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ammonia, Total (as N)	0.37 - 1.86	pH/T*	2.4 - 22.9	pH/T*	-		mg/L	<0.1	0.04	<0.005	0.04	0.007	<0.005	0.008	0.237	<0.02	0.11	0.03	0.29	0.03	-	0.11	<0.005	<0.005	<0.005	<0.01	<0.01	0.11	0.01	0.108	0.04	0.207	0.13	17.6	<0.01
Bromide (Br)	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride (Cl)	150		600		250	AO	mg/L	0.4	1.9	0.6	2.5	1	0.33	2.5	2.8	0.7	1.7	3.2	1.7	2.4	0.3	1.3	3.4	1.7	0.8	5.9	5.4	5.3	8.9	2.2	1.6	0.45	1.4	16.3	68.3	0.33
Fluoride (F)	-		0.057 - 1.70	H	1.5		mg/L	-	-	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	< 0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	-	<0.1	<0.50
Nitrate (as N)	3		32.8		10		mg/L	-	0.139	0.022	0.478	0.047	0.046	0.135	0.44	0.1	0.24	-	0.18	0.06	0.24	0.16	0.7	<0.05	0.15	0.65	0.62	<0.05	0.49	<0.05	0.135	<0.05	0.128	<0.002	2.75	<0.05
Nitrite (as N)	0.02 - 0.2	Cl	0.06 - 0.6	Cl	1		mg/L	-	0.006	0.001	0.006	0.003	<0.005	0.002	<0.005	<0.002	0.004	-	<0.002	0.004	0.004	< 0.002	0.012	<0.002	<0.002	<0.002	0.005	<0.002	<0.002	<0.002	<0.002	<0.002	0.004	<0.01	0.03	<0.002
Total Kjeldahl Nitrogen	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phosphorus (P)-Total	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Orthophosphate - Dissolved (as P	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulfate (SO4)	128 - 429	H	-		500	AO	mg/L	1.6	2.2	2	3	2	0.79	3	2.2	1.7	1.8	2.1	1.8	2.3	1.3	2	34.8	2.3	1	2.8	2.6	3	3	2	2	1.5	1.7	13.3	16.1	0.8
Biological Oxygen Demand (BOD	-		-		-		mg/L	-	-	<5	<5	<5	5	<5	-	<10	<10	<10	<10	<10	<10	< 10	<10	<10	11	<10	<6	<10	<10	<10	<10	<10	-	23	<10	<10
Chemical Oxygen Demand (COD	-		-		-		mg/L	-	-	<20	<20	<20	14	<20	<10	<25	-	<25	<25	<25	<25	< 25	<25	<25	38	<25	<10	<25	<25	<25	<25	<10	50	12	<20	<20	<20
Total Metals																																		
Aluminum	0.05	pH	0.1	pH	9.5		mg/L	<0.1	0.05	<0.05	0.05	0.062	0.08	0.01	0.02	0.037	0.041	0.14	0.016	0.027	0.062	0.022	0.11	0.025	0.13	0.07	0.0305	0.02	0.44	0.022	0.0311	0.026	0.0739	< 0.005	0.017	0.034
Antimony	-		-		-		mg/L	<0.001	-	<0.02	<0.0001	0.0001	<0.05	<0.0001	<0.0015	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	< 0.001	<0.001	<0.001	<0.001	<0.001	0.000023	<0.001	< 0.001	< 0.001	0.000016	< 0.0002	0.000023	< 0.001	<0.001	<0.001
Arsenic	-		0.005		0.01		mg/L	<0.001	0.0002	<0.2	0.0001	0.0001	<0.0005	0.0002	<0.04	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	< 0.001	<0.001	<0.001	<0.001	<0.001	0.0002	<0.001	< 0.001	< 0.001	0.0002	< 0.0002	0.0001	< 0.001	<0.001	<0.001
Barium	1		-		-		mg/L	<0.1	0.02	0.01	0.02	0.01	0.009	0.02	0.017	0.011	0.013	0.044	0.013	0.016	0.012	0.013	0.01	0.009	0.008	0.015	0.0183	0.023	0.021	0.012	0.0153	0.01	0.0123	0.012	0.2	0.007
Beryllium	0.00013		-		-		mg/L	<0.001	<0.005	<0.005	<0.005	<0.005	>0.001	<0.005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	< 0.001	<0.001	<0.001	<0.001	<0.001	<0.00002	<0.001	< 0.001	< 0.001	<0.00002	< 0.0002	0.00002	< 0.001	<0.001	<0.001
Bismuth	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	-	< 0.001	<0.00002	< 0.0002	0.00002	< 0.001	<0.001	<0.001
Boron	1.2		-		5		mg/L	-	<0.1	-	-	-	<0.01	-	0.034	<0.05	<0.05	0.06	<0.05	<0.05	<0.05	0.11	0.05	<0.05	0.08	<0.05	0.07	-	<0.05	< 0.05	< 0.05	0.019	0.03	0.018	< 0.05	0.96	< 0.05
Cadmium	0.00023 - 0.00083	H	0.00067 - 0.0040	H	0.005		mg/L	0.005	<0.0002	0.002	<0.0002	<0.0002	<0.005	0.0002	<0.0001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	< 0.0002	<0.0002	<0.0002	<0.0002	<0.00001	0.0009	< 0.0002	< 0.0002	<0.00001	< 0.00004	0.00001	< 0.0002	<0.0002	<0.0002
Calcium	-		-		-		mg/L	19	21.5	15.3	15.6	13.3	3.9	23.1	16.8	13.4	13.9	11.7	18.1	15.2	15.1	14.8	7.62	11.2	6.49	14.7	-	22.7	9.74	13.5	19.1	13.9	16.7	15.1	77.2	10.9
Cesium	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	-		-		-		mg/L	<0.02	<0.001	<0.01	<0.001	<0.001	<0.0005	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	< 0.001	<0.001	<0.001	<0.001	1	<0.0002	<0.001	< 0.001	< 0.001	<0.0002	< 0.0002	0.0002	< 0.001	<0.001	<0.001
Cobalt	0.004		0.11		-		mg/L	<0.02	<0.02	<0.01	<0.01	<0.01	<0.005	<0.01	<0.003	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	< 0.001	<0.001	<0.001	<0.001	<0.001	0.0001113	<0.001	< 0.001	< 0.001	0.00004	< 0.0002	0.0000052	< 0.001	0.001	<0.001
Copper	0.00004	H	0.013 - 0.062	H	1		mg/L	<0.01	0.001	<0.01	<0.001	0.002	0.0006	0.001	0.002	0.002	<0.001	0.001	<0.001	<0.001	0.001	< 0.001	<0.001	0.001	<0.001	0.002	0.00067	<0.001	0.002	< 0.001	0.0008	0.0006	0.00098	< 0.001	0.003	<0.001
Iron	-		0.35		0.3	AO	mg/L	<0.1	0.08	0.04	0.12	0.05	0.046	0.12	0.06	<0.05	0.11	0.2	0.2	0.12	0.09	0.13	0.14	0.1	0.08	0.15	-	0.36	0.95	< 0.05	0.053	0.08	0.08	< 0.05	0.08	<0.05
Lead	0.0071 - 0.037	H	0.096 - 0.87	H	0.01		mg/L	0.001	0.001	<0.01	<0.001	<0.001	<0.0005	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	< 0.001	<0.001	<0.001	<0.001	<0.001	0.00009	<0.001	< 0.001	< 0.001	<0.00001	< 0.0002	0.00001	< 0.001	<0.001	<0.001
Lithium	-		-		-		mg/L	-	<0.02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	0.00038	<0.001	< 0.001	< 0.001	<0.00005	< 0.0002	0.00005	< 0.001	<0.001	<0.005
Magnesium	-		-		-		mg/L	0.6	0.97	0.51	1.18	0.5	0.5	1.4	1.59	0.7	1.09	1.19	0.68	1.18	0.93	1.01	1.18	0.61	0.56	1.88	-	1.81	1.61	0.7	0.99	0.79	0.96	0.5	13.4	0.32
Manganese	1.11 - 3.43	H	1.79 - 7.60	H	0.05	AO	mg/L	<0.01	<0.005	0.008	0.19	0.007	0.004	<0.005	0.017	0.007	0.006	0.035	0.015	0.008	0.006	0.016	0.017	0.003	0.009	0.011	0.0227	0.023	0.478	0.009	0.0066	0.0041	0.00547	0.002	0.72	0.004
Mercury	0.0001		-		0.001		mg/L	-	<0.00005	<0.00005	<0.00001	<0.00001	-	<0.00001	<0.00005	<0.00005	<0.00005	<0.00002	<0.00002	<0.00002	<0.00002	< 0.00002	<0.00002	<0.00002	<0.00002	<0.00002	-	<0.00002	< 0.00002	< 0.02	<0.00005	< 0.02	0.00005	< 0.02	<0.00002	<0.00002
Molybdenum	≤ 1		2		0.25		mg/L	<0.01	<0.03	<0.03	<0.03	<0.03	<0.01	<0.03	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	< 0.001	<0.001	<0.001	<0.001	0.0016	0.00055	0.0008	< 0.0005	< 0.0005	0.00041	0.0004	0.00031	< 0.0005	<0.0005	<0.0005
Nickel	-		-		-		mg/L	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.008	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	< 0.001	<0.001	<0.001	<0.001	<0.001	<0.00005	<0.001	< 0.001	< 0.001	0.00024	<0.001	0.00011	< 0.001	0.004	<0.001
Phosphorus	-		-		0.01	AO	mg/L	-	-	-	-	-	-	-	-	-	-	0.01	<0.01	0.06	0.05	0.05	0.04	0.11	0.04	0.07	-	0.09	0.45	< 0.15	<0.2	0.03	0.1	< 0.15	<0.15	<0.15
Potassium	-		-		-		mg/L	<5.0	-	-	-	-	0.5	-	1.9	0.69	1.39	1.54	0.75	1.44	0.96	1.08	1.61	0.48	0.77	2.12	-	1.89	1.43	0.5	1	0.96	1	0.5	30.4	0.4
Rubidium	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	0.002		-		0.01	MAC	mg/L	-	<0.0005	<0.01	<0.0005	<0.0005	<0.05	<0.0005	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	< 0.002	<0.002	<0.002	<0.002	<0.002	<0.0002	<0.001	< 0.001	< 0.001	<0.0002	0.0005	0.0002	< 0.001	<0.001	<0.001
Silicon	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	3.98	6.6	5.97	5.21	6.11	4.83	2.84	3.27	5.67	-	6.76	5.8	4.5	-	6.25	-	2.1	3.7	1.5
Silver	0.00005, 0.0015	H	0.0001, 0.003	H	-		mg/L	<0.01	<0.0001	<0.001	<0.0001	<0.001	<0.01	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	< 0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.00002	<0.0001	< 0.0001	< 0.00025	<0.00002	< 0.00005	0.00002	< 0.00025	<0.00025	<0.00025
Sodium	-		-		200	AO	mg/L	<1.0	3	-	-	-	0.8	-	4.27	1.09	2.27	3.07	1.23	2.06	1.67	1.75	3.32	1.77	1.28	6.3	-	5.46	5.71	1.8	1.96	1.81	2.12	0.77	58.2	0.61
Strontium	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	0.042	0.051	0.045	0.039	0.041	0.44	0.026	0.018	0.053	0.00625	0.073	0.044	0.031	0.0457	0.039	0.0367	0.031	0.51	0.02
Sulfur	-		-		-		mg/L	-	-	-	-	0.49	-	-	1.19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.7	-	0.6	-	-	-
Tellurium	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	-		-		-		mg/L	-	-	-	<0.0001	<0.0001	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	< 0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.000004	<0.0001	< 0.0001	< 0.0001	0.000002	< 0.00002	0.002	< 0.0001	<0.0001	<0.0001
Thorium	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	< 0.001	<0.001	<0.001	<0.001	<0.001	0.00003	<0.001	< 0.001	< 0.001	0.00001	< 0.0002	-	< 0.001	<0.001	<0.001
Titanium	-		-		-		mg/L	<0.01	-	-	<0.01	<0.01	<0.002	<0.01	<0.003	0.001	0.002	<0.001	<0.001	<0.001	<0.001	< 0.001	<0.001	0.003	<0.001	0.001	0.002	-	0.001	0.015	< 0.001	<0.003	0.0006	0.003	< 0.001	<0.001	<0.001
Tungsten	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	-		-		-		mg/L	-	-	-	0.00005	0.00005	-	0.00007	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	< 0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.000079	<0.0005	< 0.0005	< 0.0005	0.000062	< 0.0001	0.00043	< 0.0005	<0.0005	<0.0005
Vanadium	-		-		-		mg/L	<0.01	<0.03	-	<0.03	<0.03	<0.01	<0.03	<0.003	<0.001	<0.001	0.001	0.001	<0.001	<0.001	< 0.001	<0.001	<0.001	<0.001	<0.001	0.00028	<0.001	0.001	< 0.001	0.00039	0.0004	0.00043	< 0.001	<0.001	<0.001
Zinc	0.026 - 0.42	H	0.051 - 0.45	H	5	AO	mg/L	<0.01	<0.005	<0.005	<0.005	<0.005	<0.002	<0.005	0.004	<0.005	<0.005	<0.005	0.006	<0.005	0.006	< 0.005	<0.005	0.006	< 0.005	<0.005	0.006	<0.005	0.008	< 0.005	<0.0001	< 0.001	0.0001	< 0.005	<0.005	<0.005
Zirconium	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	<0.0.1	<0.01	<0.01	0.02	< 0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	< 0.01	< 0.01	<0.005	< 0.002	0.005	< 0.01	<0.01	<0.01
Dissolved Metals																																		
Aluminum	0.05	pH	0.1	pH/T	9.5		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	-		0.005		0.01		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	1		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	0.00013		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bismuth	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	1.2		-		5		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	0.00023 - 0.00083	H	0.00067 - 0.0040	H	0.005		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cesium	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	0.004		0.11		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	0.00004	H	0.013 - 0.062	H	1		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron	-		0.35		0.3	AO	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead	0.0071 - 0.037	H	0.096 - 0.87	H	0.01		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lithium	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Magnesium	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Manganese	1.11 - 3.43	H	1.79 - 7.60	H	0.05	AO	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury	0.0001		-		0.001		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Molybdenum	≤ 1		2		0.25		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phosphorus	-		-		0.01	AO	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rubidium	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	0.002		-		0.01	MAC	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silicon	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver	0.00005, 0.0015	H	0.0001, 0.003	H	-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	-		-		200	AO	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Strontium	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulfur	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tellerium	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thorium	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tungsten	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	0.026 - 0.42	H	0.051 - 0.45	H	5	AO	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zirconium	-		-		-		mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

NOTES

BCWQG AWF Long-term — BC Water Quality Guidelines for Freshwater Aquatic Life - Chronic Long-term Average

BCWQG AWF Short-term — BC Water Quality Guidelines for Freshwater Aquatic Life - Short-term Maximum

BCWQG DW — BC Water Quality Guidelines for Drinking Water

Italics indicate that the laboratory detection limit exceeds the applicable standar

British Columbia Approved and Working (or interim) Water Quality Guidelines (BC WQG), updated from time to time, for the protection of freshwater aquatic life (AW-F).

H = standard is hardness dependent; pH = standard is pH dependent; Cl = standard is chloride dependent; T = standard varies with temperature

V = Standard is valence dependent VI refers to chromium VI and III refers to chromium III; Ca = standard is calcium depender

* = for ammonia guideline, an average temperature of 10 degrees Celsius and a pH of 7.5 was chosen where no data was availab

MAC = Maximum Acceptable Concentration

AO = Aesthetic Objective

QAQC = Quality Assurance and Control; FDA = Field Duplicate Available; FD = Field Duplicat

Table D-6: Surface Water Analytical Results
2019 Thornhill Transfer Station Annual Monitoring Program
Regional District of Kitimat-Stikine

Parameter	BCWQG Aquatic Life - Freshwater (Chronic - Long-term average)	Notes	BCWQG Aquatic Life - Freshwater (Short-term maximum)	Notes	BCWQG -Drinking Water	Notes	Units	2008-May-27	2008-Oct-10	2009-Sep-24	2010-Feb-22	2010-Jun-15	2010-Oct-25	2011-Feb-15	2012-Feb-22
Location								Thornhill Landfill							
Site Name								SW-6	SW-6	SW-6	SW-6	SW-6	SW-6	SW-6	SW-6
Sample ID								SW-6	SW-6	SW-6	SW-6	SW-6	SW-6	SW-6	SW-6
Laboratory ID								-	-	-	-	-	-	-	-
QAQC								-	-	-	-	-	-	-	-
Field Observations															
pH	-		-		-		-	-	-	-	-	-	-	-	-
Temperature	-		-		-		°C	-	-	-	-	-	-	-	-
Conductivity	-		-		-		uS/cm	-	-	-	-	-	-	-	-
Water level	-		-		-		m	-	-	-	-	-	-	-	-
Dissolved Oxygen	-		-		-		mg/L	-	-	-	-	-	-	-	-
Oxidation Reduction Potentia	-		-		-		mV	-	-	-	-	-	-	-	-
Conventional Parameters															
Conductivity	-		-		-		uS/cm	66.1	130	111	99	94.5	108	79.8	90
Hardness (Total as CaCO3)	-		-		-		mg/L	26.5	61.6	51.3	41.6	41	49.2	34.7	33.4
pH	6.5-9.0		-		6.5 - 8.5		-	7.7	8	7.6	7	7.2	7.8	7.4	7.4
Total Suspended Solids	-		25 mg/L (backgr. 25-250 mg/l)) (i)		-		mg/L	-	<4	-	-	-	-	-	-
Alkalinity, Total (as CaCO3)	-		-		-		mg/L	-	-	-	-	-	-	-	-
Ammonia, Total (as N)	0.37 - 1.86	pH/T*	2.4 - 22.9	pH/T*	-		mg/L	<0.03	0.2	<0.03	<0.03	<0.03	0.18	<0.03	0.18
Bromide (Br)	-		-		-		mg/L	-	-	-	-	-	-	-	-
Chloride (Cl)	150		600		250	AO	mg/L	1	2.4	1.8	2.8	1.1	1.2	2.2	3.3
Fluoride (F)	-		0.057 - 1.70	H	1.5		mg/L	<0.1	<0.005	ND	ND	ND	0.03	<0.1	<0.1
Nitrate (as N)	3		32.8		10		mg/L	<0.1	-	ND	0.6	ND	0.17	0.4	0.44
Nitrite (as N)	0.02 - 0.2	Cl	0.06 - 0.6	Cl	1		mg/L	<0.01	0.002	ND	ND	ND	ND	<0.01	<0.01
Total Kjeldahl Nitroger	-		-		-		mg/L	-	-	-	-	-	-	-	-
Phosphorus (P)-Total	-		-		-		mg/L	-	-	-	-	-	-	-	-
Orthophosphate - Dissolved (as P)	-		-		-		mg/L	-	-	-	-	-	-	-	-
Sulfate (SO4)	128 - 429	H	-		500	AO	mg/L	1.1	<0.5	2	2.5	18.1	0.6	1.8	<1
Biological Oxygen Demand (BOD	-		-		-		mg/L	<6	<10	<4	<4	<4	<4	<4	<4
Chemical Oxygen Demand (COD)	-		-		-		mg/L	<30	15	<30	<30	<30	<30	33	<30
Total Metals															
Aluminum	0.05	pH	0.1	pH	9.5		mg/L	0.05	0.037	0.022	0.029	0.022	0.042	**0.828**	**0.489**
Antimony	-		-		-		mg/L	<0.0006	<0.00002	ND	ND	ND	ND	<0.0005	<0.0005
Arsenic	-		0.005		0.01		mg/L	<0.001	0.00013	0.0001	ND	ND	ND	0.0001	0.0001
Barium	1		-		-		mg/L	0.01	0.018	0.069	0.051	0.061	0.017	0.02	0.018
Beryllium	0.00013		-		-		mg/L	<0.0004	<0.00001	ND	ND	ND	ND	<0.0001	<0.0001
Bismuth	-		-		-		mg/L	-	<0.000005	ND	ND	ND	ND	<0.001	<0.001
Boron	1.2		-		5		mg/L	0.004	<0.05	ND	ND	ND	ND	0.055	0.054
Cadmium	0.00023 - 0.00083	H	0.00067 - 0.0040	H	0.005		mg/L	0.0003	<0.000005	0.00001	0.00004	0.00002	0.00009	0.00002	0.00002
Calcium	-		-		-		mg/L	11.8	20.1	19.4	15.7	16.2	16.5	11.8	11.4
Cesium	-		-		-		mg/L	-	-	-	-	-	-	-	-
Chromium	-		-		-		mg/L	0.001	<0.0001	ND	ND	ND	ND	0.002	0.001
Cobalt	0.004		0.11		-		mg/L	<0.0001	0.000045	ND	ND	ND	ND	<0.0005	<0.0005
Copper	0.00004	H	0.013 - 0.062	H	1		mg/L	0.01	0.00058	0.0015	0.0015	0.0049	0.0048	0.0031	0.0031
Iron	-		1		0.3	AO	mg/L	0.06	0.151	0.153	0.077	0.042	0.055	0.947	0.607
Lead	0.0071 - 0.037	H	0.096 - 0.87	H	0.01		mg/L	<0.0002	0.000013	ND	0.0004	ND	0.0022	0.0003	<0.0002
Lithium	-		-		-		mg/L	<0.0004	<0.0005	ND	ND	ND	ND	<0.005	<0.005
Magnesium	-		-		-		mg/L	0.38	1.08	0.96	1.12	0.58	0.85	1.28	1.17
Manganese	1.11 - 3.43	H	1.79 - 7.60	H	0.05	AO	mg/L	0.0074	0.00598	0.004	0.009	0.008	0.004	0.033	0.022
Mercury	0.0001		-		0.001		mg/L	<0.00006	-	0.00004	ND	ND	0.00003	<0.00001	<0.00001
Molybdenum	< 1		2		0.25		mg/L	0.0003	0.00053	ND	ND	ND	ND	<0.001	<0.001
Nickel	-		-		-		mg/L	<0.001	-	ND	ND	ND	0.001	0.001	0.001
Phosphorus	-		-		0.01	AO	mg/L	-	0.007	-	-	-	-	0.03	0.017
Potassium	-		-		-		mg/L	-	1.37	1.21	1.37	0.53	1.23	1.68	1.62
Rubidium	-		-		-		mg/L	-	-	-	-	-	-	-	-
Selenium	0.002		-		0.01	MAC	mg/L	<0.001	<0.00004	ND	ND	ND	ND	<0.0001	<0.0001
Silicon	-		-		-		mg/L	-	2.65	3.43	3.05	2.5	2.82	4.14	4.14
Silver	0.00005, 0.0015	H	0.0001, 0.003	H	-		mg/L	<0.00008	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005
Sodium	-		-		200	AO	mg/L	0.93	2.25	2.28	2.86	1.09	2.02	2.91	3.25
Strontium	-		-		-		mg/L	-	0.0576	0.053	0.05	0.042	0.045	0.043	0.042
Sulfur	-		-		-		mg/L	-	<3	ND	ND	ND	ND	<3	<3
Tellurium	-		-		-		mg/L	-	-	-	-	-	-	-	-
Thallium	-		-		-		mg/L	<0.0001	<0.000002	ND	ND	ND	ND	<0.00005	<0.00005
Thorium	-		-		-		mg/L	-	-	-	-	-	-	-	-
Tin	-		-		-		mg/L	-	<0.00001	ND	ND	ND	ND	<0.005	<0.005
Titanium	-		-		-		mg/L	<0.02	0.0015	ND	ND	ND	ND	0.028	0.018
Tungsten	-		-		-		mg/L	-	-	-	-	-	-	-	-
Uranium	-		-		-		mg/L	<0.0001	0.000078	ND	ND	ND	ND	<0.0001	<0.0001
Vanadium	-		-		-		mg/L	<0.02	0.0003	ND	ND	ND	ND	<0.005	<0.005
Zinc	0.026 - 0.42	H	0.051 - 0.45	H	5	AO	mg/L	0.018	0.0002	0.028	0.032	0.023	0.021	<0.005	<0.005
Zirconium	-		-		-		mg/L	-	-	ND	ND	ND	ND	<0.0005	<0.0005
Dissolved Metals															
Aluminum	0.05	pH	0.1	pH/T	9.5		mg/L	-	-	-	-	-	-	-	-
Antimony	-		-		-		mg/L	-	-	-	-	-	-	-	-
Arsenic	-		0.005		0.01		mg/L	-	-	-	-	-	-	-	-
Barium	1		-		-		mg/L	-	-	-	-	-	-	-	-
Beryllium	0.00013		-		-		mg/L	-	-	-	-	-	-	-	-
Bismuth	-		-		-		mg/L	-	-	-	-	-	-	-	-
Boron	1.2		-		5		mg/L	-	-	-	-	-	-	-	-
Cadmium	0.00023 - 0.00083	H	0.00067 - 0.0040	H	0.005		mg/L	-	-	-	-	-	-	-	-
Calcium	-		-		-		mg/L	-	-	-	-	-	-	-	-
Cesium	-		-		-		mg/L	-	-	-	-	-	-	-	-
Chromium	-		-		-		mg/L	-	-	-	-	-	-	-	-
Cobalt	0.004		0.11		-		mg/L	-	-	-	-	-	-	-	-
Copper	0.00004	H	0.013 - 0.062	H	1		mg/L	-	-	-	-	-	-	-	-
Iron	-		0.35		0.3	AO	mg/L	-	-	-	-	-	-	-	-
Lead	0.0071 - 0.037	H	0.096 - 0.87	H	0.01		mg/L	-	-	-	-	-	-	-	-
Lithium	-		-		-		mg/L	-	-	-	-	-	-	-	-
Magnesium	-		-		-		mg/L	-	-	-	-	-	-	-	-
Manganese	1.11 - 3.43	H	1.79 - 7.60	H	0.05	AO	mg/L	-	-	-	-	-	-	-	-
Mercury	0.0001		-		0.001		mg/L	-	-	-	-	-	-	-	-
Molybdenum	< 1		2		0.25		mg/L	-	-	-	-	-	-	-	-
Nickel	-		-		-		mg/L	-	-	-	-	-	-	-	-
Phosphorus	-		-		0.01	AO	mg/L	-	-	-	-	-	-	-	-
Potassium	-		-		-		mg/L	-	-	-	-	-	-	-	-
Rubidium	-		-		-		mg/L	-	-	-	-	-	-	-	-
Selenium	0.002		-		0.01	MAC	mg/L	-	-	-	-	-	-	-	-
Silicon	-		-		-		mg/L	-	-	-	-	-	-	-	-
Silver	0.00005, 0.0015	H	0.0001, 0.003	H	-		mg/L	-	-	-	-	-	-	-	-
Sodium	-		-		200	AO	mg/L	-	-	-	-	-	-	-	-
Strontium	-		-		-		mg/L	-	-	-	-	-	-	-	-
Sulfur	-		-		-		mg/L	-	-	-	-	-	-	-	-
Tellerium	-		-		-		mg/L	-	-	-	-	-	-	-	-
Thallium	-		-		-		mg/L	-	-	-	-	-	-	-	-
Thorium	-		-		-		mg/L	-	-	-	-	-	-	-	-
Tin	-		-		-		mg/L	-	-	-	-	-	-	-	-
Titanium	-		-		-		mg/L	-	-	-	-	-	-	-	-
Tungsten	-		-		-		mg/L	-	-	-	-	-	-	-	-
Uranium	-		-		-		mg/L	-	-	-	-	-	-	-	-
Vanadium	-		-		-		mg/L	-	-	-	-	-	-	-	-
Zinc	0.026 - 0.42	H	0.051 - 0.45		5	AO	mg/L	-	-	-	-	-	-	-	-
Zirconium	-		-		-		mg/L	-	-	-	-	-	-	-	-

Parameter	2012-May-08	2013-Jan-04	2013-Apr-15	2013-Jun-06	2013-Oct-22	2014-May-06	2014-Oct-29	2015-Mar-31	2015-Aug-11	2015-Nov-04	2016-Mar-22	2016-Jul-25
Site Name	SW-6	SW-6	SW-6	SW-6	SW-6	SW-6	SW-6	SW-6	SW-6	SW-6	SW-6	SW-6
Sample ID	SW-6	SW-6	SW-6	SW-6	SW-6	SW-6	SW-6	SW-6	SW-6	SW-6	SW-6	SW-6
Laboratory ID	-	-	-	-	-	-	-	-	-	-	-	-
QAQC	-	-	-	-	-	-	-	-	-	-	-	-
Field Observations												
pH	-	-	-	-	-	-	-	-	-	-	-	-
Temperature	-	-	-	-	-	-	-	-	-	-	-	-
Conductivity	-	-	-	-	-	-	-	-	-	-	-	-
Water level	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Oxygen	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation Reduction Potentia	-	-	-	-	-	-	-	-	-	-	-	-
Conventional Parameters												
Conductivity	75.6	126	104	64.1	156	89.9	101	86	128	115	121	156
Hardness (Total as CaCO3)	36.2	48.6	47.2	35.1	73.6	39.7	44.3	38.8	64.7	-	59.8	73.3
pH	7.5	7.1	8.4	7.7	7.4	7.5	7.4	7.6	7.8	7.7	7.6	7.7
Total Suspended Solids	-	<1	-	4.5	<1	3.9	2.3	9.6	<1.0	1.3	<1.0	<1.0
Alkalinity, Total (as CaCO3)	-	-	-	-	-	-	-	-	-	-	-	-
Ammonia, Total (as N)	0.04	0.24	<0.03	<0.03	0.04	<0.03	<0.03	ND	<0.03	0.15	0.27	0.036
Bromide (Br)	-	-	-	-	-	-	-	-	-	-	-	-
Chloride (Cl)	<1	5.8	2.1	<1	3.5	1	7.4	1.97	1.3	1.9	3.6	3.3
Fluoride (F)	<0.1	<0.1	0.026	<0.1	<0.1	<0.1	<0.1	ND	<0.10	<0.10	<0.10	<0.10
Nitrate (as N)	<0.1	0.8	0.2	<0.1	0.28	0.1	0.212	0.33	0.05	0.3	0.5	0.26
Nitrite (as N)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	ND	-	<0.01	<0.01	<0.01
Total Kjeldahl Nitroger	-	-	-	-	-	-	-	-	-	-	-	-
Phosphorus (P)-Total	-	-	-	-	-	-	-	-	-	-	-	-
Orthophosphate - Dissolved (as P)	-	-	-	-	-	-	-	-	-	-	-	-
Sulfate (SO4)	0.97	1.36	1.84	1.02	6.08	0.7	<0.5	1.9	1.8	-	2.5	2.8
Biological Oxygen Demand (BOD	<4	<4	<4	<4	<4	<4	<4	ND	<4.0	<4.0	<4.0	<4.0
Chemical Oxygen Demand (COD)	<30	<20	<20	<20	<20	<20	<20	ND	<20	<20	<20	<20
Total Metals												
Aluminum	**0.514**	**0.218**	0.0516	**0.178**	0.0402	**0.141**	**0.312**	**0.962**	0.079	-	**0.135**	0.054
Antimony	<0.0005	<0.0005	0.000123	<0.0005	<0.0005	<0.0005	<0.0005	ND	<0.0001	-	<0.0001	0.0001
Arsenic	0.00024	<0.0001	0.000098	<0.0001	0.00013	0.00011	0.00022	ND	<0.0005	-	<0.0005	<0.0005
Barium	0.0146	0.0205	0.0156	0.0111	0.0215	0.0123	0.0173	0.021	0.019	-	0.021	0.024
Beryllium	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	ND	<0.0001	-	<0.0001	<0.0001
Bismuth	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	ND	<0.0001	-	<0.0001	<0.0001
Boron	<0.05	0.056	<0.05	<0.05	<0.05	<0.05	<0.05	0.072	0.063	-	0.052	0.045
Cadmium	0.000016	0.00006	0.000011	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	-	0.00001	0.00005
Calcium	13.2	16.9	17.3	13.3	27.4	15	16.1	13.8	24.3	-	21.6	27.1
Cesium	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.0005	-	<0.0005	<0.0005
Cobalt	<0.0005	<0.0005	0.000048	<0.0005	<0.0005	<0.0005	<0.0005	0.00044	0.00008	-	0.00009	0.0001
Copper	0.00213	0.0021	0.00082	0.00091	0.00066	0.00079	0.00169	0.0028	0.0011	-	0.0009	0.001
Iron	0.65	0.314	0.0895	0.209	0.157	0.158	0.34	0.97	0.16	-	0.18	0.21
Lead	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	<0.0001	-	<0.0001	<0.0001
Lithium	<0.005	<0.005	0.0017	<0.005	<0.005	<0.005	<0.005	0.0007	0.0001	-	0.0001	<0.0001
Magnesium	0.767	1.52	0.96	0.483	1.29	0.569	1.03	1.05	0.95	-	1.4	1.38
Manganese	0.0263	0.0215	0.00719	0.0102	0.0159	0.006	0.0121	0.0289	0.0143	-	0.0128	0.0173
Mercury	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	ND	<0.00002	-	<0.00002	<0.00002
Molybdenum	<0.001	<0.001	0.000593	<0.001	<0.001	<0.001	<0.001	0.0006	0.0006	-	0.0011	0.0008
Nickel	<0.001	0.0013	0.00021	<0.001	<0.001	<0.001	<0.001	0.0011	<0.0002	-	<0.0002	<0.0002
Phosphorus	0.02	0.012	<0.01	<0.01	<0.01	<0.01	0.01	0.024	0.06	-	0.04	<0.02
Potassium	0.739	2.2	1.29	0.525	1.75	0.609	1.37	1.22	1.03	-	2.17	1.84
Rubidium	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	<0.0001	<0.0001	0.000058	<0.0001	<0.0001	<0.0001	<0.0001	ND	<0.0005	-	<0.0005	<0.0005
Silicon	2.82	3.01	2.85	2.18	3.15	2.66	3.22	4.2	3.7	-	3.8	3.4
Silver	<0.000005	<0.00002	0.000007	<0.00002	<0.00002	<0.00002	<0.00002	ND	<0.00005	-	<0.00005	<0.00005
Sodium	1.1	4.53	1.82	0.715	3.1	0.961	2.65	2.19	1.95	-	4.49	3.53
Strontium	0.0337	0.0607	0.0465	0.0301	0.0688	0.0341	0.0446	0.041	0.06	-	0.057	0.074
Sulfur	<3	<3	<3	<3	<3	<3	<3	ND	1	-	1	1
Tellurium	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	ND	<0.00002	-	<0.00002	<0.00002
Thorium	-	-	-	-	-	-	-	-	-	-	-	-
Tin	<0.005	<0.005	0.00056	<0.005	<0.005	<0.005	<0.005	ND	<0.0002	-	<0.0002	<0.0002
Titanium	0.0222	<0.005	<0.005	0.0063	<0.005	<0.005	<0.005	0.029	<0.005	-	<0.005	<0.005
Tungsten	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	<0.0001	<0.0001	0.00006	<0.0001	<0.0001	<0.0001	<0.0001	0.00007	0.00009	-	0.00007	0.00011
Vanadium	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.002	<0.001	-	0.001	<0.001
Zinc	<0.005	0.0053	0.0015	<0.005	<0.005	<0.005	<0.005	0.005	<0.004	-	<0.004	<0.004
Zirconium	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0003	<0.0001	-	0.0002	<0.0001
Dissolved Metals												
Aluminum	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	-	-	-	-	-	-	-	-	-	-	-	-
Barium	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	-	-	-	-	-	-	-	-	-	-	-	-
Bismuth	-	-	-	-	-	-	-	-	-	-	-	-
Boron	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	-	-	-	-	-	-	-	-	-	-	-	-
Cesium	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	-	-	-	-	-	-	-	-	-	-	-	-
Copper	-	-	-	-	-	-	-	-	-	-	-	-
Iron	-	-	-	-	-	-	-	-	-	-	-	-
Lead	-	-	-	-	-	-	-	-	-	-	-	-
Lithium	-	-	-	-	-	-	-	-	-	-	-	-
Magnesium	-	-	-	-	-	-	-	-	-	-	-	-
Manganese	-	-	-	-	-	-	-	-	-	-	-	-
Mercury	-	-	-	-	-	-	-	-	-	-	-	-
Molybdenum	-	-	-	-	-	-	-	-	-	-	-	-
Nickel	-	-	-	-	-	-	-	-	-	-	-	-
Phosphorus	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	-	-	-	-	-	-	-	-	-	-	-	-
Rubidium	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	-	-	-	-	-	-	-	-	-	-	-	-
Silicon	-	-	-	-	-	-	-	-	-	-	-	-
Silver	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	-	-	-	-	-	-	-	-	-	-	-	-
Strontium	-	-	-	-	-	-	-	-	-	-	-	-
Sulfur	-	-	-	-	-	-	-	-	-	-	-	-
Tellerium	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	-	-	-	-	-	-	-	-	-	-	-	-
Thorium	-	-	-	-	-	-	-	-	-	-	-	-
Tin	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	-	-	-	-	-	-	-	-	-	-	-	-
Tungsten	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	-	-	-	-	-	-	-	-	-	-	-	-
Zirconium	-	-	-	-	-	-	-	-	-	-	-	-

Parameter	2016-Oct-13	2017-Mar-28	2017-Aug-24	2018-Mar-19	2018-Jul-04	2018-Sep-10	2019-Apr-11	2019-Jul-17	2019-Oct-10
Site Name	SW-6	SW-6	SW-6	SW-6	SW-6	SW-6	SW-6	SW-6	SW-6
Sample ID	SW-6	SW-6	SW-6	SW-6	SW-6	SW-6	SW-6	SW-6	SW-6
Laboratory ID	-	-	-	L2070515-3	L2124909-3	L2163156-3	L2257784-3	L2313871-3	L2364066-3
QAQC	-	-	-	-	-	-	-	-	-
Field Observations									
pH	-	-	-	-	7.37	7.11	7.62	7.73	7.14
Temperature	-	-	-	-	11.6	11.3	4.2	13	3.3
Conductivity	-	-	-	-	83.3	137	60.8	103.7	72.2
Water level	-	-	-	-	-	-	-	-	-
Dissolved Oxygen	-	-	-	-	6.9	6.1	13.5	8.9	19.6
Oxidation Reduction Potentia	-	-	-	-	293.4	145.6	261.4	264.7	248.1
Conventional Parameters									
Conductivity	128	71.6	112	72.1	108	191	101	134	130
Hardness (Total as CaCO3)	56.9	26.7	51.8	31.9	52.3	74.1	47.8	55.2	59.9
pH	7.7	7.1	7.8	7.64	7.99	8.02	7.79	8.00	7.99
Total Suspended Solids	<1.0	5.4	2.7	5.6	<3.0	10.2	-	13.8	3.8
Alkalinity, Total (as CaCO3)	-	-	-	30.2	55.7	85.8	47.5	62.2	64
Ammonia, Total (as N)	<0.03	0.16	<0.03	0.0331	<0.0050	0.015	0.0058	0.0248	<0.0050
Bromide (Br)	-	-	-	-	-	-	<0.050	<0.050	-
Chloride (Cl)	1.7	3.6	1.3	2.02	0.66	5.93	1.03	2.79	0.95
Fluoride (F)	<0.10	<0.10	<0.10	0.042	0.02	0.033	0.024	0.035	<0.020
Nitrate (as N)	0.055	0.07	0.1	0.161	0.0641	0.314	0.163	0.0855	0.0715
Nitrite (as N)	0.018	<0.01	<0.01	0.0016	<0.0010	0.0043	0.004	0.0018	<0.0010
Total Kjeldahl Nitroger	-	-	-	0.277	0.078	0.296	0.055	0.264	<0.050
Phosphorus (P)-Total	-	-	-	-	0.0062	0.0206	0.0066	0.0400	0.0037
Orthophosphate - Dissolved (as P)	-	-	-	-	<0.0010	0.0031	<0.0010	<0.0010	<0.0010
Sulfate (SO4)	2.5	1.6	1.7	1.52	1.74	2.99	1.72	1.94	2.08
Biological Oxygen Demand (BOD	<4.0	0.004	<4.0	<2.0	<2.0	<2.0	-	<2.0	<2.0
Chemical Oxygen Demand (COD)	<20	0.0004	<20	<20	<20	<20	-	<20	<20
Total Metals									
Aluminum	0.037	**0.725**	0.0927	**0.615**	0.0668	**0.306**	**0.219**	**1.46**	0.0677
Antimony	0.0002	<0.0001	<0.00020	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic	<0.0005	<0.0005	<0.00050	0.00034	0.00016	0.00047	0.00017	0.00078	0.00014
Barium	0.017	0.02	0.0169	0.0152	0.0186	0.0287	0.0175	0.0362	0.018
Beryllium	<0.0001	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth	<0.0001	<0.0001	<0.00010	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron	0.017	0.039	0.0222	<0.020	0.012	0.104	<0.010	0.02	<0.010
Cadmium	<0.00001	0.00001	0.000019	0.0000121	<0.0000050	0.0000061	<0.0000050	0.0000144	<0.0000050
Calcium	21.3	10.9	19.3	9.56	19.2	27.3	18.3	21.7	23.9
Cesium	-	-	-	0.000049	0.00001	0.000032	0.000019	0.000135	<0.000010
Chromium	<0.0005	0.0008	<0.00050	0.00064	<0.00010	0.00034	0.00024	0.00146	0.00013
Cobalt	<0.00005	0.00033	<0.00010	0.00032	<0.00010	0.00027	0.00012	0.00075	<0.00010
Copper	0.0009	0.002	0.00144	0.00174	0.00076	0.00158	0.00131	0.00330	0.0007
Iron	0.1	0.73	0.132	0.713	0.119	0.516	0.220	1.93	0.103
Lead	<0.0001	0.0002	<0.00020	0.000124	<0.000050	0.000101	<0.000050	0.000367	<0.000050
Lithium	<0.0001	0.0004	<0.00010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Magnesium	0.92	1.16	0.886	1.23	0.752	1.92	0.854	1.53	0.919
Manganese	0.0093	0.0353	0.00947	0.115	0.0116	0.0357	0.0166	0.114	0.0128
Mercury	<0.00002	<0.00002	<0.000010	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.000050	<0.0000050
Molybdenum	0.0007	0.0003	0.00057	0.000829	0.000616	0.000711	0.000601	0.000677	0.000515
Nickel	<0.0002	0.0009	<0.00040	0.0007	<0.00050	0.00057	<0.00050	0.00152	<0.00050
Phosphorus	<0.02	<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Potassium	0.87	1.17	0.98	1.2	0.947	3.54	0.825	1.65	0.912
Rubidium	-	-	-	0.00106	0.00132	0.00311	0.00093	0.00263	0.00104
Selenium	<0.0005	<0.0005	<0.00050	0.000069	<0.000050	0.00007	<0.000050	0.00008	<0.000050
Silicon	2.8	3.6	3.1	3.73	2.69	3.58	3.23	5.11	3.04
Silver	<0.00005	<0.00005	<0.000050	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium	1.5	3.52	1.64	2.45	1.46	7.72	1.47	3.64	1.38
Strontium	0.054	0.037	0.0493	0.033	0.0484	0.0853	0.0485	0.0633	0.0528
Sulfur	<1	<1	<3.0	0.7	<0.50	0.99	0.82	<0.50	0.74
Tellurium	-	<0.0002	<0.00050	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Thallium	<0.00002	<0.00002	<0.000020	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thorium	-	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Tin	<0.0002	<0.0002	<0.00020	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	<0.005	0.021	<0.0050	0.0159	0.00182	0.0108	0.00604	0.0387	0.00169
Tungsten	-	-	-	0.00013	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Uranium	0.00009	0.00004	0.000077	0.000194	0.000069	0.000164	0.000088	0.000115	0.000109
Vanadium	<0.001	0.002	<0.0010	0.00149	0.00066	0.00134	0.00085	0.00387	<0.00050
Zinc	<0.004	<0.004	<0.0040	0.0038	<0.0030	<0.0030	<0.0030	0.0049	<0.0030
Zirconium	<0.0001	0.0003	<0.00010	0.000294	<0.000060	0.000174	0.000065	0.0003	<0.00020
Dissolved Metals									
Aluminum	-	-	-	0.112	0.0253	0.0382	0.0364	0.0658	0.0328
Antimony	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic	-	-	-	0.00023	0.00014	0.00035	0.00011	0.00031	0.00012
Barium	-	-	-	0.0118	0.0177	0.0282	0.0154	0.0198	0.0182
Beryllium	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth	-	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron	-	-	-	0.015	<0.010	0.105	<0.010	0.02	<0.010
Cadmium	-	-	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000121
Calcium	-	-	-	10.7	19.6	26.7	17.8	20.3	22.4
Cesium	-	-	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Chromium	-	-	-	0.00015	<0.00010	<0.00010	<0.00010	0.0001	<0.00010
Cobalt	-	-	-	<0.00010	<0.00010	0.00015	<0.00010	0.00014	<0.00010
Copper	-	-	-	0.00109	0.00072	0.00105	0.00082	0.00105	0.00073
Iron	-	-	-	0.251	0.064	0.227	0.061	0.234	0.080
Lead	-	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium	-	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Magnesium	-	-	-	1.26	0.826	1.8	0.816	1.10	0.971
Manganese	-	-	-	0.00334	0.00994	0.0316	0.0123	0.0697	0.0123
Mercury	-	-	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	-	-	-	0.000787	0.000586	0.000712	0.000574	0.000686	0.000548
Nickel	-	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Phosphorus	-	-	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Potassium	-	-	-	1.22	0.985	3.63	0.838	1.29	0.932
Rubidium	-	-	-	0.00085	0.00125	0.00285	0.00093	0.00156	0.00113
Selenium	-	-	-	0.000064	<0.000050	0.000072	0.000099	<0.000050	<0.000050
Silicon	-	-	-	2.98	2.57	3.18	2.75	3.23	3.02
Silver	-	-	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium	-	-	-	2.47	1.52	7.69	1.6	3.18	1.43
Strontium	-	-	-	0.0352	0.0482	0.0786	0.0487	0.0587	0.0555
Sulfur	-	-	-	<0.50	0.5	0.86	0.62	0.68	0.64
Tellerium	-	-	-	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Thallium	-	-	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thorium	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Tin	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	-	-	-	0.0049	0.00051	<0.0012	0.00099	0.00303	0.00088
Tungsten	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Uranium	-	-	-	0.00017	0.000077	0.000146	0.000089	0.000094	0.000112
Vanadium	-	-	-	0.00051	0.00054	0.00054	<0.00050	0.00063	<0.00050
Zinc	-	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Zirconium	-	-	-	0.000276	<0.000060	0.000064	0.000098	<0.00020	<0.00020

NOTES
BCWQG AWF Long-term: BC Water Quality Guidelines for Freshwater Aquatic Life - Chronic Long-term Average
BCWQG AWF Short-term: BC Water Quality Guidelines for Freshwater Aquatic Life - Short-term Maximum
BCWQG DW: BC Water Quality Guidelines for Drinking Water
Italics indicate that the laboratory detection limit exceeds the applicable standard
British Columbia Approved and Working (or interim) Water Quality Guidelines (BC WQG), updated from time to time, for the protection of freshwater aquatic life (AW-F).
H = standard is hardness dependent; pH = standard is pH dependent; Cl = standard is chloride dependent; T = standard varies with temperature

V = Standard is valence dependent VI refers to chromium VI and III refers to chromium III; Ca = standard is calcium dependen
* = for ammonia guideline, an average temperature of 10 degrees Celsius and a pH of 7.5 was chosen where no data was availab
MAC = Maximum Acceptable Concentratior
AO = Aesthetic Objective
QAQC = Quality Assurance and Control; FDA = Field Duplicate Available; FD = Field Duplicat

Table D-7: Quality Control Analytical Results
2019 Thornhill Transfer Station Annual Monitoring Program
Regional District of Kitimat-Stikine

Sampling Location		SW-21	DUP					SW-21	DUP					SW-21	DUP					BH-96-2	DUP				
Sample ID		L2257784-4	L2257784-6	Laboratory Reporting Limit	Mean	Relative Percent Difference (%)	Difference Factor (-)	L2313871-4	L2313871-6	Laboratory Reporting Limit	Mean	Relative Percent Difference (%)	Difference Factor (-)	L2364066-4	L2364066-6	Laboratory Reporting Limit	Mean	Relative Percent Difference (%)	Difference Factor (-)	L2313871-1	L2313873-2	Laboratory Reporting Limit	Mean	Relative Percent Difference (%)	Difference Factor (-)
Laboratory ID		2019-Apr-11	2019-Apr-11					2019-Jul-17	2019-Jul-17					2019-Oct-10	2019-Oct-10					2019-Jul-17	2019-Jul-17				
Sample Date		FDA	FD					FDA	FD					FDA	FD					FDA	FD				
QAQC	Units																								
Conventional Parameters																									
Conductivity	uS/cm	909	903	2	906	1%	NA	705	703	2	704	0%	NA	638	635	2	636.5	0%	NA	378	384	2	381	2%	NA
Hardness (Total as CaCO3)	mg/L	288	282	0.5	285	2%	NA	199	200	0.5	199.5	1%	NA	217	218	0.5	217.5	0%	NA	85.4	94.4	0.5	89.9	10%	NA
pH	-	8.11	8.05	0.1	8.08	1%	NA	8.42	8.44	0.1	8.43	0%	NA	8.42	8.43	0.1	8.425	0%	NA	8.57	8.56	0.1	8.565	0%	NA
Total Suspended Solids	mg/L	-	-	3	NC	NC	NA	9.8	11.2	3	10.5	NC	0.466666667	4.6	4	3	4.3	NC	0.2	-	-	3	NC	NC	NA
Total Dissolved Solids	mg/L	-	-	13	NC	NC	NA	-	-	13	NC	NC	NA	-		13	NC	NC	NA	262	326	13	294	**22%**	NA
Alkalinity, Total (as CaCO3)	mg/L	393	399	1	396	2%	NA	297	291	1	294	2%	NA	289	284	1	286.5	2%	NA	201	206	1	203.5	2%	NA
Ammonia, Total (as N)	mg/L	14.7	14.8	0.005	14.75	1%	NA	3.95	4.84	0.005	4.395	20%	NA	5.6	5.64	0.005	5.62	1%	NA	0.0967	0.132	0.005	0.11435	**31%**	NA
Bromide (Br)	mg/L	0.37	0.37	0.05	0.37	0%	NA	0.321	0.321	0.05	0.321	0%	NA	-	-	0.05	NC	NC	NA	<0.050	<0.050	0.05	NC	NC	NA
Chloride (Cl)	mg/L	42.8	42.1	0.5	42.45	2%	NA	39.3	39.2	0.5	39.25	0%	NA	28.1	27.8	0.5	27.95	1%	NA	1.5	1.11	0.5	1.305	NC	0.78
Fluoride (F)	mg/L	0.1	<0.10	0.02	0.1	NC	NA	0.128	0.136	0.02	0.132	6%	NA	<0.10	<0.10	0.02	NC	NC	NA	0.166	0.168	0.02	0.167	1%	NA
Nitrate (as N)	mg/L	5.23	5.09	0.005	5.16	3%	NA	3.12	3.11	0.005	3.115	0%	NA	2.64	2.56	0.005	2.6	3%	NA	0.213	0.15	0.005	0.1815	**35%**	NA
Nitrite (as N)	mg/L	0.0814	0.0812	0.001	0.0813	0%	NA	0.227	0.227	0.001	0.227	0%	NA	0.0256	0.0268	0.001	0.0262	5%	NA	0.0053	0.0153	0.001	0.0103	**97%**	NA
Nitrate + Nitrite (as N)	mg/L	-	-	-	NC	NC	NA	-	-	-	NC	NC	NA	-	-	-	NC	NC	NA	-	-	-	NC	NC	NA
Total Kjeldahl Nitrogen	mg/L	15.9	14.6	0.05	15.25	9%	NA	6.29	4.83	0.05	5.56	**26%**	NA	7.14	6.56	0.05	6.85	8%	NA	0.251	0.195	0.05	0.223	NC	1.12
Phosphorus (P)-Total	mg/L	0.023	0.0348	0.002	0.0289	**41%**	NA	0.0548	0.0568	0.002	0.0558	4%	NA	<0.0010	0.0012	0.002	0.0012	NC	NA	0.171	0.182	0.002	0.1765	6%	NA
Orthophosphate - Dissolved (as P)	mg/L	0.0011	0.0011	0.001	0.0011	NC	0	<0.0010	<0.0010	0.001	NC	NC	NA	0.0307	0.0327	0.001	0.0317	6%	NA	-	-	0.001	NC	NC	NA
Sulfate (SO4)	mg/L	10.4	10.4	0.3	10.4	0%	NA	4.48	4.48	0.3	4.48	0%	NA	4.7	4.6	0.3	4.65	2%	NA	3.5	3.1	0.3	3.3	12%	NA
Biological Oxygen Demand (BOD)	mg/L	-	-	2	NC	NC	NA	-	-	2	NC	NC	NA	2.4	2.4	2	2.4	NC	0	-	-	2	NC	NC	NA
Chemical Oxygen Demand (COD)	mg/L	-	-	20	NC	NC	NA	-	-	20	NC	NC	NA	47	52	20	49.5	NC	0.25	-	-	20	NC	NC	NA
Total Metals																									
Aluminum	mg/L	0.118	0.161	0.003	0.1395	**30.8%**	NA	0.481	0.394	0.003	0.4375	19.9%	NA	0.186	0.184	0.003	0.185	1.1%	NA	4.16	5.08	0.003	4.62	19.9%	NA
Antimony	mg/L	0.0001	<0.00010	0.0001	0.0001	NC	NA	0.00021	0.0002	0.0001	0.000205	NC	0.1	<0.00010	<0.00010	0.0001	NC	NC	NA	0.00033	0.00036	0.0001	0.000345	NC	0.3
Arsenic	mg/L	0.00058	0.00054	0.0001	0.00056	7.1%	NA	0.00166	0.00174	0.0001	0.0017	4.7%	NA	0.00072	0.00069	0.0001	0.000705	4.3%	NA	0.00544	0.0065	0.0001	0.00597	17.8%	NA
Barium	mg/L	0.213	0.202	0.0001	0.2075	5.3%	NA	0.129	0.127	0.0001	0.128	1.6%	NA	0.154	0.153	0.0001	0.1535	0.7%	NA	0.0501	0.0539	0.0001	0.052	7.3%	NA
Beryllium	mg/L	<0.00010	<0.00010	0.0001	NC	NC	NA	<0.00010	<0.00010	0.0001	NC	NC	NA	<0.00010	<0.00010	0.0001	NC	NC	NA	<0.00010	0.00011	0.0001	0.00011	NC	NA
Bismuth	mg/L	<0.000050	<0.000050	0.00005	NC	NC	NA	<0.000050	<0.000050	0.00005	NC	NC	NA	<0.000050	<0.000050	0.00005	NC	NC	NA	<0.000050	<0.000050	0.00005	NC	NC	NA
Boron	mg/L	1.09	1.03	0.01	1.06	5.7%	NA	0.971	1.01	0.01	0.9905	3.9%	NA	0.717	0.703	0.01	0.71	2.0%	NA	0.15	0.143	0.01	0.1465	4.8%	NA
Cadmium	mg/L	0.0000124	0.0000135	0.000005	0.00001295	NC	0.22	0.0000212	0.0000204	0.000005	0.0000208	NC	0.16	0.0000113	0.0000104	0.000005	0.00001085	NC	0.18	0.00149	0.00166	0.000005	0.001575	10.8%	NA
Calcium	mg/L	97.3	89.4	0.05	93.35	8%	NA	60.2	61.3	0.05	60.75	2%	NA	66.1	67.6	0.05	66.85	2%	NA	15.2	16.3	0.05	15.75	7%	NA
Cesium	mg/L	0.000078	0.00008	0.00001	0.000079	3%	NA	0.000082	0.0000772	0.00001	0.000077	13%	NA	0.000046	0.000044	0.00001	0.000045	NC	0.2	0.00041	0.000474	0.00001	0.000442	14%	NA
Chromium	mg/L	0.00044	0.00045	0.0001	0.000445	NC	0.1	0.0007	0.00064	0.0001	0.00067	9%	NA	0.00044	0.00038	0.0001	0.00041	NC	0.6	0.00558	0.00705	0.0001	0.006315	**23%**	NA
Cobalt	mg/L	0.00111	0.00112	0.0001	0.001115	1%	NA	0.00125	0.0012	0.0001	0.001225	4%	NA	0.00064	0.00064	0.0001	0.00064	0%	NA	0.00322	0.00385	0.0001	0.003535	18%	NA
Copper	mg/L	0.00266	0.0026	0.0005	0.00263	2%	NA	0.00266	0.00249	0.0005	0.002575	7%	NA	0.00186	0.0018	0.0005	0.00183	NC	0.12	0.0156	0.0177	0.0005	0.01665	13%	NA
Iron	mg/L	0.134	0.204	0.01	0.169	**41%**	NA	1.07	0.908	0.01	0.989	16%	NA	0.284	0.278	0.01	0.281	2%	NA	6.55	7.99	0.01	7.27	20%	NA
Lead	mg/L	<0.000050	<0.000050	0.000005	NC	NC	NA	0.000188	0.000147	0.000005	0.0001675	NC	0.82	0.000073	0.000071	0.000005	0.000072	NC	0.04	0.00322	0.00389	0.000005	0.003555	19%	NA
Lithium	mg/L	<0.0010	<0.0010	0.001	NC	NC	NA	<0.0010	<0.0010	0.001	NC	NC	NA	<0.0010	<0.0010	0.001	NC	NC	NA	0.0051	0.0058	0.001	0.00545	13%	NA
Magnesium	mg/L	19	17.6	0.005	18.3	8%	NA	15.7	16.2	0.005	15.95	3%	NA	13.4	13.2	0.005	13.3	2%	NA	14.7	16.6	0.005	15.65	12%	NA
Manganese	mg/L	0.345	0.485	0.0001	0.415	**34%**	NA	0.310	0.267	0.0001	0.2885	15%	NA	0.355	0.353	0.0001	0.354	1%	NA	0.245	0.270	0.0001	0.2575	10%	NA
Mercury	mg/L	<0.0000050	<0.0000050	0.000005	NC	NC	NA	<0.0000050	<0.0000050	0.000005	NC	NC	NA	<0.0000050	<0.0000050	0.000005	NC	NC	NA	<0.000050	<0.000050	0.000005	NC	NC	NA
Molybdenum	mg/L	0.000479	0.000486	0.00005	0.0004825	1%	NA	0.000829	0.000837	0.00005	0.000833	1%	NA	0.000439	0.000423	0.00005	0.000431	4%	NA	0.00434	0.00419	0.00005	0.004265	4%	NA
Nickel	mg/L	0.00295	0.00279	0.0005	0.00287	6%	NA	0.00288	0.00281	0.0005	0.002845	2%	NA	0.00179	0.00176	0.0005	0.001775	NC	0.06	0.00816	0.00992	0.0005	0.00904	19%	NA
Phosphorus	mg/L	<0.050	<0.050	0.05	NC	NC	NA	0.062	0.058	0.05	0.06	NC	0.08	<0.050	<0.050	0.05	NC	NC	NA	0.179	0.206	0.05	0.1925	NC	0.54
Potassium	mg/L	30.5	28.9	0.05	29.7	5%	NA	26.4	27	0.05	26.7	2%	NA	18.3	18.1	0.05	18.2	1%	NA	11.3	11.7	0.05	11.5	3%	NA
Rubidium	mg/L	0.0178	0.0171	0.0002	0.01745	4%	NA	0.0172	0.017	0.0002	0.0171	1%	NA	0.0114	0.0115	0.0002	0.01145	1%	NA	0.00217	0.00253	0.0002	0.00235	15%	NA
Selenium	mg/L	0.000127	0.00017	0.00005	0.0001485	NC	0.86	0.000151	0.00021	0.00005	0.0001805	NC	1.18	0.000146	0.000167	0.00005	0.0001565	NC	0.42	0.000065	0.00009	0.00005	0.0000775	NC	0.5
Silicon	mg/L	5.56	5.24	0.1	5.4	6%	NA	5.04	4.94	0.1	4.99	2%	NA	4.81	4.65	0.1	4.73	3%	NA	10.5	11.9	0.1	11.2	13%	NA
Silver	mg/L	<0.000010	<0.000010	0.00001	NC	NC	NA	<0.000010	<0.000010	0.00001	NC	NC	NA	<0.000010	<0.000010	0.00001	NC	NC	NA	0.000074	0.000092	0.00001	0.000083	**22%**	NA
Sodium	mg/L	61.2	57.3	0.05	59.25	7%	NA	53.3	55.2	0.05	54.25	4%	NA	34	35.6	0.05	34.8	5%	NA	48.3	47.1	0.05	47.7	3%	NA
Strontium	mg/L	0.567	0.558	0.0002	0.5625	2%	NA	0.446	0.455	0.0002	0.4505	2%	NA	0.415	0.414	0.0002	0.4145	0%	NA	0.176	0.194	0.0002	0.185	10%	NA
Sulfur	mg/L	4.87	4.97	0.5	4.92	2%	NA	1.98	1.89	0.5	1.935	NC	0.18	2.47	2.47	0.5	2.47	NC	0	1	0.78	0.5	0.89	NC	0.44
Tellurium	mg/L	<0.00020	<0.00020	0.0002	NC	NC	NA	<0.00020	<0.00020	0.0002	NC	NC	NA	<0.00020	<0.00020	0.0002	NC	NC	NA	<0.00020	<0.00020	0.0002	NC	NC	NA
Thallium	mg/L	<0.000010	<0.000010	0.00001	NC	NC	NA	<0.000010	<0.000010	0.00001	NC	NC	NA	<0.000010	<0.000010	0.00001	NC	NC	NA	0.000036	0.000042	0.00001	0.000039	NC	0.6
Thorium	mg/L	<0.00010	<0.00010	0.0001	NC	NC	NA	<0.00010	<0.00010	0.0001	NC	NC	NA	<0.00010	<0.00010	0.0001	NC	NC	NA	0.00017	0.00021	0.0001	0.00019	NC	0.4
Tin	mg/L	<0.00010	<0.00010	0.0001	NC	NC	NA	<0.00010	<0.00010	0.0001	NC	NC	NA	<0.00010	<0.00010	0.0001	NC	NC	NA	0.00046	0.0005	0.0001	0.00048	NC	0.4
Titanium	mg/L	<0.0030	<0.0045	0.0003	NC	NC	NA	0.0115	0.00954	0.0003	0.01052	19%	NA	0.00393	0.00378	0.0003	0.003855	4%	NA	0.102	0.126	0.0003	0.114	**21%**	NA
Tungsten	mg/L	<0.00010	<0.00010	0.0001	NC	NC	NA	<0.00010	<0.00010	0.0001	NC	NC	NA	<0.00010	<0.00010	0.0001	NC	NC	NA	0.00014	0.00013	0.0001	0.000135	NC	0.1
Uranium	mg/L	0.000295	0.000293	0.00001	0.000294	1%	NA	0.00024	0.000241	0.00001	0.0002405	0%	NA	0.000161	0.000159	0.00001	0.00016	1%	NA	0.00238	0.00255	0.00001	0.002465	7%	NA
Vanadium	mg/L	<0.00050	<0.00050	0.0005	NC	NC	NA	0.00134	0.00113	0.0005	0.001235	NC	0.42	0.00055	0.00055	0.0005	0.00055	NC	0	0.0109	0.0133	0.0005	0.0121	20%	NA
Zinc	mg/L	<0.0030	<0.0030	0.003	NC	NC	NA	<0.0030	<0.0030	0.003	NC	NC	NA	<0.0030	<0.0030	0.003	NC	NC	NA	0.0379	0.0448	0.003	0.04135	17%	NA
Zirconium	mg/L	0.000134	0.000127	0.00006	0.0001305	NC	0.116666667	0.00045	0.00030	0.00006	0.000375	**40%**	NA	<0.00020	<0.00020	0.00006	NC	NC	NA	<0.00020	<0.00020	0.00006	NC	NC	NA
Dissolved Metals																									
Aluminum	mg/L	0.0076	0.0077	0.001	0.00765	1%	NA	0.0203	0.0165	0.001	0.0184	21%	NA	0.0169	0.0183	0.001	0.0176	8%	NA	0.0256	0.0213	0.001	0.02345	18%	NA
Antimony	mg/L	0.00012	0.00011	0.0001	0.000115	NC	0.1	0.00017	0.00017	0.0001	0.00017	NC	0	<0.00010	<0.00010	0.0001	NC	NC	NA	0.00018	0.00023	0.0001	0.000205	NC	0.5
Arsenic	mg/L	0.00053	0.00051	0.0001	0.00052	4%	NA	0.00134	0.00142	0.0001	0.00138	6%	NA	0.00062	0.00059	0.0001	0.000605	5%	NA	0.00272	0.00299	0.0001	0.002855	9%	NA
Barium	mg/L	0.207	0.186	0.0001	0.1965	11%	NA	0.111	0.11	0.0001	0.1105	1%	NA	0.137	0.14	0.0001	0.1385	2%	NA	0.0184	0.0194	0.0001	0.0189	5%	NA
Beryllium	mg/L	<0.00010	<0.00010	0.0001	NC	NC	NA	<0.00010	<0.00010	0.0001	NC	NC	NA	<0.00010	<0.00010	0.0001	NC	NC	NA	<0.00010	<0.00010	0.0001	NC	NC	NA
Bismuth	mg/L	<0.000050	<0.000050	0.00005	NC	NC	NA	<0.000050	<0.000050	0.00005	NC	NC	NA	<0.000050	<0.000050	0.00005	NC	NC	NA	<0.000050	<0.000050	0.00005	NC	NC	NA
Boron	mg/L	0.925	0.971	0.01	0.948	5%	NA	0.896	0.916	0.01	0.906	2%	NA	0.665	0.648	0.01	0.6565	3%	NA	0.16	0.159	0.01	0.1595	1%	NA
Cadmium	mg/L	0.000013	0.0000103	0.000005	0.00001165	NC	0.54	0.0000107	0.0000117	0.000005	0.0000112	NC	0.2	0.0000072	0.0000108	0.000005	0.000009	NC	0.72	0.000105	0.000142	0.000005	0.0001235	**30%**	NA
Calcium	mg/L	87.5	86.6	0.05	87.05	1%	NA	54.8	55.5	0.05	55.15	1%	NA	63.2	63.5	0.05	63.35	0%	NA	13.3	14.1	0.05	13.7	6%	NA
Cesium	mg/L	0.000083	0.000074	0.00001	0.0000785	11%	NA	0.000048	0.0000551	0.00001	0.0000495	NC	0.3	0.000036	0.0000039	0.00001	0.0000375	NC	0.3	<0.000010	<0.000010	0.00001	NC	NC	NA
Chromium	mg/L	0.00031	0.00029	0.0001	0.0003	NC	0.2	0.00028	0.00028	0.0001	0.00028	NC	0	0.00026	0.00025	0.0001	0.000255	NC	0.1	<0.00010	<0.00010	0.0001	NC	NC	NA
Cobalt	mg/L	0.00104	0.001	0.0001	0.00102	4%	NA	0.00091	0.00094	0.0001	0.000925	3%	NA	0.00062	0.00061	0.0001	0.000615	2%	NA	<0.00010	<0.00010	0.0001	NC	NC	NA
Copper	mg/L	0.00224	0.00206	0.0002	0.00215	8%	NA	0.00174	0.00171	0.0002	0.001725	2%	NA	0.00151	0.00163	0.0002	0.00157	8%	NA	0.00046	0.00045	0.0002	0.000455	NC	0.05
Iron	mg/L	0.024	0.029	0.01	0.0265	NC	0.5	0.105	0.107	0.01	0.106	2%	NA	0.048	0.052	0.01	0.05	8%	NA	0.013	<0.010	0.01	0.013	NC	NA
Lead	mg/L	<0.000050	<0.000050	0.00005	NC	NC	NA	<0.000050	<0.000050	0.00005	NC	NC	NA	<0.000050	<0.000050	0.00005	NC	NC	NA	<0.000050	<0.000050	0.00005	NC	NC	NA
Lithium	mg/L	<0.0010	<0.0010	0.001	NC	NC	NA	<0.0010	<0.0010	0.001	NC	NC	NA	<0.0010	<0.0010	0.001	NC	NC	NA	0.0015	0.0015	0.001	0.0015	NC	0
Magnesium	mg/L	17	15.9	0.005	16.45	7%	NA	15	15	0.005	15	0%	NA	14.3	14.4	0.005	14.35	1%	NA	12.7	14.4	0.005	13.55	13%	NA
Manganese	mg/L	0.405	0.35	0.0001	0.3775	15%	NA	0.188	0.179	0.0001	0.1835	5%	NA	0.337	0.342	0.0001	0.3395	1%	NA	0.00166	0.0106	0.0001	0.00613	**146%**	NA
Mercury	mg/L	<0.0000050	<0.0000050	0.000005	NC	NC	NA	<0.0000050	<0.0000050	0.000005	NC	NC	NA	<0.0000050	<0.0000050	0.000005	NC	NC	NA	<0.0000050	<0.0000050	0.000005	NC	NC	NA
Molybdenum	mg/L	0.000468	0.00045	0.00005	0.000459	4%	NA	0.000853	0.000915	0.00005	0.000884	7%	NA	0.000485	0.000465	0.00005	0.000475	4%	NA	0.00482	0.00467	0.00005	0.004745	3%	NA
Nickel	mg/L	0.00299	0.00269	0.0005	0.00284	11%	NA	0.00232	0.00226	0.0005	0.00229	NC	0.12	0.00173	0.0019	0.0005	0.001815	NC	0.34	<0.00050	0.00055	0.0005	0.00055	NC	NA
Phosphorus	mg/L	<0.050	<0.050	0.05	NC	NC	NA	<0.050	<0.050	0.05	NC	NC	NA	<0.050	<0.050	0.05	NC	NC	NA	<0.050	<0.050	0.05	NC	NC	NA
Potassium	mg/L	30.5	27.5	0.05	29	10%	NA	24.1	24.4	0.05	24.25	1%	NA	19.1	19	0.05	19.05	1%	NA	10.2	10.6	0.05	10.4	4%	NA
Rubidium	mg/L	0.0198	0.0174	0.0002	0.0186	13%	NA	0.0157	0.0161	0.0002	0.0159	3%	NA	0.0119	0.0122	0.0002	0.01205	2%	NA	0.00034	0.00037	0.0002	0.000355	NC	0.15
Selenium	mg/L	0.000192	0.000135	0.00005	0.0001635	NC	1.14	0.00015	0.00018	0.00005	0.000165	NC	0.6	0.000148	0.000156	0.00005	0.000152	NC	0.16	<0.000050	0.000054	0.00005	0.000054	NC	NA
Silicon	mg/L	5.01	4.92	0.05	4.965	2%	NA	4.55	4.64	0.05	4.595	2%	NA	4.52	4.49	0.05	4.505	1%	NA	4.05	4.14	0.05	4.095	2%	NA
Silver	mg/L	<0.000010	<0.000010	0.00001	NC	NC	NA	<0.000010	<0.000010	0.00001	NC	NC	NA	<0.000010	<0.000010	0.00001	NC	NC	NA	<0.000010	<0.000010	0.00001	NC	NC	NA
Sodium	mg/L	60	56.1	0.05	58.05	7%	NA	49.5	49.0	0.05	49.25	1%	NA	37.5	38	0.05	37.75	1%	NA	50.2	48.5	0.05	49.35	3%	NA
Strontium	mg/L	0.593	0.54	0.0002	0.5665	9%	NA	0.411	0.417	0.0002	0.414	1%	NA	0.415	0.412	0.0002	0.4135	1%	NA	0.16	0.171	0.0002	0.1655	7%	NA
Sulfur	mg/L	4.25	4	0.5	4.125	6%	NA	2.21	2.19	0.5	2.2	NC	0.04	2.45	2.8	0.5	2.625	13%	NA	1.29	1.25	0.5	1.27	NC	0.08
Tellerium	mg/L	<0.00020	<0.00020	0.0002	NC	NC	NA	<0.00020	<0.00020	0.0002	NC	NC	NA	<0.00020	<0.00020	0.0002	NC	NC	NA	<0.00020	<0.00020	0.0002	NC	NC	NA
Thallium	mg/L	<0.000010	<0.000010	0.00001	NC	NC	NA	<0.000010	<0.000010	0.00001	NC	NC	NA	<0.000010	<0.000010	0.00001	NC	NC	NA	<0.000010	0.000012	0.00001	0.000012	NC	NA
Thorium	mg/L	<0.00010	<0.00010	0.0001	NC	NC	NA	<0.00010	<0.00010	0.0001	NC	NC	NA	<0.00010	<0.00010	0.0001	NC	NC	NA	<0.00010	<0.00010	0.0001	NC	NC	NA
Tin	mg/L	<0.00010	<0.00010	0.0001	NC	NC	NA	<0.00010	<0.00010	0.0001	NC	NC	NA	<0.00010	<0.00010	0.0001	NC	NC	NA	<0.00010	<0.00010	0.0001	NC	NC	NA
Titanium	mg/L	<0.00030	0.00036	0.0003	0.00036	NC	NA	0.00068	0.00067	0.0003	0.000675	NC	0.033333333	<0.00090	0.00085	0.0003	0.00085	NC	NA	0.001	<0.00090	0.0003	0.001	NC	NA
Tungsten	mg/L	<0.00010	<0.00010	0.0001	NC	NC	NA	<0.00010	<0.00010	0.0001	NC	NC	NA	<0.00010	<0.00010	0.0001	NC	NC	NA	0.00012	0.00013	0.0001	0.000125	NC	0.1
Uranium	mg/L	0.000312	0.000321	0.00001	0.0003165	3%	NA	0.000218	0.000218	0.00001	0.000218	0%	NA	0.000167	0.000163	0.00001	0.000165	2%	NA	0.00211	0.00229	0.00001	0.0022	8%	NA
Vanadium	mg/L	<0.00050	<0.00050	0.0005	NC	NC	NA	<0.00050	<0.00050	0.0005	NC	NC	NA	<0.00050	<0.00050	0.0005	NC	NC	NA	0.00119	0.00139	0.0005	0.00129	NC	0.4
Zinc	mg/L	<0.0010	0.0014	0.001	0.0014	NC	NA	<0.0010	<0.0010	0.001	NC	NC	NA	<0.0010	<0.0010	0.001	NC	NC	NA	<0.0010	<0.0010	0.001	NC	NC	NA
Zirconium	mg/L	0.000095	0.000093	0.00006	0.000094	NC	0.03	<0.00020	<0.00020	0.00006	NC	NC	NA	<0.00020	<0.00020	0.00006	NC	NC	NA	<0.00020	<0.00020	0.00006	NC	NC	NA

Notes:
QA/QC = quality assurance/quality control; FDA = field duplicate available; FD = field duplicate
Laboratory Reporting Limit indicates the minimum concentration that could be measured by laboratory instrumentation for a specific sample.
Mean indicates the mean or average value calculated of a field duplicate pair (the FDA and the FD).
Relative Percent Difference (RPD) is calculated when the mean value is greater than five times the laboratory reporting limit.
Difference Factor (DF) is calculated when the mean value is less than five times the laboratory reporting limit.
NC = not calculated; NA = Not Applicable

80% Indicates the parameter analyzed exceeds Golder's internal QA/QC targets.

Table D-7: Quality Control Analytical Results
2019 Thornhill Transfer Station Annual Monitoring Program
Regional District of Kitimat-Stikine

Sampling Location		BH-96-2																				
Sample ID		BH-96-2	DUP	Laboratory Reporting Limit	Mean	Relative Percent Difference (%)	Difference Factor (-)	BH-96-2	DUP	Laboratory Reporting Limit	Mean	Relative Percent Difference (%)	Difference Factor (-)	BH-96-2	DUP	Laboratory Reporting Limit	Mean	Relative Percent Difference (%)	Difference Factor (-)	TRIP BLANK	TRIP BLANK	FIELD BLANK
Laboratory ID		L2325523-1	L2325523-2					L2364065-1	L2364065-2					L2379806-1	L2379806-2					L2257784-7	L2313871-5	L2325523-3
Sample Date		2019-Aug-08	2019-Aug-08					2019-Oct-10	2019-Oct-10					2019-Nov-06	2019-Nov-06					2019-Apr-11	2019-Jul-17	2019-Aug-08
QAQC	Units	FDA	FD					FDA	FD					FDA	FD					TB	TB	FB
Conventional Parameters																						
Conductivity	uS/cm	379	379	2	379	0%	NA	376	381	2	378.5	1%	NA	387	383	2	385	1%	NA	<2.0	<2.0	<2.0
Hardness (Total as CaCO3)	mg/L	92.5	92.2	0.5	92.35	0%	NA	89.2	102	0.5	95.6	13%	NA	79.7	79.5	0.5	79.6	0%	NA	<0.50	<0.50	<0.50
pH	-	8.48	8.5	0.1	8.49	0%	NA	8.49	8.47	0.1	8.48	0%	NA	8.26	8.27	0.1	8.265	0%	NA	5.61	5.57	5.46
Total Suspended Solids	mg/L	-	-	3	NC	NC	NA	-	-	3	NC	NC	NA	-	-	3	NC	NC	NA	-	<3.0	-
Total Dissolved Solids	mg/L	247	257	13	252	4%	NA	211	255	13	233	19%	NA	249.00	239.00	13	244	4%	NA	-	-	<10
Alkalinity, Total (as CaCO3)	mg/L	236	238	1	237	1%	NA	216	231	1	223.5	7%	NA	219.00	259.00	1	239	17%	NA	<1.0	<1.0	<1.0
Ammonia, Total (as N)	mg/L	0.0926	0.0979	0.005	0.09525	6%	NA	0.0787	0.0308	0.005	0.05475	87%	NA	0.15	0.15	0.005	0.1505	5%	NA	<0.0050	<0.0050	<0.0050
Bromide (Br)	mg/L	<0.050	<0.050	0.05	NC	NC	NA	-	-	0.05	NC	NC	NA	<0.050	<0.050	0.05	NC	NC	NA	<0.050	<0.050	<0.050
Chloride (Cl)	mg/L	1.39	1.44	0.5	1.415	NC	0.1	1.33	0.84	0.5	1.085	NC	0.98	1.56	1.51	0.5	1.535	NC	0.1	<0.50	<0.50	<0.50
Fluoride (F)	mg/L	0.145	0.146	0.02	0.1455	1%	NA	0.15	0.152	0.02	0.151	1%	NA	0.146	0.143	0.02	0.1445	2%	NA	<0.020	<0.020	<0.020
Nitrate (as N)	mg/L	0.139	0.172	0.005	0.1555	21%	NA	0.139	0.0705	0.005	0.10475	65%	NA	0.0719	0.0579	0.005	0.0649	22%	NA	<0.0050	<0.0050	<0.0050
Nitrite (as N)	mg/L	0.0211	0.0147	0.001	0.0179	36%	NA	0.0055	0.0126	0.001	0.00905	78%	NA	0.0082	0.0073	0.001	0.00775	12%	NA	<0.0010	<0.0010	<0.0010
Nitrate + Nitrite (as N)	mg/L	-	-	-	NC	NC	NA	-	-	-	NC	NC	NA	-	-	-	NC	NC	NA	-	-	-
Total Kjeldahl Nitrogen	mg/L	0.172	0.248	0.05	0.21	NC	1.52	0.172	0.106	0.05	0.139	NC	1.32	0.509	0.478	0.05	0.4935	6%	NA	<0.050	<0.050	<0.050
Phosphorus (P)-Total	mg/L	0.197	0.159	0.002	0.178	21%	NA	0.0974	0.0396	0.002	0.0685	84%	NA	0.115	0.105	0.002	0.11	9%	NA	<0.0020	<0.0020	<0.0020
Orthophosphate - Dissolved (as P)	mg/L	-	-	0.001	NC	NC	NA	-	-	0.001	NC	NC	NA	-	-	0.001	NC	NC	NA	<0.0010	<0.0010	-
Sulfate (SO4)	mg/L	2.99	3.18	0.3	3.085	6%	NA	2.75	2.07	0.3	2.41	28%	NA	3.08	3.04	0.3	3.06	1%	NA	<0.30	<0.30	<0.30
Biological Oxygen Demand (BOD)	mg/L	-	-	2	NC	NC	NA	-	-	2	NC	NC	NA	-	-	2	NC	NC	NA	-	-	-
Chemical Oxygen Demand (COD)	mg/L	-	-	20	NC	NC	NA	-	-	20	NC	NC	NA	<20	<20	20	NC	NC	NA	-	-	-
Total Metals																						
Aluminum	mg/L	7.12	7.12	0.003	7.12	0.0%	NA	1.39	6.06	0.003	3.725	125.4%	NA	2.23	2.03	0.003	2.13	9.4%	NA	<0.0030	<0.0030	<0.0030
Antimony	mg/L	0.0005	0.00047	0.0001	0.000485	NC	0.3	0.00018	0.00039	0.0001	0.000285	NC	2.1	0.00024	0.00022	0.0001	0.00023	NC	0.2	<0.00010	<0.00010	<0.00010
Arsenic	mg/L	0.00706	0.00665	0.0001	0.006855	6.0%	NA	0.00391	0.00674	0.0001	0.005325	53.1%	NA	0.00484	0.00482	0.0001	0.00483	0.4%	NA	<0.00010	<0.00010	<0.00010
Barium	mg/L	0.0698	0.0669	0.0001	0.06835	4.2%	NA	0.0267	0.0632	0.0001	0.04495	81.2%	NA	0.0344	0.032	0.0001	0.0332	7.2%	NA	<0.00010	<0.00010	<0.00010
Beryllium	mg/L	0.00014	0.00015	0.0001	0.000145	NC	0.1	<0.00010	0.00012	0.0001	0.00012	NC	NA	<0.00010	<0.00010	0.0001	NC	NC	NA	<0.00010	<0.00010	<0.00010
Bismuth	mg/L	0.00005	0.000051	0.00005	0.0000505	NC	0.02	<0.000050	<0.000050	0.00005	NC	NC	NA	<0.000050	<0.000050	0.00005	NC	NC	NA	<0.000050	<0.000050	<0.000050
Boron	mg/L	0.168	0.173	0.01	0.1705	2.9%	NA	0.177	0.167	0.01	0.172	5.8%	NA	0.183	0.184	0.01	0.1835	0.5%	NA	<0.010	<0.010	<0.010
Cadmium	mg/L	0.00234	0.00207	0.000005	0.002205	12.2%	NA	0.00067	0.00204	0.000005	0.001355	101.1%	NA	0.00146	0.00143	0.000005	0.001445	2.1%	NA	<0.0000050	<0.0000050	<0.0000050
Calcium	mg/L	15.5	15.5	0.05	15.5	0%	NA	13.9	17.0	0.05	15.45	20%	NA	14.9	14.7	0.05	14.8	1%	NA	<0.050	<0.050	<0.050
Cesium	mg/L	0.000745	0.000728	0.00001	0.0007365	2%	NA	0.000134	0.000534	0.00001	0.000334	120%	NA	0.000294	0.00026	0.00001	0.000277	12%	NA	<0.000010	<0.000010	<0.000010
Chromium	mg/L	0.00877	0.0086	0.0001	0.008685	2%	NA	0.00171	0.00709	0.0001	0.0044	122%	NA	0.00271	0.00252	0.0001	0.002615	7%	NA	<0.00010	<0.00010	<0.00010
Cobalt	mg/L	0.00507	0.00485	0.0001	0.00496	4%	NA	0.00111	0.00404	0.0001	0.002575	114%	NA	0.00191	0.00171	0.0001	0.00181	11%	NA	<0.00010	<0.00010	<0.00010
Copper	mg/L	0.0249	0.0239	0.0005	0.0244	4%	NA	0.006	0.0202	0.0005	0.0131	108%	NA	0.0144	0.0135	0.0005	0.01395	6%	NA	<0.00050	<0.00050	<0.00050
Iron	mg/L	10.1	9.64	0.01	9.87	5%	NA	1.99	8.14	0.01	5.065	121%	NA	2.96	2.61	0.01	2.785	13%	NA	<0.010	<0.010	<0.010
Lead	mg/L	0.00441	0.00405	0.00005	0.00423	9%	NA	0.000879	0.00334	0.00005	0.0021095	117%	NA	0.00139	0.00126	0.00005	0.001325	10%	NA	<0.000050	<0.000050	<0.000050
Lithium	mg/L	0.0068	0.0069	0.001	0.00685	1%	NA	0.0028	0.0064	0.001	0.0046	NC	3.6	0.0036	0.0034	0.001	0.0035	NC	0.2	<0.0010	<0.0010	<0.0010
Magnesium	mg/L	16.5	16.5	0.005	16.5	0%	NA	12.5	16.2	0.005	14.35	26%	NA	13.4	13.4	0.005	13.4	0%	NA	<0.0050	<0.0050	<0.0050
Manganese	mg/L	0.408	0.372	0.0001	0.39	9%	NA	0.155	0.344	0.0001	0.2495	76%	NA	0.336	0.306	0.0001	0.321	9%	NA	<0.00010	<0.00010	<0.00010
Mercury	mg/L	0.000019	0.000019	0.000005	0.000019	NC	0	0.000005	0.0000163	0.000005	0.00001065	NC	2.26	0.0000067	0.0000080	0.000005	0.00000735	NC	0.26	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.00489	0.00484	0.00005	0.004865	1%	NA	0.00448	0.00376	0.00005	0.00412	17%	NA	0.00512	0.00479	0.00005	0.004955	7%	NA	<0.000050	<0.000050	<0.000050
Nickel	mg/L	0.0129	0.0122	0.0005	0.01255	6%	NA	0.00289	0.0103	0.0005	0.006595	112%	NA	0.00478	0.00424	0.0005	0.00451	12%	NA	<0.00050	<0.00050	<0.00050
Phosphorus	mg/L	0.238	0.258	0.05	0.248	NC	0.4	0.108	0.24	0.05	0.174	NC	2.64	0.125	0.106	0.05	0.1155	NC	0.38	<0.050	<0.050	<0.050
Potassium	mg/L	11	11.2	0.05	11.1	2%	NA	10.3	11.1	0.05	10.7	7%	NA	11.9	12.1	0.05	12	2%	NA	<0.050	<0.050	<0.050
Rubidium	mg/L	0.00375	0.00376	0.0002	0.003755	0%	NA	0.00098	0.00297	0.0002	0.001975	101%	NA	0.00146	0.0014	0.0002	0.00143	4%	NA	<0.00020	<0.00020	<0.00020
Selenium	mg/L	0.000074	0.000071	0.00005	0.0000775	NC	0.26	0.000055	0.000097	0.00005	0.000076	NC	0.84	0.00005	<0.000050	0.00005	0.00005	NC	NA	<0.000050	<0.000050	<0.000050
Silicon	mg/L	15	15.2	0.1	15.1	1%	NA	5.96	12.2	0.1	9.08	69%	NA	7.06	6.85	0.1	6.955	3%	NA	<0.10	<0.10	<0.10
Silver	mg/L	0.000133	0.000113	0.00001	0.000123	16%	NA	0.000018	0.000082	0.00001	0.00005	128%	NA	0.000029	0.000025	0.00001	0.000027	NC	0.4	<0.000010	<0.000010	<0.000010
Sodium	mg/L	49.7	50.7	0.05	50.2	2%	NA	48.9	46	0.05	47.45	6%	NA	53.8	54.2	0.05	54	1%	NA	<0.050	<0.050	<0.050
Strontium	mg/L	0.202	0.191	0.0002	0.1965	6%	NA	0.17	0.19	0.0002	0.18	11%	NA	0.186	0.177	0.0002	0.1815	5%	NA	<0.00020	<0.00020	<0.00020
Sulfur	mg/L	1.22	1.11	0.5	1.165	NC	0.22	1.12	0.91	0.5	1.015	NC	0.42	1.13	0.96	0.5	1.045	NC	0.34	<0.50	<0.50	<0.50
Tellurium	mg/L	<0.00020	<0.00020	0.0002	NC	NC	NA	<0.00020	<0.00020	0.0002	NC	NC	NA	<0.00020	<0.00020	0.0002	NC	NC	NA	<0.00020	<0.00020	<0.00020
Thallium	mg/L	0.000057	0.00005	0.00001	0.0000535	13%	NA	0.000011	0.000041	0.00001	0.000026	NC	3	0.00001	<0.000010	0.00001	0.00001	NC	NA	<0.000010	<0.000010	<0.000010
Thorium	mg/L	0.00026	0.00026	0.0001	0.00026	NC	0	<0.00010	0.00019	0.0001	0.00019	NC	NA	<0.00010	<0.00010	0.0001	NC	NC	NA	<0.00010	<0.00010	<0.00010
Tin	mg/L	0.00079	0.00072	0.0001	0.000755	9%	NA	0.00023	0.00059	0.0001	0.00041	NC	3.6	0.00276	0.00248	0.0001	0.00262	11%	NA	<0.00010	<0.00010	<0.00010
Titanium	mg/L	0.166	0.162	0.0003	0.164	2%	NA	0.0374	0.126	0.0003	0.0817	108%	NA	0.064	0.0569	0.0003	0.06045	12%	NA	<0.00030	<0.00030	<0.00030
Tungsten	mg/L	0.00018	0.00016	0.0001	0.00017	NC	0.2	0.00013	0.00012	0.0001	0.000125	NC	0.1	0.00021	0.0002	0.0001	0.000205	NC	0.1	<0.00010	<0.00010	<0.00010
Uranium	mg/L	0.00025	0.00242	0.00001	0.00246	3%	NA	0.00186	0.00246	0.00001	0.00196	10%	NA	0.00212	0.00205	0.00001	0.002085	3%	NA	<0.000010	<0.000010	<0.000010
Vanadium	mg/L	0.0177	0.0172	0.0005	0.01745	3%	NA	0.00381	0.0145	0.0005	0.009155	117%	NA	0.00556	0.00503	0.0005	0.005295	10%	NA	<0.00050	<0.00050	<0.00050
Zinc	mg/L	0.0565	0.0546	0.003	0.05555	3%	NA	0.0135	0.0473	0.003	0.0304	111%	NA	0.024	0.0226	0.003	0.0233	6%	NA	<0.0030	<0.0030	<0.0030
Zirconium	mg/L	0.00069	0.00088	0.00006	0.000785	24%	NA	<0.00020	<0.00020	0.00006	NC	NC	NA	0.00050	0.00045	0.00006	0.000475	11%	NA	<0.000060	<0.00020	<0.00020
Dissolved Metals																						
Aluminum	mg/L	0.0164	0.0279	0.001	0.02215	52%	NA	0.0112	0.0178	0.001	0.0145	46%	NA	0.0255	0.0239	0.001	0.0247	6%	NA	-	<0.0010	<0.0010
Antimony	mg/L	0.00013	0.00013	0.0001	0.00013	NC	0	0.00011	<0.00010	0.0001	0.00011	NC	NA	0.00011	0.00011	0.0001	0.00011	NC	0	-	<0.00010	<0.00010
Arsenic	mg/L	0.00333	0.00339	0.0001	0.00336	2%	NA	0.00339	0.00438	0.0001	0.003885	25%	NA	0.00335	0.00336	0.0001	0.003355	0%	NA	-	<0.00010	<0.00010
Barium	mg/L	0.0186	0.0188	0.0001	0.0187	1%	NA	0.0178	0.0205	0.0001	0.01915	14%	NA	0.0182	0.0181	0.0001	0.01815	1%	NA	-	<0.00010	<0.00010
Beryllium	mg/L	<0.00010	<0.00010	0.0001	NC	NC	NA	<0.00010	<0.00010	NC	NC	NC	NA	<0.00010	<0.00010	0.0001	NC	NC	NA	-	<0.00010	<0.00010
Bismuth	mg/L	<0.000050	<0.000050	0.00005	NC	NC	NA	<0.000050	<0.000050	0.00005	NC	NC	NA	<0.000050	<0.000050	0.00005	NC	NC	NA	-	<0.000050	<0.000050
Boron	mg/L	0.157	0.156	0.01	0.1565	1%	NA	0.16	0.155	0.01	0.1575	3%	NA	0.161	0.163	0.01	0.162	1%	NA	-	<0.010	<0.010
Cadmium	mg/L	0.0000402	0.0000445	0.000005	0.00004235	10%	NA	0.000173	0.0000417	0.000005	0.00010735	122%	NA	0.000842	0.000841	0.000005	0.0008415	0%	NA	-	<0.0000050	<0.0000050
Calcium	mg/L	14.3	14.3	0.05	14.3	0%	NA	14.2	15.5	0.05	14.85	9%	NA	12.3	12.1	0.05	12.2	2%	NA	-	<0.050	<0.050
Cesium	mg/L	<0.000010	<0.000010	0.00001	NC	NC	NA	<0.000010	<0.000010	0.00001	NC	NC	NA	0.000052	0.000045	0.00001	0.0000485	NC	0.7	-	<0.000010	<0.000010
Chromium	mg/L	<0.00010	<0.00010	0.0001	NC	NC	NA	<0.00010	<0.00010	0.0001	NC	NC	NA	<0.00010	<0.00010	0.0001	NC	NC	NA	-	<0.00010	<0.00010
Cobalt	mg/L	0.00011	<0.00010	0.0001	0.00011	NC	NA	<0.00010	0.00011	0.0001	0.00011	NC	NA	<0.00010	<0.00010	0.0001	NC	NC	NA	-	<0.00010	<0.00010
Copper	mg/L	0.00062	0.00061	0.0002	0.000615	NC	0.05	0.00061	0.00035	0.0002	0.00048	NC	1.3	0.00706	0.00703	0.0002	0.007045	0%	NA	-	<0.00020	<0.00020
Iron	mg/L	0.012	0.025	0.01	0.0185	NC	1.3	0.077	0.01	0.01	0.0435	NC	6.7	0.015	0.018	0.01	0.0165	NC	0.3	-	<0.010	<0.010
Lead	mg/L	<0.000050	<0.000050	0.00005	NC	NC	NA	<0.000050	<0.000050	0.00005	NC	NC	NA	<0.000050	<0.000050	0.00005	NC	NC	NA	-	<0.000050	<0.000050
Lithium	mg/L	0.0017	0.0017	0.001	0.0017	NC	0	0.0016	0.0016	0.001	0.0016	NC	0	0.0015	0.0016	0.001	0.00155	NC	0.1	-	<0.0010	<0.0010
Magnesium	mg/L	13.8	13.7	0.005	13.75	1%	NA	13.1	15.5	0.005	14.3	17%	NA	11.9	12	0.005	11.95	1%	NA	-	<0.0050	<0.0050
Manganese	mg/L	0.0619	0.062	0.0001	0.06195	0%	NA	0.0453	0.0906	0.0001	0.06795	67%	NA	0.11	0.115	0.0001	0.1125	4%	NA	-	<0.00010	<0.00010
Mercury	mg/L	<0.0000050	<0.0000050	0.000005	NC	NC	NA	<0.0000050	<0.0000050	0.000005	NC	NC	NA	<0.0000050	<0.0000050	0.000005	NC	NC	NA	-	<0.0000050	<0.0000050
Molybdenum	mg/L	0.00465	0.00471	0.00005	0.00468	1%	NA	0.00517	0.00456	0.00005	0.004865	13%	NA	0.00464	0.00472	0.00005	0.00468	2%	NA	-	<0.000050	<0.000050
Nickel	mg/L	0.00073	0.00059	0.0005	0.00066	NC	0.28	0.00062	0.00512	0.0005	0.00287	157%	NA	0.00101	0.00103	0.0005	0.00102	NC	0.04	-	<0.00050	<0.00050
Phosphorus	mg/L	<0.050	<0.050	0.05	NC	NC	NA	0.06	<0.050	0.05	0.06	NC	NA	<0.050	<0.050	0.05	NC	NC	NA	-	<0.050	<0.050
Potassium	mg/L	10.9	10.8	0.05	10.85	1%	NA	11.2	11.5	0.05	11.35	3%	NA	10.9	11.3	0.05	11.1	4%	NA	-	<0.050	<0.050
Rubidium	mg/L	0.00042	0.00039	0.0002	0.000405	NC	0.15	0.00037	0.00042	0.0002	0.000395	NC	0.25	0.00054	0.00054	0.0002	0.00054	NC	0	-	<0.00020	<0.00020
Selenium	mg/L	<0.000050	<0.000050	0.00005	NC	NC	NA	<0.000050	<0.000050	0.00005	NC	NC	NA	<0.000050	<0.000050	0.00005	NC	NC	NA	-	<0.000050	<0.000050
Silicon	mg/L	3.95	3.94	0.05	3.945	0%	NA	4.42	4.64	0.05	4.53	5%	NA	4.13	4.18	0.05	4.155	1%	NA	-	<0.050	<0.050
Silver	mg/L	<0.000010	<0.000010	0.00001	NC	NC	NA	<0.000010	<0.000010	0.00001	NC	NC	NA	<0.000010	<0.000010	0.00001	NC	NC	NA	-	<0.000010	<0.000010
Sodium	mg/L	51.8	50.8	0.05	51.3	2%	NA	56.0	52.2	0.05	54.1	7%	NA	55.1	56.3	0.05	55.7	2%	NA	-	<0.050	<0.050
Strontium	mg/L	0.179	0.18	0.0002	0.1795	1%	NA	0.164	0.183	0.0002	0.1735	11%	NA	0.148	0.149	0.0002	0.1485	1%	NA	-	<0.00020	<0.00020
Sulfur	mg/L	1.45	1.34	0.5	1.395	NC	0.22	1.3	0.91	0.5	1.105	NC	0.78	1.34	1.38	0.5	1.36	NC	0.08	-	<0.50	<0.50
Tellerium	mg/L	<0.00020	<0.00020	0.0002	NC	NC	NA	<0.00020	<0.00020	0.0002	NC	NC	NA	<0.00020	<0.00020	0.0002	NC	NC	NA	-	<0.00020	<0.00020
Thallium	mg/L	<0.000010	<0.000010	0.00001	NC	NC	NA	<0.000010	<0.000010	0.00001	NC	NC	NA	<0.000010	<0.000010	0.00001	NC	NC	NA	-	<0.000010	<0.000010
Thorium	mg/L	<0.00010	<0.00010	0.0001	NC	NC	NA	<0.00010	<0.00010	0.0001	NC	NC	NA	<0.00010	<0.00010	0.0001	NC	NC	NA	-	<0.00010	<0.00010
Tin	mg/L	<0.00010	<0.00010	0.0001	NC	NC	NA	<0.00010	<0.00010	0.0001	NC	NC	NA	0.00395	0.00383	0.0001	0.00389	3%	NA	-	<0.00010	<0.00010
Titanium	mg/L	0.00073	0.00133	0.0003	0.00103	NC	2	0.00046	<0.00090	0.0003	0.00046	NC	NA	0.00069	0.00096	0.0003	0.000825	NC	0.9	-	<0.00030	<0.00030
Tungsten	mg/L	0.00012	0.00012	0.0001	0.00012	NC	0	0.00015	0.00014	0.0001	0.000145	NC	0.1	0.00018	0.00018	0.0001	0.00018	NC	0	-	<0.00010	<0.00010
Uranium	mg/L	0.00209	0.00205	0.00001	0.00207	2%	NA	0.00194	0.00193	0.00001	0.001935	1%	NA	0.00194	0.00192	0.00001	0.00193	1%	NA	-	<0.000010	<0.000010
Vanadium	mg/L	0.0013	0.00112	0.0005	0.00121	NC	0.36	0.00054	0.0005	0.0005	0.00052	NC	0.08	<0.00050	0.00051	0.0005	0.00051	NC	NA	-	<0.00050	<0.00050
Zinc	mg/L	<0.0010	<0.0010	0.001	NC	NC	NA	<0.0010	<0.0010	0.001	NC	NC	NA	0.0073	0.0068	0.001	0.00705	7%	NA	-	<0.0010	<0.0010
Zirconium	mg/L	<0.00020	<0.00020	0.00006	NC	NC	NA	<0.00020	<0.00020	0.00006	NC	NC	NA	<0.00020	<0.00020	0.00006	NC	NC	NA	-	<0.00020	<0.00020

Notes:
QA/QC = quality assurance/quality control; FDA = field duplicate available; FD = field duplicate
Laboratory Reporting Limit indicates the minimum concentration that could be measured by laboratory instrumentation for a specific sample.
Mean indicates the mean or average value calculated of a field duplicate pair (the FDA and the FD).
Relative Percent Difference (RPD) is calculated when the mean value is greater than five times the laboratory reporting limit.
Difference Factor (DF) is calculated when the mean value is less than five times the laboratory reporting limit.
NC = not calculated; NA = Not Applicable

80% — Indicates the parameter analyzed exceeds Golder's internal QA/QC targets.

APPENDIX E

2018 Certificates of Analysis

REGIONAL DISTRICT OF KITIMAT-STIKINE
ATTN: Chris Kerr
300 - 4545 Lazelle Avenue
Terrace BC V8G 4E1

Date Received: 20-JUL-19
Report Date: 07-AUG-19 14:57 (MT)
Version: FINAL REV. 2

Client Phone: 250-615-6100

Certificate of Analysis

Lab Work Order #: L2313873

Project P.O. #: NOT SUBMITTED
Job Reference: THORNHILL GROUNDWATER
C of C Numbers:
Legal Site Desc:

Comments:
7-AUG-2019 TOC data has been revised for L2313873-1 & 2.

Amber Springer, B.Sc
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2313873-1	L2313873-2			
	Description	Water	Water			
	Sampled Date	17-JUL-19	17-JUL-19			
	Sampled Time	12:15	12:00			
	Client ID	BH-96-2	DUP			
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	378	384			
	Hardness (as CaCO3) (mg/L)	85.4	94.4			
	pH (pH)	8.57	8.56			
	Total Dissolved Solids (mg/L)	262	326			
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	201	206			
	Ammonia, Total (as N) (mg/L)	0.0967	0.132			
	Bromide (Br) (mg/L)	<0.050	<0.050			
	Chloride (Cl) (mg/L)	1.50	1.11			
	Fluoride (F) (mg/L)	0.166	0.168			
	Nitrate (as N) (mg/L)	0.213	0.150			
	Nitrite (as N) (mg/L)	0.0053	0.0153			
	Total Kjeldahl Nitrogen (mg/L)	0.251	0.195			
	Phosphorus (P)-Total (mg/L)	0.171	0.182			
	Sulfate (SO4) (mg/L)	3.50	3.10			
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	4.24 RRV	5.66 RRV			
Total Metals	Aluminum (Al)-Total (mg/L)	4.16	5.08			
	Antimony (Sb)-Total (mg/L)	0.00033	0.00036			
	Arsenic (As)-Total (mg/L)	0.00544	0.00650			
	Barium (Ba)-Total (mg/L)	0.0501	0.0539			
	Beryllium (Be)-Total (mg/L)	<0.00010	0.00011			
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050			
	Boron (B)-Total (mg/L)	0.150	0.143			
	Cadmium (Cd)-Total (mg/L)	0.00149	0.00166			
	Calcium (Ca)-Total (mg/L)	15.2	16.3			
	Cesium (Cs)-Total (mg/L)	0.000410	0.000474			
	Chromium (Cr)-Total (mg/L)	0.00558	0.00705			
	Cobalt (Co)-Total (mg/L)	0.00322	0.00385			
	Copper (Cu)-Total (mg/L)	0.0156	0.0177			
	Iron (Fe)-Total (mg/L)	6.55	7.99			
	Lead (Pb)-Total (mg/L)	0.00322	0.00389			
	Lithium (Li)-Total (mg/L)	0.0051	0.0058			
	Magnesium (Mg)-Total (mg/L)	14.7	16.6			
	Manganese (Mn)-Total (mg/L)	0.245	0.270			
	Mercury (Hg)-Total (mg/L)	<0.000050 DLM	<0.000050 DLM			
	Molybdenum (Mo)-Total (mg/L)	0.00434	0.00419			
	Nickel (Ni)-Total (mg/L)	0.00816	0.00992			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2313873-1	L2313873-2			
	Description	Water	Water			
	Sampled Date	17-JUL-19	17-JUL-19			
	Sampled Time	12:15	12:00			
	Client ID	BH-96-2	DUP			
Grouping	**Analyte**					
WATER						
Total Metals	Phosphorus (P)-Total (mg/L)	0.179	0.206			
	Potassium (K)-Total (mg/L)	11.3	11.7			
	Rubidium (Rb)-Total (mg/L)	0.00217	0.00253			
	Selenium (Se)-Total (mg/L)	0.000065	0.000090			
	Silicon (Si)-Total (mg/L)	10.5	11.9			
	Silver (Ag)-Total (mg/L)	0.000074	0.000092			
	Sodium (Na)-Total (mg/L)	48.3	47.1			
	Strontium (Sr)-Total (mg/L)	0.176	0.194			
	Sulfur (S)-Total (mg/L)	1.00	0.78			
	Tellurium (Te)-Total (mg/L)	<0.00020	<0.00020			
	Thallium (Tl)-Total (mg/L)	0.000036	0.000042			
	Thorium (Th)-Total (mg/L)	0.00017	0.00021			
	Tin (Sn)-Total (mg/L)	0.00046	0.00050			
	Titanium (Ti)-Total (mg/L)	0.102	0.126			
	Tungsten (W)-Total (mg/L)	0.00014	0.00013			
	Uranium (U)-Total (mg/L)	0.00238	0.00255			
	Vanadium (V)-Total (mg/L)	0.0109	0.0133			
	Zinc (Zn)-Total (mg/L)	0.0379	0.0448			
	Zirconium (Zr)-Total (mg/L)	<0.00020	<0.00020			
Dissolved Metals	Dissolved Mercury Filtration Location	LAB	LAB			
	Dissolved Metals Filtration Location	LAB	LAB			
	Aluminum (Al)-Dissolved (mg/L)	0.0256	0.0213			
	Antimony (Sb)-Dissolved (mg/L)	0.00018	0.00023			
	Arsenic (As)-Dissolved (mg/L)	0.00272	0.00299			
	Barium (Ba)-Dissolved (mg/L)	0.0184	0.0194			
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00010			
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050			
	Boron (B)-Dissolved (mg/L)	0.160	0.159			
	Cadmium (Cd)-Dissolved (mg/L)	0.000105	0.000142			
	Calcium (Ca)-Dissolved (mg/L)	13.3	14.1			
	Cesium (Cs)-Dissolved (mg/L)	<0.000010	<0.000010			
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010			
	Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010			
	Copper (Cu)-Dissolved (mg/L)	0.00046	0.00045			
	Iron (Fe)-Dissolved (mg/L)	0.013	<0.010			
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050			
	Lithium (Li)-Dissolved (mg/L)	0.0015	0.0015			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2313873-1	L2313873-2			
Description	Water	Water			
Sampled Date	17-JUL-19	17-JUL-19			
Sampled Time	12:15	12:00			
Client ID	BH-96-2	DUP			
Grouping / **Analyte**					
WATER					
Dissolved Metals Magnesium (Mg)-Dissolved (mg/L)	12.7	14.4			
Manganese (Mn)-Dissolved (mg/L)	0.00166	0.0106			
Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050			
Molybdenum (Mo)-Dissolved (mg/L)	0.00482	0.00467			
Nickel (Ni)-Dissolved (mg/L)	<0.00050	0.00055			
Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050			
Potassium (K)-Dissolved (mg/L)	10.2	10.6			
Rubidium (Rb)-Dissolved (mg/L)	0.00034	0.00037			
Selenium (Se)-Dissolved (mg/L)	<0.000050	0.000054			
Silicon (Si)-Dissolved (mg/L)	4.05	4.14			
Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010			
Sodium (Na)-Dissolved (mg/L)	50.2	48.5			
Strontium (Sr)-Dissolved (mg/L)	0.160	0.171			
Sulfur (S)-Dissolved (mg/L)	1.29	1.25			
Tellurium (Te)-Dissolved (mg/L)	<0.00020	<0.00020			
Thallium (Tl)-Dissolved (mg/L)	<0.000010	0.000012			
Thorium (Th)-Dissolved (mg/L)	<0.00010	<0.00010			
Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010			
Titanium (Ti)-Dissolved (mg/L)	0.00100	<0.00090 DLM			
Tungsten (W)-Dissolved (mg/L)	0.00012	0.00013			
Uranium (U)-Dissolved (mg/L)	0.00211	0.00229			
Vanadium (V)-Dissolved (mg/L)	0.00119	0.00139			
Zinc (Zn)-Dissolved (mg/L)	<0.0010	<0.0010			
Zirconium (Zr)-Dissolved (mg/L)	<0.00020	<0.00020			
Aggregate Organics COD (mg/L)	<20	<20			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2313873-1, -2
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2313873-1, -2
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L2313873-1, -2
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2313873-1, -2
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2313873-1, -2
Matrix Spike	Phosphorus (P)-Total	MS-B	L2313873-1, -2

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RRV	Reported Result Verified By Repeat Analysis

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-TITR-VA	Water	Alkalinity Species by Titration	APHA 2320 Alkalinity

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

BR-L-IC-N-VA	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

CARBONS-TOC-VA	Water	Total organic carbon by combustion	APHA 5310B TOTAL ORGANIC CARBON (TOC)

This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".

CL-IC-N-VA	Water	Chloride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

COD-COL-VA	Water	Chemical Oxygen Demand by Colorimetric	APHA 5220 D. CHEMICAL OXYGEN DEMAND

This analysis is carried out using procedures adapted from APHA Method 5220 "Chemical Oxygen Demand (COD)". Chemical oxygen demand is determined using the closed reflux colourimetric method.

EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.

This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.

EC-SCREEN-VA	Water	Conductivity Screen (Internal Use Only)	APHA 2510

Qualitative analysis of conductivity where required during preparation of other tests - e.g. TDS, metals, etc.

F-IC-N-VA	Water	Fluoride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-VA	Water	Hardness	APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA	Water	Diss. Mercury in Water by CVAAS or CVAFS	APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-CVAA-VA	Water	Total Mercury in Water by CVAAS or CVAFS	EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

MET-D-CCMS-VA	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-VA	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Reference Information

NH3-F-VA	Water	Ammonia in Water by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-VA	Water	Nitrite in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-VA	Water	Nitrate in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

P-T-PRES-COL-VA	Water	Total P in Water by Colour	APHA 4500-P Phosphorus

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.
Samples with very high dissolved solids (i.e. seawaters, brackish waters) may produce a negative bias by this method. Alternate methods are available for these types of samples.

Arsenic (5+), at elevated levels, is a positive interference on colourimetric phosphate analysis.

PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

SO4-IC-N-VA	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

TDS-VA	Water	Total Dissolved Solids by Gravimetric	APHA 2540 C - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TKN-F-VA	Water	TKN in Water by Fluorescence	APHA 4500-NORG D.

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: REGIONAL DISTRICT OF KITIMAT-STIKINE
300 - 4545 Lazelle Avenue
Terrace BC V8G 4E1
Contact: Chris Kerr

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-TITR-VA	**Water**							
Batch R4721628								
WG3111779-1 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	23-JUL-19
BR-L-IC-N-VA	**Water**							
Batch R4720008								
WG3111767-2 LCS								
Bromide (Br)			101.7		%		85-115	22-JUL-19
WG3111767-1 MB								
Bromide (Br)			<0.050		mg/L		0.05	22-JUL-19
CL-IC-N-VA	**Water**							
Batch R4720008								
WG3111767-2 LCS								
Chloride (Cl)			99.4		%		90-110	22-JUL-19
WG3111767-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	22-JUL-19
COD-COL-VA	**Water**							
Batch R4730924								
WG3118509-3 LCS								
COD			99.8		%		85-115	29-JUL-19
WG3118509-6 LCS								
COD			99.1		%		85-115	29-JUL-19
WG3118509-1 MB								
COD			<20		mg/L		20	29-JUL-19
WG3118509-5 MB								
COD			<20		mg/L		20	29-JUL-19
EC-PCT-VA	**Water**							
Batch R4721628								
WG3111779-3 LCS								
Conductivity			99.9		%		90-110	23-JUL-19
Conductivity			99.9		%		90-110	23-JUL-19
WG3111779-1 MB								
Conductivity			<2.0		uS/cm		2	23-JUL-19
F-IC-N-VA	**Water**							
Batch R4720008								
WG3111767-2 LCS								
Fluoride (F)			102.5		%		90-110	22-JUL-19
WG3111767-1 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F-IC-N-VA	**Water**							
Batch R4720008								
WG3111767-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	22-JUL-19
HG-D-CVAA-VA	**Water**							
Batch R4734044								
WG3120386-3 DUP		**L2313873-1**						
Mercury (Hg)-Dissolved		<0.0000050	<0.000005C	RPD-NA	mg/L	N/A	20	31-JUL-19
WG3120386-2 LCS								
Mercury (Hg)-Dissolved			94.9		%		80-120	31-JUL-19
WG3120386-1 MB		**LF**						
Mercury (Hg)-Dissolved			<0.000005C		mg/L		0.000005	31-JUL-19
WG3120386-4 MS		**L2313873-2**						
Mercury (Hg)-Dissolved			79.0		%		70-130	31-JUL-19
HG-T-CVAA-VA	**Water**							
Batch R4720560								
WG3112324-2 LCS								
Mercury (Hg)-Total			99.2		%		80-120	23-JUL-19
WG3112324-1 MB								
Mercury (Hg)-Total			<0.000005C		mg/L		0.000005	23-JUL-19
MET-D-CCMS-VA	**Water**							
Batch R4730148								
WG3117586-2 LCS								
Aluminum (Al)-Dissolved			97.8		%		80-120	29-JUL-19
Antimony (Sb)-Dissolved			100.2		%		80-120	29-JUL-19
Arsenic (As)-Dissolved			98.0		%		80-120	29-JUL-19
Barium (Ba)-Dissolved			101.0		%		80-120	29-JUL-19
Beryllium (Be)-Dissolved			95.1		%		80-120	29-JUL-19
Bismuth (Bi)-Dissolved			95.2		%		80-120	29-JUL-19
Boron (B)-Dissolved			96.9		%		80-120	29-JUL-19
Cadmium (Cd)-Dissolved			98.3		%		80-120	29-JUL-19
Calcium (Ca)-Dissolved			97.7		%		80-120	29-JUL-19
Cesium (Cs)-Dissolved			98.4		%		80-120	29-JUL-19
Chromium (Cr)-Dissolved			98.8		%		80-120	29-JUL-19
Cobalt (Co)-Dissolved			96.6		%		80-120	29-JUL-19
Copper (Cu)-Dissolved			96.8		%		80-120	29-JUL-19
Iron (Fe)-Dissolved			90.5		%		80-120	29-JUL-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R4730148								
WG3117586-2 LCS								
Lead (Pb)-Dissolved			99.1		%		80-120	29-JUL-19
Lithium (Li)-Dissolved			94.1		%		80-120	29-JUL-19
Magnesium (Mg)-Dissolved			100.7		%		80-120	29-JUL-19
Manganese (Mn)-Dissolved			97.4		%		80-120	29-JUL-19
Molybdenum (Mo)-Dissolved			102.2		%		80-120	29-JUL-19
Nickel (Ni)-Dissolved			97.1		%		80-120	29-JUL-19
Phosphorus (P)-Dissolved			105.1		%		70-130	29-JUL-19
Potassium (K)-Dissolved			94.8		%		80-120	29-JUL-19
Rubidium (Rb)-Dissolved			95.7		%		80-120	29-JUL-19
Selenium (Se)-Dissolved			95.9		%		80-120	29-JUL-19
Silicon (Si)-Dissolved			96.5		%		60-140	29-JUL-19
Silver (Ag)-Dissolved			95.2		%		80-120	29-JUL-19
Sodium (Na)-Dissolved			99.6		%		80-120	29-JUL-19
Strontium (Sr)-Dissolved			100.6		%		80-120	29-JUL-19
Sulfur (S)-Dissolved			101.3		%		80-120	29-JUL-19
Tellurium (Te)-Dissolved			100.4		%		80-120	29-JUL-19
Thallium (Tl)-Dissolved			95.1		%		80-120	29-JUL-19
Thorium (Th)-Dissolved			96.7		%		80-120	29-JUL-19
Tin (Sn)-Dissolved			97.6		%		80-120	29-JUL-19
Titanium (Ti)-Dissolved			97.8		%		80-120	29-JUL-19
Tungsten (W)-Dissolved			100.3		%		80-120	29-JUL-19
Uranium (U)-Dissolved			100.2		%		80-120	29-JUL-19
Vanadium (V)-Dissolved			97.8		%		80-120	29-JUL-19
Zinc (Zn)-Dissolved			94.0		%		80-120	29-JUL-19
Zirconium (Zr)-Dissolved			97.6		%		80-120	29-JUL-19
WG3117586-1 MB		**LF**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	29-JUL-19
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	29-JUL-19
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	29-JUL-19
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	29-JUL-19
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	29-JUL-19
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	29-JUL-19
Boron (B)-Dissolved			<0.010		mg/L		0.01	29-JUL-19
Cadmium (Cd)-Dissolved			<0.000005C		mg/L		0.000005	29-JUL-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R4730148								
WG3117586-1 MB		**LF**						
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	29-JUL-19
Cesium (Cs)-Dissolved			<0.000010		mg/L		0.00001	29-JUL-19
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	29-JUL-19
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	29-JUL-19
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	29-JUL-19
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	29-JUL-19
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	29-JUL-19
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	29-JUL-19
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	29-JUL-19
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	29-JUL-19
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	29-JUL-19
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	29-JUL-19
Phosphorus (P)-Dissolved			<0.050		mg/L		0.05	29-JUL-19
Potassium (K)-Dissolved			<0.050		mg/L		0.05	29-JUL-19
Rubidium (Rb)-Dissolved			<0.00020		mg/L		0.0002	29-JUL-19
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	29-JUL-19
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	29-JUL-19
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	29-JUL-19
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	29-JUL-19
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	29-JUL-19
Sulfur (S)-Dissolved			<0.50		mg/L		0.5	29-JUL-19
Tellurium (Te)-Dissolved			<0.00020		mg/L		0.0002	29-JUL-19
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	29-JUL-19
Thorium (Th)-Dissolved			<0.00010		mg/L		0.0001	29-JUL-19
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	29-JUL-19
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	29-JUL-19
Tungsten (W)-Dissolved			<0.00010		mg/L		0.0001	29-JUL-19
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	29-JUL-19
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	29-JUL-19
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	29-JUL-19
Zirconium (Zr)-Dissolved			<0.00020		mg/L		0.0002	29-JUL-19
MET-T-CCMS-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R4723949								
WG3112663-2 LCS								
Aluminum (Al)-Total			94.6		%		80-120	24-JUL-19
Antimony (Sb)-Total			103.1		%		80-120	24-JUL-19
Arsenic (As)-Total			99.1		%		80-120	24-JUL-19
Barium (Ba)-Total			100.5		%		80-120	24-JUL-19
Beryllium (Be)-Total			96.7		%		80-120	24-JUL-19
Bismuth (Bi)-Total			105.3		%		80-120	24-JUL-19
Boron (B)-Total			90.9		%		80-120	24-JUL-19
Cadmium (Cd)-Total			98.1		%		80-120	24-JUL-19
Calcium (Ca)-Total			101.8		%		80-120	24-JUL-19
Cesium (Cs)-Total			96.1		%		80-120	24-JUL-19
Chromium (Cr)-Total			99.1		%		80-120	24-JUL-19
Cobalt (Co)-Total			96.9		%		80-120	24-JUL-19
Copper (Cu)-Total			96.3		%		80-120	24-JUL-19
Iron (Fe)-Total			96.0		%		80-120	24-JUL-19
Lead (Pb)-Total			97.9		%		80-120	24-JUL-19
Lithium (Li)-Total			93.6		%		80-120	24-JUL-19
Magnesium (Mg)-Total			100.0		%		80-120	24-JUL-19
Manganese (Mn)-Total			99.8		%		80-120	24-JUL-19
Molybdenum (Mo)-Total			99.2		%		80-120	24-JUL-19
Nickel (Ni)-Total			100.9		%		80-120	24-JUL-19
Phosphorus (P)-Total			105.0		%		80-120	24-JUL-19
Potassium (K)-Total			102.2		%		80-120	24-JUL-19
Rubidium (Rb)-Total			105.1		%		80-120	24-JUL-19
Selenium (Se)-Total			101.0		%		80-120	24-JUL-19
Silicon (Si)-Total			101.9		%		80-120	24-JUL-19
Silver (Ag)-Total			96.2		%		80-120	24-JUL-19
Sodium (Na)-Total			103.7		%		80-120	24-JUL-19
Strontium (Sr)-Total			98.8		%		80-120	24-JUL-19
Sulfur (S)-Total			93.0		%		80-120	24-JUL-19
Tellurium (Te)-Total			96.1		%		80-120	24-JUL-19
Thallium (Tl)-Total			99.4		%		80-120	24-JUL-19
Thorium (Th)-Total			99.0		%		80-120	24-JUL-19
Tin (Sn)-Total			95.1		%		80-120	24-JUL-19
Titanium (Ti)-Total			94.7		%		80-120	24-JUL-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R4723949								
WG3112663-2 LCS								
Tungsten (W)-Total			101.5		%		80-120	24-JUL-19
Uranium (U)-Total			99.4		%		80-120	24-JUL-19
Vanadium (V)-Total			100.4		%		80-120	24-JUL-19
Zinc (Zn)-Total			96.9		%		80-120	24-JUL-19
Zirconium (Zr)-Total			99.7		%		80-120	24-JUL-19
WG3112663-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	24-JUL-19
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	24-JUL-19
Arsenic (As)-Total			<0.00010		mg/L		0.0001	24-JUL-19
Barium (Ba)-Total			<0.00010		mg/L		0.0001	24-JUL-19
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	24-JUL-19
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	24-JUL-19
Boron (B)-Total			<0.010		mg/L		0.01	24-JUL-19
Cadmium (Cd)-Total			<0.0000050		mg/L		0.000005	24-JUL-19
Calcium (Ca)-Total			<0.050		mg/L		0.05	24-JUL-19
Cesium (Cs)-Total			<0.000010		mg/L		0.00001	24-JUL-19
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	24-JUL-19
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	24-JUL-19
Copper (Cu)-Total			<0.00050		mg/L		0.0005	24-JUL-19
Iron (Fe)-Total			<0.010		mg/L		0.01	24-JUL-19
Lead (Pb)-Total			<0.000050		mg/L		0.00005	24-JUL-19
Lithium (Li)-Total			<0.0010		mg/L		0.001	24-JUL-19
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	24-JUL-19
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	24-JUL-19
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	24-JUL-19
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	24-JUL-19
Phosphorus (P)-Total			<0.050		mg/L		0.05	24-JUL-19
Potassium (K)-Total			<0.050		mg/L		0.05	24-JUL-19
Rubidium (Rb)-Total			<0.00020		mg/L		0.0002	24-JUL-19
Selenium (Se)-Total			<0.000050		mg/L		0.00005	24-JUL-19
Silicon (Si)-Total			<0.10		mg/L		0.1	24-JUL-19
Silver (Ag)-Total			<0.000010		mg/L		0.00001	24-JUL-19
Sodium (Na)-Total			<0.050		mg/L		0.05	24-JUL-19
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	24-JUL-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R4723949								
WG3112663-1 MB								
Sulfur (S)-Total			<0.50		mg/L		0.5	24-JUL-19
Tellurium (Te)-Total			<0.00020		mg/L		0.0002	24-JUL-19
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	24-JUL-19
Thorium (Th)-Total			<0.00010		mg/L		0.0001	24-JUL-19
Tin (Sn)-Total			<0.00010		mg/L		0.0001	24-JUL-19
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	24-JUL-19
Tungsten (W)-Total			<0.00010		mg/L		0.0001	24-JUL-19
Uranium (U)-Total			<0.000010		mg/L		0.00001	24-JUL-19
Vanadium (V)-Total			<0.00050		mg/L		0.0005	24-JUL-19
Zinc (Zn)-Total			<0.0030		mg/L		0.003	24-JUL-19
Zirconium (Zr)-Total			<0.00020		mg/L		0.0002	24-JUL-19
NH3-F-VA	**Water**							
Batch R4731212								
WG3117566-3 DUP		**L2313873-2**						
Ammonia, Total (as N)		0.132	0.128		mg/L	2.6	20	30-JUL-19
WG3117566-2 LCS								
Ammonia, Total (as N)			93.4		%		85-115	30-JUL-19
WG3117566-1 MB								
Ammonia, Total (as N)			<0.0050		mg/L		0.005	30-JUL-19
Batch R4731253								
WG3117374-2 LCS								
Ammonia, Total (as N)			99.7		%		85-115	30-JUL-19
WG3117374-1 MB								
Ammonia, Total (as N)			<0.0050		mg/L		0.005	30-JUL-19
NO2-L-IC-N-VA	**Water**							
Batch R4720008								
WG3111767-2 LCS								
Nitrite (as N)			101.6		%		90-110	22-JUL-19
WG3111767-1 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	22-JUL-19
NO3-L-IC-N-VA	**Water**							
Batch R4720008								
WG3111767-2 LCS								
Nitrate (as N)			100.6		%		90-110	22-JUL-19
WG3111767-1 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	22-JUL-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
P-T-PRES-COL-VA	**Water**							
Batch R4729519								
WG3117584-3 DUP		**L2313873-2**						
Phosphorus (P)-Total		0.182	0.185		mg/L	1.4	20	29-JUL-19
WG3117584-2 LCS								
Phosphorus (P)-Total			102.1		%		80-120	29-JUL-19
WG3117584-1 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	29-JUL-19
WG3117584-4 MS		**L2313873-1**						
Phosphorus (P)-Total			N/A	MS-B	%		-	29-JUL-19
SO4-IC-N-VA	**Water**							
Batch R4720008								
WG3111767-2 LCS								
Sulfate (SO4)			100.6		%		90-110	22-JUL-19
WG3111767-1 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	22-JUL-19
TDS-VA	**Water**							
Batch R4723786								
WG3112695-5 LCS								
Total Dissolved Solids			101.1		%		85-115	23-JUL-19
WG3112695-4 MB								
Total Dissolved Solids			<10		mg/L		10	23-JUL-19
TKN-F-VA	**Water**							
Batch R4730362								
WG3117592-2 LCS								
Total Kjeldahl Nitrogen			102.4		%		75-125	29-JUL-19
WG3117592-1 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	29-JUL-19

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
pH by Meter (Automated)							
	1	17-JUL-19 12:15	23-JUL-19 10:57	0.25	143	hours	EHTR-FM
	2	17-JUL-19 12:00	23-JUL-19 10:57	0.25	143	hours	EHTR-FM
Anions and Nutrients							
Nitrate in Water by IC (Low Level)							
	1	17-JUL-19 12:15	22-JUL-19 11:04	3	5	days	EHTL
	2	17-JUL-19 12:00	22-JUL-19 11:04	3	5	days	EHTL
Nitrite in Water by IC (Low Level)							
	1	17-JUL-19 12:15	22-JUL-19 11:04	3	5	days	EHTL
	2	17-JUL-19 12:00	22-JUL-19 11:04	3	5	days	EHTL

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2313873 were received on 20-JUL-19 10:55.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L2313873-COFC

COC Number: 17 -

Page of

Report To	Contact and company name below will appear on the final report
Company:	Regional District of Kitimat-Stikine
Contact:	Chris Kerr
Phone:	250-641-4141
	Company address below will appear on the final report
Street:	4545 Lazelle Avenue
City/Province:	Terrace/BC
Postal Code:	V8G4E1
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	Regional District of Kitimat-Stikine
Contact:	Roger Tooms

Report Format / Distribution	
Select Report Format:	☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ YES ☐ NO
☑ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	rtooms@rdks.bc.ca
Email 2	ckerr@rdks.bc.ca
Email 3	eblaney@rdks.bc.ca
Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	rtooms@rdks.bc.ca
Email 2	ckerr@rdks.bc.ca; eblaney@rdks.bc.ca

Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)	EMERGENCY
4 day [P4-20%] ☐	1 Business day [E1 - 100%] ☐
3 day [P3-25%] ☐	Same Day, Weekend or Statutory holiday [E2 -200% (Laboratory opening fees may apply)] ☐
2 day [P2-50%] ☐	

Date and Time Required for all E&P TATs:

For tests that can not be performed according to the service level selected, you will be contacted.

Project Information	
ALS Account # / Quote #:	
Job #:	Thornhill Groundwater
PO / AFE:	
LSD:	

Oil and Gas Required Fields (client use)	
AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (lab use only):

ALS Contact:

Sampler: Chris Kerr

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	F/P	P	F	P	P	P	P	P	P	P	P	P		F		SAMPLES ON HOLD	Sample is hazardous (please provide further detail)	NUMBER OF CONTAINERS
					Dissolved metals	Total Metals	dissolved hardness	Ammonia	Chloride	Fluoride	Nitrate	Nitrite	Total Kjeldahl Nitrogen	Total phosphorus	COD	Total Dissolved Solids	Sulphate	Alkalinity	pH, Conductivity				
	BH-96-2	17/07/19	12:15	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R				
	DUP	"	12:00	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R				
	[redacted]																						

Terrace Shipping X 3 Coolers

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)
Are samples taken from a Regulated DW System? ☐ YES ☑ NO	British Columbia Approved and Working Water Quality Guidelines (MAY, 2015)
Are samples for human consumption/ use? ☐ YES ☑ NO	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☑ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☑

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C		
9.7				5 on 3		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
	July 17/19	3:35	Jennifer Brousseau	July 17/19	15:35		2017/19	10:55

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

SEPT 2017 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

REGIONAL DISTRICT OF KITIMAT-STIKINE
ATTN: Chris Kerr
300 - 4545 Lazelle Avenue
Terrace BC V8G 4E1

Date Received: 08-AUG-19
Report Date: 28-AUG-19 13:55 (MT)
Version: FINAL REV. 2

Client Phone: 250-641-4141

Certificate of Analysis

Lab Work Order #: L2325523

Project P.O. #: NOT SUBMITTED
Job Reference: THORNHILL GROUNDWATER
C of C Numbers:
Legal Site Desc:

Comments:
28-AUG-2019 Total Metals data for L2325523 - 1 & 2 has been revised.

Amber Springer, B.Sc
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2325523-1	L2325523-2	L2325523-3		
	Description	Water	Water	Water		
	Sampled Date	08-AUG-19	08-AUG-19	08-AUG-19		
	Sampled Time	11:30	12:00	12:00		
	Client ID	BH-96-2	DUP	FIELD BLANK		
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	379	379	<2.0		
	Hardness (as CaCO3) (mg/L)	92.5	92.2	<0.50		
	pH (pH)	8.48	8.50	5.46		
	Total Dissolved Solids (mg/L)	247	257	<10		
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	236	238	<1.0		
	Ammonia, Total (as N) (mg/L)	0.0926	0.0979	<0.0050		
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050		
	Chloride (Cl) (mg/L)	1.39	1.44	<0.50		
	Fluoride (F) (mg/L)	0.145	0.146	<0.020		
	Nitrate (as N) (mg/L)	0.139	0.172	<0.0050		
	Nitrite (as N) (mg/L)	0.0211	0.0147	<0.0010		
	Total Kjeldahl Nitrogen (mg/L)	0.172	0.248	<0.050		
	Phosphorus (P)-Total (mg/L)	0.197	0.159	<0.0020		
	Sulfate (SO4) (mg/L)	2.99	3.18	<0.30		
Total Metals	Aluminum (Al)-Total (mg/L)	7.12	7.12	<0.0030		
	Antimony (Sb)-Total (mg/L)	0.00050	0.00047	<0.00010		
	Arsenic (As)-Total (mg/L)	0.00706	0.00665	<0.00010		
	Barium (Ba)-Total (mg/L)	0.0698	0.0669	<0.00010		
	Beryllium (Be)-Total (mg/L)	0.00014	0.00015	<0.00010		
	Bismuth (Bi)-Total (mg/L)	0.000050	0.000051	<0.000050		
	Boron (B)-Total (mg/L)	0.168	0.173	<0.010		
	Cadmium (Cd)-Total (mg/L)	0.00234	0.00207	<0.0000050		
	Calcium (Ca)-Total (mg/L)	15.5	15.5	<0.050		
	Cesium (Cs)-Total (mg/L)	0.000745	0.000728	<0.000010		
	Chromium (Cr)-Total (mg/L)	0.00877	0.00860	<0.00010		
	Cobalt (Co)-Total (mg/L)	0.00507	0.00485	<0.00010		
	Copper (Cu)-Total (mg/L)	0.0249	0.0239	<0.00050		
	Iron (Fe)-Total (mg/L)	10.1	9.64	<0.010		
	Lead (Pb)-Total (mg/L)	0.00441	0.00405	<0.000050		
	Lithium (Li)-Total (mg/L)	0.0068	0.0069	<0.0010		
	Magnesium (Mg)-Total (mg/L)	16.5	16.5	<0.0050		
	Manganese (Mn)-Total (mg/L)	0.408	0.372	<0.00010		
	Mercury (Hg)-Total (mg/L)	0.000019	0.000019	<0.0000050		
	Molybdenum (Mo)-Total (mg/L)	0.00489	0.00484	<0.000050		
	Nickel (Ni)-Total (mg/L)	0.0129	0.0122	<0.00050		
	Phosphorus (P)-Total (mg/L)	0.238	0.258	<0.050		
	Potassium (K)-Total (mg/L)	11.0	11.2	<0.050		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2325523-1	L2325523-2	L2325523-3		
	Description	Water	Water	Water		
	Sampled Date	08-AUG-19	08-AUG-19	08-AUG-19		
	Sampled Time	11:30	12:00	12:00		
	Client ID	BH-96-2	DUP	FIELD BLANK		
Grouping	**Analyte**					
WATER						
Total Metals	Rubidium (Rb)-Total (mg/L)	0.00375	0.00376	<0.00020		
	Selenium (Se)-Total (mg/L)	0.000084	0.000071	<0.000050		
	Silicon (Si)-Total (mg/L)	15.0	15.2	<0.10		
	Silver (Ag)-Total (mg/L)	0.000133	0.000113	<0.000010		
	Sodium (Na)-Total (mg/L)	49.7	50.7	<0.050		
	Strontium (Sr)-Total (mg/L)	0.202	0.191	<0.00020		
	Sulfur (S)-Total (mg/L)	1.22	1.11	<0.50		
	Tellurium (Te)-Total (mg/L)	<0.00020	<0.00020	<0.00020		
	Thallium (Tl)-Total (mg/L)	0.000057	0.000050	<0.000010		
	Thorium (Th)-Total (mg/L)	0.00026	0.00026	<0.00010		
	Tin (Sn)-Total (mg/L)	0.00079	0.00072	<0.00010		
	Titanium (Ti)-Total (mg/L)	0.166	0.162	<0.00030		
	Tungsten (W)-Total (mg/L)	0.00018	0.00016	<0.00010		
	Uranium (U)-Total (mg/L)	0.00250	0.00242	<0.000010		
	Vanadium (V)-Total (mg/L)	0.0177	0.0172	<0.00050		
	Zinc (Zn)-Total (mg/L)	0.0565	0.0546	<0.0030		
	Zirconium (Zr)-Total (mg/L)	0.00069	0.00088	<0.00020		
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD		
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD		
	Aluminum (Al)-Dissolved (mg/L)	0.0164	0.0279	<0.0010		
	Antimony (Sb)-Dissolved (mg/L)	0.00013	0.00013	<0.00010		
	Arsenic (As)-Dissolved (mg/L)	0.00333	0.00339	<0.00010		
	Barium (Ba)-Dissolved (mg/L)	0.0186	0.0188	<0.00010		
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		
	Boron (B)-Dissolved (mg/L)	0.157	0.156	<0.010		
	Cadmium (Cd)-Dissolved (mg/L)	0.0000402	0.0000445	<0.0000050		
	Calcium (Ca)-Dissolved (mg/L)	14.3	14.3	<0.050		
	Cesium (Cs)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Cobalt (Co)-Dissolved (mg/L)	0.00011	<0.00010	<0.00010		
	Copper (Cu)-Dissolved (mg/L)	0.00062	0.00061	<0.00020		
	Iron (Fe)-Dissolved (mg/L)	0.012	0.025	<0.010		
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		
	Lithium (Li)-Dissolved (mg/L)	0.0017	0.0017	<0.0010		
	Magnesium (Mg)-Dissolved (mg/L)	13.8	13.7	<0.0050		
	Manganese (Mn)-Dissolved (mg/L)	0.0619	0.0620	<0.00010		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2325523-1	L2325523-2	L2325523-3		
	Description	Water	Water	Water		
	Sampled Date	08-AUG-19	08-AUG-19	08-AUG-19		
	Sampled Time	11:30	12:00	12:00		
	Client ID	BH-96-2	DUP	FIELD BLANK		
Grouping	**Analyte**					
WATER						
Dissolved Metals	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050		
	Molybdenum (Mo)-Dissolved (mg/L)	0.00465 DTMF	0.00471 DTMF	<0.000050		
	Nickel (Ni)-Dissolved (mg/L)	0.00073	0.00059	<0.00050		
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050		
	Potassium (K)-Dissolved (mg/L)	10.9	10.8	<0.050		
	Rubidium (Rb)-Dissolved (mg/L)	0.00042	0.00039	<0.00020		
	Selenium (Se)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		
	Silicon (Si)-Dissolved (mg/L)	3.95	3.94	<0.050		
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		
	Sodium (Na)-Dissolved (mg/L)	51.8	50.8	<0.050		
	Strontium (Sr)-Dissolved (mg/L)	0.179	0.180	<0.00020		
	Sulfur (S)-Dissolved (mg/L)	1.45	1.34	<0.50		
	Tellurium (Te)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020		
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		
	Thorium (Th)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Titanium (Ti)-Dissolved (mg/L)	0.00073	0.00133	<0.00030		
	Tungsten (W)-Dissolved (mg/L)	0.00012	0.00012	<0.00010		
	Uranium (U)-Dissolved (mg/L)	0.00209	0.00205	<0.000010		
	Vanadium (V)-Dissolved (mg/L)	0.00130	0.00112	<0.00050		
	Zinc (Zn)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010		
	Zirconium (Zr)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020		
Aggregate Organics	COD (mg/L)	<20	22	<20		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Antimony (Sb)-Dissolved	MS-B	L2325523-1, -2, -3
Matrix Spike	Arsenic (As)-Dissolved	MS-B	L2325523-1, -2, -3
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2325523-1, -2, -3
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2325523-1, -2, -3
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L2325523-1, -2, -3
Matrix Spike	Molybdenum (Mo)-Dissolved	MS-B	L2325523-1, -2, -3
Matrix Spike	Potassium (K)-Dissolved	MS-B	L2325523-1, -2, -3
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2325523-1, -2, -3
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2325523-1, -2, -3
Matrix Spike	Sulfur (S)-Dissolved	MS-B	L2325523-1, -2, -3
Matrix Spike	Aluminum (Al)-Total	MS-B	L2325523-3
Matrix Spike	Aluminum (Al)-Total	MS-B	L2325523-1, -2
Matrix Spike	Barium (Ba)-Total	MS-B	L2325523-3
Matrix Spike	Cadmium (Cd)-Total	MS-B	L2325523-3
Matrix Spike	Calcium (Ca)-Total	MS-B	L2325523-3
Matrix Spike	Calcium (Ca)-Total	MS-B	L2325523-1, -2
Matrix Spike	Copper (Cu)-Total	MS-B	L2325523-3
Matrix Spike	Iron (Fe)-Total	MS-B	L2325523-3
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2325523-3
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2325523-1, -2
Matrix Spike	Manganese (Mn)-Total	MS-B	L2325523-3
Matrix Spike	Manganese (Mn)-Total	MS-B	L2325523-1, -2
Matrix Spike	Nickel (Ni)-Total	MS-B	L2325523-3
Matrix Spike	Sodium (Na)-Total	MS-B	L2325523-1, -2
Matrix Spike	Strontium (Sr)-Total	MS-B	L2325523-3
Matrix Spike	Strontium (Sr)-Total	MS-B	L2325523-1, -2
Matrix Spike	Sulfur (S)-Total	MS-B	L2325523-3
Matrix Spike	Uranium (U)-Total	MS-B	L2325523-3
Matrix Spike	Zinc (Zn)-Total	MS-B	L2325523-3
Matrix Spike	Phosphorus (P)-Total	MS-B	L2325523-1, -2, -3

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DTMF	Dissolved concentration exceeds total for field-filtered metals sample. Metallic contaminants may have been introduced to dissolved sample during field filtration.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-TITR-VA	Water	Alkalinity Species by Titration	APHA 2320 Alkalinity

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

BR-L-IC-N-VA	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

CL-IC-N-VA	Water	Chloride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

COD-COL-VA	Water	Chemical Oxygen Demand by Colorimetric	APHA 5220 D. CHEMICAL OXYGEN DEMAND

This analysis is carried out using procedures adapted from APHA Method 5220 "Chemical Oxygen Demand (COD)". Chemical oxygen demand is determined using the closed reflux colourimetric method.

EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.

This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.

Reference Information

EC-SCREEN-VA	Water	Conductivity Screen (Internal Use Only)	APHA 2510

Qualitative analysis of conductivity where required during preparation of other tests - e.g. TDS, metals, etc.

F-IC-N-VA	Water	Fluoride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-VA	Water	Hardness	APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA	Water	Diss. Mercury in Water by CVAAS or CVAFS	APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-CVAA-VA	Water	Total Mercury in Water by CVAAS or CVAFS	EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

MET-D-CCMS-VA	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-VA	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NH3-F-VA	Water	Ammonia in Water by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-VA	Water	Nitrite in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-VA	Water	Nitrate in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

P-T-PRES-COL-VA	Water	Total P in Water by Colour	APHA 4500-P Phosphorus

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.
Samples with very high dissolved solids (i.e. seawaters, brackish waters) may produce a negative bias by this method. Alternate methods are available for these types of samples.

Arsenic (5+), at elevated levels, is a positive interference on colourimetric phosphate analysis.

PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

SO4-IC-N-VA	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

TDS-VA	Water	Total Dissolved Solids by Gravimetric	APHA 2540 C - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TKN-F-VA	Water	TKN in Water by Fluorescence	APHA 4500-NORG D.

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Reference Information

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: REGIONAL DISTRICT OF KITIMAT-STIKINE
300 - 4545 Lazelle Avenue
Terrace BC V8G 4E1
Contact: Chris Kerr

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-TITR-VA	**Water**							
Batch R4749933								
WG3129008-3 LCS								
Alkalinity, Total (as CaCO3)			103.1		%		85-115	12-AUG-19
WG3129008-1 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	12-AUG-19
Batch R4751448								
WG3129010-3 LCS								
Alkalinity, Total (as CaCO3)			99.7		%		85-115	13-AUG-19
WG3129010-1 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	13-AUG-19
BR-L-IC-N-VA	**Water**							
Batch R4753088								
WG3129004-2 LCS								
Bromide (Br)			85.6		%		85-115	10-AUG-19
WG3129004-1 MB								
Bromide (Br)			<0.050		mg/L		0.05	10-AUG-19
WG3129004-4 MS		**L2325523-1**						
Bromide (Br)			86.7		%		75-125	10-AUG-19
CL-IC-N-VA	**Water**							
Batch R4753088								
WG3129004-2 LCS								
Chloride (Cl)			92.6		%		90-110	10-AUG-19
WG3129004-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	10-AUG-19
WG3129004-4 MS		**L2325523-1**						
Chloride (Cl)			97.6		%		75-125	10-AUG-19
COD-COL-VA	**Water**							
Batch R4752361								
WG3131810-3 LCS								
COD			99.2		%		85-115	13-AUG-19
WG3131810-1 MB								
COD			<20		mg/L		20	13-AUG-19
EC-PCT-VA	**Water**							
Batch R4749933								
WG3129008-3 LCS								
Conductivity			98.6		%		90-110	12-AUG-19
WG3129008-1 MB								
Conductivity			<2.0		uS/cm		2	12-AUG-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
EC-PCT-VA	**Water**							
Batch R4751448								
WG3129010-3 LCS								
Conductivity			98.9		%		90-110	13-AUG-19
WG3129010-1 MB								
Conductivity			<2.0		uS/cm		2	13-AUG-19
F-IC-N-VA	**Water**							
Batch R4753088								
WG3129004-2 LCS								
Fluoride (F)			91.5		%		90-110	10-AUG-19
WG3129004-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	10-AUG-19
WG3129004-4 MS		**L2325523-1**						
Fluoride (F)			94.6		%		75-125	10-AUG-19
HG-D-CVAA-VA	**Water**							
Batch R4746312								
WG3129473-2 LCS								
Mercury (Hg)-Dissolved			101.2		%		80-120	11-AUG-19
WG3129473-1 MB								
Mercury (Hg)-Dissolved			<0.000005		mg/L		0.000005	11-AUG-19
HG-T-CVAA-VA	**Water**							
Batch R4747339								
WG3130399-2 LCS								
Mercury (Hg)-Total			107.6		%		80-120	12-AUG-19
WG3130399-1 MB								
Mercury (Hg)-Total			<0.000005		mg/L		0.000005	12-AUG-19
MET-D-CCMS-VA	**Water**							
Batch R4746216								
WG3128931-2 LCS								
Aluminum (Al)-Dissolved			102.6		%		80-120	10-AUG-19
Antimony (Sb)-Dissolved			96.6		%		80-120	10-AUG-19
Arsenic (As)-Dissolved			99.0		%		80-120	10-AUG-19
Barium (Ba)-Dissolved			98.3		%		80-120	10-AUG-19
Beryllium (Be)-Dissolved			96.5		%		80-120	10-AUG-19
Bismuth (Bi)-Dissolved			101.0		%		80-120	10-AUG-19
Boron (B)-Dissolved			96.9		%		80-120	10-AUG-19
Cadmium (Cd)-Dissolved			96.7		%		80-120	10-AUG-19
Calcium (Ca)-Dissolved			100.0		%		80-120	10-AUG-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R4746216								
WG3128931-2 LCS								
Cesium (Cs)-Dissolved			99.1		%		80-120	10-AUG-19
Chromium (Cr)-Dissolved			97.2		%		80-120	10-AUG-19
Cobalt (Co)-Dissolved			99.0		%		80-120	10-AUG-19
Copper (Cu)-Dissolved			95.5		%		80-120	10-AUG-19
Iron (Fe)-Dissolved			93.2		%		80-120	10-AUG-19
Lead (Pb)-Dissolved			97.5		%		80-120	10-AUG-19
Lithium (Li)-Dissolved			97.1		%		80-120	10-AUG-19
Magnesium (Mg)-Dissolved			103.2		%		80-120	10-AUG-19
Manganese (Mn)-Dissolved			100.1		%		80-120	10-AUG-19
Molybdenum (Mo)-Dissolved			99.0		%		80-120	10-AUG-19
Nickel (Ni)-Dissolved			102.0		%		80-120	10-AUG-19
Phosphorus (P)-Dissolved			109.1		%		70-130	10-AUG-19
Potassium (K)-Dissolved			99.9		%		80-120	10-AUG-19
Rubidium (Rb)-Dissolved			101.1		%		80-120	10-AUG-19
Selenium (Se)-Dissolved			99.4		%		80-120	10-AUG-19
Silicon (Si)-Dissolved			96.3		%		60-140	10-AUG-19
Silver (Ag)-Dissolved			96.5		%		80-120	10-AUG-19
Sodium (Na)-Dissolved			108.4		%		80-120	10-AUG-19
Strontium (Sr)-Dissolved			101.6		%		80-120	10-AUG-19
Sulfur (S)-Dissolved			102.3		%		80-120	10-AUG-19
Tellurium (Te)-Dissolved			96.1		%		80-120	10-AUG-19
Thallium (Tl)-Dissolved			99.7		%		80-120	10-AUG-19
Thorium (Th)-Dissolved			99.5		%		80-120	10-AUG-19
Tin (Sn)-Dissolved			99.3		%		80-120	10-AUG-19
Titanium (Ti)-Dissolved			95.9		%		80-120	10-AUG-19
Tungsten (W)-Dissolved			99.4		%		80-120	10-AUG-19
Uranium (U)-Dissolved			100.9		%		80-120	10-AUG-19
Vanadium (V)-Dissolved			99.2		%		80-120	10-AUG-19
Zinc (Zn)-Dissolved			92.5		%		80-120	10-AUG-19
Zirconium (Zr)-Dissolved			95.6		%		80-120	10-AUG-19
WG3128931-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	10-AUG-19
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	10-AUG-19
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	10-AUG-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R4746216								
WG3128931-1 MB		**NP**						
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	10-AUG-19
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	10-AUG-19
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	10-AUG-19
Boron (B)-Dissolved			<0.010		mg/L		0.01	10-AUG-19
Cadmium (Cd)-Dissolved			<0.000005(		mg/L		0.000005	10-AUG-19
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	10-AUG-19
Cesium (Cs)-Dissolved			<0.000010		mg/L		0.00001	10-AUG-19
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	10-AUG-19
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	10-AUG-19
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	10-AUG-19
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	10-AUG-19
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	10-AUG-19
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	10-AUG-19
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	10-AUG-19
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	10-AUG-19
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	10-AUG-19
Phosphorus (P)-Dissolved			<0.050		mg/L		0.05	10-AUG-19
Potassium (K)-Dissolved			<0.050		mg/L		0.05	10-AUG-19
Rubidium (Rb)-Dissolved			<0.00020		mg/L		0.0002	10-AUG-19
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	10-AUG-19
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	10-AUG-19
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	10-AUG-19
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	10-AUG-19
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	10-AUG-19
Sulfur (S)-Dissolved			<0.50		mg/L		0.5	10-AUG-19
Tellurium (Te)-Dissolved			<0.00020		mg/L		0.0002	10-AUG-19
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	10-AUG-19
Thorium (Th)-Dissolved			<0.00010		mg/L		0.0001	10-AUG-19
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	10-AUG-19
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	10-AUG-19
Tungsten (W)-Dissolved			<0.00010		mg/L		0.0001	10-AUG-19
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	10-AUG-19
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	10-AUG-19
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	10-AUG-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R4746216								
WG3128931-1 MB		**NP**						
Zirconium (Zr)-Dissolved			<0.00020		mg/L		0.0002	10-AUG-19
Batch R4748589								
WG3128931-1 MB		**NP**						
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	12-AUG-19
MET-T-CCMS-VA	**Water**							
Batch R4750829								
WG3130746-2 LCS								
Aluminum (Al)-Total			104.4		%		80-120	13-AUG-19
Antimony (Sb)-Total			99.96		%		80-120	13-AUG-19
Arsenic (As)-Total			97.3		%		80-120	13-AUG-19
Barium (Ba)-Total			100.3		%		80-120	13-AUG-19
Beryllium (Be)-Total			96.8		%		80-120	13-AUG-19
Bismuth (Bi)-Total			98.3		%		80-120	13-AUG-19
Boron (B)-Total			94.8		%		80-120	13-AUG-19
Cadmium (Cd)-Total			98.8		%		80-120	13-AUG-19
Calcium (Ca)-Total			96.7		%		80-120	13-AUG-19
Cesium (Cs)-Total			93.7		%		80-120	13-AUG-19
Chromium (Cr)-Total			96.4		%		80-120	13-AUG-19
Cobalt (Co)-Total			94.2		%		80-120	13-AUG-19
Copper (Cu)-Total			97.1		%		80-120	13-AUG-19
Iron (Fe)-Total			97.8		%		80-120	13-AUG-19
Lead (Pb)-Total			98.0		%		80-120	13-AUG-19
Lithium (Li)-Total			98.1		%		80-120	13-AUG-19
Magnesium (Mg)-Total			97.1		%		80-120	13-AUG-19
Manganese (Mn)-Total			102.0		%		80-120	13-AUG-19
Molybdenum (Mo)-Total			99.97		%		80-120	13-AUG-19
Nickel (Ni)-Total			94.3		%		80-120	13-AUG-19
Phosphorus (P)-Total			99.7		%		80-120	13-AUG-19
Potassium (K)-Total			102.0		%		80-120	13-AUG-19
Rubidium (Rb)-Total			103.9		%		80-120	13-AUG-19
Selenium (Se)-Total			101.5		%		80-120	13-AUG-19
Silicon (Si)-Total			111.2		%		80-120	13-AUG-19
Silver (Ag)-Total			97.8		%		80-120	13-AUG-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R4750829								
WG3130746-2 LCS								
Sodium (Na)-Total			100.3		%		80-120	13-AUG-19
Strontium (Sr)-Total			104.9		%		80-120	13-AUG-19
Sulfur (S)-Total			99.7		%		80-120	13-AUG-19
Tellurium (Te)-Total			106.1		%		80-120	13-AUG-19
Thallium (Tl)-Total			94.0		%		80-120	13-AUG-19
Thorium (Th)-Total			98.9		%		80-120	13-AUG-19
Tin (Sn)-Total			97.0		%		80-120	13-AUG-19
Titanium (Ti)-Total			98.6		%		80-120	13-AUG-19
Tungsten (W)-Total			97.8		%		80-120	13-AUG-19
Uranium (U)-Total			104.6		%		80-120	13-AUG-19
Vanadium (V)-Total			101.3		%		80-120	13-AUG-19
Zinc (Zn)-Total			97.3		%		80-120	13-AUG-19
Zirconium (Zr)-Total			100.1		%		80-120	13-AUG-19
WG3130746-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	13-AUG-19
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	13-AUG-19
Arsenic (As)-Total			<0.00010		mg/L		0.0001	13-AUG-19
Barium (Ba)-Total			<0.00010		mg/L		0.0001	13-AUG-19
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	13-AUG-19
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	13-AUG-19
Boron (B)-Total			<0.010		mg/L		0.01	13-AUG-19
Cadmium (Cd)-Total			<0.000005C		mg/L		0.000005	13-AUG-19
Calcium (Ca)-Total			<0.050		mg/L		0.05	13-AUG-19
Cesium (Cs)-Total			<0.000010		mg/L		0.00001	13-AUG-19
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	13-AUG-19
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	13-AUG-19
Copper (Cu)-Total			<0.00050		mg/L		0.0005	13-AUG-19
Iron (Fe)-Total			<0.010		mg/L		0.01	13-AUG-19
Lead (Pb)-Total			<0.000050		mg/L		0.00005	13-AUG-19
Lithium (Li)-Total			<0.0010		mg/L		0.001	13-AUG-19
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	13-AUG-19
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	13-AUG-19
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	13-AUG-19
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	13-AUG-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R4750829								
WG3130746-1 MB								
Phosphorus (P)-Total			<0.050		mg/L		0.05	13-AUG-19
Potassium (K)-Total			<0.050		mg/L		0.05	13-AUG-19
Rubidium (Rb)-Total			<0.00020		mg/L		0.0002	13-AUG-19
Selenium (Se)-Total			<0.000050		mg/L		0.00005	13-AUG-19
Silicon (Si)-Total			<0.10		mg/L		0.1	13-AUG-19
Silver (Ag)-Total			<0.000010		mg/L		0.00001	13-AUG-19
Sodium (Na)-Total			<0.050		mg/L		0.05	13-AUG-19
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	13-AUG-19
Sulfur (S)-Total			<0.50		mg/L		0.5	13-AUG-19
Tellurium (Te)-Total			<0.00020		mg/L		0.0002	13-AUG-19
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	13-AUG-19
Thorium (Th)-Total			<0.00010		mg/L		0.0001	13-AUG-19
Tin (Sn)-Total			<0.00010		mg/L		0.0001	13-AUG-19
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	13-AUG-19
Tungsten (W)-Total			<0.00010		mg/L		0.0001	13-AUG-19
Uranium (U)-Total			<0.000010		mg/L		0.00001	13-AUG-19
Vanadium (V)-Total			<0.00050		mg/L		0.0005	13-AUG-19
Zinc (Zn)-Total			<0.0030		mg/L		0.003	13-AUG-19
Zirconium (Zr)-Total			<0.00020		mg/L		0.0002	13-AUG-19
Batch R4762679								
WG3139451-5 DUP		**L2325523-1**						
Aluminum (Al)-Total		7.12	7.16		mg/L	0.5	20	22-AUG-19
Antimony (Sb)-Total		0.00050	0.00049		mg/L	1.4	20	22-AUG-19
Arsenic (As)-Total		0.00706	0.00691		mg/L	2.2	20	22-AUG-19
Barium (Ba)-Total		0.0698	0.0690		mg/L	1.0	20	22-AUG-19
Beryllium (Be)-Total		0.00014	0.00015		mg/L	7.0	20	22-AUG-19
Bismuth (Bi)-Total		0.000050	0.000050		mg/L	0.0	20	22-AUG-19
Boron (B)-Total		0.168	0.165		mg/L	1.3	20	22-AUG-19
Cadmium (Cd)-Total		0.00234	0.00236		mg/L	1.0	20	22-AUG-19
Calcium (Ca)-Total		15.5	15.6		mg/L	1.1	20	22-AUG-19
Cesium (Cs)-Total		0.000745	0.000722		mg/L	3.1	20	22-AUG-19
Chromium (Cr)-Total		0.00877	0.00871		mg/L	0.7	20	22-AUG-19
Cobalt (Co)-Total		0.00507	0.00500		mg/L	1.4	20	22-AUG-19
Copper (Cu)-Total		0.0249	0.0246		mg/L	1.3	20	22-AUG-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R4762679								
WG3139451-5 DUP		**L2325523-1**						
Iron (Fe)-Total		10.1	9.91		mg/L	2.0	20	22-AUG-19
Lead (Pb)-Total		0.00441	0.00433		mg/L	1.8	20	22-AUG-19
Lithium (Li)-Total		0.0068	0.0069		mg/L	1.5	20	22-AUG-19
Magnesium (Mg)-Total		16.5	16.3		mg/L	1.6	20	22-AUG-19
Manganese (Mn)-Total		0.408	0.413		mg/L	1.3	20	22-AUG-19
Molybdenum (Mo)-Total		0.00489	0.00469		mg/L	4.1	20	22-AUG-19
Nickel (Ni)-Total		0.0129	0.0126		mg/L	2.2	20	22-AUG-19
Phosphorus (P)-Total		0.238	0.272		mg/L	13	20	22-AUG-19
Potassium (K)-Total		11.0	11.0		mg/L	0.3	20	22-AUG-19
Rubidium (Rb)-Total		0.00375	0.00386		mg/L	2.7	20	22-AUG-19
Selenium (Se)-Total		0.000084	0.000090		mg/L	7.0	20	22-AUG-19
Silicon (Si)-Total		15.0	15.0		mg/L	0.4	20	22-AUG-19
Silver (Ag)-Total		0.000133	0.000125		mg/L	5.7	20	22-AUG-19
Sodium (Na)-Total		49.7	49.3		mg/L	0.9	20	22-AUG-19
Strontium (Sr)-Total		0.202	0.197		mg/L	2.7	20	22-AUG-19
Sulfur (S)-Total		1.22	1.11		mg/L	10	20	22-AUG-19
Tellurium (Te)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	22-AUG-19
Thallium (Tl)-Total		0.000057	0.000059		mg/L	3.7	20	22-AUG-19
Thorium (Th)-Total		0.00026	0.00026		mg/L	2.1	20	22-AUG-19
Tin (Sn)-Total		0.00079	0.00077		mg/L	2.2	20	22-AUG-19
Titanium (Ti)-Total		0.166	0.166		mg/L	0.2	20	22-AUG-19
Tungsten (W)-Total		0.00018	0.00015		mg/L	15	20	22-AUG-19
Uranium (U)-Total		0.00250	0.00251		mg/L	0.5	20	22-AUG-19
Vanadium (V)-Total		0.0177	0.0175		mg/L	0.6	20	22-AUG-19
Zinc (Zn)-Total		0.0565	0.0559		mg/L	1.0	20	22-AUG-19
Zirconium (Zr)-Total		0.00069	0.00103	J	mg/L	0.00033	0.0004	22-AUG-19
WG3139451-6 DUP		**L2325523-2**						
Aluminum (Al)-Total		7.12	6.91		mg/L	2.9	20	22-AUG-19
Antimony (Sb)-Total		0.00047	0.00047		mg/L	0.9	20	22-AUG-19
Arsenic (As)-Total		0.00665	0.00657		mg/L	1.3	20	22-AUG-19
Barium (Ba)-Total		0.0669	0.0656		mg/L	1.9	20	22-AUG-19
Beryllium (Be)-Total		0.00015	0.00014		mg/L	7.2	20	22-AUG-19
Bismuth (Bi)-Total		0.000051	<0.000050	RPD-NA	mg/L	N/A	20	22-AUG-19
Boron (B)-Total		0.173	0.175		mg/L	1.5	20	22-AUG-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R4762679								
WG3139451-6 DUP		**L2325523-2**						
Cadmium (Cd)-Total		0.00207	0.00199		mg/L	4.1	20	22-AUG-19
Calcium (Ca)-Total		15.5	16.1		mg/L	3.6	20	22-AUG-19
Cesium (Cs)-Total		0.000728	0.000700		mg/L	3.9	20	22-AUG-19
Chromium (Cr)-Total		0.00860	0.00833		mg/L	3.2	20	22-AUG-19
Cobalt (Co)-Total		0.00485	0.00476		mg/L	1.9	20	22-AUG-19
Copper (Cu)-Total		0.0239	0.0240		mg/L	0.3	20	22-AUG-19
Iron (Fe)-Total		9.64	9.87		mg/L	2.4	20	22-AUG-19
Lead (Pb)-Total		0.00405	0.00400		mg/L	1.2	20	22-AUG-19
Lithium (Li)-Total		0.0069	0.0069		mg/L	0.5	20	22-AUG-19
Magnesium (Mg)-Total		16.5	16.4		mg/L	0.7	20	22-AUG-19
Manganese (Mn)-Total		0.372	0.369		mg/L	0.8	20	22-AUG-19
Molybdenum (Mo)-Total		0.00484	0.00475		mg/L	2.0	20	22-AUG-19
Nickel (Ni)-Total		0.0122	0.0122		mg/L	0.1	20	22-AUG-19
Phosphorus (P)-Total		0.258	0.233		mg/L	10	20	22-AUG-19
Potassium (K)-Total		11.2	11.2		mg/L	0.4	20	22-AUG-19
Rubidium (Rb)-Total		0.00376	0.00355		mg/L	5.9	20	22-AUG-19
Selenium (Se)-Total		0.000071	0.000104	J	mg/L	0.000033	0.0001	22-AUG-19
Silicon (Si)-Total		15.2	14.9		mg/L	1.8	20	22-AUG-19
Silver (Ag)-Total		0.000113	0.000100		mg/L	12	20	22-AUG-19
Sodium (Na)-Total		50.7	50.4		mg/L	0.5	20	22-AUG-19
Strontium (Sr)-Total		0.191	0.191		mg/L	0.0	20	22-AUG-19
Sulfur (S)-Total		1.11	1.09		mg/L	1.4	20	22-AUG-19
Tellurium (Te)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	22-AUG-19
Thallium (Tl)-Total		0.000050	0.000048		mg/L	3.5	20	22-AUG-19
Thorium (Th)-Total		0.00026	0.00025		mg/L	6.0	20	22-AUG-19
Tin (Sn)-Total		0.00072	0.00071		mg/L	1.0	20	22-AUG-19
Titanium (Ti)-Total		0.162	0.160		mg/L	1.4	20	22-AUG-19
Tungsten (W)-Total		0.00016	0.00016		mg/L	2.3	20	22-AUG-19
Uranium (U)-Total		0.00242	0.00241		mg/L	0.7	20	22-AUG-19
Vanadium (V)-Total		0.0172	0.0169		mg/L	1.5	20	22-AUG-19
Zinc (Zn)-Total		0.0546	0.0535		mg/L	2.0	20	22-AUG-19
Zirconium (Zr)-Total		0.00088	0.00055	J	mg/L	0.00033	0.0004	22-AUG-19
WG3139451-2 LCS								
Aluminum (Al)-Total			101.2		%		80-120	22-AUG-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R4762679								
WG3139451-2 LCS								
Antimony (Sb)-Total			110.6		%		80-120	22-AUG-19
Arsenic (As)-Total			99.3		%		80-120	22-AUG-19
Barium (Ba)-Total			100.7		%		80-120	22-AUG-19
Beryllium (Be)-Total			95.3		%		80-120	22-AUG-19
Bismuth (Bi)-Total			105.2		%		80-120	22-AUG-19
Boron (B)-Total			95.6		%		80-120	22-AUG-19
Cadmium (Cd)-Total			100.1		%		80-120	22-AUG-19
Calcium (Ca)-Total			94.9		%		80-120	22-AUG-19
Cesium (Cs)-Total			103.0		%		80-120	22-AUG-19
Chromium (Cr)-Total			99.6		%		80-120	22-AUG-19
Cobalt (Co)-Total			100.6		%		80-120	22-AUG-19
Copper (Cu)-Total			97.7		%		80-120	22-AUG-19
Iron (Fe)-Total			92.5		%		80-120	22-AUG-19
Lead (Pb)-Total			96.1		%		80-120	22-AUG-19
Lithium (Li)-Total			95.8		%		80-120	22-AUG-19
Magnesium (Mg)-Total			106.1		%		80-120	22-AUG-19
Manganese (Mn)-Total			100.8		%		80-120	22-AUG-19
Molybdenum (Mo)-Total			101.9		%		80-120	22-AUG-19
Nickel (Ni)-Total			100.6		%		80-120	22-AUG-19
Phosphorus (P)-Total			103.6		%		80-120	22-AUG-19
Potassium (K)-Total			94.1		%		80-120	22-AUG-19
Rubidium (Rb)-Total			98.1		%		80-120	22-AUG-19
Selenium (Se)-Total			96.8		%		80-120	22-AUG-19
Silicon (Si)-Total			102.1		%		80-120	22-AUG-19
Silver (Ag)-Total			98.9		%		80-120	22-AUG-19
Sodium (Na)-Total			103.1		%		80-120	22-AUG-19
Strontium (Sr)-Total			102.1		%		80-120	22-AUG-19
Sulfur (S)-Total			91.7		%		80-120	22-AUG-19
Tellurium (Te)-Total			99.9		%		80-120	22-AUG-19
Thallium (Tl)-Total			96.3		%		80-120	22-AUG-19
Thorium (Th)-Total			96.2		%		80-120	22-AUG-19
Tin (Sn)-Total			101.1		%		80-120	22-AUG-19
Titanium (Ti)-Total			97.1		%		80-120	22-AUG-19
Tungsten (W)-Total			99.6		%		80-120	22-AUG-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R4762679								
WG3139451-2 LCS								
Uranium (U)-Total			99.1		%		80-120	22-AUG-19
Vanadium (V)-Total			101.1		%		80-120	22-AUG-19
Zinc (Zn)-Total			98.5		%		80-120	22-AUG-19
Zirconium (Zr)-Total			96.6		%		80-120	22-AUG-19
WG3139451-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	22-AUG-19
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	22-AUG-19
Arsenic (As)-Total			<0.00010		mg/L		0.0001	22-AUG-19
Barium (Ba)-Total			<0.00010		mg/L		0.0001	22-AUG-19
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	22-AUG-19
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	22-AUG-19
Boron (B)-Total			<0.010		mg/L		0.01	22-AUG-19
Cadmium (Cd)-Total			<0.0000050		mg/L		0.000005	22-AUG-19
Calcium (Ca)-Total			<0.050		mg/L		0.05	22-AUG-19
Cesium (Cs)-Total			<0.000010		mg/L		0.00001	22-AUG-19
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	22-AUG-19
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	22-AUG-19
Copper (Cu)-Total			<0.00050		mg/L		0.0005	22-AUG-19
Iron (Fe)-Total			<0.010		mg/L		0.01	22-AUG-19
Lead (Pb)-Total			<0.000050		mg/L		0.00005	22-AUG-19
Lithium (Li)-Total			<0.0010		mg/L		0.001	22-AUG-19
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	22-AUG-19
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	22-AUG-19
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	22-AUG-19
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	22-AUG-19
Phosphorus (P)-Total			<0.050		mg/L		0.05	22-AUG-19
Potassium (K)-Total			<0.050		mg/L		0.05	22-AUG-19
Rubidium (Rb)-Total			<0.00020		mg/L		0.0002	22-AUG-19
Selenium (Se)-Total			<0.000050		mg/L		0.00005	22-AUG-19
Silicon (Si)-Total			<0.10		mg/L		0.1	22-AUG-19
Silver (Ag)-Total			<0.000010		mg/L		0.00001	22-AUG-19
Sodium (Na)-Total			<0.050		mg/L		0.05	22-AUG-19
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	22-AUG-19
Sulfur (S)-Total			<0.50		mg/L		0.5	22-AUG-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R4762679								
WG3139451-1 MB								
Tellurium (Te)-Total			<0.00020		mg/L		0.0002	22-AUG-19
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	22-AUG-19
Thorium (Th)-Total			<0.00010		mg/L		0.0001	22-AUG-19
Tin (Sn)-Total			<0.00010		mg/L		0.0001	22-AUG-19
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	22-AUG-19
Tungsten (W)-Total			<0.00010		mg/L		0.0001	22-AUG-19
Uranium (U)-Total			<0.000010		mg/L		0.00001	22-AUG-19
Vanadium (V)-Total			<0.00050		mg/L		0.0005	22-AUG-19
Zinc (Zn)-Total			<0.0030		mg/L		0.003	22-AUG-19
Zirconium (Zr)-Total			<0.00020		mg/L		0.0002	22-AUG-19
NH3-F-VA	**Water**							
Batch R4748614								
WG3129358-2 LCS								
Ammonia, Total (as N)			98.3		%		85-115	12-AUG-19
WG3129358-1 MB								
Ammonia, Total (as N)			<0.0050		mg/L		0.005	12-AUG-19
NO2-L-IC-N-VA	**Water**							
Batch R4753088								
WG3129004-2 LCS								
Nitrite (as N)			92.1		%		90-110	10-AUG-19
WG3129004-1 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	10-AUG-19
WG3129004-4 MS		**L2325523-1**						
Nitrite (as N)			93.6		%		75-125	10-AUG-19
NO3-L-IC-N-VA	**Water**							
Batch R4753088								
WG3129004-2 LCS								
Nitrate (as N)			94.1		%		90-110	10-AUG-19
WG3129004-1 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	10-AUG-19
WG3129004-4 MS		**L2325523-1**						
Nitrate (as N)			98.4		%		75-125	10-AUG-19
P-T-PRES-COL-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
P-T-PRES-COL-VA	**Water**							
Batch R4746657								
WG3129349-3 DUP		**L2325523-1**						
Phosphorus (P)-Total		0.197	0.197		mg/L	0.2	20	12-AUG-19
WG3129349-2 LCS								
Phosphorus (P)-Total			93.9		%		80-120	12-AUG-19
WG3129349-1 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	12-AUG-19
WG3129349-4 MS		**L2325523-2**						
Phosphorus (P)-Total			N/A	MS-B	%		-	12-AUG-19
PH-PCT-VA	**Water**							
Batch R4749933								
WG3129008-2 CRM		**VA-PH7-BUF**						
pH			7.02		pH		6.9-7.1	12-AUG-19
Batch R4751448								
WG3129010-2 CRM		**VA-PH7-BUF**						
pH			7.02		pH		6.9-7.1	13-AUG-19
SO4-IC-N-VA	**Water**							
Batch R4753088								
WG3129004-2 LCS								
Sulfate (SO4)			93.3		%		90-110	10-AUG-19
WG3129004-1 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	10-AUG-19
WG3129004-4 MS		**L2325523-1**						
Sulfate (SO4)			96.8		%		75-125	10-AUG-19
TDS-VA	**Water**							
Batch R4747928								
WG3128960-5 LCS								
Total Dissolved Solids			96.0		%		85-115	10-AUG-19
WG3128960-4 MB								
Total Dissolved Solids			<10		mg/L		10	10-AUG-19
TKN-F-VA	**Water**							
Batch R4753568								
WG3129352-2 LCS								
Total Kjeldahl Nitrogen			103.3		%		75-125	13-AUG-19
WG3129352-1 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	13-AUG-19

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
pH by Meter (Automated)							
	1	08-AUG-19 11:30	13-AUG-19 09:39	0.25	118	hours	EHTR-FM
	2	08-AUG-19 12:00	13-AUG-19 09:39	0.25	118	hours	EHTR-FM
	3	08-AUG-19 12:00	12-AUG-19 09:26	0.25	93	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2325523 were received on 08-AUG-19 21:25.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

L2325523-COFC

COC Number: 17 -

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Report To	Contact and company name below will appear on the final report
Company:	Regional District of Kitimat-Stikine
Contact:	Chris Kerr
Phone:	250-641-4141
	Company address below will appear on the final report
Street:	4545 Lazelle Avenue
City/Province:	Terrace/BC
Postal Code:	V8G4E1
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	Regional District of Kitimat-Stikine
Contact:	Roger Tooms

Report Format / Distribution	
Select Report Format:	☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ YES ☐ NO
☑ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	rtooms@rdks.bc.ca
Email 2	ckerr@rdks.bc.ca
Email 3	eblaney@rdks.bc.ca
Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	rtooms@rdks.bc.ca
Email 2	ckerr@rdks.bc.ca; eblaney@rdks.bc.ca

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:		AFE/Cost Center:	PO#
Job #:	Thornhill Groundwater	Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	

ALS Lab Work Order # (lab use only): **ALS Contact:** **Sampler:** Chris Kerr

Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days): 4 day [P4-20%] ☐ | 3 day [P3-25%] ☐ | 2 day [P2-50%] ☐

EMERGENCY: 1 Business day [E1 - 100%] ☐ | Same Day, Weekend or Statutory holiday [E2 -200% (Laboratory opening fees may apply)] ☐

Date and Time Required for all E&P TATs:

For tests that can not be performed according to the service level selected, you will be contacted.

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Dissolved metals (F/P)	Total Metals (P)	dissolved hardness (F)	Ammonia (P)	Chloride (P)	Fluoride (P)	Nitrate (P)	Nitrite (P)	Total Kjeldahl Nitrogen (P)	Total phosphorus (P)	COD (P)	Total Dissolved Solids (P)	Sulphate	Alkalinity (F)	pH, Conductivity	SAMPLES ON HOLD	Sample is hazardous (please provide further detail)	NUMBER OF CONTAINERS
	BH-96-2	8/8/19	11:30	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			7
	DUP	"	12:00	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			7
	Field Blank	"	12:00	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			7

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☑ NO

Are samples for human consumption/ use? ☐ YES ☑ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

British Columbia Approved and Working Water Quality Guidelines (MAY, 2015)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☑ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
8.1				1.0			

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Chris Kerr	Date: 8/8/19	Time: 1:00	Received by: Jennifer Braussen	Date: Aug 8/19	Time: 1:00	Received by: CW	Date: Aug 8	Time: 2125

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

SEPT 2017 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

REGIONAL DISTRICT OF KITIMAT-STIKINE
ATTN: Chris Kerr
300 - 4545 Lazelle Avenue
Terrace BC V8G 4E1

Date Received: 08-NOV-19
Report Date: 17-NOV-19 13:50 (MT)
Version: FINAL

Client Phone: 250-615-6100

Certificate of Analysis

Lab Work Order #: L2379806

Project P.O. #: NOT SUBMITTED
Job Reference: THORNHILL GROUNDWATER
C of C Numbers:
Legal Site Desc:

Amber Springer, B.Sc
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2379806-1	L2379806-2	L2379806-3		
	Description	Water	Water	Water		
	Sampled Date	06-NOV-19	06-NOV-19	06-NOV-19		
	Sampled Time	13:45	12:00	12:00		
	Client ID	BH-96-2	DUP	FIELD BLANK		
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	387	383	<2.0		
	Hardness (as CaCO3) (mg/L)	79.7	79.5			
	pH (pH)	8.26	8.27	5.41		
	Total Dissolved Solids (mg/L)	249	239			
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	219	259	<1.0		
	Ammonia, Total (as N) (mg/L)	0.147	0.154	<0.0050		
	Bromide (Br) (mg/L)	<0.050	<0.050			
	Chloride (Cl) (mg/L)	1.56	1.51			
	Fluoride (F) (mg/L)	0.146	0.143			
	Nitrate (as N) (mg/L)	0.0719	0.0579			
	Nitrite (as N) (mg/L)	0.0082	0.0073			
	Total Kjeldahl Nitrogen (mg/L)	0.509	0.478			
	Phosphorus (P)-Total (mg/L)	0.115	0.105	0.0059 RRV		
	Sulfate (SO4) (mg/L)	3.08	3.04			
Total Metals	Aluminum (Al)-Total (mg/L)	2.23	2.03			
	Antimony (Sb)-Total (mg/L)	0.00024	0.00022			
	Arsenic (As)-Total (mg/L)	0.00484	0.00482			
	Barium (Ba)-Total (mg/L)	0.0344	0.0320			
	Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010			
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050			
	Boron (B)-Total (mg/L)	0.183	0.184			
	Cadmium (Cd)-Total (mg/L)	0.00146	0.00143			
	Calcium (Ca)-Total (mg/L)	14.9	14.7			
	Cesium (Cs)-Total (mg/L)	0.000294	0.000260			
	Chromium (Cr)-Total (mg/L)	0.00271	0.00252			
	Cobalt (Co)-Total (mg/L)	0.00191	0.00171			
	Copper (Cu)-Total (mg/L)	0.0144	0.0135			
	Iron (Fe)-Total (mg/L)	2.96	2.61			
	Lead (Pb)-Total (mg/L)	0.00139	0.00126			
	Lithium (Li)-Total (mg/L)	0.0036	0.0034			
	Magnesium (Mg)-Total (mg/L)	13.4	13.4			
	Manganese (Mn)-Total (mg/L)	0.336	0.306			
	Mercury (Hg)-Total (mg/L)	0.0000067	0.0000080			
	Molybdenum (Mo)-Total (mg/L)	0.00512	0.00479			
	Nickel (Ni)-Total (mg/L)	0.00478	0.00424			
	Phosphorus (P)-Total (mg/L)	0.125	0.106			
	Potassium (K)-Total (mg/L)	11.9	12.1			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2379806-1	L2379806-2	L2379806-3		
Description	Water	Water	Water		
Sampled Date	06-NOV-19	06-NOV-19	06-NOV-19		
Sampled Time	13:45	12:00	12:00		
Client ID	BH-96-2	DUP	FIELD BLANK		
Grouping / **Analyte**					
WATER					
Total Metals Rubidium (Rb)-Total (mg/L)	0.00146	0.00140			
Selenium (Se)-Total (mg/L)	0.000050	<0.000050			
Silicon (Si)-Total (mg/L)	7.06	6.85			
Silver (Ag)-Total (mg/L)	0.000029	0.000025			
Sodium (Na)-Total (mg/L)	53.8	54.2			
Strontium (Sr)-Total (mg/L)	0.186	0.177			
Sulfur (S)-Total (mg/L)	1.13	0.96			
Tellurium (Te)-Total (mg/L)	<0.00020	<0.00020			
Thallium (Tl)-Total (mg/L)	0.000010	<0.000010			
Thorium (Th)-Total (mg/L)	<0.00010	<0.00010			
Tin (Sn)-Total (mg/L)	0.00276	0.00248			
Titanium (Ti)-Total (mg/L)	0.0640	0.0569			
Tungsten (W)-Total (mg/L)	0.00021	0.00020			
Uranium (U)-Total (mg/L)	0.00212	0.00205			
Vanadium (V)-Total (mg/L)	0.00556	0.00503			
Zinc (Zn)-Total (mg/L)	0.0240	0.0226			
Zirconium (Zr)-Total (mg/L)	0.00050	0.00045			
Dissolved Metals Dissolved Mercury Filtration Location	FIELD	FIELD			
Dissolved Metals Filtration Location	FIELD	FIELD			
Aluminum (Al)-Dissolved (mg/L)	0.0255	0.0239			
Antimony (Sb)-Dissolved (mg/L)	0.00011	0.00011			
Arsenic (As)-Dissolved (mg/L)	0.00335	0.00336			
Barium (Ba)-Dissolved (mg/L)	0.0182	0.0181			
Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00010			
Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050			
Boron (B)-Dissolved (mg/L)	0.161	0.163			
Cadmium (Cd)-Dissolved (mg/L)	0.000842	0.000841			
Calcium (Ca)-Dissolved (mg/L)	12.3	12.1			
Cesium (Cs)-Dissolved (mg/L)	0.000052	0.000045			
Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010			
Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010			
Copper (Cu)-Dissolved (mg/L)	0.00706	0.00703			
Iron (Fe)-Dissolved (mg/L)	0.015	0.018			
Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050			
Lithium (Li)-Dissolved (mg/L)	0.0015	0.0016			
Magnesium (Mg)-Dissolved (mg/L)	11.9	12.0			
Manganese (Mn)-Dissolved (mg/L)	0.110	0.115			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2379806-1	L2379806-2	L2379806-3		
Description	Water	Water	Water		
Sampled Date	06-NOV-19	06-NOV-19	06-NOV-19		
Sampled Time	13:45	12:00	12:00		
Client ID	BH-96-2	DUP	FIELD BLANK		
Grouping / **Analyte**					
WATER					
Dissolved Metals					
Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050			
Molybdenum (Mo)-Dissolved (mg/L)	0.00464	0.00472			
Nickel (Ni)-Dissolved (mg/L)	0.00101	0.00103			
Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050			
Potassium (K)-Dissolved (mg/L)	10.9	11.3			
Rubidium (Rb)-Dissolved (mg/L)	0.00054	0.00054			
Selenium (Se)-Dissolved (mg/L)	<0.000050	<0.000050			
Silicon (Si)-Dissolved (mg/L)	4.13	4.18			
Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010			
Sodium (Na)-Dissolved (mg/L)	55.1	56.3			
Strontium (Sr)-Dissolved (mg/L)	0.148	0.149			
Sulfur (S)-Dissolved (mg/L)	1.34	1.38			
Tellurium (Te)-Dissolved (mg/L)	<0.00020	<0.00020			
Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010			
Thorium (Th)-Dissolved (mg/L)	<0.00010	<0.00010			
Tin (Sn)-Dissolved (mg/L)	0.00395 DTC	0.00383 DTC			
Titanium (Ti)-Dissolved (mg/L)	0.00069	0.00096			
Tungsten (W)-Dissolved (mg/L)	0.00018	0.00018			
Uranium (U)-Dissolved (mg/L)	0.00194	0.00192			
Vanadium (V)-Dissolved (mg/L)	<0.00050	0.00051			
Zinc (Zn)-Dissolved (mg/L)	0.0073	0.0068			
Zirconium (Zr)-Dissolved (mg/L)	<0.00020	<0.00020			
Aggregate Organics					
COD (mg/L)	<20	<20			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Antimony (Sb)-Dissolved	MS-B	L2379806-1, -2
Matrix Spike	Arsenic (As)-Dissolved	MS-B	L2379806-1, -2
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2379806-1, -2
Matrix Spike	Boron (B)-Dissolved	MS-B	L2379806-1, -2
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2379806-1, -2
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2379806-1, -2
Matrix Spike	Cesium (Cs)-Dissolved	MS-B	L2379806-1, -2
Matrix Spike	Lithium (Li)-Dissolved	MS-B	L2379806-1, -2
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2379806-1, -2
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L2379806-1, -2
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L2379806-1, -2
Matrix Spike	Molybdenum (Mo)-Dissolved	MS-B	L2379806-1, -2
Matrix Spike	Potassium (K)-Dissolved	MS-B	L2379806-1, -2
Matrix Spike	Rubidium (Rb)-Dissolved	MS-B	L2379806-1, -2
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2379806-1, -2
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2379806-1, -2
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2379806-1, -2
Matrix Spike	Sulfur (S)-Dissolved	MS-B	L2379806-1, -2
Matrix Spike	Barium (Ba)-Total	MS-B	L2379806-1, -2
Matrix Spike	Calcium (Ca)-Total	MS-B	L2379806-1, -2
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2379806-1, -2
Matrix Spike	Manganese (Mn)-Total	MS-B	L2379806-1, -2
Matrix Spike	Sodium (Na)-Total	MS-B	L2379806-1, -2
Matrix Spike	Strontium (Sr)-Total	MS-B	L2379806-1, -2
Matrix Spike	Sulfur (S)-Total	MS-B	L2379806-1, -2
Matrix Spike	Sulfate (SO4)	MS-B	L2379806-1, -2

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DTC	Dissolved concentration exceeds total. Results were confirmed by re-analysis.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RRV	Reported Result Verified By Repeat Analysis

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-TITR-VA	Water	Alkalinity Species by Titration	APHA 2320 Alkalinity

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

BR-L-IC-N-VA	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

CL-IC-N-VA	Water	Chloride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

COD-COL-VA	Water	Chemical Oxygen Demand by Colorimetric	APHA 5220 D. CHEMICAL OXYGEN DEMAND

This analysis is carried out using procedures adapted from APHA Method 5220 "Chemical Oxygen Demand (COD)". Chemical oxygen demand is determined using the closed reflux colourimetric method.

EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.

This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.

EC-SCREEN-VA	Water	Conductivity Screen (Internal Use Only)	APHA 2510

Qualitative analysis of conductivity where required during preparation of other tests - e.g. TDS, metals, etc.

F-IC-N-VA	Water	Fluoride in Water by IC	EPA 300.1 (mod)

Reference Information

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-VA	Water	Hardness	APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA	Water	Diss. Mercury in Water by CVAAS or CVAFS	APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-CVAA-VA	Water	Total Mercury in Water by CVAAS or CVAFS	EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

MET-D-CCMS-VA	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-VA	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NH3-F-VA	Water	Ammonia in Water by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-VA	Water	Nitrite in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-VA	Water	Nitrate in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

P-T-PRES-COL-VA	Water	Total P in Water by Colour	APHA 4500-P Phosphorus

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.
Samples with very high dissolved solids (i.e. seawaters, brackish waters) may produce a negative bias by this method. Alternate methods are available for these types of samples.

Arsenic (5+), at elevated levels, is a positive interference on colourimetric phosphate analysis.

PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

SO4-IC-N-VA	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

TDS-VA	Water	Total Dissolved Solids by Gravimetric	APHA 2540 C - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TKN-F-VA	Water	TKN in Water by Fluorescence	APHA 4500-NORG D.

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Reference Information

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L2379806 Report Date: 17-NOV-19

Client: REGIONAL DISTRICT OF KITIMAT-STIKINE
300 - 4545 Lazelle Avenue
Terrace BC V8G 4E1
Contact: Chris Kerr

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-TITR-VA	**Water**							
Batch R4904854								
WG3215183-3 LCS								
Alkalinity, Total (as CaCO3)			100.7		%		85-115	09-NOV-19
WG3215183-1 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	09-NOV-19
BR-L-IC-N-VA	**Water**							
Batch R4905151								
WG3215325-2 LCS								
Bromide (Br)			99.3		%		85-115	10-NOV-19
WG3215325-1 MB								
Bromide (Br)			<0.050		mg/L		0.05	10-NOV-19
CL-IC-N-VA	**Water**							
Batch R4905151								
WG3215325-2 LCS								
Chloride (Cl)			96.3		%		90-110	10-NOV-19
WG3215325-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	10-NOV-19
COD-COL-VA	**Water**							
Batch R4908286								
WG3218994-3 LCS								
COD			101.9		%		85-115	14-NOV-19
WG3218994-1 MB								
COD			<20		mg/L		20	14-NOV-19
EC-PCT-VA	**Water**							
Batch R4904854								
WG3215183-3 LCS								
Conductivity			106.7		%		90-110	09-NOV-19
WG3215183-1 MB								
Conductivity			<2.0		uS/cm		2	09-NOV-19
F-IC-N-VA	**Water**							
Batch R4905151								
WG3215325-2 LCS								
Fluoride (F)			100.3		%		90-110	10-NOV-19
WG3215325-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	10-NOV-19
HG-D-CVAA-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-D-CVAA-VA	**Water**							
Batch R4906310								
WG3216903-10 LCS								
Mercury (Hg)-Dissolved			98.8		%		80-120	14-NOV-19
WG3216903-9 MB		**NP**						
Mercury (Hg)-Dissolved			<0.000005(		mg/L		0.000005	14-NOV-19
HG-T-CVAA-VA	**Water**							
Batch R4906310								
WG3218285-2 LCS								
Mercury (Hg)-Total			97.5		%		80-120	14-NOV-19
WG3218285-1 MB								
Mercury (Hg)-Total			<0.000005(		mg/L		0.000005	14-NOV-19
MET-D-CCMS-VA	**Water**							
Batch R4904676								
WG3215017-2 LCS								
Aluminum (Al)-Dissolved			101.6		%		80-120	10-NOV-19
Antimony (Sb)-Dissolved			95.8		%		80-120	10-NOV-19
Arsenic (As)-Dissolved			96.4		%		80-120	10-NOV-19
Barium (Ba)-Dissolved			104.2		%		80-120	10-NOV-19
Beryllium (Be)-Dissolved			86.8		%		80-120	10-NOV-19
Bismuth (Bi)-Dissolved			90.5		%		80-120	10-NOV-19
Boron (B)-Dissolved			89.7		%		80-120	10-NOV-19
Cadmium (Cd)-Dissolved			96.6		%		80-120	10-NOV-19
Calcium (Ca)-Dissolved			93.4		%		80-120	10-NOV-19
Cesium (Cs)-Dissolved			101.4		%		80-120	10-NOV-19
Chromium (Cr)-Dissolved			98.8		%		80-120	10-NOV-19
Cobalt (Co)-Dissolved			98.5		%		80-120	10-NOV-19
Copper (Cu)-Dissolved			98.9		%		80-120	10-NOV-19
Iron (Fe)-Dissolved			97.5		%		80-120	10-NOV-19
Lead (Pb)-Dissolved			93.2		%		80-120	10-NOV-19
Lithium (Li)-Dissolved			86.0		%		80-120	10-NOV-19
Magnesium (Mg)-Dissolved			96.2		%		80-120	10-NOV-19
Manganese (Mn)-Dissolved			95.5		%		80-120	10-NOV-19
Molybdenum (Mo)-Dissolved			99.9		%		80-120	10-NOV-19
Nickel (Ni)-Dissolved			98.3		%		80-120	10-NOV-19
Phosphorus (P)-Dissolved			101.0		%		70-130	10-NOV-19
Potassium (K)-Dissolved			97.5		%		80-120	10-NOV-19
Rubidium (Rb)-Dissolved			95.2		%		80-120	10-NOV-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R4904676								
WG3215017-2 LCS								
Selenium (Se)-Dissolved			102.9		%		80-120	10-NOV-19
Silicon (Si)-Dissolved			103.4		%		60-140	10-NOV-19
Silver (Ag)-Dissolved			99.97		%		80-120	10-NOV-19
Sodium (Na)-Dissolved			103.0		%		80-120	10-NOV-19
Strontium (Sr)-Dissolved			98.8		%		80-120	10-NOV-19
Sulfur (S)-Dissolved			103.5		%		80-120	10-NOV-19
Tellurium (Te)-Dissolved			97.4		%		80-120	10-NOV-19
Thallium (Tl)-Dissolved			92.6		%		80-120	10-NOV-19
Thorium (Th)-Dissolved			93.3		%		80-120	10-NOV-19
Titanium (Ti)-Dissolved			96.7		%		80-120	10-NOV-19
Tungsten (W)-Dissolved			95.6		%		80-120	10-NOV-19
Uranium (U)-Dissolved			103.4		%		80-120	10-NOV-19
Vanadium (V)-Dissolved			99.3		%		80-120	10-NOV-19
Zinc (Zn)-Dissolved			97.8		%		80-120	10-NOV-19
Zirconium (Zr)-Dissolved			91.1		%		80-120	10-NOV-19
WG3215017-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	10-NOV-19
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	10-NOV-19
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	10-NOV-19
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	10-NOV-19
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	10-NOV-19
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	10-NOV-19
Boron (B)-Dissolved			<0.010		mg/L		0.01	10-NOV-19
Cadmium (Cd)-Dissolved			<0.000005C		mg/L		0.000005	10-NOV-19
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	10-NOV-19
Cesium (Cs)-Dissolved			<0.000010		mg/L		0.00001	10-NOV-19
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	10-NOV-19
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	10-NOV-19
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	10-NOV-19
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	10-NOV-19
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	10-NOV-19
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	10-NOV-19
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	10-NOV-19
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	10-NOV-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R4904676								
WG3215017-1 MB		**NP**						
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	10-NOV-19
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	10-NOV-19
Phosphorus (P)-Dissolved			<0.050		mg/L		0.05	10-NOV-19
Potassium (K)-Dissolved			<0.050		mg/L		0.05	10-NOV-19
Rubidium (Rb)-Dissolved			<0.00020		mg/L		0.0002	10-NOV-19
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	10-NOV-19
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	10-NOV-19
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	10-NOV-19
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	10-NOV-19
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	10-NOV-19
Sulfur (S)-Dissolved			<0.50		mg/L		0.5	10-NOV-19
Tellurium (Te)-Dissolved			<0.00020		mg/L		0.0002	10-NOV-19
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	10-NOV-19
Thorium (Th)-Dissolved			<0.00010		mg/L		0.0001	10-NOV-19
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	10-NOV-19
Tungsten (W)-Dissolved			<0.00010		mg/L		0.0001	10-NOV-19
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	10-NOV-19
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	10-NOV-19
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	10-NOV-19
Zirconium (Zr)-Dissolved			<0.00020		mg/L		0.0002	10-NOV-19
Batch R4909915								
WG3219450-2 LCS								
Aluminum (Al)-Dissolved			99.7		%		80-120	15-NOV-19
Antimony (Sb)-Dissolved			107.8		%		80-120	15-NOV-19
Arsenic (As)-Dissolved			99.8		%		80-120	15-NOV-19
Barium (Ba)-Dissolved			97.3		%		80-120	15-NOV-19
Beryllium (Be)-Dissolved			93.6		%		80-120	15-NOV-19
Bismuth (Bi)-Dissolved			99.3		%		80-120	15-NOV-19
Boron (B)-Dissolved			97.8		%		80-120	15-NOV-19
Cadmium (Cd)-Dissolved			99.6		%		80-120	15-NOV-19
Calcium (Ca)-Dissolved			98.2		%		80-120	15-NOV-19
Cesium (Cs)-Dissolved			102.4		%		80-120	15-NOV-19
Chromium (Cr)-Dissolved			100.2		%		80-120	15-NOV-19
Cobalt (Co)-Dissolved			98.3		%		80-120	15-NOV-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R4909915								
WG3219450-2 LCS								
Copper (Cu)-Dissolved			98.8		%		80-120	15-NOV-19
Iron (Fe)-Dissolved			95.9		%		80-120	15-NOV-19
Lead (Pb)-Dissolved			101.1		%		80-120	15-NOV-19
Lithium (Li)-Dissolved			91.2		%		80-120	15-NOV-19
Magnesium (Mg)-Dissolved			99.1		%		80-120	15-NOV-19
Manganese (Mn)-Dissolved			100.4		%		80-120	15-NOV-19
Molybdenum (Mo)-Dissolved			106.6		%		80-120	15-NOV-19
Nickel (Ni)-Dissolved			97.3		%		80-120	15-NOV-19
Phosphorus (P)-Dissolved			101.8		%		70-130	15-NOV-19
Potassium (K)-Dissolved			100.5		%		80-120	15-NOV-19
Rubidium (Rb)-Dissolved			99.7		%		80-120	15-NOV-19
Selenium (Se)-Dissolved			96.8		%		80-120	15-NOV-19
Silicon (Si)-Dissolved			100.0		%		60-140	15-NOV-19
Silver (Ag)-Dissolved			107.9		%		80-120	15-NOV-19
Sodium (Na)-Dissolved			104.6		%		80-120	15-NOV-19
Strontium (Sr)-Dissolved			106.2		%		80-120	15-NOV-19
Sulfur (S)-Dissolved			92.0		%		80-120	15-NOV-19
Tellurium (Te)-Dissolved			107.0		%		80-120	15-NOV-19
Thallium (Tl)-Dissolved			99.2		%		80-120	15-NOV-19
Thorium (Th)-Dissolved			98.5		%		80-120	15-NOV-19
Tin (Sn)-Dissolved			95.5		%		80-120	15-NOV-19
Titanium (Ti)-Dissolved			97.6		%		80-120	15-NOV-19
Tungsten (W)-Dissolved			106.8		%		80-120	15-NOV-19
Uranium (U)-Dissolved			97.3		%		80-120	15-NOV-19
Vanadium (V)-Dissolved			101.5		%		80-120	15-NOV-19
Zinc (Zn)-Dissolved			98.4		%		80-120	15-NOV-19
Zirconium (Zr)-Dissolved			109.3		%		80-120	15-NOV-19
WG3219450-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	15-NOV-19
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	15-NOV-19
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	15-NOV-19
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	15-NOV-19
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	15-NOV-19
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	15-NOV-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R4909915								
WG3219450-1 MB		**NP**						
Boron (B)-Dissolved			<0.010		mg/L		0.01	15-NOV-19
Cadmium (Cd)-Dissolved			<0.0000050		mg/L		0.000005	15-NOV-19
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	15-NOV-19
Cesium (Cs)-Dissolved			<0.000010		mg/L		0.00001	15-NOV-19
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	15-NOV-19
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	15-NOV-19
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	15-NOV-19
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	15-NOV-19
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	15-NOV-19
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	15-NOV-19
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	15-NOV-19
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	15-NOV-19
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	15-NOV-19
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	15-NOV-19
Phosphorus (P)-Dissolved			<0.050		mg/L		0.05	15-NOV-19
Potassium (K)-Dissolved			<0.050		mg/L		0.05	15-NOV-19
Rubidium (Rb)-Dissolved			<0.00020		mg/L		0.0002	15-NOV-19
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	15-NOV-19
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	15-NOV-19
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	15-NOV-19
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	15-NOV-19
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	15-NOV-19
Sulfur (S)-Dissolved			<0.50		mg/L		0.5	15-NOV-19
Tellurium (Te)-Dissolved			<0.00020		mg/L		0.0002	15-NOV-19
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	15-NOV-19
Thorium (Th)-Dissolved			<0.00010		mg/L		0.0001	15-NOV-19
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	15-NOV-19
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	15-NOV-19
Tungsten (W)-Dissolved			<0.00010		mg/L		0.0001	15-NOV-19
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	15-NOV-19
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	15-NOV-19
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	15-NOV-19
Zirconium (Zr)-Dissolved			<0.00020		mg/L		0.0002	15-NOV-19
MET-T-CCMS-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R4907808								
WG3217627-2 LCS								
Aluminum (Al)-Total			108.5		%		80-120	14-NOV-19
Antimony (Sb)-Total			109.4		%		80-120	14-NOV-19
Arsenic (As)-Total			104.6		%		80-120	14-NOV-19
Barium (Ba)-Total			102.5		%		80-120	14-NOV-19
Beryllium (Be)-Total			86.5		%		80-120	14-NOV-19
Bismuth (Bi)-Total			110.0		%		80-120	14-NOV-19
Boron (B)-Total			85.8		%		80-120	14-NOV-19
Cadmium (Cd)-Total			98.8		%		80-120	14-NOV-19
Calcium (Ca)-Total			92.8		%		80-120	14-NOV-19
Cesium (Cs)-Total			106.0		%		80-120	14-NOV-19
Chromium (Cr)-Total			106.6		%		80-120	14-NOV-19
Cobalt (Co)-Total			105.0		%		80-120	14-NOV-19
Copper (Cu)-Total			101.9		%		80-120	14-NOV-19
Iron (Fe)-Total			98.6		%		80-120	14-NOV-19
Lead (Pb)-Total			109.4		%		80-120	14-NOV-19
Lithium (Li)-Total			84.0		%		80-120	14-NOV-19
Magnesium (Mg)-Total			104.6		%		80-120	14-NOV-19
Manganese (Mn)-Total			105.1		%		80-120	14-NOV-19
Molybdenum (Mo)-Total			106.6		%		80-120	14-NOV-19
Nickel (Ni)-Total			101.7		%		80-120	14-NOV-19
Phosphorus (P)-Total			102.8		%		80-120	14-NOV-19
Potassium (K)-Total			109.3		%		80-120	14-NOV-19
Rubidium (Rb)-Total			103.7		%		80-120	14-NOV-19
Selenium (Se)-Total			102.2		%		80-120	14-NOV-19
Silicon (Si)-Total			103.4		%		80-120	14-NOV-19
Silver (Ag)-Total			103.4		%		80-120	14-NOV-19
Sodium (Na)-Total			103.2		%		80-120	14-NOV-19
Strontium (Sr)-Total			107.7		%		80-120	14-NOV-19
Sulfur (S)-Total			102.8		%		80-120	14-NOV-19
Tellurium (Te)-Total			107.3		%		80-120	14-NOV-19
Thallium (Tl)-Total			109.8		%		80-120	14-NOV-19
Thorium (Th)-Total			103.7		%		80-120	14-NOV-19
Tin (Sn)-Total			99.98		%		80-120	14-NOV-19
Titanium (Ti)-Total			104.0		%		80-120	14-NOV-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R4907808								
WG3217627-2 LCS								
Tungsten (W)-Total			113.0		%		80-120	14-NOV-19
Uranium (U)-Total			104.5		%		80-120	14-NOV-19
Vanadium (V)-Total			105.2		%		80-120	14-NOV-19
Zinc (Zn)-Total			106.0		%		80-120	14-NOV-19
Zirconium (Zr)-Total			103.0		%		80-120	14-NOV-19
WG3217627-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	14-NOV-19
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	14-NOV-19
Arsenic (As)-Total			<0.00010		mg/L		0.0001	14-NOV-19
Barium (Ba)-Total			<0.00010		mg/L		0.0001	14-NOV-19
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	14-NOV-19
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	14-NOV-19
Boron (B)-Total			<0.010		mg/L		0.01	14-NOV-19
Cadmium (Cd)-Total			<0.0000050		mg/L		0.000005	14-NOV-19
Calcium (Ca)-Total			<0.050		mg/L		0.05	14-NOV-19
Cesium (Cs)-Total			<0.000010		mg/L		0.00001	14-NOV-19
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	14-NOV-19
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	14-NOV-19
Copper (Cu)-Total			<0.00050		mg/L		0.0005	14-NOV-19
Iron (Fe)-Total			<0.010		mg/L		0.01	14-NOV-19
Lead (Pb)-Total			<0.000050		mg/L		0.00005	14-NOV-19
Lithium (Li)-Total			<0.0010		mg/L		0.001	14-NOV-19
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	14-NOV-19
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	14-NOV-19
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	14-NOV-19
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	14-NOV-19
Phosphorus (P)-Total			<0.050		mg/L		0.05	14-NOV-19
Potassium (K)-Total			<0.050		mg/L		0.05	14-NOV-19
Rubidium (Rb)-Total			<0.00020		mg/L		0.0002	14-NOV-19
Selenium (Se)-Total			<0.000050		mg/L		0.00005	14-NOV-19
Silicon (Si)-Total			<0.10		mg/L		0.1	14-NOV-19
Silver (Ag)-Total			<0.000010		mg/L		0.00001	14-NOV-19
Sodium (Na)-Total			<0.050		mg/L		0.05	14-NOV-19
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	14-NOV-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R4907808								
WG3217627-1 MB								
Sulfur (S)-Total			<0.50		mg/L		0.5	14-NOV-19
Tellurium (Te)-Total			<0.00020		mg/L		0.0002	14-NOV-19
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	14-NOV-19
Thorium (Th)-Total			<0.00010		mg/L		0.0001	14-NOV-19
Tin (Sn)-Total			<0.00010		mg/L		0.0001	14-NOV-19
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	14-NOV-19
Tungsten (W)-Total			<0.00010		mg/L		0.0001	14-NOV-19
Uranium (U)-Total			<0.000010		mg/L		0.00001	14-NOV-19
Vanadium (V)-Total			<0.00050		mg/L		0.0005	14-NOV-19
Zinc (Zn)-Total			<0.0030		mg/L		0.003	14-NOV-19
Zirconium (Zr)-Total			<0.00020		mg/L		0.0002	14-NOV-19
NH3-F-VA	**Water**							
Batch R4907009								
WG3217117-2 LCS								
Ammonia, Total (as N)			100.4		%		85-115	13-NOV-19
WG3217117-1 MB								
Ammonia, Total (as N)			<0.0050		mg/L		0.005	13-NOV-19
NO2-L-IC-N-VA	**Water**							
Batch R4905151								
WG3215325-2 LCS								
Nitrite (as N)			98.8		%		90-110	10-NOV-19
WG3215325-1 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	10-NOV-19
NO3-L-IC-N-VA	**Water**							
Batch R4905151								
WG3215325-2 LCS								
Nitrate (as N)			97.2		%		90-110	10-NOV-19
WG3215325-1 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	10-NOV-19
P-T-PRES-COL-VA	**Water**							
Batch R4906119								
WG3217116-2 LCS								
Phosphorus (P)-Total			99.5		%		80-120	13-NOV-19
WG3217116-1 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	13-NOV-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
P-T-PRES-COL-VA	**Water**							
Batch R4906978								
WG3218290-6 LCS								
Phosphorus (P)-Total			90.4		%		80-120	14-NOV-19
WG3218290-5 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	14-NOV-19
PH-PCT-VA	**Water**							
Batch R4904854								
WG3215183-2 CRM		**VA-PH7-BUF**						
pH			7.02		pH		6.9-7.1	09-NOV-19
SO4-IC-N-VA	**Water**							
Batch R4905151								
WG3215325-2 LCS								
Sulfate (SO4)			97.6		%		90-110	10-NOV-19
WG3215325-1 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	10-NOV-19
TDS-VA	**Water**							
Batch R4905744								
WG3216929-2 LCS								
Total Dissolved Solids			101.2		%		85-115	12-NOV-19
WG3216929-1 MB								
Total Dissolved Solids			<10		mg/L		10	12-NOV-19
Batch R4907409								
WG3217083-2 LCS								
Total Dissolved Solids			101.8		%		85-115	13-NOV-19
WG3217083-1 MB								
Total Dissolved Solids			<10		mg/L		10	13-NOV-19
TKN-F-VA	**Water**							
Batch R4908487								
WG3217126-2 LCS								
Total Kjeldahl Nitrogen			102.1		%		75-125	14-NOV-19
WG3217126-1 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	14-NOV-19

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Quality Control Report

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
pH by Meter (Automated)							
	1	06-NOV-19 13:45	09-NOV-19 10:50	0.25	69	hours	EHTR-FM
	2	06-NOV-19 12:00	09-NOV-19 10:50	0.25	71	hours	EHTR-FM
	3	06-NOV-19 12:00	09-NOV-19 10:50	0.25	71	hours	EHTR-FM
Anions and Nutrients							
Nitrate in Water by IC (Low Level)							
	1	06-NOV-19 13:45	10-NOV-19 08:26	3	4	days	EHT
	2	06-NOV-19 12:00	10-NOV-19 08:26	3	4	days	EHT
Nitrite in Water by IC (Low Level)							
	1	06-NOV-19 13:45	10-NOV-19 08:26	3	4	days	EHT
	2	06-NOV-19 12:00	10-NOV-19 08:26	3	4	days	EHT

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2379806 were received on 08-NOV-19 11:20.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental
www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L2379806-COFC

COC Number: 17 -

Page of

Report To	Contact and company name below will appear on the final report
Company:	Regional District of Kitimat-Stikine
Contact:	Chris Kerr
Phone:	250-641-4141
	Company address below will appear on the final report
Street:	4545 Lazelle Avenue
City/Province:	Terrace/BC
Postal Code:	V8G4E1
Invoice To	Same as Report To . ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	Regional District of Kitimat-Stikine
Contact:	Erin Blaney

Project Information

ALS Account # / Quote #:	
Job #:	Thornhill Groundwater
PO / AFE:	
LSD:	

Report Format

Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report ☑ YES ☐ NO
☑ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax eblaney@rdks.bc.ca
Email 2 ckerr@rdks.bc.ca
Email 3 sprouse@rdks.bc.ca

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax anne-maries@rdks.bc.ca
Email 2 ckerr@rdks.bc.ca; eblaney@rdks.bc.ca

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (lab use only): **ALS Contact:** **Sampler:** Chris Kerr

Contact your AM to confirm all E&P TATs (surcharges may apply)

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days): 4 day [P4-20%] ☐ | 3 day [P3-25%] ☐ | 2 day [P2-50%] ☐

EMERGENCY: 1 Business day [E1 - 100%] ☐ | Same Day, Weekend or Statutory holiday [E2 -200% (Laboratory opening fees may apply)] ☐

Date and Time Required for all E&P TATs:

For tests that can not be performed according to the service level selected, you will be contacted.

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	F/P Dissolved metals	P Total Metals	F dissolved hardness	P Ammonia	P Chloride	P Fluoride	P Nitrate	P Nitrite	P Total Kjeldahl Nitrogen	P Total phosphorus	P COD	P Total Dissolved Solids	Sulphate	F Alkalinity	pH, Conductivity	SAMPLES ON HOLD	Sample is hazardous (please provide further detail)	NUMBER OF CONTAINERS
	BH-96-2	6/11/19	1:45	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			6
	DUP	6/11/19	12:00	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			6
	Field Blank	6/11/19	12:00	Water				R						R				R	R			6

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☑ NO

Are samples for human consumption/ use? ☐ YES ☑ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

British Columbia Approved and Working Water Quality Guidelines (MAY, 2015)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☑ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
7.8				2C			

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
Chris Kerr	Nov 6/19	

INITIAL SHIPMENT RECEPTION (lab use only)

Received by:	Date:	Time:
Jennifer Bowsher	Nov 6/19	2:40

FINAL SHIPMENT RECEPTION (lab use only)

Received by:	Date:	Time:
JA	8 NOV 19	11:20

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

AM

REGIONAL DISTRICT OF KITIMAT-STIKINE
ATTN: Chris Kerr
300 - 4545 Lazelle Avenue
Terrace BC V8G 4E1

Date Received: 20-JUL-19
Report Date: 09-AUG-19 14:24 (MT)
Version: FINAL REV. 2

Client Phone: 250-615-6100

Certificate of Analysis

Lab Work Order #: L2313871

Project P.O. #: NOT SUBMITTED
Job Reference: THORNHILL TRANSFER STATION SURFACE WATER
C of C Numbers:
Legal Site Desc:

Comments:
9-AUG-2019 COD data has been revised for L2313871-4, after re-analysis.

Amber Springer, B.Sc
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2313871-1	L2313871-2	L2313871-3	L2313871-4	L2313871-5
Description	Water	Water	Water	Water	Water
Sampled Date	17-JUL-19	17-JUL-19	17-JUL-19	17-JUL-19	17-JUL-19
Sampled Time	14:10	12:45	15:00	13:25	12:00
Client ID	SW-1	SW-3	SW-6	SW-21	TRAVEL BLANK
Grouping / **Analyte**					
WATER					
Physical Tests Conductivity (uS/cm)	85.3	746	134	705	<2.0
Hardness (as CaCO3) (mg/L)	38.5	423	55.2	199	<0.50
pH (pH)	7.81	7.91	8.00	8.42	5.57
Total Suspended Solids (mg/L)	5.8	57.4	13.8	9.8	<3.0
Anions and Nutrients Alkalinity, Total (as CaCO3) (mg/L)	41.5	347	62.2	297	<1.0
Ammonia, Total (as N) (mg/L)	<0.0050	58.9	0.0248	3.95	<0.0050
Bromide (Br) (mg/L)	<0.050	0.271	<0.050	0.321	<0.050
Chloride (Cl) (mg/L)	<0.50	30.9	2.79	39.3	<0.50
Fluoride (F) (mg/L)	0.023	<0.10 DLDS	0.035	0.128	<0.020
Nitrate (as N) (mg/L)	0.0391	0.0156	0.0855	3.12	<0.0050
Nitrite (as N) (mg/L)	<0.0010	0.0048	0.0018	0.227	<0.0010
Total Kjeldahl Nitrogen (mg/L)	0.085	58.4	0.264	6.29	<0.050
Orthophosphate-Dissolved (as P) (mg/L)	<0.0010	0.0011	<0.0010	<0.0010	<0.0010
Phosphorus (P)-Total (mg/L)	0.0061	0.422	0.0400	0.0548	<0.0020
Sulfate (SO4) (mg/L)	1.11	1.47	1.94	4.48	<0.30
Total Metals Aluminum (Al)-Total (mg/L)	0.0542	0.533	1.46	0.481	<0.0030
Antimony (Sb)-Total (mg/L)	<0.00010	0.00013	<0.00010	0.00021	<0.00010
Arsenic (As)-Total (mg/L)	<0.00010	0.0153	0.00078	0.00166	<0.00010
Barium (Ba)-Total (mg/L)	0.0315	0.633	0.0362	0.129	<0.00010
Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron (B)-Total (mg/L)	<0.010	1.38	0.020	0.971	<0.010
Cadmium (Cd)-Total (mg/L)	<0.0000050	0.0000152	0.0000144	0.0000212	<0.0000050
Calcium (Ca)-Total (mg/L)	14.4	119	21.7	60.2	<0.050
Cesium (Cs)-Total (mg/L)	<0.000010	0.000209	0.000135	0.000082	<0.000010
Chromium (Cr)-Total (mg/L)	0.00010	0.00129	0.00146	0.00070	<0.00010
Cobalt (Co)-Total (mg/L)	<0.00010	0.00284	0.00075	0.00125	<0.00010
Copper (Cu)-Total (mg/L)	0.00068	0.00194	0.00330	0.00266	<0.00050
Iron (Fe)-Total (mg/L)	0.060	34.4	1.93	1.07	<0.010
Lead (Pb)-Total (mg/L)	<0.000050	0.000131	0.000367	0.000188	<0.000050
Lithium (Li)-Total (mg/L)	<0.0010	0.0022	<0.0010	<0.0010	<0.0010
Magnesium (Mg)-Total (mg/L)	0.987	24.8	1.53	15.7	<0.0050
Manganese (Mn)-Total (mg/L)	0.00951	2.26	0.114	0.310	<0.00010
Mercury (Hg)-Total (mg/L)	<0.0000050	<0.0000050	<0.000050 DLM	<0.0000050	<0.0000050
Molybdenum (Mo)-Total (mg/L)	0.000343	0.000738	0.000677	0.000829	<0.000050
Nickel (Ni)-Total (mg/L)	<0.00050	0.00381	0.00152	0.00288	<0.00050
Phosphorus (P)-Total (mg/L)	<0.050	0.354	<0.050	0.062	<0.050

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2313871-6				
	Description	Water				
	Sampled Date	17-JUL-19				
	Sampled Time	12:00				
	Client ID	DUP				
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	703				
	Hardness (as CaCO3) (mg/L)	200				
	pH (pH)	8.44				
	Total Suspended Solids (mg/L)	11.2				
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	291				
	Ammonia, Total (as N) (mg/L)	4.84				
	Bromide (Br) (mg/L)	0.321				
	Chloride (Cl) (mg/L)	39.2				
	Fluoride (F) (mg/L)	0.136				
	Nitrate (as N) (mg/L)	3.11				
	Nitrite (as N) (mg/L)	0.227				
	Total Kjeldahl Nitrogen (mg/L)	4.83				
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010				
	Phosphorus (P)-Total (mg/L)	0.0568				
	Sulfate (SO4) (mg/L)	4.48				
Total Metals	Aluminum (Al)-Total (mg/L)	0.394				
	Antimony (Sb)-Total (mg/L)	0.00020				
	Arsenic (As)-Total (mg/L)	0.00174				
	Barium (Ba)-Total (mg/L)	0.127				
	Beryllium (Be)-Total (mg/L)	<0.00010				
	Bismuth (Bi)-Total (mg/L)	<0.000050				
	Boron (B)-Total (mg/L)	1.01				
	Cadmium (Cd)-Total (mg/L)	0.0000204				
	Calcium (Ca)-Total (mg/L)	61.3				
	Cesium (Cs)-Total (mg/L)	0.000072				
	Chromium (Cr)-Total (mg/L)	0.00064				
	Cobalt (Co)-Total (mg/L)	0.00120				
	Copper (Cu)-Total (mg/L)	0.00249				
	Iron (Fe)-Total (mg/L)	0.908				
	Lead (Pb)-Total (mg/L)	0.000147				
	Lithium (Li)-Total (mg/L)	<0.0010				
	Magnesium (Mg)-Total (mg/L)	16.2				
	Manganese (Mn)-Total (mg/L)	0.267				
	Mercury (Hg)-Total (mg/L)	<0.0000050				
	Molybdenum (Mo)-Total (mg/L)	0.000837				
	Nickel (Ni)-Total (mg/L)	0.00281				
	Phosphorus (P)-Total (mg/L)	0.058				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2313871-1	L2313871-2	L2313871-3	L2313871-4	L2313871-5
Description	Water	Water	Water	Water	Water
Sampled Date	17-JUL-19	17-JUL-19	17-JUL-19	17-JUL-19	17-JUL-19
Sampled Time	14:10	12:45	15:00	13:25	12:00
Client ID	SW-1	SW-3	SW-6	SW-21	TRAVEL BLANK
Grouping / **Analyte**					
WATER					
Total Metals Potassium (K)-Total (mg/L)	0.910	44.6	1.65	26.4	<0.050
Rubidium (Rb)-Total (mg/L)	0.00114	0.0316	0.00263	0.0172	<0.00020
Selenium (Se)-Total (mg/L)	0.000081	0.000139	0.000080	0.000151	<0.000050
Silicon (Si)-Total (mg/L)	2.73	9.70	5.11	5.04	<0.10
Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Total (mg/L)	1.29	75.7	3.64	53.3	<0.050
Strontium (Sr)-Total (mg/L)	0.0564	0.776	0.0633	0.446	<0.00020
Sulfur (S)-Total (mg/L)	<0.50	0.94	<0.50	1.98	<0.50
Tellurium (Te)-Total (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thorium (Th)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Tin (Sn)-Total (mg/L)	<0.00010	0.00014	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total (mg/L)	0.00162	0.0167	0.0387	0.0115	<0.00030
Tungsten (W)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Uranium (U)-Total (mg/L)	0.000017	0.000065	0.000115	0.000240	<0.000010
Vanadium (V)-Total (mg/L)	0.00054	0.00296	0.00387	0.00134	<0.00050
Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	0.0049	<0.0030	<0.0030
Zirconium (Zr)-Total (mg/L)	<0.00020	0.00086	0.00030	0.00045	<0.00020
Dissolved Metals Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	LAB
Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	LAB
Aluminum (Al)-Dissolved (mg/L)	0.0265	0.0187	0.0658	0.0203	<0.0010
Antimony (Sb)-Dissolved (mg/L)	<0.00010	0.00012	<0.00010	0.00017	<0.00010
Arsenic (As)-Dissolved (mg/L)	<0.00010	0.0170	0.00031	0.00134	<0.00010
Barium (Ba)-Dissolved (mg/L)	0.0294	0.657	0.0198	0.111	<0.00010
Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron (B)-Dissolved (mg/L)	<0.010	1.47	0.020	0.896	<0.010
Cadmium (Cd)-Dissolved (mg/L)	0.0000330 DTC	0.0000070	<0.0000050	0.0000107	<0.0000050
Calcium (Ca)-Dissolved (mg/L)	13.9	126	20.3	54.8	<0.050
Cesium (Cs)-Dissolved (mg/L)	<0.000010	0.000199	<0.000010	0.000048	<0.000010
Chromium (Cr)-Dissolved (mg/L)	<0.00010	0.00076	0.00010	0.00028	<0.00010
Cobalt (Co)-Dissolved (mg/L)	<0.00010	0.00264	0.00014	0.00091	<0.00010
Copper (Cu)-Dissolved (mg/L)	0.00141	0.00077	0.00105	0.00174	<0.00020
Iron (Fe)-Dissolved (mg/L)	0.028	36.6	0.234	0.105	<0.010
Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)-Dissolved (mg/L)	<0.0010	0.0020	<0.0010	<0.0010	<0.0010
Magnesium (Mg)-Dissolved (mg/L)	0.954	26.6	1.10	15.0	<0.0050

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2313871-6				
	Description	Water				
	Sampled Date	17-JUL-19				
	Sampled Time	12:00				
	Client ID	DUP				
Grouping	**Analyte**					
WATER						
Total Metals	Potassium (K)-Total (mg/L)	27.0				
	Rubidium (Rb)-Total (mg/L)	0.0170				
	Selenium (Se)-Total (mg/L)	0.000210				
	Silicon (Si)-Total (mg/L)	4.94				
	Silver (Ag)-Total (mg/L)	<0.000010				
	Sodium (Na)-Total (mg/L)	55.2				
	Strontium (Sr)-Total (mg/L)	0.455				
	Sulfur (S)-Total (mg/L)	1.89				
	Tellurium (Te)-Total (mg/L)	<0.00020				
	Thallium (Tl)-Total (mg/L)	<0.000010				
	Thorium (Th)-Total (mg/L)	<0.00010				
	Tin (Sn)-Total (mg/L)	<0.00010				
	Titanium (Ti)-Total (mg/L)	0.00954				
	Tungsten (W)-Total (mg/L)	<0.00010				
	Uranium (U)-Total (mg/L)	0.000241				
	Vanadium (V)-Total (mg/L)	0.00113				
	Zinc (Zn)-Total (mg/L)	<0.0030				
	Zirconium (Zr)-Total (mg/L)	0.00030				
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD				
	Dissolved Metals Filtration Location	FIELD				
	Aluminum (Al)-Dissolved (mg/L)	0.0165				
	Antimony (Sb)-Dissolved (mg/L)	0.00017				
	Arsenic (As)-Dissolved (mg/L)	0.00142				
	Barium (Ba)-Dissolved (mg/L)	0.110				
	Beryllium (Be)-Dissolved (mg/L)	<0.00010				
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050				
	Boron (B)-Dissolved (mg/L)	0.916				
	Cadmium (Cd)-Dissolved (mg/L)	0.0000117				
	Calcium (Ca)-Dissolved (mg/L)	55.5				
	Cesium (Cs)-Dissolved (mg/L)	0.000051				
	Chromium (Cr)-Dissolved (mg/L)	0.00028				
	Cobalt (Co)-Dissolved (mg/L)	0.00094				
	Copper (Cu)-Dissolved (mg/L)	0.00171				
	Iron (Fe)-Dissolved (mg/L)	0.107				
	Lead (Pb)-Dissolved (mg/L)	<0.000050				
	Lithium (Li)-Dissolved (mg/L)	<0.0010				
	Magnesium (Mg)-Dissolved (mg/L)	15.0				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2313871-1	L2313871-2	L2313871-3	L2313871-4	L2313871-5
	Description	Water	Water	Water	Water	Water
	Sampled Date	17-JUL-19	17-JUL-19	17-JUL-19	17-JUL-19	17-JUL-19
	Sampled Time	14:10	12:45	15:00	13:25	12:00
	Client ID	SW-1	SW-3	SW-6	SW-21	TRAVEL BLANK
Grouping	**Analyte**					
WATER						
Dissolved Metals	Manganese (Mn)-Dissolved (mg/L)	0.00761	2.19	0.0697	0.188	<0.00010
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Dissolved (mg/L)	0.000333	0.000560	0.000686	0.000853	<0.000050
	Nickel (Ni)-Dissolved (mg/L)	<0.00050	0.00393	<0.00050	0.00232	<0.00050
	Phosphorus (P)-Dissolved (mg/L)	<0.050	0.181	<0.050	<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)	0.856	47.7	1.29	24.1	<0.050
	Rubidium (Rb)-Dissolved (mg/L)	0.00112	0.0364	0.00156	0.0157	<0.00020
	Selenium (Se)-Dissolved (mg/L)	<0.000050	0.000213	<0.000050	0.000150	<0.000050
	Silicon (Si)-Dissolved (mg/L)	2.80	10.1	3.23	4.55	<0.050
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	1.26	82.3	3.18	49.5	<0.050
	Strontium (Sr)-Dissolved (mg/L)	0.0533	0.908	0.0587	0.411	<0.00020
	Sulfur (S)-Dissolved (mg/L)	<0.50	1.28	0.68	2.21	<0.50
	Tellurium (Te)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Thorium (Th)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Tin (Sn)-Dissolved (mg/L)	<0.00010	0.00017	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Dissolved (mg/L)	0.00041	0.00231	0.00303	0.00068	<0.00030
	Tungsten (W)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Uranium (U)-Dissolved (mg/L)	0.000015	0.000043	0.000094	0.000218	<0.000010
	Vanadium (V)-Dissolved (mg/L)	<0.00050	0.00182	0.00063	<0.00050	<0.00050
	Zinc (Zn)-Dissolved (mg/L)	0.0011	0.0012	<0.0010	<0.0010	<0.0010
	Zirconium (Zr)-Dissolved (mg/L)	<0.00020	0.00045	<0.00020	<0.00020	<0.00020
Aggregate Organics	BOD (mg/L)	<2.0	7.5	<2.0	7.9	<2.0
	COD (mg/L)	<20	140	<20	51	<20

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2313871-6				
	Description	Water				
	Sampled Date	17-JUL-19				
	Sampled Time	12:00				
	Client ID	DUP				
Grouping	**Analyte**					
WATER						
Dissolved Metals	Manganese (Mn)-Dissolved (mg/L)	0.179				
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050				
	Molybdenum (Mo)-Dissolved (mg/L)	0.000915				
	Nickel (Ni)-Dissolved (mg/L)	0.00226				
	Phosphorus (P)-Dissolved (mg/L)	<0.050				
	Potassium (K)-Dissolved (mg/L)	24.4				
	Rubidium (Rb)-Dissolved (mg/L)	0.0161				
	Selenium (Se)-Dissolved (mg/L)	0.000180				
	Silicon (Si)-Dissolved (mg/L)	4.64				
	Silver (Ag)-Dissolved (mg/L)	<0.000010				
	Sodium (Na)-Dissolved (mg/L)	49.0				
	Strontium (Sr)-Dissolved (mg/L)	0.417				
	Sulfur (S)-Dissolved (mg/L)	2.19				
	Tellurium (Te)-Dissolved (mg/L)	<0.00020				
	Thallium (Tl)-Dissolved (mg/L)	<0.000010				
	Thorium (Th)-Dissolved (mg/L)	<0.00010				
	Tin (Sn)-Dissolved (mg/L)	<0.00010				
	Titanium (Ti)-Dissolved (mg/L)	0.00067				
	Tungsten (W)-Dissolved (mg/L)	<0.00010				
	Uranium (U)-Dissolved (mg/L)	0.000218				
	Vanadium (V)-Dissolved (mg/L)	<0.00050				
	Zinc (Zn)-Dissolved (mg/L)	<0.0010				
	Zirconium (Zr)-Dissolved (mg/L)	<0.00020				
Aggregate Organics	BOD (mg/L)	6.5				
	COD (mg/L)	51				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Individual Samples Listed:

Sample Number	Client Sample ID	Qualifier	Description
L2313871-5	TRAVEL BLANK	WSMD	Water sample(s) for dissolved mercury analysis was not submitted in glass or PTFE container with HCl preservative. Results may be biased low.

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Laboratory Control Sample	Sulfur (S)-Dissolved	MES	L2313871-5
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2313871-5
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2313871-1, -3
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2313871-5
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2313871-1, -3
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2313871-5
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2313871-1, -3
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L2313871-5
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L2313871-1, -3
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2313871-5
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2313871-1, -3
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2313871-5
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2313871-1, -3
Matrix Spike	Copper (Cu)-Total	MS-B	L2313871-1, -2, -3, -4, -5, -6
Matrix Spike	Zinc (Zn)-Total	MS-B	L2313871-1, -2, -3, -4, -5, -6
Matrix Spike	Phosphorus (P)-Total	MS-B	L2313871-1, -2, -3, -4, -5, -6

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
DTC	Dissolved concentration exceeds total. Results were confirmed by re-analysis.
MES	Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-TITR-VA	Water	Alkalinity Species by Titration	APHA 2320 Alkalinity

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

BOD5-VA	Water	Biochemical Oxygen Demand- 5 day	APHA 5210 B- BIOCHEMICAL OXYGEN DEMAND

This analysis is carried out using procedures adapted from APHA Method 5210 B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.

BR-L-IC-N-VA	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

CL-IC-N-VA	Water	Chloride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

COD-COL-VA	Water	Chemical Oxygen Demand by Colorimetric	APHA 5220 D. CHEMICAL OXYGEN DEMAND

This analysis is carried out using procedures adapted from APHA Method 5220 "Chemical Oxygen Demand (COD)". Chemical oxygen demand is determined using the closed reflux colourimetric method.

EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.

This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.

EC-SCREEN-VA	Water	Conductivity Screen (Internal Use Only)	APHA 2510

Reference Information

Qualitative analysis of conductivity where required during preparation of other tests - e.g. TDS, metals, etc.

F-IC-N-VA	Water	Fluoride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-VA	Water	Hardness	APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA	Water	Diss. Mercury in Water by CVAAS or CVAFS	APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-CVAA-VA	Water	Total Mercury in Water by CVAAS or CVAFS	EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

MET-D-CCMS-VA	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-VA	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NH3-F-VA	Water	Ammonia in Water by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-VA	Water	Nitrite in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-VA	Water	Nitrate in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

P-T-PRES-COL-VA	Water	Total P in Water by Colour	APHA 4500-P Phosphorus

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.
Samples with very high dissolved solids (i.e. seawaters, brackish waters) may produce a negative bias by this method. Alternate methods are available for these types of samples.

Arsenic (5+), at elevated levels, is a positive interference on colourimetric phosphate analysis.

PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PO4-DO-COL-VA	Water	Diss. Orthophosphate in Water by Colour	APHA 4500-P Phosphorus

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.
Samples with very high dissolved solids (i.e. seawaters, brackish waters) may produce a negative bias by this method. Alternate methods are available for these types of samples.

Arsenic (5+), at elevated levels, is a positive interference on colourimetric phosphate analysis.

SO4-IC-N-VA	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

TKN-F-VA	Water	TKN in Water by Fluorescence	APHA 4500-NORG D.

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

TSS-VA	Water	Total Suspended Solids by Gravimetric	APHA 2540 D - GRAVIMETRIC

Reference Information

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: REGIONAL DISTRICT OF KITIMAT-STIKINE
300 - 4545 Lazelle Avenue
Terrace BC V8G 4E1
Contact: Chris Kerr

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-TITR-VA	**Water**							
Batch R4720657								
WG3111300-1 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	22-JUL-19
BOD5-VA	**Water**							
Batch R4728333								
WG3111211-2 LCS								
BOD			98.9		%		85-115	21-JUL-19
WG3111211-7 LCS								
BOD			103.3		%		85-115	21-JUL-19
WG3111211-1 MB								
BOD			<2.0		mg/L		2	21-JUL-19
WG3111211-6 MB								
BOD			<2.0		mg/L		2	21-JUL-19
BR-L-IC-N-VA	**Water**							
Batch R4720008								
WG3111290-2 LCS								
Bromide (Br)			103.6		%		85-115	22-JUL-19
WG3111290-1 MB								
Bromide (Br)			<0.050		mg/L		0.05	22-JUL-19
CL-IC-N-VA	**Water**							
Batch R4720008								
WG3111290-2 LCS								
Chloride (Cl)			99.4		%		90-110	22-JUL-19
WG3111290-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	22-JUL-19
COD-COL-VA	**Water**							
Batch R4733888								
WG3120258-2 DUP		**L2313871-5**						
COD		<20	<20	RPD-NA	mg/L	N/A	20	31-JUL-19
WG3120258-3 LCS								
COD			98.9		%		85-115	31-JUL-19
WG3120258-6 LCS								
COD			98.2		%		85-115	31-JUL-19
WG3120258-1 MB								
COD			<20		mg/L		20	31-JUL-19
WG3120258-5 MB								
COD			<20		mg/L		20	31-JUL-19
WG3120258-8 MS		**L2313871-6**						

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
COD-COL-VA	**Water**							
Batch R4733888								
WG3120258-8 MS		**L2313871-6**						
COD			101.3		%		75-125	31-JUL-19
EC-PCT-VA	**Water**							
Batch R4720657								
WG3111300-1 MB								
Conductivity			<2.0		uS/cm		2	22-JUL-19
F-IC-N-VA	**Water**							
Batch R4720008								
WG3111290-2 LCS								
Fluoride (F)			105.3		%		90-110	22-JUL-19
WG3111290-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	22-JUL-19
Batch R4725830								
WG3114602-3 DUP		**L2313871-2**						
Fluoride (F)		<0.10	<0.10	RPD-NA	mg/L	N/A	20	24-JUL-19
WG3114602-2 LCS								
Fluoride (F)			100.2		%		90-110	24-JUL-19
WG3114602-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	24-JUL-19
HG-D-CVAA-VA	**Water**							
Batch R4721230								
WG3112671-11 DUP		**L2313871-1**						
Mercury (Hg)-Dissolved		<0.0000050	<0.000005C	RPD-NA	mg/L	N/A	20	23-JUL-19
WG3112671-10 LCS								
Mercury (Hg)-Dissolved			94.3		%		80-120	23-JUL-19
WG3112671-9 MB		**NP**						
Mercury (Hg)-Dissolved			<0.000005C		mg/L		0.000005	23-JUL-19
Batch R4734327								
WG3121185-3 DUP		**L2313871-5**						
Mercury (Hg)-Dissolved		<0.0000050	<0.000005C	RPD-NA	mg/L	N/A	20	01-AUG-19
WG3121185-2 LCS								
Mercury (Hg)-Dissolved			97.4		%		80-120	01-AUG-19
WG3121185-1 MB								
Mercury (Hg)-Dissolved			<0.000005C		mg/L		0.000005	01-AUG-19
HG-T-CVAA-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-T-CVAA-VA	**Water**							
Batch R4720560								
WG3112324-25 DUP		**L2313871-1**						
Mercury (Hg)-Total		<0.0000050	<0.000005(	RPD-NA	mg/L	N/A	20	23-JUL-19
WG3112324-2 LCS								
Mercury (Hg)-Total			99.2		%		80-120	23-JUL-19
WG3112324-1 MB								
Mercury (Hg)-Total			<0.000005(		mg/L		0.000005	23-JUL-19
WG3112324-26 MS		**L2313871-2**						
Mercury (Hg)-Total			92.1		%		70-130	23-JUL-19
MET-D-CCMS-VA	**Water**							
Batch R4720165								
WG3111101-2 LCS								
Aluminum (Al)-Dissolved			111.9		%		80-120	21-JUL-19
Antimony (Sb)-Dissolved			97.9		%		80-120	21-JUL-19
Arsenic (As)-Dissolved			104.8		%		80-120	21-JUL-19
Barium (Ba)-Dissolved			104.0		%		80-120	21-JUL-19
Beryllium (Be)-Dissolved			109.4		%		80-120	21-JUL-19
Bismuth (Bi)-Dissolved			103.4		%		80-120	21-JUL-19
Boron (B)-Dissolved			104.1		%		80-120	21-JUL-19
Cadmium (Cd)-Dissolved			106.7		%		80-120	21-JUL-19
Calcium (Ca)-Dissolved			105.3		%		80-120	21-JUL-19
Cesium (Cs)-Dissolved			101.2		%		80-120	21-JUL-19
Chromium (Cr)-Dissolved			109.6		%		80-120	21-JUL-19
Cobalt (Co)-Dissolved			108.4		%		80-120	21-JUL-19
Copper (Cu)-Dissolved			105.5		%		80-120	21-JUL-19
Iron (Fe)-Dissolved			103.0		%		80-120	21-JUL-19
Lead (Pb)-Dissolved			102.5		%		80-120	21-JUL-19
Lithium (Li)-Dissolved			107.5		%		80-120	21-JUL-19
Magnesium (Mg)-Dissolved			104.1		%		80-120	21-JUL-19
Manganese (Mn)-Dissolved			107.8		%		80-120	21-JUL-19
Molybdenum (Mo)-Dissolved			99.5		%		80-120	21-JUL-19
Nickel (Ni)-Dissolved			108.7		%		80-120	21-JUL-19
Phosphorus (P)-Dissolved			109.8		%		70-130	21-JUL-19
Potassium (K)-Dissolved			118.5		%		80-120	21-JUL-19
Rubidium (Rb)-Dissolved			113.3		%		80-120	21-JUL-19
Selenium (Se)-Dissolved			99.3		%		80-120	21-JUL-19
Silicon (Si)-Dissolved			112.7		%		60-140	21-JUL-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R4720165								
WG3111101-2 LCS								
Silver (Ag)-Dissolved			100.9		%		80-120	21-JUL-19
Sodium (Na)-Dissolved			116.3		%		80-120	21-JUL-19
Strontium (Sr)-Dissolved			98.9		%		80-120	21-JUL-19
Sulfur (S)-Dissolved			122.8	MES	%		80-120	21-JUL-19
Tellurium (Te)-Dissolved			90.8		%		80-120	21-JUL-19
Thallium (Tl)-Dissolved			102.1		%		80-120	21-JUL-19
Thorium (Th)-Dissolved			94.5		%		80-120	21-JUL-19
Tin (Sn)-Dissolved			99.0		%		80-120	21-JUL-19
Titanium (Ti)-Dissolved			107.5		%		80-120	21-JUL-19
Tungsten (W)-Dissolved			105.2		%		80-120	21-JUL-19
Uranium (U)-Dissolved			100.7		%		80-120	21-JUL-19
Vanadium (V)-Dissolved			108.1		%		80-120	21-JUL-19
Zinc (Zn)-Dissolved			112.5		%		80-120	21-JUL-19
Zirconium (Zr)-Dissolved			99.7		%		80-120	21-JUL-19
WG3111101-1 MB		**LF**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	21-JUL-19
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	21-JUL-19
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	21-JUL-19
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	21-JUL-19
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	21-JUL-19
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	21-JUL-19
Boron (B)-Dissolved			<0.010		mg/L		0.01	21-JUL-19
Cadmium (Cd)-Dissolved			<0.000005C		mg/L		0.000005	21-JUL-19
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	21-JUL-19
Cesium (Cs)-Dissolved			<0.000010		mg/L		0.00001	21-JUL-19
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	21-JUL-19
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	21-JUL-19
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	21-JUL-19
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	21-JUL-19
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	21-JUL-19
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	21-JUL-19
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	21-JUL-19
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	21-JUL-19
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	21-JUL-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R4720165								
WG3111101-1 MB		**LF**						
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	21-JUL-19
Phosphorus (P)-Dissolved			<0.050		mg/L		0.05	21-JUL-19
Potassium (K)-Dissolved			<0.050		mg/L		0.05	21-JUL-19
Rubidium (Rb)-Dissolved			<0.00020		mg/L		0.0002	21-JUL-19
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	21-JUL-19
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	21-JUL-19
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	21-JUL-19
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	21-JUL-19
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	21-JUL-19
Sulfur (S)-Dissolved			<0.50		mg/L		0.5	21-JUL-19
Tellurium (Te)-Dissolved			<0.00020		mg/L		0.0002	21-JUL-19
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	21-JUL-19
Thorium (Th)-Dissolved			<0.00010		mg/L		0.0001	21-JUL-19
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	21-JUL-19
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	21-JUL-19
Tungsten (W)-Dissolved			<0.00010		mg/L		0.0001	21-JUL-19
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	21-JUL-19
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	21-JUL-19
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	21-JUL-19
Zirconium (Zr)-Dissolved			<0.00020		mg/L		0.0002	21-JUL-19
Batch R4720706								
WG3112280-2 LCS								
Aluminum (Al)-Dissolved			100.2		%		80-120	22-JUL-19
Antimony (Sb)-Dissolved			99.2		%		80-120	22-JUL-19
Arsenic (As)-Dissolved			96.5		%		80-120	22-JUL-19
Barium (Ba)-Dissolved			102.9		%		80-120	22-JUL-19
Beryllium (Be)-Dissolved			105.2		%		80-120	22-JUL-19
Bismuth (Bi)-Dissolved			88.9		%		80-120	22-JUL-19
Boron (B)-Dissolved			104.9		%		80-120	22-JUL-19
Cadmium (Cd)-Dissolved			95.1		%		80-120	22-JUL-19
Calcium (Ca)-Dissolved			100.3		%		80-120	22-JUL-19
Cesium (Cs)-Dissolved			100.2		%		80-120	22-JUL-19
Chromium (Cr)-Dissolved			100.6		%		80-120	22-JUL-19
Cobalt (Co)-Dissolved			98.6		%		80-120	22-JUL-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R4720706								
WG3112280-2 LCS								
Copper (Cu)-Dissolved			98.6		%		80-120	22-JUL-19
Iron (Fe)-Dissolved			101.4		%		80-120	22-JUL-19
Lead (Pb)-Dissolved			96.0		%		80-120	22-JUL-19
Lithium (Li)-Dissolved			100.0		%		80-120	22-JUL-19
Magnesium (Mg)-Dissolved			99.9		%		80-120	22-JUL-19
Manganese (Mn)-Dissolved			101.1		%		80-120	22-JUL-19
Molybdenum (Mo)-Dissolved			104.1		%		80-120	22-JUL-19
Nickel (Ni)-Dissolved			99.0		%		80-120	22-JUL-19
Phosphorus (P)-Dissolved			107.8		%		70-130	22-JUL-19
Potassium (K)-Dissolved			99.2		%		80-120	22-JUL-19
Rubidium (Rb)-Dissolved			104.2		%		80-120	22-JUL-19
Selenium (Se)-Dissolved			98.4		%		80-120	22-JUL-19
Silicon (Si)-Dissolved			108.8		%		60-140	22-JUL-19
Silver (Ag)-Dissolved			100.3		%		80-120	22-JUL-19
Sodium (Na)-Dissolved			100.6		%		80-120	22-JUL-19
Strontium (Sr)-Dissolved			100.4		%		80-120	22-JUL-19
Sulfur (S)-Dissolved			105.6		%		80-120	22-JUL-19
Tellurium (Te)-Dissolved			99.8		%		80-120	22-JUL-19
Thallium (Tl)-Dissolved			89.4		%		80-120	22-JUL-19
Thorium (Th)-Dissolved			94.7		%		80-120	22-JUL-19
Tin (Sn)-Dissolved			95.6		%		80-120	22-JUL-19
Titanium (Ti)-Dissolved			98.7		%		80-120	22-JUL-19
Tungsten (W)-Dissolved			98.9		%		80-120	22-JUL-19
Uranium (U)-Dissolved			96.4		%		80-120	22-JUL-19
Vanadium (V)-Dissolved			102.4		%		80-120	22-JUL-19
Zinc (Zn)-Dissolved			97.6		%		80-120	22-JUL-19
Zirconium (Zr)-Dissolved			97.9		%		80-120	22-JUL-19
WG3112280-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	22-JUL-19
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	22-JUL-19
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	22-JUL-19
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	22-JUL-19
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	22-JUL-19
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	22-JUL-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R4720706								
WG3112280-1 MB		**NP**						
Boron (B)-Dissolved			<0.010		mg/L		0.01	22-JUL-19
Cadmium (Cd)-Dissolved			<0.000005C		mg/L		0.000005	22-JUL-19
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	22-JUL-19
Cesium (Cs)-Dissolved			<0.000010		mg/L		0.00001	22-JUL-19
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	22-JUL-19
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	22-JUL-19
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	22-JUL-19
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	22-JUL-19
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	22-JUL-19
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	22-JUL-19
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	22-JUL-19
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	22-JUL-19
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	22-JUL-19
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	22-JUL-19
Phosphorus (P)-Dissolved			<0.050		mg/L		0.05	22-JUL-19
Potassium (K)-Dissolved			<0.050		mg/L		0.05	22-JUL-19
Rubidium (Rb)-Dissolved			<0.00020		mg/L		0.0002	22-JUL-19
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	22-JUL-19
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	22-JUL-19
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	22-JUL-19
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	22-JUL-19
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	22-JUL-19
Sulfur (S)-Dissolved			<0.50		mg/L		0.5	22-JUL-19
Tellurium (Te)-Dissolved			<0.00020		mg/L		0.0002	22-JUL-19
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	22-JUL-19
Thorium (Th)-Dissolved			<0.00010		mg/L		0.0001	22-JUL-19
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	22-JUL-19
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	22-JUL-19
Tungsten (W)-Dissolved			<0.00010		mg/L		0.0001	22-JUL-19
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	22-JUL-19
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	22-JUL-19
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	22-JUL-19
Zirconium (Zr)-Dissolved			<0.00020		mg/L		0.0002	22-JUL-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R4724308								
WG3113580-3 DUP		**L2313871-1**						
Aluminum (Al)-Dissolved		0.0265	0.0325		mg/L	14	20	25-JUL-19
Antimony (Sb)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	25-JUL-19
Arsenic (As)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	25-JUL-19
Barium (Ba)-Dissolved		0.0294	0.0292		mg/L	0.8	20	25-JUL-19
Beryllium (Be)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	25-JUL-19
Bismuth (Bi)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	25-JUL-19
Boron (B)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	25-JUL-19
Cadmium (Cd)-Dissolved		0.0000330	0.0000335		mg/L	1.5	20	25-JUL-19
Calcium (Ca)-Dissolved		13.9	14.4		mg/L	0.8	20	25-JUL-19
Cesium (Cs)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	25-JUL-19
Chromium (Cr)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	25-JUL-19
Cobalt (Co)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	25-JUL-19
Copper (Cu)-Dissolved		0.00141	0.00141		mg/L	1.4	20	25-JUL-19
Iron (Fe)-Dissolved		0.028	0.029		mg/L	1.7	20	25-JUL-19
Lead (Pb)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	25-JUL-19
Lithium (Li)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	25-JUL-19
Magnesium (Mg)-Dissolved		0.954	0.978		mg/L	1.4	20	25-JUL-19
Manganese (Mn)-Dissolved		0.00761	0.00801		mg/L	4.3	20	25-JUL-19
Molybdenum (Mo)-Dissolved		0.000333	0.000333		mg/L	0.4	20	25-JUL-19
Nickel (Ni)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	25-JUL-19
Phosphorus (P)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	25-JUL-19
Potassium (K)-Dissolved		0.856	0.915		mg/L	0.2	20	25-JUL-19
Rubidium (Rb)-Dissolved		0.00112	0.00121		mg/L	4.1	20	25-JUL-19
Selenium (Se)-Dissolved		<0.000050	0.000058	RPD-NA	mg/L	N/A	20	25-JUL-19
Silicon (Si)-Dissolved		2.80	2.56		mg/L	1.8	20	25-JUL-19
Silver (Ag)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	25-JUL-19
Sodium (Na)-Dissolved		1.26	1.29		mg/L	3.4	20	25-JUL-19
Strontium (Sr)-Dissolved		0.0533	0.0615		mg/L	0.7	20	25-JUL-19
Sulfur (S)-Dissolved		<0.50	<0.50	RPD-NA	mg/L	N/A	20	25-JUL-19
Tellurium (Te)-Dissolved		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	25-JUL-19
Thallium (Tl)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	25-JUL-19
Thorium (Th)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	25-JUL-19
Tin (Sn)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	25-JUL-19
Tungsten (W)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	25-JUL-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R4724308								
WG3113580-3 DUP		**L2313871-1**						
Uranium (U)-Dissolved		0.000015	0.000015		mg/L	2.6	20	25-JUL-19
Vanadium (V)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	25-JUL-19
Zinc (Zn)-Dissolved		0.0011	0.0011		mg/L	5.4	20	25-JUL-19
Zirconium (Zr)-Dissolved		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	25-JUL-19
WG3113580-2 LCS								
Aluminum (Al)-Dissolved			102.3		%		80-120	25-JUL-19
Antimony (Sb)-Dissolved			105.5		%		80-120	25-JUL-19
Arsenic (As)-Dissolved			97.9		%		80-120	25-JUL-19
Barium (Ba)-Dissolved			101.0		%		80-120	25-JUL-19
Beryllium (Be)-Dissolved			102.9		%		80-120	25-JUL-19
Bismuth (Bi)-Dissolved			106.0		%		80-120	25-JUL-19
Boron (B)-Dissolved			102.7		%		80-120	25-JUL-19
Cadmium (Cd)-Dissolved			98.4		%		80-120	25-JUL-19
Calcium (Ca)-Dissolved			105.3		%		80-120	25-JUL-19
Cesium (Cs)-Dissolved			108.6		%		80-120	25-JUL-19
Chromium (Cr)-Dissolved			98.6		%		80-120	25-JUL-19
Cobalt (Co)-Dissolved			95.9		%		80-120	25-JUL-19
Copper (Cu)-Dissolved			95.4		%		80-120	25-JUL-19
Iron (Fe)-Dissolved			95.9		%		80-120	25-JUL-19
Lead (Pb)-Dissolved			107.3		%		80-120	25-JUL-19
Lithium (Li)-Dissolved			102.6		%		80-120	25-JUL-19
Magnesium (Mg)-Dissolved			97.8		%		80-120	25-JUL-19
Manganese (Mn)-Dissolved			95.7		%		80-120	25-JUL-19
Molybdenum (Mo)-Dissolved			106.9		%		80-120	25-JUL-19
Nickel (Ni)-Dissolved			94.8		%		80-120	25-JUL-19
Phosphorus (P)-Dissolved			92.0		%		70-130	25-JUL-19
Potassium (K)-Dissolved			99.8		%		80-120	25-JUL-19
Rubidium (Rb)-Dissolved			99.3		%		80-120	25-JUL-19
Selenium (Se)-Dissolved			97.1		%		80-120	25-JUL-19
Silicon (Si)-Dissolved			100.3		%		60-140	25-JUL-19
Silver (Ag)-Dissolved			106.1		%		80-120	25-JUL-19
Sodium (Na)-Dissolved			97.1		%		80-120	25-JUL-19
Strontium (Sr)-Dissolved			113.1		%		80-120	25-JUL-19
Sulfur (S)-Dissolved			98.0		%		80-120	25-JUL-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R4724308								
WG3113580-2 LCS								
Tellurium (Te)-Dissolved			107.9		%		80-120	25-JUL-19
Thallium (Tl)-Dissolved			99.9		%		80-120	25-JUL-19
Thorium (Th)-Dissolved			110.9		%		80-120	25-JUL-19
Tin (Sn)-Dissolved			97.7		%		80-120	25-JUL-19
Titanium (Ti)-Dissolved			95.5		%		80-120	25-JUL-19
Tungsten (W)-Dissolved			106.8		%		80-120	25-JUL-19
Uranium (U)-Dissolved			108.1		%		80-120	25-JUL-19
Vanadium (V)-Dissolved			94.8		%		80-120	25-JUL-19
Zinc (Zn)-Dissolved			99.8		%		80-120	25-JUL-19
Zirconium (Zr)-Dissolved			108.0		%		80-120	25-JUL-19
WG3113580-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	25-JUL-19
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	25-JUL-19
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	25-JUL-19
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	25-JUL-19
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	25-JUL-19
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	25-JUL-19
Boron (B)-Dissolved			<0.010		mg/L		0.01	25-JUL-19
Cadmium (Cd)-Dissolved			<0.000005C		mg/L		0.000005	25-JUL-19
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	25-JUL-19
Cesium (Cs)-Dissolved			<0.000010		mg/L		0.00001	25-JUL-19
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	25-JUL-19
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	25-JUL-19
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	25-JUL-19
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	25-JUL-19
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	25-JUL-19
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	25-JUL-19
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	25-JUL-19
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	25-JUL-19
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	25-JUL-19
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	25-JUL-19
Phosphorus (P)-Dissolved			<0.050		mg/L		0.05	25-JUL-19
Potassium (K)-Dissolved			<0.050		mg/L		0.05	25-JUL-19
Rubidium (Rb)-Dissolved			<0.00020		mg/L		0.0002	25-JUL-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R4724308								
WG3113580-1 MB		**NP**						
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	25-JUL-19
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	25-JUL-19
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	25-JUL-19
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	25-JUL-19
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	25-JUL-19
Sulfur (S)-Dissolved			<0.50		mg/L		0.5	25-JUL-19
Tellurium (Te)-Dissolved			<0.00020		mg/L		0.0002	25-JUL-19
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	25-JUL-19
Thorium (Th)-Dissolved			<0.00010		mg/L		0.0001	25-JUL-19
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	25-JUL-19
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	25-JUL-19
Tungsten (W)-Dissolved			<0.00010		mg/L		0.0001	25-JUL-19
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	25-JUL-19
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	25-JUL-19
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	25-JUL-19
Zirconium (Zr)-Dissolved			<0.00020		mg/L		0.0002	25-JUL-19
WG3113580-4 MS		**L2313871-3**						
Aluminum (Al)-Dissolved			99.3		%		70-130	25-JUL-19
Antimony (Sb)-Dissolved			101.6		%		70-130	25-JUL-19
Arsenic (As)-Dissolved			101.3		%		70-130	25-JUL-19
Barium (Ba)-Dissolved			N/A	MS-B	%		-	25-JUL-19
Beryllium (Be)-Dissolved			98.2		%		70-130	25-JUL-19
Bismuth (Bi)-Dissolved			97.6		%		70-130	25-JUL-19
Boron (B)-Dissolved			100.5		%		70-130	25-JUL-19
Cadmium (Cd)-Dissolved			103.6		%		70-130	25-JUL-19
Calcium (Ca)-Dissolved			N/A	MS-B	%		-	25-JUL-19
Cesium (Cs)-Dissolved			104.9		%		70-130	25-JUL-19
Chromium (Cr)-Dissolved			101.1		%		70-130	25-JUL-19
Cobalt (Co)-Dissolved			99.4		%		70-130	25-JUL-19
Copper (Cu)-Dissolved			98.3		%		70-130	25-JUL-19
Iron (Fe)-Dissolved			97.6		%		70-130	25-JUL-19
Lead (Pb)-Dissolved			101.8		%		70-130	25-JUL-19
Lithium (Li)-Dissolved			96.8		%		70-130	25-JUL-19
Magnesium (Mg)-Dissolved			N/A	MS-B	%		-	25-JUL-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R4724308								
WG3113580-4 MS		**L2313871-3**						
Manganese (Mn)-Dissolved			N/A	MS-B	%		-	25-JUL-19
Molybdenum (Mo)-Dissolved			99.9		%		70-130	25-JUL-19
Nickel (Ni)-Dissolved			98.2		%		70-130	25-JUL-19
Phosphorus (P)-Dissolved			99.5		%		70-130	25-JUL-19
Potassium (K)-Dissolved			103.8		%		70-130	25-JUL-19
Rubidium (Rb)-Dissolved			99.5		%		70-130	25-JUL-19
Selenium (Se)-Dissolved			104.1		%		70-130	25-JUL-19
Silicon (Si)-Dissolved			94.7		%		70-130	25-JUL-19
Silver (Ag)-Dissolved			77.8		%		70-130	25-JUL-19
Sodium (Na)-Dissolved			N/A	MS-B	%		-	25-JUL-19
Strontium (Sr)-Dissolved			N/A	MS-B	%		-	25-JUL-19
Sulfur (S)-Dissolved			103.5		%		70-130	25-JUL-19
Tellurium (Te)-Dissolved			106.9		%		70-130	25-JUL-19
Thallium (Tl)-Dissolved			97.4		%		70-130	25-JUL-19
Thorium (Th)-Dissolved			109.7		%		70-130	25-JUL-19
Tin (Sn)-Dissolved			99.9		%		70-130	25-JUL-19
Titanium (Ti)-Dissolved			100.5		%		70-130	25-JUL-19
Tungsten (W)-Dissolved			102.3		%		70-130	25-JUL-19
Uranium (U)-Dissolved			100.9		%		70-130	25-JUL-19
Vanadium (V)-Dissolved			97.3		%		70-130	25-JUL-19
Zinc (Zn)-Dissolved			103.0		%		70-130	25-JUL-19
Zirconium (Zr)-Dissolved			100.7		%		70-130	25-JUL-19
MET-T-CCMS-VA	**Water**							
Batch R4721081								
WG3112662-2 LCS								
Aluminum (Al)-Total			106.1		%		80-120	23-JUL-19
Antimony (Sb)-Total			107.5		%		80-120	23-JUL-19
Arsenic (As)-Total			104.6		%		80-120	23-JUL-19
Barium (Ba)-Total			108.1		%		80-120	23-JUL-19
Beryllium (Be)-Total			96.3		%		80-120	23-JUL-19
Bismuth (Bi)-Total			103.2		%		80-120	23-JUL-19
Boron (B)-Total			92.4		%		80-120	23-JUL-19
Cadmium (Cd)-Total			107.0		%		80-120	23-JUL-19
Calcium (Ca)-Total			100.4		%		80-120	23-JUL-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R4721081								
WG3112662-2 LCS								
Cesium (Cs)-Total			99.0		%		80-120	23-JUL-19
Chromium (Cr)-Total			103.8		%		80-120	23-JUL-19
Cobalt (Co)-Total			103.8		%		80-120	23-JUL-19
Copper (Cu)-Total			103.1		%		80-120	23-JUL-19
Iron (Fe)-Total			109.3		%		80-120	23-JUL-19
Lead (Pb)-Total			104.7		%		80-120	23-JUL-19
Lithium (Li)-Total			95.5		%		80-120	23-JUL-19
Magnesium (Mg)-Total			105.6		%		80-120	23-JUL-19
Manganese (Mn)-Total			110.3		%		80-120	23-JUL-19
Molybdenum (Mo)-Total			99.7		%		80-120	23-JUL-19
Nickel (Ni)-Total			103.4		%		80-120	23-JUL-19
Phosphorus (P)-Total			104.3		%		80-120	23-JUL-19
Potassium (K)-Total			105.7		%		80-120	23-JUL-19
Rubidium (Rb)-Total			107.6		%		80-120	23-JUL-19
Selenium (Se)-Total			102.6		%		80-120	23-JUL-19
Silicon (Si)-Total			110.2		%		80-120	23-JUL-19
Silver (Ag)-Total			102.1		%		80-120	23-JUL-19
Sodium (Na)-Total			105.0		%		80-120	23-JUL-19
Strontium (Sr)-Total			101.1		%		80-120	23-JUL-19
Sulfur (S)-Total			97.4		%		80-120	23-JUL-19
Tellurium (Te)-Total			105.2		%		80-120	23-JUL-19
Thallium (Tl)-Total			102.7		%		80-120	23-JUL-19
Thorium (Th)-Total			97.8		%		80-120	23-JUL-19
Tin (Sn)-Total			103.5		%		80-120	23-JUL-19
Titanium (Ti)-Total			100.8		%		80-120	23-JUL-19
Tungsten (W)-Total			107.0		%		80-120	23-JUL-19
Uranium (U)-Total			104.3		%		80-120	23-JUL-19
Vanadium (V)-Total			106.1		%		80-120	23-JUL-19
Zinc (Zn)-Total			106.1		%		80-120	23-JUL-19
Zirconium (Zr)-Total			101.5		%		80-120	23-JUL-19
WG3112662-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	23-JUL-19
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	23-JUL-19
Arsenic (As)-Total			<0.00010		mg/L		0.0001	23-JUL-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R4721081								
WG3112662-1 MB								
Barium (Ba)-Total			<0.00010		mg/L		0.0001	23-JUL-19
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	23-JUL-19
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	23-JUL-19
Boron (B)-Total			<0.010		mg/L		0.01	23-JUL-19
Cadmium (Cd)-Total			<0.0000050		mg/L		0.000005	23-JUL-19
Calcium (Ca)-Total			<0.050		mg/L		0.05	23-JUL-19
Cesium (Cs)-Total			<0.000010		mg/L		0.00001	23-JUL-19
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	23-JUL-19
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	23-JUL-19
Copper (Cu)-Total			<0.00050		mg/L		0.0005	23-JUL-19
Iron (Fe)-Total			<0.010		mg/L		0.01	23-JUL-19
Lead (Pb)-Total			<0.000050		mg/L		0.00005	23-JUL-19
Lithium (Li)-Total			<0.0010		mg/L		0.001	23-JUL-19
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	23-JUL-19
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	23-JUL-19
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	23-JUL-19
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	23-JUL-19
Phosphorus (P)-Total			<0.050		mg/L		0.05	23-JUL-19
Potassium (K)-Total			<0.050		mg/L		0.05	23-JUL-19
Rubidium (Rb)-Total			<0.00020		mg/L		0.0002	23-JUL-19
Selenium (Se)-Total			<0.000050		mg/L		0.00005	23-JUL-19
Silicon (Si)-Total			<0.10		mg/L		0.1	23-JUL-19
Silver (Ag)-Total			<0.000010		mg/L		0.00001	23-JUL-19
Sodium (Na)-Total			<0.050		mg/L		0.05	23-JUL-19
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	23-JUL-19
Sulfur (S)-Total			<0.50		mg/L		0.5	23-JUL-19
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	23-JUL-19
Thorium (Th)-Total			<0.00010		mg/L		0.0001	23-JUL-19
Tin (Sn)-Total			<0.00010		mg/L		0.0001	23-JUL-19
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	23-JUL-19
Tungsten (W)-Total			<0.00010		mg/L		0.0001	23-JUL-19
Uranium (U)-Total			<0.000010		mg/L		0.00001	23-JUL-19
Vanadium (V)-Total			<0.00050		mg/L		0.0005	23-JUL-19
Zinc (Zn)-Total			<0.0030		mg/L		0.003	23-JUL-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R4721081								
WG3112662-1 MB								
Zirconium (Zr)-Total			<0.00020		mg/L		0.0002	23-JUL-19
Batch R4723949								
WG3112662-1 MB								
Tellurium (Te)-Total			<0.00020		mg/L		0.0002	24-JUL-19
NH3-F-VA	**Water**							
Batch R4731212								
WG3117566-2 LCS								
Ammonia, Total (as N)			93.4		%		85-115	30-JUL-19
WG3117566-1 MB								
Ammonia, Total (as N)			<0.0050		mg/L		0.005	30-JUL-19
WG3117566-4 MS		**L2313871-1**						
Ammonia, Total (as N)			104.7		%		75-125	30-JUL-19
NO2-L-IC-N-VA	**Water**							
Batch R4720008								
WG3111290-2 LCS								
Nitrite (as N)			102.2		%		90-110	22-JUL-19
WG3111290-1 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	22-JUL-19
NO3-L-IC-N-VA	**Water**							
Batch R4720008								
WG3111290-2 LCS								
Nitrate (as N)			100.8		%		90-110	22-JUL-19
WG3111290-1 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	22-JUL-19
Batch R4725830								
WG3114602-2 LCS								
Nitrate (as N)			101.6		%		90-110	24-JUL-19
WG3114602-1 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	24-JUL-19
WG3114602-4 MS		**L2313871-5**						
Nitrate (as N)			104.7		%		75-125	24-JUL-19
P-T-PRES-COL-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
P-T-PRES-COL-VA	**Water**							
Batch R4729519								
WG3117584-2 LCS								
Phosphorus (P)-Total			102.1		%		80-120	29-JUL-19
WG3117584-1 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	29-JUL-19
PO4-DO-COL-VA	**Water**							
Batch R4720133								
WG3111295-2 CRM		**VA-OPO4-CONTROL**						
Orthophosphate-Dissolved (as P)			103.2		%		80-120	22-JUL-19
WG3111295-1 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	22-JUL-19
SO4-IC-N-VA	**Water**							
Batch R4720008								
WG3111290-2 LCS								
Sulfate (SO4)			100.9		%		90-110	22-JUL-19
WG3111290-1 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	22-JUL-19
TKN-F-VA	**Water**							
Batch R4730362								
WG3117592-2 LCS								
Total Kjeldahl Nitrogen			102.4		%		75-125	29-JUL-19
WG3117592-1 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	29-JUL-19
TSS-VA	**Water**							
Batch R4723717								
WG3112436-9 DUP		**L2313871-6**						
Total Suspended Solids		11.2	11.2		mg/L	0.0	20	23-JUL-19
WG3112436-5 LCS								
Total Suspended Solids			94.9		%		85-115	23-JUL-19
WG3112436-8 LCS								
Total Suspended Solids			87.7		%		85-115	23-JUL-19
WG3112436-4 MB								
Total Suspended Solids			<3.0		mg/L		3	23-JUL-19
WG3112436-7 MB								
Total Suspended Solids			<3.0		mg/L		3	23-JUL-19

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
MES	Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
pH by Meter (Automated)							
	1	17-JUL-19 14:10	22-JUL-19 09:40	0.25	115	hours	EHTR-FM
	2	17-JUL-19 12:45	22-JUL-19 09:40	0.25	117	hours	EHTR-FM
	3	17-JUL-19 15:00	22-JUL-19 09:40	0.25	115	hours	EHTR-FM
	4	17-JUL-19 13:25	22-JUL-19 09:40	0.25	116	hours	EHTR-FM
	5	17-JUL-19 12:00	22-JUL-19 09:40	0.25	118	hours	EHTR-FM
	6	17-JUL-19 12:00	22-JUL-19 09:40	0.25	118	hours	EHTR-FM
Anions and Nutrients							
Diss. Orthophosphate in Water by Colour							
	1	17-JUL-19 14:10	22-JUL-19 10:06	3	5	days	EHTL
	2	17-JUL-19 12:45	22-JUL-19 10:06	3	5	days	EHTL
	3	17-JUL-19 15:00	22-JUL-19 10:06	3	5	days	EHTL
	4	17-JUL-19 13:25	22-JUL-19 10:09	3	5	days	EHTL
	5	17-JUL-19 12:00	22-JUL-19 10:09	3	5	days	EHTL
	6	17-JUL-19 12:00	22-JUL-19 10:09	3	5	days	EHTL
Nitrate in Water by IC (Low Level)							
	1	17-JUL-19 14:10	22-JUL-19 11:04	3	5	days	EHTL
	2	17-JUL-19 12:45	22-JUL-19 11:04	3	5	days	EHTL
	3	17-JUL-19 15:00	22-JUL-19 11:04	3	5	days	EHTL
	4	17-JUL-19 13:25	22-JUL-19 11:04	3	5	days	EHTL
	5	17-JUL-19 12:00	24-JUL-19 06:36	3	7	days	EHTL
	6	17-JUL-19 12:00	22-JUL-19 11:04	3	5	days	EHTL
Nitrite in Water by IC (Low Level)							
	1	17-JUL-19 14:10	22-JUL-19 11:04	3	5	days	EHTL
	2	17-JUL-19 12:45	22-JUL-19 11:04	3	5	days	EHTL
	3	17-JUL-19 15:00	22-JUL-19 11:04	3	5	days	EHTL
	4	17-JUL-19 13:25	22-JUL-19 11:04	3	5	days	EHTL
	5	17-JUL-19 12:00	22-JUL-19 11:04	3	5	days	EHTL
	6	17-JUL-19 12:00	22-JUL-19 11:04	3	5	days	EHTL
Aggregate Organics							
Biochemical Oxygen Demand- 5 day							
	1	17-JUL-19 14:10	21-JUL-19 12:36	3	4	days	EHTL
	2	17-JUL-19 12:45	21-JUL-19 12:36	3	4	days	EHTL
	3	17-JUL-19 15:00	21-JUL-19 12:36	3	4	days	EHTL
	4	17-JUL-19 13:25	21-JUL-19 12:36	3	4	days	EHTL
	5	17-JUL-19 12:00	21-JUL-19 12:36	3	4	days	EHTL
	6	17-JUL-19 12:00	21-JUL-19 12:36	3	4	days	EHTL

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2313871 were received on 20-JUL-19 10:55.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

Quality Control Report

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

L2313871-COFC

COC Number: 17 -

Page 1 of

Report To	Contact and company name below will appear on the final report
Company:	Regional District of Kitimat-Stikine
Contact:	Chris Kerr
Phone:	250-641-4141
	Company address below will appear on the final report
Street:	4545 Lazelle Avenue
City/Province:	Terrace/BC
Postal Code:	V8G4E1
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	Regional District of Kitimat-Stikine
Contact:	Roger Tooms

Report Format	
Select Report Format:	☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ YES ☐ NO
☑ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	rtooms@rdks.bc.ca
Email 2	ckerr@rdks.bc.ca
Email 3	eblaney@rdks.bc.ca
Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	rtooms@rdks.bc.ca
Email 2	ckerr@rdks.bc.ca; eblaney@rdks.bc.ca

Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)		EMERGENCY	
	4 day [P4-20%] ☐		1 Business day [E1 - 100%] ☐
	3 day [P3-25%] ☐		Same Day, Weekend or Statutory holiday [E2 -200% (Laboratory opening fees may apply)] ☐
	2 day [P2-50%] ☐		

Date and Time Required for all E&P TATs:

For tests that can not be performed according to the service level selected, you will be contacted.

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:		AFE/Cost Center:	PO#
Job #:	Thornhill Transfer Station Surface Water	Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	

ALS Lab Work Order # (lab use only): **ALS Contact:** **Sampler:** Chris Kerr

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Dissolved metals (F/P)	Total metals (P)	Alkilinity (as CaCO3)	Total Hardness	Dissolved Hardness	Ammonia (P)	Fluoride, Chloride	COD and BOD (P)	Sulphate	Nitrate and Nitrite	TSS	total Kjeldahl nitrogen- (P)	pH, Conductivity	Total phosphorus (P)	ortho-phosphorus (P)	SAMPLES ON HOLD	Sample is hazardous (please provide further details)	NUMBER OF CONTAINERS
	SW-1	17/07/19	2:10	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			7
	SW-3	"	12:45	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			7
	SW-6	"	3:00	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			7
	SW-21	"	1:25	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			7
	TRAVEL BLANK	"	12:00	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			5
	DUP	"	12:00	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			7

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☑ NO

Are samples for human consumption/ use? ☐ YES ☑ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

British Columbia Approved and Working Water Quality Guidelines (MAY, 2015)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☒ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☒

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
9.9							

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
	July 17/19	13:35	Jennifer Boussard	July 17/19	15:35		2017 07 19	10:55

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

SEPT 2017 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

REGIONAL DISTRICT OF KITIMAT-STIKINE
ATTN: Chris Kerr
300 - 4545 Lazelle Avenue
Terrace BC V8G 4E1

Date Received: 10-OCT-19
Report Date: 25-OCT-19 14:12 (MT)
Version: FINAL

Client Phone: 250-615-6100

Certificate of Analysis

Lab Work Order #: L2364066

Project P.O. #: NOT SUBMITTED
Job Reference: THORNHILL TRANSFER STATION SURFACE WATER
C of C Numbers:
Legal Site Desc:

Amber Springer, B.Sc
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2364066-1 Water 10-OCT-19 11:50 SW-1	L2364066-2 Water 10-OCT-19 10:00 SW-3	L2364066-3 Water 10-OCT-19 09:15 SW-6	L2364066-4 Water 10-OCT-19 11:50 SW-21	L2364066-5 Water 10-OCT-19 12:00 FIELD BLANK
WATER						
Physical Tests	Conductivity (uS/cm)	64.8	1740	130	638	<2.0 HTC
	Hardness (as CaCO3) (mg/L)	29.6	531	59.9	217	<0.50
	pH (pH)	7.69	7.06	7.99	8.42	5.63
	Total Suspended Solids (mg/L)	<3.0	109	3.8	4.6	
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	29.6	856	64.0	289	<1.0
	Ammonia, Total (as N) (mg/L)	<0.0050	67.6	<0.0050	5.60	<0.0050
	Chloride (Cl) (mg/L)	<0.50	83.1 DLDS	0.95	28.1 DLDS	
	Fluoride (F) (mg/L)	<0.020	<0.20	<0.020	<0.10	
	Nitrate (as N) (mg/L)	0.0529	0.111 DLDS	0.0715	2.64	
	Nitrite (as N) (mg/L)	<0.0010	<0.010	<0.0010	0.0256	
	Total Kjeldahl Nitrogen (mg/L)	0.077	64.3	<0.050	7.14	
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Phosphorus (P)-Total (mg/L)	0.0024	0.412 DLDS	0.0037	0.0307	
	Sulfate (SO4) (mg/L)	1.03	<3.0	2.08	4.7	
Total Metals	Aluminum (Al)-Total (mg/L)	0.0397	0.0981	0.0677	0.186	
	Antimony (Sb)-Total (mg/L)	<0.00010	0.00013	<0.00010	<0.00010	
	Arsenic (As)-Total (mg/L)	<0.00010	0.0232	0.00014	0.00072	
	Barium (Ba)-Total (mg/L)	0.0206	0.898	0.0180	0.154	
	Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Boron (B)-Total (mg/L)	<0.010	2.13	<0.010	0.717	
	Cadmium (Cd)-Total (mg/L)	<0.0000050	0.0000059	<0.0000050	0.0000113	
	Calcium (Ca)-Total (mg/L)	10.6	164	23.9	66.1	<0.050
	Cesium (Cs)-Total (mg/L)	<0.000010	0.000260	<0.000010	0.000046	
	Chromium (Cr)-Total (mg/L)	0.00012	0.00123	0.00013	0.00044	
	Cobalt (Co)-Total (mg/L)	<0.00010	0.00290	<0.00010	0.00064	
	Copper (Cu)-Total (mg/L)	0.00061	<0.00050	0.00070	0.00186	
	Iron (Fe)-Total (mg/L)	0.030	47.5	0.103	0.284	
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	0.000073	
	Lithium (Li)-Total (mg/L)	<0.0010	0.0031	<0.0010	<0.0010	
	Magnesium (Mg)-Total (mg/L)	0.710	32.1	0.919	13.4	<0.10
	Manganese (Mn)-Total (mg/L)	0.00435	2.70	0.0128	0.355	
	Mercury (Hg)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	
	Molybdenum (Mo)-Total (mg/L)	0.000186	0.000371	0.000515	0.000439	
	Nickel (Ni)-Total (mg/L)	<0.00050	0.00454	<0.00050	0.00179	
	Phosphorus (P)-Total (mg/L)	<0.050	0.461	<0.050	<0.050	
	Potassium (K)-Total (mg/L)	0.684	64.6	0.912	18.3	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2364066-6
	Description	Water
	Sampled Date	10-OCT-19
	Sampled Time	12:00
	Client ID	DUP
Grouping	**Analyte**	
WATER		
Physical Tests	Conductivity (uS/cm)	635
	Hardness (as CaCO3) (mg/L)	218
	pH (pH)	8.43
	Total Suspended Solids (mg/L)	4.0
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	284
	Ammonia, Total (as N) (mg/L)	5.64
	Chloride (Cl) (mg/L)	27.8
	Fluoride (F) (mg/L)	<0.10 DLDS
	Nitrate (as N) (mg/L)	2.56
	Nitrite (as N) (mg/L)	0.0268
	Total Kjeldahl Nitrogen (mg/L)	6.56
	Orthophosphate-Dissolved (as P) (mg/L)	0.0012
	Phosphorus (P)-Total (mg/L)	0.0327
	Sulfate (SO4) (mg/L)	4.6
Total Metals	Aluminum (Al)-Total (mg/L)	0.184
	Antimony (Sb)-Total (mg/L)	<0.00010
	Arsenic (As)-Total (mg/L)	0.00069
	Barium (Ba)-Total (mg/L)	0.153
	Beryllium (Be)-Total (mg/L)	<0.00010
	Bismuth (Bi)-Total (mg/L)	<0.000050
	Boron (B)-Total (mg/L)	0.703
	Cadmium (Cd)-Total (mg/L)	0.0000104
	Calcium (Ca)-Total (mg/L)	67.6
	Cesium (Cs)-Total (mg/L)	0.000044
	Chromium (Cr)-Total (mg/L)	0.00038
	Cobalt (Co)-Total (mg/L)	0.00064
	Copper (Cu)-Total (mg/L)	0.00180
	Iron (Fe)-Total (mg/L)	0.278
	Lead (Pb)-Total (mg/L)	0.000071
	Lithium (Li)-Total (mg/L)	<0.0010
	Magnesium (Mg)-Total (mg/L)	13.2
	Manganese (Mn)-Total (mg/L)	0.353
	Mercury (Hg)-Total (mg/L)	<0.0000050
	Molybdenum (Mo)-Total (mg/L)	0.000423
	Nickel (Ni)-Total (mg/L)	0.00176
	Phosphorus (P)-Total (mg/L)	<0.050
	Potassium (K)-Total (mg/L)	18.1

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2364066-1 Water 10-OCT-19 11:50 SW-1	L2364066-2 Water 10-OCT-19 10:00 SW-3	L2364066-3 Water 10-OCT-19 09:15 SW-6	L2364066-4 Water 10-OCT-19 11:50 SW-21	L2364066-5 Water 10-OCT-19 12:00 FIELD BLANK
WATER						
Total Metals	Rubidium (Rb)-Total (mg/L)	0.00089	0.0502	0.00104	0.0114	
	Selenium (Se)-Total (mg/L)	0.000052	0.000145	<0.000050	0.000146	
	Silicon (Si)-Total (mg/L)	2.51	12.1	3.04	4.81	
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Sodium (Na)-Total (mg/L)	1.03	107	1.38	34.0	
	Strontium (Sr)-Total (mg/L)	0.0410	1.12	0.0528	0.415	
	Sulfur (S)-Total (mg/L)	<0.50	1.17	0.74	2.47	
	Tellurium (Te)-Total (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	
	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Thorium (Th)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Tin (Sn)-Total (mg/L)	0.00052	0.00025	<0.00010	<0.00010	
	Titanium (Ti)-Total (mg/L)	0.00075	0.00561	0.00169	0.00393	
	Tungsten (W)-Total (mg/L)	<0.00010	0.00012	<0.00010	<0.00010	
	Uranium (U)-Total (mg/L)	0.000013	0.000031	0.000109	0.000161	
	Vanadium (V)-Total (mg/L)	<0.00050	0.00325	<0.00050	0.00055	
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	
	Zirconium (Zr)-Total (mg/L)	<0.00020	0.00062	<0.00020	<0.00020	
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	
	Aluminum (Al)-Dissolved (mg/L)	0.0334	0.0201	0.0328	0.0169	
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	0.00013	<0.00010	<0.00010	
	Arsenic (As)-Dissolved (mg/L)	<0.00010	0.0285	0.00012	0.00062	
	Barium (Ba)-Dissolved (mg/L)	0.0218	0.776	0.0182	0.137	
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Boron (B)-Dissolved (mg/L)	<0.010	1.89	<0.010	0.665	
	Cadmium (Cd)-Dissolved (mg/L)	<0.0000050	<0.0000050	0.0000121	0.0000072	
	Calcium (Ca)-Dissolved (mg/L)	10.6	155	22.4	63.2	
	Cesium (Cs)-Dissolved (mg/L)	<0.000010	0.000265	<0.000010	0.000036	
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	0.00126	<0.00010	0.00026	
	Cobalt (Co)-Dissolved (mg/L)	<0.00010	0.00318	<0.00010	0.00062	
	Copper (Cu)-Dissolved (mg/L)	0.00072	0.00023	0.00073	0.00151	
	Iron (Fe)-Dissolved (mg/L)	0.024	54.6	0.080	0.048	
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Lithium (Li)-Dissolved (mg/L)	<0.0010	0.0030	<0.0010	<0.0010	
	Magnesium (Mg)-Dissolved (mg/L)	0.779	35.3	0.971	14.3	
	Manganese (Mn)-Dissolved (mg/L)	0.00478	2.77	0.0123	0.337	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2364066-6				
	Description	Water				
	Sampled Date	10-OCT-19				
	Sampled Time	12:00				
	Client ID	DUP				
Grouping	**Analyte**					
WATER						
Total Metals	Rubidium (Rb)-Total (mg/L)	0.0115				
	Selenium (Se)-Total (mg/L)	0.000167				
	Silicon (Si)-Total (mg/L)	4.65				
	Silver (Ag)-Total (mg/L)	<0.000010				
	Sodium (Na)-Total (mg/L)	35.6				
	Strontium (Sr)-Total (mg/L)	0.414				
	Sulfur (S)-Total (mg/L)	2.47				
	Tellurium (Te)-Total (mg/L)	<0.00020				
	Thallium (Tl)-Total (mg/L)	<0.000010				
	Thorium (Th)-Total (mg/L)	<0.00010				
	Tin (Sn)-Total (mg/L)	<0.00010				
	Titanium (Ti)-Total (mg/L)	0.00378				
	Tungsten (W)-Total (mg/L)	<0.00010				
	Uranium (U)-Total (mg/L)	0.000159				
	Vanadium (V)-Total (mg/L)	0.00055				
	Zinc (Zn)-Total (mg/L)	<0.0030				
	Zirconium (Zr)-Total (mg/L)	<0.00020				
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD				
	Dissolved Metals Filtration Location	FIELD				
	Aluminum (Al)-Dissolved (mg/L)	0.0183				
	Antimony (Sb)-Dissolved (mg/L)	<0.00010				
	Arsenic (As)-Dissolved (mg/L)	0.00059				
	Barium (Ba)-Dissolved (mg/L)	0.140				
	Beryllium (Be)-Dissolved (mg/L)	<0.00010				
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050				
	Boron (B)-Dissolved (mg/L)	0.648				
	Cadmium (Cd)-Dissolved (mg/L)	0.0000108				
	Calcium (Ca)-Dissolved (mg/L)	63.5				
	Cesium (Cs)-Dissolved (mg/L)	0.000039				
	Chromium (Cr)-Dissolved (mg/L)	0.00025				
	Cobalt (Co)-Dissolved (mg/L)	0.00061				
	Copper (Cu)-Dissolved (mg/L)	0.00163				
	Iron (Fe)-Dissolved (mg/L)	0.052				
	Lead (Pb)-Dissolved (mg/L)	<0.000050				
	Lithium (Li)-Dissolved (mg/L)	<0.0010				
	Magnesium (Mg)-Dissolved (mg/L)	14.4				
	Manganese (Mn)-Dissolved (mg/L)	0.342				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2364066-1	L2364066-2	L2364066-3	L2364066-4	L2364066-5
Description	Water	Water	Water	Water	Water
Sampled Date	10-OCT-19	10-OCT-19	10-OCT-19	10-OCT-19	10-OCT-19
Sampled Time	11:50	10:00	09:15	11:50	12:00
Client ID	SW-1	SW-3	SW-6	SW-21	FIELD BLANK
Grouping / **Analyte**					
WATER					
Dissolved Metals Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	
Molybdenum (Mo)-Dissolved (mg/L)	0.000207	0.000394	0.000548	0.000485	
Nickel (Ni)-Dissolved (mg/L)	<0.00050	0.00501	<0.00050	0.00173	
Phosphorus (P)-Dissolved (mg/L)	<0.050	0.236	<0.050	<0.050	
Potassium (K)-Dissolved (mg/L)	0.757	65.7	0.932	19.1	
Rubidium (Rb)-Dissolved (mg/L)	0.00090	0.0519	0.00113	0.0119	
Selenium (Se)-Dissolved (mg/L)	<0.000050	0.000223	<0.000050	0.000148	
Silicon (Si)-Dissolved (mg/L)	2.50	12.0	3.02	4.52	
Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
Sodium (Na)-Dissolved (mg/L)	1.07	116	1.43	37.5	
Strontium (Sr)-Dissolved (mg/L)	0.0436	1.12	0.0555	0.415	
Sulfur (S)-Dissolved (mg/L)	<0.50	1.23	0.64	2.45	
Tellurium (Te)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	
Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
Thorium (Th)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
Tin (Sn)-Dissolved (mg/L)	<0.00010	0.00021	<0.00010	<0.00010	
Titanium (Ti)-Dissolved (mg/L)	0.00031	0.00325	0.00088	<0.00090 DLM	
Tungsten (W)-Dissolved (mg/L)	<0.00010	0.00013	<0.00010	<0.00010	
Uranium (U)-Dissolved (mg/L)	0.000013	0.000033	0.000112	0.000167	
Vanadium (V)-Dissolved (mg/L)	<0.00050	0.00297	<0.00050	<0.00050	
Zinc (Zn)-Dissolved (mg/L)	<0.0010	0.0013	<0.0010	<0.0010	
Zirconium (Zr)-Dissolved (mg/L)	<0.00020	0.00056	<0.00020	<0.00020	
Aggregate Organics BOD (mg/L)	<2.0	6.0	<2.0	2.4	
COD (mg/L)	<20	150	<20	47	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2364066-6				
	Description	Water				
	Sampled Date	10-OCT-19				
	Sampled Time	12:00				
	Client ID	DUP				
Grouping	**Analyte**					
WATER						
Dissolved Metals	Mercury (Hg)-Dissolved (mg/L)	<0.0000050				
	Molybdenum (Mo)-Dissolved (mg/L)	0.000465				
	Nickel (Ni)-Dissolved (mg/L)	0.00190				
	Phosphorus (P)-Dissolved (mg/L)	<0.050				
	Potassium (K)-Dissolved (mg/L)	19.0				
	Rubidium (Rb)-Dissolved (mg/L)	0.0122				
	Selenium (Se)-Dissolved (mg/L)	0.000156				
	Silicon (Si)-Dissolved (mg/L)	4.49				
	Silver (Ag)-Dissolved (mg/L)	<0.000010				
	Sodium (Na)-Dissolved (mg/L)	38.0				
	Strontium (Sr)-Dissolved (mg/L)	0.412				
	Sulfur (S)-Dissolved (mg/L)	2.80				
	Tellurium (Te)-Dissolved (mg/L)	<0.00020				
	Thallium (Tl)-Dissolved (mg/L)	<0.000010				
	Thorium (Th)-Dissolved (mg/L)	<0.00010				
	Tin (Sn)-Dissolved (mg/L)	<0.00010				
	Titanium (Ti)-Dissolved (mg/L)	0.00085				
	Tungsten (W)-Dissolved (mg/L)	<0.00010				
	Uranium (U)-Dissolved (mg/L)	0.000163				
	Vanadium (V)-Dissolved (mg/L)	<0.00050				
	Zinc (Zn)-Dissolved (mg/L)	<0.0010				
	Zirconium (Zr)-Dissolved (mg/L)	<0.00020				
Aggregate Organics	BOD (mg/L)	2.4				
	COD (mg/L)	52				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2364066-1, -2, -3, -4, -6
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2364066-1, -2, -3, -4, -6
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2364066-1, -2, -3, -4, -6
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L2364066-1, -2, -3, -4, -6
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2364066-1, -2, -3, -4, -6
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2364066-1, -2, -3, -4, -6
Matrix Spike	Calcium (Ca)-Total	MS-B	L2364066-1, -2, -3, -4, -5, -6
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2364066-1, -2, -3, -4, -5, -6
Matrix Spike	Strontium (Sr)-Total	MS-B	L2364066-1, -2, -3, -4, -5, -6

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
HTC	Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-TITR-VA	Water	Alkalinity Species by Titration	APHA 2320 Alkalinity

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

BOD5-VA	Water	Biochemical Oxygen Demand- 5 day	APHA 5210 B- BIOCHEMICAL OXYGEN DEMAND

This analysis is carried out using procedures adapted from APHA Method 5210 B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.

CL-IC-N-VA	Water	Chloride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

COD-COL-VA	Water	Chemical Oxygen Demand by Colorimetric	APHA 5220 D. CHEMICAL OXYGEN DEMAND

This analysis is carried out using procedures adapted from APHA Method 5220 "Chemical Oxygen Demand (COD)". Chemical oxygen demand is determined using the closed reflux colourimetric method.

EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.

This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.

EC-SCREEN-VA	Water	Conductivity Screen (Internal Use Only)	APHA 2510

Qualitative analysis of conductivity where required during preparation of other tests - e.g. TDS, metals, etc.

F-IC-N-VA	Water	Fluoride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-VA	Water	Hardness	APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA	Water	Diss. Mercury in Water by CVAAS or CVAFS	APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-CVAA-VA	Water	Total Mercury in Water by CVAAS or CVAFS	EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

MET-D-CCMS-VA	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Reference Information

MET-T-CCMS-VA	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NH3-F-VA	Water	Ammonia in Water by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-VA	Water	Nitrite in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-VA	Water	Nitrate in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

P-T-PRES-COL-VA	Water	Total P in Water by Colour	APHA 4500-P Phosphorus

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.
Samples with very high dissolved solids (i.e. seawaters, brackish waters) may produce a negative bias by this method. Alternate methods are available for these types of samples.

Arsenic (5+), at elevated levels, is a positive interference on colourimetric phosphate analysis.

PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PO4-DO-COL-VA	Water	Diss. Orthophosphate in Water by Colour	APHA 4500-P Phosphorus

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.
Samples with very high dissolved solids (i.e. seawaters, brackish waters) may produce a negative bias by this method. Alternate methods are available for these types of samples.

Arsenic (5+), at elevated levels, is a positive interference on colourimetric phosphate analysis.

SO4-IC-N-VA	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

TKN-F-VA	Water	TKN in Water by Fluorescence	APHA 4500-NORG D.

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

TSS-VA	Water	Total Suspended Solids by Gravimetric	APHA 2540 D - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.
Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

Reference Information

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L2364066 Report Date: 25-OCT-19

Client: REGIONAL DISTRICT OF KITIMAT-STIKINE
300 - 4545 Lazelle Avenue
Terrace BC V8G 4E1
Contact: Chris Kerr

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-TITR-VA	**Water**							
Batch R4871373								
WG3189839-3 LCS								
Alkalinity, Total (as CaCO3)			100.3		%		85-115	15-OCT-19
WG3189839-1 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	15-OCT-19
BOD5-VA	**Water**							
Batch R4874567								
WG3190380-3 DUP		**L2364066-1**						
BOD		<2.0	<2.0	RPD-NA	mg/L	N/A	20	13-OCT-19
WG3190380-2 LCS								
BOD			98.4		%		85-115	13-OCT-19
WG3190380-1 MB								
BOD			<2.0		mg/L		2	13-OCT-19
CL-IC-N-VA	**Water**							
Batch R4868268								
WG3189828-2 LCS								
Chloride (Cl)			95.6		%		90-110	12-OCT-19
WG3189828-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	12-OCT-19
COD-COL-VA	**Water**							
Batch R4883673								
WG3200277-3 LCS								
COD			102.9		%		85-115	24-OCT-19
WG3200277-1 MB								
COD			<20		mg/L		20	24-OCT-19
WG3200277-4 MS		**L2364066-1**						
COD			103.0		%		75-125	24-OCT-19
EC-PCT-VA	**Water**							
Batch R4871373								
WG3189839-3 LCS								
Conductivity			104.9		%		90-110	15-OCT-19
WG3189839-1 MB								
Conductivity			<2.0		uS/cm		2	15-OCT-19
F-IC-N-VA	**Water**							
Batch R4868268								
WG3189828-2 LCS								
Fluoride (F)			96.0		%		90-110	12-OCT-19
WG3189828-1 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F-IC-N-VA	**Water**							
Batch R4868268								
WG3189828-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	12-OCT-19
HG-D-CVAA-VA	**Water**							
Batch R4870900								
WG3190941-10 LCS								
Mercury (Hg)-Dissolved			106.3		%		80-120	15-OCT-19
WG3190941-9 MB								
Mercury (Hg)-Dissolved			<0.000005C		mg/L		0.000005	15-OCT-19
HG-T-CVAA-VA	**Water**							
Batch R4868480								
WG3190451-5 DUP		**L2364066-1**						
Mercury (Hg)-Total		<0.0000050	<0.000005C	RPD-NA	mg/L	N/A	20	13-OCT-19
WG3190451-2 LCS								
Mercury (Hg)-Total			95.7		%		80-120	13-OCT-19
WG3190451-1 MB								
Mercury (Hg)-Total			<0.000005C		mg/L		0.000005	13-OCT-19
WG3190451-6 MS		**L2364066-2**						
Mercury (Hg)-Total			86.0		%		70-130	13-OCT-19
MET-D-CCMS-VA	**Water**							
Batch R4874512								
WG3189751-2 LCS								
Aluminum (Al)-Dissolved			111.2		%		80-120	17-OCT-19
Antimony (Sb)-Dissolved			102.1		%		80-120	17-OCT-19
Arsenic (As)-Dissolved			104.9		%		80-120	17-OCT-19
Barium (Ba)-Dissolved			108.0		%		80-120	17-OCT-19
Beryllium (Be)-Dissolved			99.5		%		80-120	17-OCT-19
Bismuth (Bi)-Dissolved			103.9		%		80-120	17-OCT-19
Boron (B)-Dissolved			100.6		%		80-120	17-OCT-19
Cadmium (Cd)-Dissolved			105.7		%		80-120	17-OCT-19
Calcium (Ca)-Dissolved			100.4		%		80-120	17-OCT-19
Cesium (Cs)-Dissolved			104.7		%		80-120	17-OCT-19
Chromium (Cr)-Dissolved			105.7		%		80-120	17-OCT-19
Cobalt (Co)-Dissolved			104.2		%		80-120	17-OCT-19
Copper (Cu)-Dissolved			102.4		%		80-120	17-OCT-19
Iron (Fe)-Dissolved			102.2		%		80-120	17-OCT-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R4874512								
WG3189751-2 LCS								
Lead (Pb)-Dissolved			102.9		%		80-120	17-OCT-19
Lithium (Li)-Dissolved			101.2		%		80-120	17-OCT-19
Magnesium (Mg)-Dissolved			103.4		%		80-120	17-OCT-19
Manganese (Mn)-Dissolved			107.2		%		80-120	17-OCT-19
Molybdenum (Mo)-Dissolved			105.6		%		80-120	17-OCT-19
Nickel (Ni)-Dissolved			107.9		%		80-120	17-OCT-19
Phosphorus (P)-Dissolved			119.6		%		70-130	17-OCT-19
Potassium (K)-Dissolved			107.4		%		80-120	17-OCT-19
Rubidium (Rb)-Dissolved			111.4		%		80-120	17-OCT-19
Selenium (Se)-Dissolved			99.95		%		80-120	17-OCT-19
Silicon (Si)-Dissolved			104.2		%		60-140	17-OCT-19
Silver (Ag)-Dissolved			103.0		%		80-120	17-OCT-19
Sodium (Na)-Dissolved			105.5		%		80-120	17-OCT-19
Strontium (Sr)-Dissolved			104.7		%		80-120	17-OCT-19
Sulfur (S)-Dissolved			103.2		%		80-120	17-OCT-19
Tellurium (Te)-Dissolved			102.0		%		80-120	17-OCT-19
Thallium (Tl)-Dissolved			102.5		%		80-120	17-OCT-19
Thorium (Th)-Dissolved			101.7		%		80-120	17-OCT-19
Tin (Sn)-Dissolved			103.6		%		80-120	17-OCT-19
Titanium (Ti)-Dissolved			100.7		%		80-120	17-OCT-19
Tungsten (W)-Dissolved			106.1		%		80-120	17-OCT-19
Uranium (U)-Dissolved			104.1		%		80-120	17-OCT-19
Vanadium (V)-Dissolved			105.3		%		80-120	17-OCT-19
Zinc (Zn)-Dissolved			101.8		%		80-120	17-OCT-19
Zirconium (Zr)-Dissolved			101.4		%		80-120	17-OCT-19
WG3189751-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	17-OCT-19
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	17-OCT-19
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	17-OCT-19
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	17-OCT-19
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	17-OCT-19
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	17-OCT-19
Boron (B)-Dissolved			<0.010		mg/L		0.01	17-OCT-19
Cadmium (Cd)-Dissolved			<0.000005(		mg/L		0.000005	17-OCT-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R4874512								
WG3189751-1 MB		**NP**						
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	17-OCT-19
Cesium (Cs)-Dissolved			<0.000010		mg/L		0.00001	17-OCT-19
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	17-OCT-19
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	17-OCT-19
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	17-OCT-19
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	17-OCT-19
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	17-OCT-19
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	17-OCT-19
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	17-OCT-19
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	17-OCT-19
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	17-OCT-19
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	17-OCT-19
Phosphorus (P)-Dissolved			<0.050		mg/L		0.05	17-OCT-19
Potassium (K)-Dissolved			<0.050		mg/L		0.05	17-OCT-19
Rubidium (Rb)-Dissolved			<0.00020		mg/L		0.0002	17-OCT-19
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	17-OCT-19
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	17-OCT-19
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	17-OCT-19
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	17-OCT-19
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	17-OCT-19
Sulfur (S)-Dissolved			<0.50		mg/L		0.5	17-OCT-19
Tellurium (Te)-Dissolved			<0.00020		mg/L		0.0002	17-OCT-19
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	17-OCT-19
Thorium (Th)-Dissolved			<0.00010		mg/L		0.0001	17-OCT-19
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	17-OCT-19
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	17-OCT-19
Tungsten (W)-Dissolved			<0.00010		mg/L		0.0001	17-OCT-19
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	17-OCT-19
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	17-OCT-19
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	17-OCT-19
Zirconium (Zr)-Dissolved			<0.00020		mg/L		0.0002	17-OCT-19
MET-T-CCMS-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R4873468								
WG3190268-2 LCS								
Aluminum (Al)-Total			101.6		%		80-120	17-OCT-19
Antimony (Sb)-Total			107.1		%		80-120	17-OCT-19
Arsenic (As)-Total			100.6		%		80-120	17-OCT-19
Barium (Ba)-Total			110.4		%		80-120	17-OCT-19
Beryllium (Be)-Total			101.8		%		80-120	17-OCT-19
Bismuth (Bi)-Total			100.0		%		80-120	17-OCT-19
Boron (B)-Total			116.0		%		80-120	17-OCT-19
Cadmium (Cd)-Total			101.0		%		80-120	17-OCT-19
Calcium (Ca)-Total			103.4		%		80-120	17-OCT-19
Cesium (Cs)-Total			98.3		%		80-120	17-OCT-19
Chromium (Cr)-Total			98.7		%		80-120	17-OCT-19
Cobalt (Co)-Total			92.8		%		80-120	17-OCT-19
Copper (Cu)-Total			91.8		%		80-120	17-OCT-19
Iron (Fe)-Total			86.2		%		80-120	17-OCT-19
Lead (Pb)-Total			102.1		%		80-120	17-OCT-19
Lithium (Li)-Total			107.2		%		80-120	17-OCT-19
Magnesium (Mg)-Total			101.0		%		80-120	17-OCT-19
Manganese (Mn)-Total			100.6		%		80-120	17-OCT-19
Molybdenum (Mo)-Total			97.9		%		80-120	17-OCT-19
Nickel (Ni)-Total			95.4		%		80-120	17-OCT-19
Phosphorus (P)-Total			104.2		%		80-120	17-OCT-19
Potassium (K)-Total			102.8		%		80-120	17-OCT-19
Rubidium (Rb)-Total			104.1		%		80-120	17-OCT-19
Selenium (Se)-Total			90.8		%		80-120	17-OCT-19
Silicon (Si)-Total			102.3		%		80-120	17-OCT-19
Silver (Ag)-Total			99.0		%		80-120	17-OCT-19
Sodium (Na)-Total			96.0		%		80-120	17-OCT-19
Strontium (Sr)-Total			104.8		%		80-120	17-OCT-19
Sulfur (S)-Total			92.5		%		80-120	17-OCT-19
Tellurium (Te)-Total			106.8		%		80-120	17-OCT-19
Thallium (Tl)-Total			100.1		%		80-120	17-OCT-19
Thorium (Th)-Total			93.8		%		80-120	17-OCT-19
Tin (Sn)-Total			102.1		%		80-120	17-OCT-19
Titanium (Ti)-Total			97.2		%		80-120	17-OCT-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R4873468								
WG3190268-2 LCS								
Tungsten (W)-Total			95.2		%		80-120	17-OCT-19
Uranium (U)-Total			96.8		%		80-120	17-OCT-19
Vanadium (V)-Total			101.9		%		80-120	17-OCT-19
Zinc (Zn)-Total			97.1		%		80-120	17-OCT-19
Zirconium (Zr)-Total			94.7		%		80-120	17-OCT-19
WG3190268-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	17-OCT-19
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	17-OCT-19
Arsenic (As)-Total			<0.00010		mg/L		0.0001	17-OCT-19
Barium (Ba)-Total			<0.00010		mg/L		0.0001	17-OCT-19
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	17-OCT-19
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	17-OCT-19
Boron (B)-Total			<0.010		mg/L		0.01	17-OCT-19
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	17-OCT-19
Calcium (Ca)-Total			<0.050		mg/L		0.05	17-OCT-19
Cesium (Cs)-Total			<0.000010		mg/L		0.00001	17-OCT-19
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	17-OCT-19
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	17-OCT-19
Copper (Cu)-Total			<0.00050		mg/L		0.0005	17-OCT-19
Iron (Fe)-Total			<0.010		mg/L		0.01	17-OCT-19
Lead (Pb)-Total			<0.000050		mg/L		0.00005	17-OCT-19
Lithium (Li)-Total			<0.0010		mg/L		0.001	17-OCT-19
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	17-OCT-19
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	17-OCT-19
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	17-OCT-19
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	17-OCT-19
Phosphorus (P)-Total			<0.050		mg/L		0.05	17-OCT-19
Potassium (K)-Total			<0.050		mg/L		0.05	17-OCT-19
Rubidium (Rb)-Total			<0.00020		mg/L		0.0002	17-OCT-19
Selenium (Se)-Total			<0.000050		mg/L		0.00005	17-OCT-19
Silicon (Si)-Total			<0.10		mg/L		0.1	17-OCT-19
Silver (Ag)-Total			<0.000010		mg/L		0.00001	17-OCT-19
Sodium (Na)-Total			<0.050		mg/L		0.05	17-OCT-19
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	17-OCT-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R4873468								
WG3190268-1 MB								
Sulfur (S)-Total			<0.50		mg/L		0.5	17-OCT-19
Tellurium (Te)-Total			<0.00020		mg/L		0.0002	17-OCT-19
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	17-OCT-19
Thorium (Th)-Total			<0.00010		mg/L		0.0001	17-OCT-19
Tin (Sn)-Total			<0.00010		mg/L		0.0001	17-OCT-19
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	17-OCT-19
Tungsten (W)-Total			<0.00010		mg/L		0.0001	17-OCT-19
Uranium (U)-Total			<0.000010		mg/L		0.00001	17-OCT-19
Vanadium (V)-Total			<0.00050		mg/L		0.0005	17-OCT-19
Zinc (Zn)-Total			<0.0030		mg/L		0.003	17-OCT-19
Zirconium (Zr)-Total			<0.00020		mg/L		0.0002	17-OCT-19
NH3-F-VA	**Water**							
Batch R4871036								
WG3191387-2 LCS								
Ammonia, Total (as N)			100.4		%		85-115	16-OCT-19
WG3191387-1 MB								
Ammonia, Total (as N)			<0.0050		mg/L		0.005	16-OCT-19
NO2-L-IC-N-VA	**Water**							
Batch R4868268								
WG3189828-2 LCS								
Nitrite (as N)			93.7		%		90-110	12-OCT-19
WG3189828-1 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	12-OCT-19
NO3-L-IC-N-VA	**Water**							
Batch R4868268								
WG3189828-2 LCS								
Nitrate (as N)			95.2		%		90-110	12-OCT-19
WG3189828-1 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	12-OCT-19
P-T-PRES-COL-VA	**Water**							
Batch R4871797								
WG3191383-2 LCS								
Phosphorus (P)-Total			99.0		%		80-120	16-OCT-19
WG3191383-1 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	16-OCT-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-PCT-VA	**Water**							
Batch R4871373								
WG3189839-2 CRM		**VA-PH7-BUF**						
pH			7.01		pH		6.9-7.1	15-OCT-19
PO4-DO-COL-VA	**Water**							
Batch R4868269								
WG3189831-2 CRM		**VA-OPO4-CONTROL**						
Orthophosphate-Dissolved (as P)			104.3		%		80-120	12-OCT-19
WG3189832-2 CRM		**VA-OPO4-CONTROL**						
Orthophosphate-Dissolved (as P)			103.4		%		80-120	12-OCT-19
WG3189832-3 DUP		**L2364066-3**						
Orthophosphate-Dissolved (as P)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	12-OCT-19
WG3189831-1 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	12-OCT-19
WG3189832-1 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	12-OCT-19
WG3189832-4 MS		**L2364066-4**						
Orthophosphate-Dissolved (as P)			106.2		%		70-130	12-OCT-19
SO4-IC-N-VA	**Water**							
Batch R4868268								
WG3189828-2 LCS								
Sulfate (SO4)			96.4		%		90-110	12-OCT-19
WG3189828-1 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	12-OCT-19
TKN-F-VA	**Water**							
Batch R4872355								
WG3191393-2 LCS								
Total Kjeldahl Nitrogen			104.0		%		75-125	16-OCT-19
WG3191393-1 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	16-OCT-19
TSS-VA	**Water**							
Batch R4874395								
WG3193613-5 LCS								
Total Suspended Solids			108.0		%		85-115	17-OCT-19
WG3193613-4 MB								
Total Suspended Solids			<3.0		mg/L		3	17-OCT-19

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
pH by Meter (Automated)							
	1	10-OCT-19 11:50	15-OCT-19 11:12	0.25	119	hours	EHTR-FM
	2	10-OCT-19 10:00	15-OCT-19 11:12	0.25	121	hours	EHTR-FM
	3	10-OCT-19 09:15	15-OCT-19 11:12	0.25	122	hours	EHTR-FM
	4	10-OCT-19 11:50	15-OCT-19 11:12	0.25	119	hours	EHTR-FM
	5	10-OCT-19 12:00	15-OCT-19 11:12	0.25	119	hours	EHTR-FM
	6	10-OCT-19 12:00	15-OCT-19 11:12	0.25	119	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2364066 were received on 10-OCT-19 20:30.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number: 17 -

Page 1 of

Report To	Contact and company name below will appear on the final report
Company:	Regional District of Kitimat-Stikine
Contact:	Chris Kerr
Phone:	250-641-4141
	Company address below will appear on the final report
Street:	4545 Lazelle Avenue
City/Province:	Terrace/BC
Postal Code:	V8G4E1
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	Regional District of Kitimat-Stikine
Contact:	Erin Blaney

Report Format / Distribution	
Select Report Format:	☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ YES ☐ NO
☑ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	eblaney@rdks.bc.ca
Email 2	ckerr@rdks.bc.ca
Email 3	sprouse@rdks.bc.ca
Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	anne-maries@rdks.bc.ca
Email 2	ckerr@rdks.bc.ca; eblaney@rdks.bc.ca

Project Information	
ALS Account # / Quote #:	
Job #:	Thornhill Transfer Station Surface Water
PO / AFE:	
LSD:	

Oil and Gas Required Fields (client use)	
AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (lab use only):

ALS Contact:

Sampler: Chris Kerr

Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days): 4 day [P4-20%] ☐ | 3 day [P3-25%] ☐ | 2 day [P2-50%] ☐

EMERGENCY: 1 Business day [E1 - 100%] ☐ | Same Day, Weekend or Statutory holiday [E2 -200% (Laboratory opening fees may apply)] ☐

Date and Time Required for all E&P TATs:

For tests that can not be performed according to the service level selected, you will be contacted.

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	F/P	P				P		P				P		P	P	SAMPLES ON HOLD	Sample is hazardous (please provide further detail)	NUMBER OF CONTAINERS
					Dissolved metals	Total metals	alkilinity (as CaCO3)	Total Hardness	Dissolved Hardness	Ammonia	Fluoride, Chloride	COD and BOD	sulphate	Nitrate and Nitrite	TSS	total Kjeldahl nitrogen	pH, Conductivity	Total phosphorus	ortho-phosphorus			
	SW-1	10/10/19	11:50	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			
	SW-3	"	10:00	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			
	SW-6	"	9:15	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			
	SW-21	"	11:50	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			
	Field Blank	"	12:50	Water			R	R		R							R		R			
	DUP	"	12:50	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			

L2364066-COFC

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)
Are samples taken from a Regulated DW System? ☐ YES ☑ NO	British Columbia Approved and Working Water Quality Guidelines (MAY, 2015)
Are samples for human consumption/ use? ☐ YES ☑ NO	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ | SIF Observations Yes ☐ No ☐

Ice Packs ☑ Ice Cubes ☐ | Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				4	6	6	

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
C Kerr	Oct 10/19	12:25				CW	Oct 10	2030

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

SEPT 2017 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

REGIONAL DISTRICT OF KITIMAT-STIKINE
ATTN: Chris Kerr
300 - 4545 Lazelle Avenue
Terrace BC V8G 4E1

Date Received: 12-APR-19
Report Date: 23-APR-19 15:49 (MT)
Version: FINAL

Client Phone: 250-615-6100

Certificate of Analysis

Lab Work Order #: L2257784

Project P.O. #: NOT SUBMITTED
Job Reference: THORNHILL TRANSFER STATION
C of C Numbers:
Legal Site Desc:

Amber Springer, B.Sc
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2257784-1	L2257784-2	L2257784-3	L2257784-4	L2257784-5
Description	Water	Water	Water	Water	Water
Sampled Date	11-APR-19	11-APR-19	11-APR-19	11-APR-19	11-APR-19
Sampled Time	11:35	12:45	14:45	10:55	12:05
Client ID	SW-1	SW-3	SW-6	SW-21	BH96-2
Grouping / **Analyte**					
WATER					
Physical Tests					
Conductivity (uS/cm)	53.5	1940	101	909	377
Hardness (as CaCO3) (mg/L)	23.8	512	47.8	288	94.9
pH (pH)	7.49	7.03	7.79	8.11	8.35
Anions and Nutrients					
Alkalinity, Total (as CaCO3) (mg/L)	25.1	933	47.5	393	200
Ammonia, Total (as N) (mg/L)	<0.0050	58.6	0.0058	14.7	0.162
Bromide (Br) (mg/L)	<0.050	0.79	<0.050	0.37	<0.050
Chloride (Cl) (mg/L)	<0.50	94.4	1.03	42.8	0.77
Fluoride (F) (mg/L)	0.023	<0.22 DLCI	0.024	0.10	0.172
Nitrate (as N) (mg/L)	0.0301	0.067	0.163	5.23	0.0345
Nitrite (as N) (mg/L)	<0.0010	<0.010 DLDS	0.0040	0.0814	0.0070
Total Kjeldahl Nitrogen (mg/L)	<0.050	65.3	0.055	15.9	0.271
Orthophosphate-Dissolved (as P) (mg/L)	<0.0010	<0.0010	<0.0010	0.0011	0.0338
Phosphorus (P)-Total (mg/L)	<0.0020	0.520	0.0066	0.0230	0.097
Sulfate (SO4) (mg/L)	1.37	<3.0 DLDS	1.72	10.4	2.20
Total Metals					
Aluminum (Al)-Total (mg/L)	0.0446	0.0560	0.219	0.118	2.59
Antimony (Sb)-Total (mg/L)	<0.00010	0.00012	<0.00010	0.00010	0.00028
Arsenic (As)-Total (mg/L)	<0.00010	0.0107	0.00017	0.00058	0.00562
Barium (Ba)-Total (mg/L)	0.0169	0.925	0.0175	0.213	0.0405
Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron (B)-Total (mg/L)	<0.010	1.99	<0.010	1.09	0.157
Cadmium (Cd)-Total (mg/L)	<0.0000050	0.0000063	<0.0000050	0.0000124	0.000943
Calcium (Ca)-Total (mg/L)	8.71	169	18.3	97.3	15.7
Cesium (Cs)-Total (mg/L)	<0.000010	0.000269	0.000019	0.000078	0.000237
Chromium (Cr)-Total (mg/L)	0.00018	0.00125	0.00024	0.00044	0.00301
Cobalt (Co)-Total (mg/L)	<0.00010	0.00301	0.00012	0.00111	0.00181
Copper (Cu)-Total (mg/L)	0.00092	<0.00050	0.00131	0.00266	0.00870
Iron (Fe)-Total (mg/L)	0.028	51.5	0.220	0.134	3.50
Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	0.00135
Lithium (Li)-Total (mg/L)	<0.0010	0.0023	<0.0010	<0.0010	0.0033
Magnesium (Mg)-Total (mg/L)	0.641	37.1	0.854	19.0	16.9
Manganese (Mn)-Total (mg/L)	0.00120	3.24	0.0166	0.345	0.169
Mercury (Hg)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum (Mo)-Total (mg/L)	0.000387	0.000366	0.000601	0.000479	0.00424
Nickel (Ni)-Total (mg/L)	<0.00050	0.00561	<0.00050	0.00295	0.00469
Phosphorus (P)-Total (mg/L)	<0.050	0.406	<0.050	<0.050	0.119
Potassium (K)-Total (mg/L)	0.644	72.3	0.825	30.5	12.3

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2257784-6	L2257784-7	L2257784-8		
Description	Water	Water	Water		
Sampled Date	11-APR-19	11-APR-19	11-APR-19		
Sampled Time	12:00	12:00	13:35		
Client ID	DUP	BLANK	SW-17		
Grouping / **Analyte**					
WATER					
Physical Tests					
Conductivity (uS/cm)	903	<2.0	80.8		
Hardness (as CaCO3) (mg/L)	282	<0.50 HTC	33.8		
pH (pH)	8.05	5.61	7.60		
Anions and Nutrients					
Alkalinity, Total (as CaCO3) (mg/L)	399	<1.0	35.7		
Ammonia, Total (as N) (mg/L)	14.8	<0.0050	0.0099		
Bromide (Br) (mg/L)	0.37	<0.050	<0.050		
Chloride (Cl) (mg/L)	42.1	<0.50	1.41		
Fluoride (F) (mg/L)	<0.10 DLDS	<0.020	0.027		
Nitrate (as N) (mg/L)	5.09	<0.0050	0.493		
Nitrite (as N) (mg/L)	0.0812	<0.0010	0.0019		
Total Kjeldahl Nitrogen (mg/L)	14.6	<0.050	0.106		
Orthophosphate-Dissolved (as P) (mg/L)	0.0011	<0.0010	<0.0010		
Phosphorus (P)-Total (mg/L)	0.0348	<0.0020	0.0052		
Sulfate (SO4) (mg/L)	10.4	<0.30	1.77		
Total Metals					
Aluminum (Al)-Total (mg/L)	0.161	<0.0030	0.126		
Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010		
Arsenic (As)-Total (mg/L)	0.00054	<0.00010	0.00012		
Barium (Ba)-Total (mg/L)	0.202	<0.00010	0.0213		
Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010	<0.00010		
Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050		
Boron (B)-Total (mg/L)	1.03	<0.010	0.027		
Cadmium (Cd)-Total (mg/L)	0.0000135	<0.0000050	<0.0000050		
Calcium (Ca)-Total (mg/L)	89.4	<0.050	12.2		
Cesium (Cs)-Total (mg/L)	0.000080	<0.000010	<0.000010		
Chromium (Cr)-Total (mg/L)	0.00045	<0.00010	0.00017		
Cobalt (Co)-Total (mg/L)	0.00112	<0.00010	0.00010		
Copper (Cu)-Total (mg/L)	0.00260	<0.00050	0.00122		
Iron (Fe)-Total (mg/L)	0.204	<0.010	0.150		
Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050		
Lithium (Li)-Total (mg/L)	<0.0010	<0.0010	<0.0010		
Magnesium (Mg)-Total (mg/L)	17.6	<0.0050	1.08		
Manganese (Mn)-Total (mg/L)	0.485	<0.00010	0.0134		
Mercury (Hg)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050		
Molybdenum (Mo)-Total (mg/L)	0.000486	<0.000050	0.000350		
Nickel (Ni)-Total (mg/L)	0.00279	<0.00050	<0.00050		
Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050		
Potassium (K)-Total (mg/L)	28.9	<0.050	1.30		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2257784-1	L2257784-2	L2257784-3	L2257784-4	L2257784-5
Description	Water	Water	Water	Water	Water
Sampled Date	11-APR-19	11-APR-19	11-APR-19	11-APR-19	11-APR-19
Sampled Time	11:35	12:45	14:45	10:55	12:05
Client ID	SW-1	SW-3	SW-6	SW-21	BH96-2
Grouping / **Analyte**					
WATER					
Total Metals Rubidium (Rb)-Total (mg/L)	0.00076	0.0507	0.00093	0.0178	0.00155
Selenium (Se)-Total (mg/L)	<0.000050	0.000118	<0.000050	0.000127	<0.000050
Silicon (Si)-Total (mg/L)	2.44	12.6	3.23	5.56	7.66
Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	0.000033
Sodium (Na)-Total (mg/L)	0.938	122	1.47	61.2	48.3
Strontium (Sr)-Total (mg/L)	0.0368	1.20	0.0485	0.567	0.209
Sulfur (S)-Total (mg/L)	0.59	1.60	0.82	4.87	1.00
Tellurium (Te)-Total (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	0.000019
Thorium (Th)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Tin (Sn)-Total (mg/L)	<0.00010	0.00021	<0.00010	<0.00010	0.00046
Titanium (Ti)-Total (mg/L)	0.00117	0.00340	0.00604	<0.0030 DLM	0.0570
Tungsten (W)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	0.00013
Uranium (U)-Total (mg/L)	0.000014	0.000049	0.000088	0.000295	0.00212
Vanadium (V)-Total (mg/L)	<0.00050	0.00208	0.00085	<0.00050	0.00741
Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	0.0248
Zirconium (Zr)-Total (mg/L)	<0.000060	0.000483	0.000065	0.000134	0.000196
Dissolved Metals Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
Aluminum (Al)-Dissolved (mg/L)	0.0288	0.0063	0.0364	0.0076	0.0054
Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	0.00012	<0.00010
Arsenic (As)-Dissolved (mg/L)	<0.00010	0.00888	0.00011	0.00053	0.00431
Barium (Ba)-Dissolved (mg/L)	0.0165	0.665	0.0154	0.207	0.0197
Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron (B)-Dissolved (mg/L)	<0.010	1.84	<0.010	0.925	0.149
Cadmium (Cd)-Dissolved (mg/L)	<0.0000050	0.0000132	<0.0000050	0.0000130	0.0000198
Calcium (Ca)-Dissolved (mg/L)	8.48	153	17.8	87.5	14.9
Cesium (Cs)-Dissolved (mg/L)	<0.000010	0.000284	<0.000010	0.000083	<0.000010
Chromium (Cr)-Dissolved (mg/L)	<0.00010	0.00090	<0.00010	0.00031	<0.00010
Cobalt (Co)-Dissolved (mg/L)	<0.00010	0.00281	<0.00010	0.00104	0.00012
Copper (Cu)-Dissolved (mg/L)	0.00108	<0.00020	0.00082	0.00224	0.00035
Iron (Fe)-Dissolved (mg/L)	0.011	36.2	0.061	0.024	0.016
Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)-Dissolved (mg/L)	<0.0010	0.0021	<0.0010	<0.0010	0.0015
Magnesium (Mg)-Dissolved (mg/L)	0.646	31.7	0.816	17.0	14.0
Manganese (Mn)-Dissolved (mg/L)	0.00065	2.93	0.0123	0.405	0.0853

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2257784-6	L2257784-7	L2257784-8		
Description	Water	Water	Water		
Sampled Date	11-APR-19	11-APR-19	11-APR-19		
Sampled Time	12:00	12:00	13:35		
Client ID	DUP	BLANK	SW-17		
Grouping / **Analyte**					
WATER					
Total Metals Rubidium (Rb)-Total (mg/L)	0.0171	<0.00020	0.00105		
Selenium (Se)-Total (mg/L)	0.000170	<0.000050	0.000081		
Silicon (Si)-Total (mg/L)	5.24	<0.10	2.86		
Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010		
Sodium (Na)-Total (mg/L)	57.3	<0.050	2.35		
Strontium (Sr)-Total (mg/L)	0.558	<0.00020	0.0533		
Sulfur (S)-Total (mg/L)	4.97	<0.50	0.60		
Tellurium (Te)-Total (mg/L)	<0.00020	<0.00020	<0.00020		
Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010		
Thorium (Th)-Total (mg/L)	<0.00010	<0.00010	<0.00010		
Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010		
Titanium (Ti)-Total (mg/L)	<0.0045 DLM	<0.00030	0.00388		
Tungsten (W)-Total (mg/L)	<0.00010	<0.00010	<0.00010		
Uranium (U)-Total (mg/L)	0.000293	<0.000010	0.000024		
Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	0.00070		
Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030		
Zirconium (Zr)-Total (mg/L)	0.000127	<0.000060	0.000073		
Dissolved Metals Dissolved Mercury Filtration Location	FIELD		FIELD		
Dissolved Metals Filtration Location	FIELD		FIELD		
Aluminum (Al)-Dissolved (mg/L)	0.0077		0.0417		
Antimony (Sb)-Dissolved (mg/L)	0.00011		<0.00010		
Arsenic (As)-Dissolved (mg/L)	0.00051		<0.00010		
Barium (Ba)-Dissolved (mg/L)	0.186		0.0203		
Beryllium (Be)-Dissolved (mg/L)	<0.00010		<0.00010		
Bismuth (Bi)-Dissolved (mg/L)	<0.000050		<0.000050		
Boron (B)-Dissolved (mg/L)	0.971		0.030		
Cadmium (Cd)-Dissolved (mg/L)	0.0000103		<0.0000050		
Calcium (Ca)-Dissolved (mg/L)	86.6		11.8		
Cesium (Cs)-Dissolved (mg/L)	0.000074		<0.000010		
Chromium (Cr)-Dissolved (mg/L)	0.00029		0.00014		
Cobalt (Co)-Dissolved (mg/L)	0.00100		<0.00010		
Copper (Cu)-Dissolved (mg/L)	0.00206		0.00080		
Iron (Fe)-Dissolved (mg/L)	0.029		0.067		
Lead (Pb)-Dissolved (mg/L)	<0.000050		<0.000050		
Lithium (Li)-Dissolved (mg/L)	<0.0010		<0.0010		
Magnesium (Mg)-Dissolved (mg/L)	15.9		1.07		
Manganese (Mn)-Dissolved (mg/L)	0.350		0.00929		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2257784-1 Water 11-APR-19 11:35 SW-1	L2257784-2 Water 11-APR-19 12:45 SW-3	L2257784-3 Water 11-APR-19 14:45 SW-6	L2257784-4 Water 11-APR-19 10:55 SW-21	L2257784-5 Water 11-APR-19 12:05 BH96-2
WATER						
Dissolved Metals	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Dissolved (mg/L)	0.000376	0.000320	0.000574	0.000468	0.00442
	Nickel (Ni)-Dissolved (mg/L)	<0.00050	0.00557	<0.00050	0.00299	<0.00050
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)	0.653	65.6	0.838	30.5	10.7
	Rubidium (Rb)-Dissolved (mg/L)	0.00069	0.0506	0.00093	0.0198	0.00041
	Selenium (Se)-Dissolved (mg/L)	<0.000050	0.000164	0.000099	0.000192	<0.000050
	Silicon (Si)-Dissolved (mg/L)	2.26	11.8	2.75	5.01	4.08
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000020 DLM	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	1.03	116	1.60	60.0	46.2
	Strontium (Sr)-Dissolved (mg/L)	0.0357	1.14	0.0487	0.593	0.190
	Sulfur (S)-Dissolved (mg/L)	<0.50	1.02	0.62	4.25	0.85
	Tellurium (Te)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Thorium (Th)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Tin (Sn)-Dissolved (mg/L)	<0.00010	0.00016	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.00030	0.00067	0.00099	<0.00030	<0.00030
	Tungsten (W)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	0.00013
	Uranium (U)-Dissolved (mg/L)	0.000015	0.000052	0.000089	0.000312	0.00195
	Vanadium (V)-Dissolved (mg/L)	<0.00050	0.00064	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Dissolved (mg/L)	<0.0010	0.0017	<0.0010	<0.0010	<0.0010
	Zirconium (Zr)-Dissolved (mg/L)	<0.000060	0.000349	0.000098	0.000095	<0.000060

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2257784-6	L2257784-7	L2257784-8		
Description	Water	Water	Water		
Sampled Date	11-APR-19	11-APR-19	11-APR-19		
Sampled Time	12:00	12:00	13:35		
Client ID	DUP	BLANK	SW-17		
Grouping / **Analyte**					
WATER					
Dissolved Metals Mercury (Hg)-Dissolved (mg/L)	<0.0000050		<0.0000050		
Molybdenum (Mo)-Dissolved (mg/L)	0.000450		0.000356		
Nickel (Ni)-Dissolved (mg/L)	0.00269		<0.00050		
Phosphorus (P)-Dissolved (mg/L)	<0.050		<0.050		
Potassium (K)-Dissolved (mg/L)	27.5		1.30		
Rubidium (Rb)-Dissolved (mg/L)	0.0174		0.00093		
Selenium (Se)-Dissolved (mg/L)	0.000135		<0.000050		
Silicon (Si)-Dissolved (mg/L)	4.92		2.72		
Silver (Ag)-Dissolved (mg/L)	<0.000010		<0.000010		
Sodium (Na)-Dissolved (mg/L)	56.1		2.42		
Strontium (Sr)-Dissolved (mg/L)	0.540		0.0522		
Sulfur (S)-Dissolved (mg/L)	4.00		<0.50		
Tellurium (Te)-Dissolved (mg/L)	<0.00020		<0.00020		
Thallium (Tl)-Dissolved (mg/L)	<0.000010		<0.000010		
Thorium (Th)-Dissolved (mg/L)	<0.00010		<0.00010		
Tin (Sn)-Dissolved (mg/L)	<0.00010		<0.00010		
Titanium (Ti)-Dissolved (mg/L)	0.00036		0.00128		
Tungsten (W)-Dissolved (mg/L)	<0.00010		<0.00010		
Uranium (U)-Dissolved (mg/L)	0.000321		0.000028		
Vanadium (V)-Dissolved (mg/L)	<0.00050		<0.00050		
Zinc (Zn)-Dissolved (mg/L)	0.0014		<0.0010		
Zirconium (Zr)-Dissolved (mg/L)	0.000093		0.000114		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Method Blank	Manganese (Mn)-Total	B	L2257784-1, -2, -3, -4, -5, -6, -8
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2257784-1, -2, -3, -4, -5, -6, -8
Matrix Spike	Boron (B)-Dissolved	MS-B	L2257784-1, -2, -3, -4, -5, -6, -8
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2257784-1, -2, -3, -4, -5, -6, -8
Matrix Spike	Iron (Fe)-Dissolved	MS-B	L2257784-1, -2, -3, -4, -5, -6, -8
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2257784-1, -2, -3, -4, -5, -6, -8
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L2257784-1, -2, -3, -4, -5, -6, -8
Matrix Spike	Potassium (K)-Dissolved	MS-B	L2257784-1, -2, -3, -4, -5, -6, -8
Matrix Spike	Rubidium (Rb)-Dissolved	MS-B	L2257784-1, -2, -3, -4, -5, -6, -8
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L2257784-1, -2, -3, -4, -5, -6, -8
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2257784-1, -2, -3, -4, -5, -6, -8
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2257784-1, -2, -3, -4, -5, -6, -8
Matrix Spike	Antimony (Sb)-Total	MS-B	L2257784-2, -7
Matrix Spike	Barium (Ba)-Total	MS-B	L2257784-2, -7
Matrix Spike	Calcium (Ca)-Total	MS-B	L2257784-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Calcium (Ca)-Total	MS-B	L2257784-2, -7
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2257784-2, -7
Matrix Spike	Manganese (Mn)-Total	MS-B	L2257784-2, -7
Matrix Spike	Sodium (Na)-Total	MS-B	L2257784-2, -7
Matrix Spike	Strontium (Sr)-Total	MS-B	L2257784-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Strontium (Sr)-Total	MS-B	L2257784-2, -7
Matrix Spike	Sulfur (S)-Total	MS-B	L2257784-2, -7

Qualifiers for Individual Parameters Listed:

Qualifier	Description
B	Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.
DLCI	Detection Limit Raised: Chromatographic Interference due to co-elution.
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
HTC	Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-TITR-VA	Water	Alkalinity Species by Titration	APHA 2320 Alkalinity
This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.			
BR-L-IC-N-VA	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
CL-IC-N-VA	Water	Chloride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.
This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.			
EC-SCREEN-VA	Water	Conductivity Screen (Internal Use Only)	APHA 2510
Qualitative analysis of conductivity where required during preparation of other tests - e.g. TDS, metals, etc.			
F-IC-N-VA	Water	Fluoride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
HARDNESS-CALC-VA	Water	Hardness	APHA 2340B

Reference Information

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA Water Diss. Mercury in Water by CVAAS or CVAFS APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-CVAA-VA Water Total Mercury in Water by CVAAS or CVAFS EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-VA Water Total Metals in Water by CRC ICPMS EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NH3-F-VA Water Ammonia in Water by Fluorescence J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-VA Water Nitrite in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-VA Water Nitrate in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

P-T-PRES-COL-VA Water Total P in Water by Colour APHA 4500-P Phosphorus

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.
Samples with very high dissolved solids (i.e. seawaters, brackish waters) may produce a negative bias by this method. Alternate methods are available for these types of samples.

Arsenic (5+), at elevated levels, is a positive interference on colourimetric phosphate analysis.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PO4-DO-COL-VA Water Diss. Orthophosphate in Water by Colour APHA 4500-P Phosphorus

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.
Samples with very high dissolved solids (i.e. seawaters, brackish waters) may produce a negative bias by this method. Alternate methods are available for these types of samples.

Arsenic (5+), at elevated levels, is a positive interference on colourimetric phosphate analysis.

SO4-IC-N-VA Water Sulfate in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

TKN-F-VA Water TKN in Water by Fluorescence APHA 4500-NORG D.

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Reference Information

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: REGIONAL DISTRICT OF KITIMAT-STIKINE
300 - 4545 Lazelle Avenue
Terrace BC V8G 4E1
Contact: Chris Kerr

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-TITR-VA	**Water**							
Batch R4602225								
WG3028117-3 CRM		**VA-ALK-TITR-CONTROL**						
Alkalinity, Total (as CaCO3)			97.7		%		85-115	16-APR-19
WG3028117-5 DUP		**L2257784-1**						
Alkalinity, Total (as CaCO3)		25.1	24.6		mg/L	2.0	20	16-APR-19
WG3028117-1 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	16-APR-19
BR-L-IC-N-VA	**Water**							
Batch R4604086								
WG3028115-3 DUP		**L2257784-1**						
Bromide (Br)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	16-APR-19
WG3028145-3 DUP		**L2257784-8**						
Bromide (Br)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	16-APR-19
WG3028115-2 LCS								
Bromide (Br)			97.3		%		85-115	16-APR-19
WG3028145-2 LCS								
Bromide (Br)			100.1		%		85-115	16-APR-19
WG3028115-1 MB								
Bromide (Br)			<0.050		mg/L		0.05	16-APR-19
WG3028145-1 MB								
Bromide (Br)			<0.050		mg/L		0.05	16-APR-19
Batch R4606162								
WG3029925-2 LCS								
Bromide (Br)			96.4		%		85-115	17-APR-19
WG3029925-1 MB								
Bromide (Br)			<0.050		mg/L		0.05	17-APR-19
WG3029925-4 MS		**L2257784-3**						
Bromide (Br)			106.1		%		75-125	17-APR-19
CL-IC-N-VA	**Water**							
Batch R4604086								
WG3028115-3 DUP		**L2257784-1**						
Chloride (Cl)		<0.50	<0.50	RPD-NA	mg/L	N/A	20	16-APR-19
WG3028145-3 DUP		**L2257784-8**						
Chloride (Cl)		1.41	1.41		mg/L	0.2	20	16-APR-19
WG3028115-2 LCS								
Chloride (Cl)			97.1		%		90-110	16-APR-19
WG3028145-2 LCS								
Chloride (Cl)			97.6		%		90-110	16-APR-19
WG3028115-1 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CL-IC-N-VA	**Water**							
Batch R4604086								
WG3028115-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	16-APR-19
WG3028145-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	16-APR-19
Batch R4606162								
WG3029925-2 LCS								
Chloride (Cl)			98.2		%		90-110	17-APR-19
WG3029925-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	17-APR-19
WG3029925-4 MS		**L2257784-3**						
Chloride (Cl)			102.0		%		75-125	17-APR-19
EC-PCT-VA	**Water**							
Batch R4602225								
WG3028117-4 CRM		**VA-EC-PCT-CONTROL**						
Conductivity			99.2		%		90-110	16-APR-19
WG3028117-5 DUP		**L2257784-1**						
Conductivity		53.5	53.1		uS/cm	0.8	10	16-APR-19
WG3028117-1 MB								
Conductivity			<2.0		uS/cm		2	16-APR-19
F-IC-N-VA	**Water**							
Batch R4604086								
WG3028115-3 DUP		**L2257784-1**						
Fluoride (F)		0.023	0.022		mg/L	3.1	20	16-APR-19
WG3028145-3 DUP		**L2257784-8**						
Fluoride (F)		0.027	0.026		mg/L	3.1	20	16-APR-19
WG3028115-2 LCS								
Fluoride (F)			100.1		%		90-110	16-APR-19
WG3028145-2 LCS								
Fluoride (F)			100.6		%		90-110	16-APR-19
WG3028115-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	16-APR-19
WG3028145-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	16-APR-19
Batch R4606162								
WG3029925-2 LCS								
Fluoride (F)			99.7		%		90-110	17-APR-19
WG3029925-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	17-APR-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F-IC-N-VA	**Water**							
Batch R4606162								
WG3029925-4 MS		**L2257784-3**						
Fluoride (F)			107.2		%		75-125	17-APR-19
HG-D-CVAA-VA	**Water**							
Batch R4601518								
WG3027768-15 DUP		**L2257784-8**						
Mercury (Hg)-Dissolved		<0.0000050	<0.000005C	RPD-NA	mg/L	N/A	20	15-APR-19
WG3027768-10 LCS								
Mercury (Hg)-Dissolved			101.4		%		80-120	15-APR-19
WG3027768-14 LCS								
Mercury (Hg)-Dissolved			100.6		%		80-120	15-APR-19
WG3027768-13 MB								
Mercury (Hg)-Dissolved			<0.000005C		mg/L		0.000005	15-APR-19
WG3027768-9 MB								
Mercury (Hg)-Dissolved			<0.000005C		mg/L		0.000005	15-APR-19
HG-T-CVAA-VA	**Water**							
Batch R4601846								
WG3028268-3 DUP		**L2257784-8**						
Mercury (Hg)-Total		<0.0000050	<0.000005C	RPD-NA	mg/L	N/A	20	16-APR-19
WG3028268-2 LCS								
Mercury (Hg)-Total			101.2		%		80-120	16-APR-19
WG3028268-1 MB								
Mercury (Hg)-Total			<0.000005C		mg/L		0.000005	16-APR-19
WG3028268-4 MS		**L2257784-7**						
Mercury (Hg)-Total			102.7		%		70-130	16-APR-19
MET-D-CCMS-VA	**Water**							
Batch R4602296								
WG3027910-3 DUP		**L2257784-1**						
Aluminum (Al)-Dissolved		0.0288	0.0280		mg/L	2.8	20	16-APR-19
Antimony (Sb)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	16-APR-19
Arsenic (As)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	16-APR-19
Barium (Ba)-Dissolved		0.0165	0.0162		mg/L	1.5	20	16-APR-19
Beryllium (Be)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	16-APR-19
Bismuth (Bi)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	16-APR-19
Boron (B)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	16-APR-19
Cadmium (Cd)-Dissolved		<0.0000050	<0.000005C	RPD-NA	mg/L	N/A	20	16-APR-19
Calcium (Ca)-Dissolved		8.48	8.66		mg/L	2.0	20	16-APR-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R4602296								
WG3027910-3 DUP		**L2257784-1**						
Cesium (Cs)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	16-APR-19
Chromium (Cr)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	16-APR-19
Cobalt (Co)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	16-APR-19
Copper (Cu)-Dissolved		0.00108	0.00095		mg/L	12	20	16-APR-19
Iron (Fe)-Dissolved		0.011	0.010		mg/L	6.2	20	16-APR-19
Lead (Pb)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	16-APR-19
Lithium (Li)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	16-APR-19
Magnesium (Mg)-Dissolved		0.646	0.624		mg/L	3.5	20	16-APR-19
Manganese (Mn)-Dissolved		0.00065	0.00065		mg/L	1.0	20	16-APR-19
Molybdenum (Mo)-Dissolved		0.000376	0.000370		mg/L	1.6	20	16-APR-19
Nickel (Ni)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	16-APR-19
Phosphorus (P)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	16-APR-19
Potassium (K)-Dissolved		0.653	0.638		mg/L	2.3	20	16-APR-19
Rubidium (Rb)-Dissolved		0.00069	0.00066		mg/L	3.6	20	16-APR-19
Selenium (Se)-Dissolved		<0.000050	0.000053	RPD-NA	mg/L	N/A	20	16-APR-19
Silicon (Si)-Dissolved		2.26	2.22		mg/L	1.9	20	16-APR-19
Silver (Ag)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	16-APR-19
Sodium (Na)-Dissolved		1.03	1.02		mg/L	0.5	20	16-APR-19
Strontium (Sr)-Dissolved		0.0357	0.0355		mg/L	0.6	20	16-APR-19
Sulfur (S)-Dissolved		<0.50	<0.50	RPD-NA	mg/L	N/A	20	16-APR-19
Tellurium (Te)-Dissolved		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	16-APR-19
Thallium (Tl)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	16-APR-19
Thorium (Th)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	16-APR-19
Tin (Sn)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	16-APR-19
Titanium (Ti)-Dissolved		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	16-APR-19
Tungsten (W)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	16-APR-19
Uranium (U)-Dissolved		0.000015	0.000013		mg/L	18	20	16-APR-19
Vanadium (V)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	16-APR-19
Zinc (Zn)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	16-APR-19
Zirconium (Zr)-Dissolved		<0.000060	<0.000060	RPD-NA	mg/L	N/A	20	16-APR-19
WG3027910-2 LCS								
Aluminum (Al)-Dissolved			99.3		%		80-120	16-APR-19
Antimony (Sb)-Dissolved			97.4		%		80-120	16-APR-19
Arsenic (As)-Dissolved			99.4		%		80-120	16-APR-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R4602296								
WG3027910-2 LCS								
Barium (Ba)-Dissolved			101.6		%		80-120	16-APR-19
Beryllium (Be)-Dissolved			97.3		%		80-120	16-APR-19
Bismuth (Bi)-Dissolved			99.5		%		80-120	16-APR-19
Boron (B)-Dissolved			98.0		%		80-120	16-APR-19
Cadmium (Cd)-Dissolved			100.2		%		80-120	16-APR-19
Calcium (Ca)-Dissolved			101.2		%		80-120	16-APR-19
Cesium (Cs)-Dissolved			104.8		%		80-120	16-APR-19
Chromium (Cr)-Dissolved			98.7		%		80-120	16-APR-19
Cobalt (Co)-Dissolved			99.0		%		80-120	16-APR-19
Copper (Cu)-Dissolved			94.9		%		80-120	16-APR-19
Iron (Fe)-Dissolved			102.0		%		80-120	16-APR-19
Lead (Pb)-Dissolved			100.0		%		80-120	16-APR-19
Lithium (Li)-Dissolved			96.3		%		80-120	16-APR-19
Magnesium (Mg)-Dissolved			99.6		%		80-120	16-APR-19
Manganese (Mn)-Dissolved			103.8		%		80-120	16-APR-19
Molybdenum (Mo)-Dissolved			103.0		%		80-120	16-APR-19
Nickel (Ni)-Dissolved			99.8		%		80-120	16-APR-19
Phosphorus (P)-Dissolved			100.6		%		70-130	16-APR-19
Potassium (K)-Dissolved			101.5		%		80-120	16-APR-19
Rubidium (Rb)-Dissolved			104.7		%		80-120	16-APR-19
Selenium (Se)-Dissolved			102.7		%		80-120	16-APR-19
Silicon (Si)-Dissolved			95.8		%		60-140	16-APR-19
Silver (Ag)-Dissolved			102.4		%		80-120	16-APR-19
Sodium (Na)-Dissolved			104.3		%		80-120	16-APR-19
Strontium (Sr)-Dissolved			107.7		%		80-120	16-APR-19
Sulfur (S)-Dissolved			93.5		%		80-120	16-APR-19
Tellurium (Te)-Dissolved			102.7		%		80-120	16-APR-19
Thallium (Tl)-Dissolved			98.1		%		80-120	16-APR-19
Thorium (Th)-Dissolved			97.9		%		80-120	16-APR-19
Tin (Sn)-Dissolved			98.9		%		80-120	16-APR-19
Titanium (Ti)-Dissolved			92.5		%		80-120	16-APR-19
Tungsten (W)-Dissolved			96.3		%		80-120	16-APR-19
Uranium (U)-Dissolved			100.3		%		80-120	16-APR-19
Vanadium (V)-Dissolved			101.0		%		80-120	16-APR-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R4602296								
WG3027910-2 LCS								
Zinc (Zn)-Dissolved			99.0		%		80-120	16-APR-19
Zirconium (Zr)-Dissolved			98.6		%		80-120	16-APR-19
WG3027910-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	16-APR-19
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	16-APR-19
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	16-APR-19
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	16-APR-19
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	16-APR-19
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	16-APR-19
Boron (B)-Dissolved			<0.010		mg/L		0.01	16-APR-19
Cadmium (Cd)-Dissolved			<0.000005C		mg/L		0.000005	16-APR-19
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	16-APR-19
Cesium (Cs)-Dissolved			<0.000010		mg/L		0.00001	16-APR-19
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	16-APR-19
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	16-APR-19
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	16-APR-19
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	16-APR-19
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	16-APR-19
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	16-APR-19
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	16-APR-19
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	16-APR-19
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	16-APR-19
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	16-APR-19
Phosphorus (P)-Dissolved			<0.050		mg/L		0.05	16-APR-19
Potassium (K)-Dissolved			<0.050		mg/L		0.05	16-APR-19
Rubidium (Rb)-Dissolved			<0.00020		mg/L		0.0002	16-APR-19
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	16-APR-19
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	16-APR-19
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	16-APR-19
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	16-APR-19
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	16-APR-19
Sulfur (S)-Dissolved			<0.50		mg/L		0.5	16-APR-19
Tellurium (Te)-Dissolved			<0.00020		mg/L		0.0002	16-APR-19
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	16-APR-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R4602296								
WG3027910-1 MB		**NP**						
Thorium (Th)-Dissolved			<0.00010		mg/L		0.0001	16-APR-19
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	16-APR-19
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	16-APR-19
Tungsten (W)-Dissolved			<0.00010		mg/L		0.0001	16-APR-19
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	16-APR-19
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	16-APR-19
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	16-APR-19
Zirconium (Zr)-Dissolved			<0.000060		mg/L		0.00006	16-APR-19
WG3027910-4 MS		**L2257784-2**						
Aluminum (Al)-Dissolved			97.4		%		70-130	16-APR-19
Antimony (Sb)-Dissolved			97.1		%		70-130	16-APR-19
Arsenic (As)-Dissolved			101.3		%		70-130	16-APR-19
Barium (Ba)-Dissolved			N/A	MS-B	%		-	16-APR-19
Beryllium (Be)-Dissolved			96.0		%		70-130	16-APR-19
Bismuth (Bi)-Dissolved			97.6		%		70-130	16-APR-19
Boron (B)-Dissolved			N/A	MS-B	%		-	16-APR-19
Cadmium (Cd)-Dissolved			97.1		%		70-130	16-APR-19
Calcium (Ca)-Dissolved			N/A	MS-B	%		-	16-APR-19
Cesium (Cs)-Dissolved			104.8		%		70-130	16-APR-19
Chromium (Cr)-Dissolved			94.1		%		70-130	16-APR-19
Cobalt (Co)-Dissolved			93.4		%		70-130	16-APR-19
Copper (Cu)-Dissolved			87.5		%		70-130	16-APR-19
Iron (Fe)-Dissolved			N/A	MS-B	%		-	16-APR-19
Lead (Pb)-Dissolved			93.6		%		70-130	16-APR-19
Lithium (Li)-Dissolved			92.6		%		70-130	16-APR-19
Magnesium (Mg)-Dissolved			N/A	MS-B	%		-	16-APR-19
Manganese (Mn)-Dissolved			N/A	MS-B	%		-	16-APR-19
Molybdenum (Mo)-Dissolved			105.6		%		70-130	16-APR-19
Nickel (Ni)-Dissolved			93.0		%		70-130	16-APR-19
Phosphorus (P)-Dissolved			110.6		%		70-130	16-APR-19
Potassium (K)-Dissolved			N/A	MS-B	%		-	16-APR-19
Rubidium (Rb)-Dissolved			N/A	MS-B	%		-	16-APR-19
Selenium (Se)-Dissolved			113.6		%		70-130	16-APR-19
Silicon (Si)-Dissolved			N/A	MS-B	%		-	16-APR-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R4602296								
WG3027910-4 MS		**L2257784-2**						
Sodium (Na)-Dissolved			N/A	MS-B	%		-	16-APR-19
Strontium (Sr)-Dissolved			N/A	MS-B	%		-	16-APR-19
Sulfur (S)-Dissolved			112.5		%		70-130	16-APR-19
Tellurium (Te)-Dissolved			105.2		%		70-130	16-APR-19
Thallium (Tl)-Dissolved			94.2		%		70-130	16-APR-19
Thorium (Th)-Dissolved			98.4		%		70-130	16-APR-19
Tin (Sn)-Dissolved			98.4		%		70-130	16-APR-19
Titanium (Ti)-Dissolved			95.3		%		70-130	16-APR-19
Tungsten (W)-Dissolved			97.5		%		70-130	16-APR-19
Uranium (U)-Dissolved			100.8		%		70-130	16-APR-19
Vanadium (V)-Dissolved			100.2		%		70-130	16-APR-19
Zinc (Zn)-Dissolved			93.0		%		70-130	16-APR-19
Zirconium (Zr)-Dissolved			103.7		%		70-130	16-APR-19
MET-T-CCMS-VA	**Water**							
Batch R4602626								
WG3028223-3 DUP		**L2257784-2**						
Antimony (Sb)-Total		0.00012	0.00011		mg/L	7.7	20	17-APR-19
Arsenic (As)-Total		0.0107	0.0107		mg/L	0.0	20	17-APR-19
Barium (Ba)-Total		0.925	0.954		mg/L	3.1	20	17-APR-19
Beryllium (Be)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	17-APR-19
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	17-APR-19
Boron (B)-Total		1.99	2.13		mg/L	6.8	20	17-APR-19
Cadmium (Cd)-Total		0.0000063	0.0000081	J	mg/L	0.000001	0.00001	17-APR-19
Calcium (Ca)-Total		169	180		mg/L	6.2	20	17-APR-19
Cesium (Cs)-Total		0.000269	0.000268		mg/L	0.5	20	17-APR-19
Chromium (Cr)-Total		0.00125	0.00115		mg/L	8.2	20	17-APR-19
Cobalt (Co)-Total		0.00301	0.00304		mg/L	1.1	20	17-APR-19
Copper (Cu)-Total		<0.00050	0.00052	RPD-NA	mg/L	N/A	20	17-APR-19
Iron (Fe)-Total		51.5	50.4		mg/L	2.3	20	17-APR-19
Lead (Pb)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	17-APR-19
Lithium (Li)-Total		0.0023	0.0024		mg/L	2.9	20	17-APR-19
Magnesium (Mg)-Total		37.1	36.2		mg/L	2.5	20	17-APR-19
Manganese (Mn)-Total		3.24	3.21		mg/L	0.9	20	17-APR-19
Molybdenum (Mo)-Total		0.000366	0.000373		mg/L	1.9	20	17-APR-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R4602626								
WG3028223-3 DUP		**L2257784-2**						
Nickel (Ni)-Total		0.00561	0.00549		mg/L	2.3	20	17-APR-19
Phosphorus (P)-Total		0.406	0.426		mg/L	4.6	20	17-APR-19
Potassium (K)-Total		72.3	72.0		mg/L	0.4	20	17-APR-19
Rubidium (Rb)-Total		0.0507	0.0509		mg/L	0.3	20	17-APR-19
Selenium (Se)-Total		0.000118	0.000092	J	mg/L	0.000026	0.0001	17-APR-19
Silicon (Si)-Total		12.6	12.6		mg/L	0.2	20	17-APR-19
Silver (Ag)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	17-APR-19
Sodium (Na)-Total		122	124		mg/L	1.2	20	17-APR-19
Strontium (Sr)-Total		1.20	1.23		mg/L	2.6	20	17-APR-19
Sulfur (S)-Total		1.60	1.41		mg/L	13	20	17-APR-19
Tellurium (Te)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	17-APR-19
Thallium (Tl)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	17-APR-19
Thorium (Th)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	17-APR-19
Tin (Sn)-Total		0.00021	0.00021		mg/L	1.5	20	17-APR-19
Titanium (Ti)-Total		0.00340	0.00354		mg/L	4.2	20	17-APR-19
Tungsten (W)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	17-APR-19
Uranium (U)-Total		0.000049	0.000049		mg/L	1.5	20	17-APR-19
Vanadium (V)-Total		0.00208	0.00213		mg/L	2.0	20	17-APR-19
Zinc (Zn)-Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	17-APR-19
Zirconium (Zr)-Total		0.000483	0.000490		mg/L	1.4	20	17-APR-19
WG3028223-2 LCS								
Aluminum (Al)-Total			100.9		%		80-120	17-APR-19
Antimony (Sb)-Total			104.2		%		80-120	17-APR-19
Arsenic (As)-Total			98.8		%		80-120	17-APR-19
Barium (Ba)-Total			105.6		%		80-120	17-APR-19
Beryllium (Be)-Total			99.1		%		80-120	17-APR-19
Bismuth (Bi)-Total			91.6		%		80-120	17-APR-19
Boron (B)-Total			90.6		%		80-120	17-APR-19
Cadmium (Cd)-Total			101.1		%		80-120	17-APR-19
Calcium (Ca)-Total			96.6		%		80-120	17-APR-19
Cesium (Cs)-Total			101.5		%		80-120	17-APR-19
Chromium (Cr)-Total			98.3		%		80-120	17-APR-19
Cobalt (Co)-Total			100.5		%		80-120	17-APR-19
Copper (Cu)-Total			97.7		%		80-120	17-APR-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R4602626								
WG3028223-2 LCS								
Iron (Fe)-Total			91.4		%		80-120	17-APR-19
Lead (Pb)-Total			95.3		%		80-120	17-APR-19
Lithium (Li)-Total			95.1		%		80-120	17-APR-19
Magnesium (Mg)-Total			101.4		%		80-120	17-APR-19
Manganese (Mn)-Total			100.8		%		80-120	17-APR-19
Molybdenum (Mo)-Total			103.0		%		80-120	17-APR-19
Nickel (Ni)-Total			100.1		%		80-120	17-APR-19
Phosphorus (P)-Total			94.4		%		80-120	17-APR-19
Potassium (K)-Total			102.6		%		80-120	17-APR-19
Rubidium (Rb)-Total			100.8		%		80-120	17-APR-19
Selenium (Se)-Total			102.5		%		80-120	17-APR-19
Silicon (Si)-Total			106.3		%		80-120	17-APR-19
Silver (Ag)-Total			98.9		%		80-120	17-APR-19
Sodium (Na)-Total			102.9		%		80-120	17-APR-19
Strontium (Sr)-Total			103.5		%		80-120	17-APR-19
Sulfur (S)-Total			101.1		%		80-120	17-APR-19
Tellurium (Te)-Total			100.6		%		80-120	17-APR-19
Thallium (Tl)-Total			94.0		%		80-120	17-APR-19
Thorium (Th)-Total			80.6		%		80-120	17-APR-19
Tin (Sn)-Total			99.3		%		80-120	17-APR-19
Titanium (Ti)-Total			98.6		%		80-120	17-APR-19
Tungsten (W)-Total			88.7		%		80-120	17-APR-19
Uranium (U)-Total			95.5		%		80-120	17-APR-19
Vanadium (V)-Total			102.1		%		80-120	17-APR-19
Zinc (Zn)-Total			102.1		%		80-120	17-APR-19
Zirconium (Zr)-Total			101.6		%		80-120	17-APR-19
WG3028223-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	17-APR-19
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	17-APR-19
Arsenic (As)-Total			<0.00010		mg/L		0.0001	17-APR-19
Barium (Ba)-Total			<0.00010		mg/L		0.0001	17-APR-19
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	17-APR-19
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	17-APR-19
Boron (B)-Total			<0.010		mg/L		0.01	17-APR-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R4602626								
WG3028223-1 MB								
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	17-APR-19
Calcium (Ca)-Total			<0.050		mg/L		0.05	17-APR-19
Cesium (Cs)-Total			<0.000010		mg/L		0.00001	17-APR-19
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	17-APR-19
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	17-APR-19
Copper (Cu)-Total			<0.00050		mg/L		0.0005	17-APR-19
Iron (Fe)-Total			<0.010		mg/L		0.01	17-APR-19
Lead (Pb)-Total			<0.000050		mg/L		0.00005	17-APR-19
Lithium (Li)-Total			<0.0010		mg/L		0.001	17-APR-19
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	17-APR-19
Manganese (Mn)-Total			0.00010	B	mg/L		0.0001	17-APR-19
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	17-APR-19
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	17-APR-19
Phosphorus (P)-Total			<0.050		mg/L		0.05	17-APR-19
Potassium (K)-Total			<0.050		mg/L		0.05	17-APR-19
Rubidium (Rb)-Total			<0.00020		mg/L		0.0002	17-APR-19
Selenium (Se)-Total			<0.000050		mg/L		0.00005	17-APR-19
Silicon (Si)-Total			<0.10		mg/L		0.1	17-APR-19
Silver (Ag)-Total			<0.000010		mg/L		0.00001	17-APR-19
Sodium (Na)-Total			<0.050		mg/L		0.05	17-APR-19
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	17-APR-19
Sulfur (S)-Total			<0.50		mg/L		0.5	17-APR-19
Tellurium (Te)-Total			<0.00020		mg/L		0.0002	17-APR-19
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	17-APR-19
Thorium (Th)-Total			<0.00010		mg/L		0.0001	17-APR-19
Tin (Sn)-Total			<0.00010		mg/L		0.0001	17-APR-19
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	17-APR-19
Tungsten (W)-Total			<0.00010		mg/L		0.0001	17-APR-19
Uranium (U)-Total			<0.000010		mg/L		0.00001	17-APR-19
Vanadium (V)-Total			<0.00050		mg/L		0.0005	17-APR-19
Zinc (Zn)-Total			<0.0030		mg/L		0.003	17-APR-19
Zirconium (Zr)-Total			<0.000060		mg/L		0.00006	17-APR-19
WG3028223-4 MS		**L2257784-1**						
Aluminum (Al)-Total			102.7		%		70-130	17-APR-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R4602626								
WG3028223-4 MS		**L2257784-1**						
Antimony (Sb)-Total			95.2		%		70-130	17-APR-19
Arsenic (As)-Total			102.6		%		70-130	17-APR-19
Barium (Ba)-Total			101.9		%		70-130	17-APR-19
Beryllium (Be)-Total			103.5		%		70-130	17-APR-19
Bismuth (Bi)-Total			97.6		%		70-130	17-APR-19
Boron (B)-Total			94.0		%		70-130	17-APR-19
Cadmium (Cd)-Total			103.0		%		70-130	17-APR-19
Calcium (Ca)-Total			N/A	MS-B	%		-	17-APR-19
Cesium (Cs)-Total			98.8		%		70-130	17-APR-19
Chromium (Cr)-Total			97.2		%		70-130	17-APR-19
Cobalt (Co)-Total			102.9		%		70-130	17-APR-19
Copper (Cu)-Total			102.0		%		70-130	17-APR-19
Iron (Fe)-Total			103.3		%		70-130	17-APR-19
Lead (Pb)-Total			97.9		%		70-130	17-APR-19
Lithium (Li)-Total			97.4		%		70-130	17-APR-19
Magnesium (Mg)-Total			98.0		%		70-130	17-APR-19
Manganese (Mn)-Total			104.9		%		70-130	17-APR-19
Molybdenum (Mo)-Total			96.2		%		70-130	17-APR-19
Nickel (Ni)-Total			102.7		%		70-130	17-APR-19
Phosphorus (P)-Total			101.4		%		70-130	17-APR-19
Potassium (K)-Total			99.9		%		70-130	17-APR-19
Rubidium (Rb)-Total			103.5		%		70-130	17-APR-19
Selenium (Se)-Total			104.5		%		70-130	17-APR-19
Silicon (Si)-Total			97.5		%		70-130	17-APR-19
Silver (Ag)-Total			97.9		%		70-130	17-APR-19
Sodium (Na)-Total			104.8		%		70-130	17-APR-19
Strontium (Sr)-Total			N/A	MS-B	%		-	17-APR-19
Sulfur (S)-Total			110.0		%		70-130	17-APR-19
Tellurium (Te)-Total			95.7		%		70-130	17-APR-19
Thallium (Tl)-Total			93.0		%		70-130	17-APR-19
Thorium (Th)-Total			98.1		%		70-130	17-APR-19
Tin (Sn)-Total			96.2		%		70-130	17-APR-19
Titanium (Ti)-Total			94.3		%		70-130	17-APR-19
Tungsten (W)-Total			90.5		%		70-130	17-APR-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R4602626								
WG3028223-4 MS		**L2257784-1**						
Uranium (U)-Total			97.3		%		70-130	17-APR-19
Vanadium (V)-Total			101.4		%		70-130	17-APR-19
Zinc (Zn)-Total			103.6		%		70-130	17-APR-19
Zirconium (Zr)-Total			102.9		%		70-130	17-APR-19
Batch R4604667								
WG3029695-7 DUP		**L2257784-2**						
Aluminum (Al)-Total		0.0560	0.0584		mg/L	4.3	20	17-APR-19
Antimony (Sb)-Total		0.00012	0.00010		mg/L	2.3	20	17-APR-19
Arsenic (As)-Total		0.0107	0.0106		mg/L	2.0	20	17-APR-19
Barium (Ba)-Total		0.925	0.788		mg/L	1.9	20	17-APR-19
Beryllium (Be)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	17-APR-19
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	17-APR-19
Boron (B)-Total		1.99	1.90		mg/L	1.3	20	17-APR-19
Calcium (Ca)-Total		169	158		mg/L	0.4	20	17-APR-19
Cesium (Cs)-Total		0.000269	0.000264		mg/L	0.8	20	17-APR-19
Chromium (Cr)-Total		0.00125	0.00112		mg/L	2.5	20	17-APR-19
Cobalt (Co)-Total		0.00301	0.00298		mg/L	3.8	20	17-APR-19
Copper (Cu)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	17-APR-19
Iron (Fe)-Total		51.5	49.1		mg/L	0.5	20	17-APR-19
Lead (Pb)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	17-APR-19
Lithium (Li)-Total		0.0023	0.0022		mg/L	0.8	20	17-APR-19
Magnesium (Mg)-Total		37.1	33.7		mg/L	3.0	20	17-APR-19
Manganese (Mn)-Total		3.24	2.99		mg/L	1.8	20	17-APR-19
Molybdenum (Mo)-Total		0.000366	0.000320		mg/L	3.9	20	17-APR-19
Nickel (Ni)-Total		0.00561	0.00548		mg/L	2.8	20	17-APR-19
Phosphorus (P)-Total		0.406	0.386		mg/L	3.9	20	17-APR-19
Potassium (K)-Total		72.3	65.6		mg/L	1.2	20	17-APR-19
Rubidium (Rb)-Total		0.0507	0.0483		mg/L	4.5	20	17-APR-19
Selenium (Se)-Total		0.000118	0.000133		mg/L	5.5	20	17-APR-19
Silicon (Si)-Total		12.6	11.7		mg/L	3.4	20	17-APR-19
Silver (Ag)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	17-APR-19
Sodium (Na)-Total		122	114		mg/L	1.4	20	17-APR-19
Strontium (Sr)-Total		1.20	1.05		mg/L	2.0	20	17-APR-19
Sulfur (S)-Total		1.60	1.26		mg/L	10	20	17-APR-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R4604667								
WG3029695-7 DUP		**L2257784-2**						
Tellurium (Te)-Total		<0.00020	0.00022	RPD-NA	mg/L	N/A	20	17-APR-19
Thallium (Tl)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	17-APR-19
Thorium (Th)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	17-APR-19
Tin (Sn)-Total		0.00021	0.00019		mg/L	5.4	20	17-APR-19
Titanium (Ti)-Total		0.00340	0.00316		mg/L	0.5	20	17-APR-19
Tungsten (W)-Total		<0.00010	0.00010		mg/L	0.2	20	17-APR-19
Uranium (U)-Total		0.000049	0.000055		mg/L	0.5	20	17-APR-19
Vanadium (V)-Total		0.00208	0.00193		mg/L	3.7	20	17-APR-19
Zinc (Zn)-Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	17-APR-19
Zirconium (Zr)-Total		0.000483	0.000436		mg/L	2.3	20	17-APR-19
WG3029695-2 LCS								
Aluminum (Al)-Total			98.2		%		80-120	17-APR-19
Antimony (Sb)-Total			89.0		%		80-120	17-APR-19
Arsenic (As)-Total			97.0		%		80-120	17-APR-19
Barium (Ba)-Total			95.9		%		80-120	17-APR-19
Beryllium (Be)-Total			92.0		%		80-120	17-APR-19
Bismuth (Bi)-Total			92.8		%		80-120	17-APR-19
Boron (B)-Total			84.7		%		80-120	17-APR-19
Cadmium (Cd)-Total			97.8		%		80-120	17-APR-19
Calcium (Ca)-Total			93.5		%		80-120	17-APR-19
Cesium (Cs)-Total			91.6		%		80-120	17-APR-19
Chromium (Cr)-Total			95.8		%		80-120	17-APR-19
Cobalt (Co)-Total			96.4		%		80-120	17-APR-19
Copper (Cu)-Total			95.2		%		80-120	17-APR-19
Iron (Fe)-Total			101.0		%		80-120	17-APR-19
Lead (Pb)-Total			94.4		%		80-120	17-APR-19
Lithium (Li)-Total			89.1		%		80-120	17-APR-19
Magnesium (Mg)-Total			97.4		%		80-120	17-APR-19
Manganese (Mn)-Total			95.5		%		80-120	17-APR-19
Molybdenum (Mo)-Total			90.3		%		80-120	17-APR-19
Nickel (Ni)-Total			95.0		%		80-120	17-APR-19
Phosphorus (P)-Total			101.1		%		80-120	17-APR-19
Potassium (K)-Total			99.3		%		80-120	17-APR-19
Rubidium (Rb)-Total			96.2		%		80-120	17-APR-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R4604667								
WG3029695-2 LCS								
Selenium (Se)-Total			104.2		%		80-120	17-APR-19
Silicon (Si)-Total			94.5		%		80-120	17-APR-19
Silver (Ag)-Total			88.8		%		80-120	17-APR-19
Sodium (Na)-Total			100.7		%		80-120	17-APR-19
Strontium (Sr)-Total			92.1		%		80-120	17-APR-19
Sulfur (S)-Total			100.7		%		80-120	17-APR-19
Tellurium (Te)-Total			83.0		%		80-120	17-APR-19
Thallium (Tl)-Total			94.9		%		80-120	17-APR-19
Thorium (Th)-Total			94.0		%		80-120	17-APR-19
Tin (Sn)-Total			86.0		%		80-120	17-APR-19
Titanium (Ti)-Total			91.7		%		80-120	17-APR-19
Tungsten (W)-Total			92.1		%		80-120	17-APR-19
Uranium (U)-Total			95.5		%		80-120	17-APR-19
Vanadium (V)-Total			95.6		%		80-120	17-APR-19
Zinc (Zn)-Total			95.5		%		80-120	17-APR-19
Zirconium (Zr)-Total			88.4		%		80-120	17-APR-19
WG3029695-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	17-APR-19
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	17-APR-19
Arsenic (As)-Total			<0.00010		mg/L		0.0001	17-APR-19
Barium (Ba)-Total			<0.00010		mg/L		0.0001	17-APR-19
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	17-APR-19
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	17-APR-19
Boron (B)-Total			<0.010		mg/L		0.01	17-APR-19
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	17-APR-19
Calcium (Ca)-Total			<0.050		mg/L		0.05	17-APR-19
Cesium (Cs)-Total			<0.000010		mg/L		0.00001	17-APR-19
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	17-APR-19
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	17-APR-19
Copper (Cu)-Total			<0.00050		mg/L		0.0005	17-APR-19
Iron (Fe)-Total			<0.010		mg/L		0.01	17-APR-19
Lead (Pb)-Total			<0.000050		mg/L		0.00005	17-APR-19
Lithium (Li)-Total			<0.0010		mg/L		0.001	17-APR-19
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	17-APR-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R4604667								
WG3029695-1 MB								
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	17-APR-19
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	17-APR-19
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	17-APR-19
Phosphorus (P)-Total			<0.050		mg/L		0.05	17-APR-19
Potassium (K)-Total			<0.050		mg/L		0.05	17-APR-19
Rubidium (Rb)-Total			<0.00020		mg/L		0.0002	17-APR-19
Selenium (Se)-Total			<0.000050		mg/L		0.00005	17-APR-19
Silicon (Si)-Total			<0.10		mg/L		0.1	17-APR-19
Silver (Ag)-Total			<0.000010		mg/L		0.00001	17-APR-19
Sodium (Na)-Total			<0.050		mg/L		0.05	17-APR-19
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	17-APR-19
Sulfur (S)-Total			<0.50		mg/L		0.5	17-APR-19
Tellurium (Te)-Total			<0.00020		mg/L		0.0002	17-APR-19
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	17-APR-19
Thorium (Th)-Total			<0.00010		mg/L		0.0001	17-APR-19
Tin (Sn)-Total			<0.00010		mg/L		0.0001	17-APR-19
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	17-APR-19
Tungsten (W)-Total			<0.00010		mg/L		0.0001	17-APR-19
Uranium (U)-Total			<0.000010		mg/L		0.00001	17-APR-19
Vanadium (V)-Total			<0.00050		mg/L		0.0005	17-APR-19
Zinc (Zn)-Total			<0.0030		mg/L		0.003	17-APR-19
Zirconium (Zr)-Total			<0.000060		mg/L		0.00006	17-APR-19
NH3-F-VA	**Water**							
Batch R4608338								
WG3031475-4 LCS								
Ammonia, Total (as N)			95.3		%		85-115	22-APR-19
WG3031475-3 MB								
Ammonia, Total (as N)			<0.0050		mg/L		0.005	22-APR-19
Batch R4610254								
WG3032257-2 LCS								
Ammonia, Total (as N)			94.2		%		85-115	23-APR-19
WG3032257-1 MB								
Ammonia, Total (as N)			<0.0050		mg/L		0.005	23-APR-19
NO2-L-IC-N-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO2-L-IC-N-VA	**Water**							
Batch R4604086								
WG3028115-3 DUP		**L2257784-1**						
Nitrite (as N)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	16-APR-19
WG3028145-3 DUP		**L2257784-8**						
Nitrite (as N)		0.0019	0.0018		mg/L	7.2	20	16-APR-19
WG3028115-2 LCS								
Nitrite (as N)			98.6		%		90-110	16-APR-19
WG3028145-2 LCS								
Nitrite (as N)			99.9		%		90-110	16-APR-19
WG3028115-1 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	16-APR-19
WG3028145-1 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	16-APR-19
Batch R4606162								
WG3029925-2 LCS								
Nitrite (as N)			97.3		%		90-110	17-APR-19
WG3029925-1 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	17-APR-19
WG3029925-4 MS		**L2257784-3**						
Nitrite (as N)			96.2		%		75-125	17-APR-19
NO3-L-IC-N-VA	**Water**							
Batch R4604086								
WG3028115-3 DUP		**L2257784-1**						
Nitrate (as N)		0.0301	0.0298		mg/L	1.0	20	16-APR-19
WG3028145-3 DUP		**L2257784-8**						
Nitrate (as N)		0.493	0.490		mg/L	0.6	20	16-APR-19
WG3028115-2 LCS								
Nitrate (as N)			99.1		%		90-110	16-APR-19
WG3028145-2 LCS								
Nitrate (as N)			99.1		%		90-110	16-APR-19
WG3028115-1 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	16-APR-19
WG3028145-1 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	16-APR-19
Batch R4606162								
WG3029925-2 LCS								
Nitrate (as N)			99.0		%		90-110	17-APR-19
WG3029925-1 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	17-APR-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-L-IC-N-VA	**Water**							
Batch R4606162								
WG3029925-4 MS		**L2257784-3**						
Nitrate (as N)			102.4		%		75-125	17-APR-19
P-T-PRES-COL-VA	**Water**							
Batch R4602082								
WG3027357-2 CRM		**VA-ERA-PO4**						
Phosphorus (P)-Total			111.6		%		80-120	16-APR-19
WG3027357-1 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	16-APR-19
Batch R4602127								
WG3027325-2 CRM		**VA-ERA-PO4**						
Phosphorus (P)-Total			105.1		%		80-120	16-APR-19
WG3027325-1 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	16-APR-19
PH-PCT-VA	**Water**							
Batch R4602225								
WG3028117-2 CRM		**VA-PH7-BUF**						
pH			6.99		pH		6.9-7.1	16-APR-19
WG3028117-5 DUP		**L2257784-1**						
pH		7.49	7.41	J	pH	0.08	0.3	16-APR-19
PO4-DO-COL-VA	**Water**							
Batch R4602120								
WG3028116-2 CRM		**VA-OPO4-CONTROL**						
Orthophosphate-Dissolved (as P)			100.6		%		80-120	16-APR-19
WG3028140-2 CRM		**VA-OPO4-CONTROL**						
Orthophosphate-Dissolved (as P)			103.5		%		80-120	16-APR-19
WG3028116-3 DUP		**L2257784-1**						
Orthophosphate-Dissolved (as P)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	16-APR-19
WG3028116-1 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	16-APR-19
WG3028140-1 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	16-APR-19
WG3028116-4 MS		**L2257784-2**						
Orthophosphate-Dissolved (as P)			92.1		%		70-130	16-APR-19
WG3028140-4 MS		**L2257784-8**						
Orthophosphate-Dissolved (as P)			103.3		%		70-130	16-APR-19
SO4-IC-N-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SO4-IC-N-VA	**Water**							
Batch R4604086								
WG3028115-3 DUP		**L2257784-1**						
Sulfate (SO4)		1.37	1.37		mg/L	0.2	20	16-APR-19
WG3028145-3 DUP		**L2257784-8**						
Sulfate (SO4)		1.77	1.77		mg/L	0.2	20	16-APR-19
WG3028115-2 LCS								
Sulfate (SO4)			98.0		%		90-110	16-APR-19
WG3028145-2 LCS								
Sulfate (SO4)			98.4		%		90-110	16-APR-19
WG3028115-1 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	16-APR-19
WG3028145-1 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	16-APR-19
Batch R4606162								
WG3029925-2 LCS								
Sulfate (SO4)			101.7		%		90-110	17-APR-19
WG3029925-1 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	17-APR-19
WG3029925-4 MS		**L2257784-3**						
Sulfate (SO4)			104.1		%		75-125	17-APR-19
TKN-F-VA	**Water**							
Batch R4605851								
WG3029477-2 LCS								
Total Kjeldahl Nitrogen			101.3		%		75-125	18-APR-19
WG3029477-1 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	18-APR-19

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
B	Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
pH by Meter (Automated)							
	1	11-APR-19 11:35	16-APR-19 14:03	0.25	122	hours	EHTR-FM
	2	11-APR-19 12:45	16-APR-19 14:03	0.25	121	hours	EHTR-FM
	3	11-APR-19 14:45	16-APR-19 14:03	0.25	119	hours	EHTR-FM
	4	11-APR-19 10:55	16-APR-19 14:03	0.25	123	hours	EHTR-FM
	5	11-APR-19 12:05	16-APR-19 14:03	0.25	122	hours	EHTR-FM
	6	11-APR-19 12:00	16-APR-19 14:03	0.25	122	hours	EHTR-FM
	7	11-APR-19 12:00	16-APR-19 14:03	0.25	122	hours	EHTR-FM
	8	11-APR-19 13:35	16-APR-19 14:03	0.25	120	hours	EHTR-FM
Anions and Nutrients							
Diss. Orthophosphate in Water by Colour							
	1	11-APR-19 11:35	16-APR-19 09:17	3	5	days	EHT
	2	11-APR-19 12:45	16-APR-19 09:21	3	5	days	EHT
	3	11-APR-19 14:45	16-APR-19 09:21	3	5	days	EHT
	4	11-APR-19 10:55	16-APR-19 09:23	3	5	days	EHT
	5	11-APR-19 12:05	16-APR-19 09:23	3	5	days	EHT
	6	11-APR-19 12:00	16-APR-19 09:23	3	5	days	EHT
	7	11-APR-19 12:00	16-APR-19 09:32	3	5	days	EHT
	8	11-APR-19 13:35	16-APR-19 09:47	3	5	days	EHT
Nitrate in Water by IC (Low Level)							
	1	11-APR-19 11:35	16-APR-19 09:48	3	5	days	EHT
	2	11-APR-19 12:45	16-APR-19 09:48	3	5	days	EHT
	3	11-APR-19 14:45	17-APR-19 08:37	3	6	days	EHT
	4	11-APR-19 10:55	16-APR-19 09:48	3	5	days	EHT
	5	11-APR-19 12:05	16-APR-19 09:48	3	5	days	EHT
	6	11-APR-19 12:00	16-APR-19 09:48	3	5	days	EHT
	7	11-APR-19 12:00	16-APR-19 09:48	3	5	days	EHT
	8	11-APR-19 13:35	16-APR-19 09:48	3	5	days	EHT
Nitrite in Water by IC (Low Level)							
	1	11-APR-19 11:35	16-APR-19 09:48	3	5	days	EHT
	2	11-APR-19 12:45	16-APR-19 09:48	3	5	days	EHT
	3	11-APR-19 14:45	17-APR-19 08:37	3	6	days	EHT
	4	11-APR-19 10:55	16-APR-19 09:48	3	5	days	EHT
	5	11-APR-19 12:05	16-APR-19 09:48	3	5	days	EHT
	6	11-APR-19 12:00	16-APR-19 09:48	3	5	days	EHT
	7	11-APR-19 12:00	16-APR-19 09:48	3	5	days	EHT
	8	11-APR-19 13:35	16-APR-19 09:48	3	5	days	EHT

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2257784 were received on 12-APR-19 19:50.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

Quality Control Report

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental
www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L2257784-COFC

COC Number: 17 -

Page 1 of

Report To	Contact and company name below will appear on the final report
Company:	Regional District of Kitimat-Stikine
Contact:	Chris Kerr
Phone:	250-641-4141
	Company address below will appear on the final report
Street:	4545 Lazell Avenue
City/Province:	Terrace/BC
Postal Code:	V8G4E1
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	Regional District of Kitimat-Stikine
Contact:	Roger Tooms

Report Fo	
Select Report Format:	☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ YES ☐ NO
☑ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	rtooms@rdks.bc.ca
Email 2	ckerr@rdks.bc.ca
Email 3	jcoosemans@rdks.bc.ca

Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	rtooms@rdks.bc.ca
Email 2	ckerr@rdks.bc.ca; jcoosemans@rdks.bc.ca

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:		AFE/Cost Center:	PO#
Job #:	Thornhill Transfer Station	Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	

ALS Lab Work Order # (lab use only): | ALS Contact: | Sampler: Chris Kerr

Turnaround Time (TAT) Required — Please provide advance notice for rush projects

Regular [R] Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days): 4 day [P4-20%] ☐ | 3 day [P3-25%] ☐ | 2 day [P2-50%] ☐

EMERGENCY: 1 Business day [E1 - 100%] ☐ | Same Day, Weekend or Statutory holiday [E2 -200% (Laboratory opening fees may apply)] ☐

Date and Time Required for all E&P TATs:

For tests that can not be performed according to the service level selected, you will be contacted.

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Dissolved metal F/P	Total metals F/P	alkilinity (as CaCO3)	Total Hardness	Dissolved Hardness	Ammonia P	Fluoride	Chloride	Conductivity	Nitrate	Nitrite	total Kjeldahl nitrogen P	pH	Total phosphorus P	ortho-phosphorus	SAMPLES ON HOLD	Sample is hazardous (please provide further detail)	NUMBER OF CONTAINERS
	SW-1	4-Jul-19	11:35	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			7
	SW-3	4-Jul-19	12:45	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			7
	SW-6	4-Jul-19	2:45	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			7
	SW-21	4-Jul-19	10:55	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			7
	BH96-2	4-Jul-19	12:05	Water	R	R	R		R	R	R	R	R	R	R	R	R	R	R			7
	DUP	4-Jul-19	12:00	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			7
	Blank	4-Jul-19	12:00	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			7
	SW-17	4/11/19	1:35	WATER	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			7

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☑ NO

Are samples for human consumption/ use? ☐ YES ☑ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

British Columbia Approved and Working Water Quality Guidelines (MAY, 2015)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ | SIF Observations Yes ☐ No ☐

Ice Packs ☑ Ice Cubes ☐ | Custody seal intact Yes ☐ No ☐

Cooling Initiated ☑

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
9.5							4

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date: April 11/19	Time: 3:25	Received by:	Date: April 11/19	Time: 5:25	Received by: HA	Date: 4/12	Time: 7:50A

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

SEPT 2017 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

REGIONAL DISTRICT OF KITIMAT-STIKINE
ATTN: Chris Kerr
300 - 4545 Lazelle Avenue
Terrace BC V8G 4E1

Date Received: 10-OCT-19
Report Date: 21-OCT-19 16:41 (MT)
Version: FINAL

Client Phone: 250-615-6100

Certificate of Analysis

Lab Work Order #: L2364065

Project P.O. #: NOT SUBMITTED
Job Reference: THORNHILL GROUNDWATER
C of C Numbers:
Legal Site Desc:

Amber Springer, B.Sc
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2364065-1	L2364065-2	L2364065-3		
Description	Water	Water	Water		
Sampled Date	10-OCT-19	10-OCT-19	10-OCT-19		
Sampled Time	10:25	12:00	12:00		
Client ID	BH-96-2	DUP	FIELD BLANK		
Grouping / **Analyte**					
WATER					
Physical Tests					
Conductivity (uS/cm)	376	381	<2.0		
Hardness (as CaCO3) (mg/L)	89.2	102			
pH (pH)	8.49	8.47	5.71		
Total Dissolved Solids (mg/L)	211	255			
Anions and Nutrients					
Alkalinity, Total (as CaCO3) (mg/L)	216	231	<1.0		
Ammonia, Total (as N) (mg/L)	0.0787	0.0308	<0.0050		
Chloride (Cl) (mg/L)	1.33	0.84			
Fluoride (F) (mg/L)	0.150	0.152			
Nitrate (as N) (mg/L)	0.139	0.0705			
Nitrite (as N) (mg/L)	0.0055	0.0126			
Total Kjeldahl Nitrogen (mg/L)	0.172	0.106			
Phosphorus (P)-Total (mg/L)	0.0974	0.0396	<0.0020		
Sulfate (SO4) (mg/L)	2.75	2.07			
Total Metals					
Aluminum (Al)-Total (mg/L)	1.39	6.06			
Antimony (Sb)-Total (mg/L)	0.00018	0.00039			
Arsenic (As)-Total (mg/L)	0.00391	0.00674			
Barium (Ba)-Total (mg/L)	0.0267	0.0632			
Beryllium (Be)-Total (mg/L)	<0.00010	0.00012			
Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050			
Boron (B)-Total (mg/L)	0.177	0.167			
Cadmium (Cd)-Total (mg/L)	0.000670	0.00204			
Calcium (Ca)-Total (mg/L)	13.9	17.0			
Cesium (Cs)-Total (mg/L)	0.000134	0.000534			
Chromium (Cr)-Total (mg/L)	0.00171	0.00709			
Cobalt (Co)-Total (mg/L)	0.00111	0.00404			
Copper (Cu)-Total (mg/L)	0.00600	0.0202			
Iron (Fe)-Total (mg/L)	1.99	8.14			
Lead (Pb)-Total (mg/L)	0.000879	0.00334			
Lithium (Li)-Total (mg/L)	0.0028	0.0064			
Magnesium (Mg)-Total (mg/L)	12.5	16.2			
Manganese (Mn)-Total (mg/L)	0.155	0.344			
Mercury (Hg)-Total (mg/L)	0.0000050	0.0000163			
Molybdenum (Mo)-Total (mg/L)	0.00448	0.00376			
Nickel (Ni)-Total (mg/L)	0.00289	0.0103			
Phosphorus (P)-Total (mg/L)	0.108	0.240 RRV			
Potassium (K)-Total (mg/L)	10.3	11.1			
Rubidium (Rb)-Total (mg/L)	0.00098	0.00297			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2364065-1	L2364065-2	L2364065-3		
Description	Water	Water	Water		
Sampled Date	10-OCT-19	10-OCT-19	10-OCT-19		
Sampled Time	10:25	12:00	12:00		
Client ID	BH-96-2	DUP	FIELD BLANK		
Grouping / **Analyte**					
WATER					
Total Metals Selenium (Se)-Total (mg/L)	0.000055	0.000097			
Silicon (Si)-Total (mg/L)	5.96	12.2			
Silver (Ag)-Total (mg/L)	0.000018	0.000082			
Sodium (Na)-Total (mg/L)	48.9	46.0			
Strontium (Sr)-Total (mg/L)	0.170	0.190			
Sulfur (S)-Total (mg/L)	1.12	0.91			
Tellurium (Te)-Total (mg/L)	<0.00020	<0.00020			
Thallium (Tl)-Total (mg/L)	0.000011	0.000041			
Thorium (Th)-Total (mg/L)	<0.00010	0.00019			
Tin (Sn)-Total (mg/L)	0.00023	0.00059			
Titanium (Ti)-Total (mg/L)	0.0374	0.126			
Tungsten (W)-Total (mg/L)	0.00013	0.00012			
Uranium (U)-Total (mg/L)	0.00186	0.00206			
Vanadium (V)-Total (mg/L)	0.00381	0.0145			
Zinc (Zn)-Total (mg/L)	0.0135	0.0473			
Zirconium (Zr)-Total (mg/L)	<0.00020	<0.00020			
Dissolved Metals Dissolved Mercury Filtration Location	FIELD	FIELD			
Dissolved Metals Filtration Location	FIELD	FIELD			
Aluminum (Al)-Dissolved (mg/L)	0.0112	0.0178			
Antimony (Sb)-Dissolved (mg/L)	0.00011	<0.00010			
Arsenic (As)-Dissolved (mg/L)	0.00339	0.00438			
Barium (Ba)-Dissolved (mg/L)	0.0178	0.0205			
Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00010			
Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050			
Boron (B)-Dissolved (mg/L)	0.160	0.155			
Cadmium (Cd)-Dissolved (mg/L)	0.000173	0.0000417			
Calcium (Ca)-Dissolved (mg/L)	14.2	15.5			
Cesium (Cs)-Dissolved (mg/L)	<0.000010	<0.000010			
Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010			
Cobalt (Co)-Dissolved (mg/L)	<0.00010	0.00011			
Copper (Cu)-Dissolved (mg/L)	0.00061	0.00035			
Iron (Fe)-Dissolved (mg/L)	0.010	0.077			
Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050			
Lithium (Li)-Dissolved (mg/L)	0.0016	0.0016			
Magnesium (Mg)-Dissolved (mg/L)	13.1	15.5			
Manganese (Mn)-Dissolved (mg/L)	0.0453	0.0906			
Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2364065-1	L2364065-2	L2364065-3		
	Description	Water	Water	Water		
	Sampled Date	10-OCT-19	10-OCT-19	10-OCT-19		
	Sampled Time	10:25	12:00	12:00		
	Client ID	BH-96-2	DUP	FIELD BLANK		
Grouping	**Analyte**					
WATER						
Dissolved Metals	Molybdenum (Mo)-Dissolved (mg/L)	0.00517	0.00456			
	Nickel (Ni)-Dissolved (mg/L)	0.00062	0.00512			
	Phosphorus (P)-Dissolved (mg/L)	0.060	<0.050			
	Potassium (K)-Dissolved (mg/L)	11.2	11.5			
	Rubidium (Rb)-Dissolved (mg/L)	0.00037	0.00042			
	Selenium (Se)-Dissolved (mg/L)	<0.000050	<0.000050			
	Silicon (Si)-Dissolved (mg/L)	4.42	4.64			
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010			
	Sodium (Na)-Dissolved (mg/L)	56.0	52.2			
	Strontium (Sr)-Dissolved (mg/L)	0.164	0.183			
	Sulfur (S)-Dissolved (mg/L)	1.30	0.91			
	Tellurium (Te)-Dissolved (mg/L)	<0.00020	<0.00020			
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010			
	Thorium (Th)-Dissolved (mg/L)	<0.00010	<0.00010			
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010			
	Titanium (Ti)-Dissolved (mg/L)	0.00046	<0.00090 DLM			
	Tungsten (W)-Dissolved (mg/L)	0.00015	0.00014			
	Uranium (U)-Dissolved (mg/L)	0.00194	0.00193			
	Vanadium (V)-Dissolved (mg/L)	0.00054	0.00050			
	Zinc (Zn)-Dissolved (mg/L)	<0.0010	<0.0010			
	Zirconium (Zr)-Dissolved (mg/L)	<0.00020	<0.00020			
Aggregate Organics	COD (mg/L)	<20	<20			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2364065-1, -2
Matrix Spike	Iron (Fe)-Dissolved	MS-B	L2364065-1, -2
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2364065-1, -2
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L2364065-1, -2
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2364065-1, -2
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2364065-1, -2
Matrix Spike	Calcium (Ca)-Total	MS-B	L2364065-1, -2
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2364065-1, -2
Matrix Spike	Strontium (Sr)-Total	MS-B	L2364065-1, -2
Matrix Spike	Phosphorus (P)-Total	MS-B	L2364065-1, -2, -3

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RRV	Reported Result Verified By Repeat Analysis

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-TITR-VA	Water	Alkalinity Species by Titration	APHA 2320 Alkalinity

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

CL-IC-N-VA	Water	Chloride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

COD-COL-VA	Water	Chemical Oxygen Demand by Colorimetric	APHA 5220 D. CHEMICAL OXYGEN DEMAND

This analysis is carried out using procedures adapted from APHA Method 5220 "Chemical Oxygen Demand (COD)". Chemical oxygen demand is determined using the closed reflux colourimetric method.

EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.

This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.

EC-SCREEN-VA	Water	Conductivity Screen (Internal Use Only)	APHA 2510

Qualitative analysis of conductivity where required during preparation of other tests - e.g. TDS, metals, etc.

F-IC-N-VA	Water	Fluoride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-VA	Water	Hardness	APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA	Water	Diss. Mercury in Water by CVAAS or CVAFS	APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-CVAA-VA	Water	Total Mercury in Water by CVAAS or CVAFS	EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

MET-D-CCMS-VA	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-VA	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Reference Information

NH3-F-VA	Water	Ammonia in Water by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-VA	Water	Nitrite in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-VA	Water	Nitrate in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

P-T-PRES-COL-VA	Water	Total P in Water by Colour	APHA 4500-P Phosphorus

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.
Samples with very high dissolved solids (i.e. seawaters, brackish waters) may produce a negative bias by this method. Alternate methods are available for these types of samples.

Arsenic (5+), at elevated levels, is a positive interference on colourimetric phosphate analysis.

PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

SO4-IC-N-VA	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

TDS-VA	Water	Total Dissolved Solids by Gravimetric	APHA 2540 C - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TKN-F-VA	Water	TKN in Water by Fluorescence	APHA 4500-NORG D.

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L2364065 Report Date: 21-OCT-19

Client: REGIONAL DISTRICT OF KITIMAT-STIKINE
300 - 4545 Lazelle Avenue
Terrace BC V8G 4E1
Contact: Chris Kerr

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-TITR-VA	**Water**							
Batch R4872266								
WG3189835-3 LCS								
Alkalinity, Total (as CaCO3)			102.5		%		85-115	16-OCT-19
WG3189835-1 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	16-OCT-19
CL-IC-N-VA	**Water**							
Batch R4868268								
WG3189825-2 LCS								
Chloride (Cl)			95.5		%		90-110	12-OCT-19
WG3189825-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	12-OCT-19
COD-COL-VA	**Water**							
Batch R4876864								
WG3196738-3 LCS								
COD			101.6		%		85-115	21-OCT-19
WG3196738-1 MB								
COD			<20		mg/L		20	21-OCT-19
EC-PCT-VA	**Water**							
Batch R4872266								
WG3189835-3 LCS								
Conductivity			101.9		%		90-110	16-OCT-19
WG3189835-1 MB								
Conductivity			<2.0		uS/cm		2	16-OCT-19
F-IC-N-VA	**Water**							
Batch R4868268								
WG3189825-2 LCS								
Fluoride (F)			95.3		%		90-110	12-OCT-19
WG3189825-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	12-OCT-19
HG-D-CVAA-VA	**Water**							
Batch R4870900								
WG3190941-11 DUP		**L2364065-2**						
Mercury (Hg)-Dissolved		<0.0000050	<0.000005(	RPD-NA	mg/L	N/A	20	15-OCT-19
WG3190941-10 LCS								
Mercury (Hg)-Dissolved			106.3		%		80-120	15-OCT-19
WG3190941-9 MB								
Mercury (Hg)-Dissolved			<0.000005(		mg/L		0.000005	15-OCT-19
WG3190941-12 MS		**L2364065-1**						

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-D-CVAA-VA	**Water**							
Batch R4870900								
WG3190941-12 MS		**L2364065-1**						
Mercury (Hg)-Dissolved			89.1		%		70-130	15-OCT-19
HG-T-CVAA-VA	**Water**							
Batch R4868480								
WG3190451-2 LCS								
Mercury (Hg)-Total			95.7		%		80-120	13-OCT-19
WG3190451-1 MB								
Mercury (Hg)-Total			<0.000005(		mg/L		0.000005	13-OCT-19
MET-D-CCMS-VA	**Water**							
Batch R4869993								
WG3189750-2 LCS								
Aluminum (Al)-Dissolved			104.6		%		80-120	13-OCT-19
Antimony (Sb)-Dissolved			100.9		%		80-120	13-OCT-19
Arsenic (As)-Dissolved			101.6		%		80-120	13-OCT-19
Barium (Ba)-Dissolved			106.6		%		80-120	13-OCT-19
Beryllium (Be)-Dissolved			102.1		%		80-120	13-OCT-19
Bismuth (Bi)-Dissolved			99.7		%		80-120	13-OCT-19
Boron (B)-Dissolved			94.8		%		80-120	13-OCT-19
Cadmium (Cd)-Dissolved			101.6		%		80-120	13-OCT-19
Calcium (Ca)-Dissolved			103.9		%		80-120	13-OCT-19
Cesium (Cs)-Dissolved			101.7		%		80-120	13-OCT-19
Chromium (Cr)-Dissolved			102.6		%		80-120	13-OCT-19
Cobalt (Co)-Dissolved			102.3		%		80-120	13-OCT-19
Copper (Cu)-Dissolved			102.0		%		80-120	13-OCT-19
Iron (Fe)-Dissolved			101.0		%		80-120	13-OCT-19
Lead (Pb)-Dissolved			100.2		%		80-120	13-OCT-19
Lithium (Li)-Dissolved			99.8		%		80-120	13-OCT-19
Magnesium (Mg)-Dissolved			105.5		%		80-120	13-OCT-19
Manganese (Mn)-Dissolved			104.4		%		80-120	13-OCT-19
Molybdenum (Mo)-Dissolved			104.1		%		80-120	13-OCT-19
Nickel (Ni)-Dissolved			104.2		%		80-120	13-OCT-19
Phosphorus (P)-Dissolved			115.9		%		70-130	13-OCT-19
Potassium (K)-Dissolved			100.9		%		80-120	13-OCT-19
Rubidium (Rb)-Dissolved			99.1		%		80-120	13-OCT-19
Selenium (Se)-Dissolved			102.4		%		80-120	13-OCT-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R4869993								
WG3189750-2 LCS								
Silicon (Si)-Dissolved			109.5		%		60-140	13-OCT-19
Silver (Ag)-Dissolved			98.8		%		80-120	13-OCT-19
Sodium (Na)-Dissolved			106.8		%		80-120	13-OCT-19
Strontium (Sr)-Dissolved			102.5		%		80-120	13-OCT-19
Sulfur (S)-Dissolved			101.7		%		80-120	13-OCT-19
Tellurium (Te)-Dissolved			94.0		%		80-120	13-OCT-19
Thallium (Tl)-Dissolved			99.6		%		80-120	13-OCT-19
Thorium (Th)-Dissolved			97.8		%		80-120	13-OCT-19
Tin (Sn)-Dissolved			101.2		%		80-120	13-OCT-19
Titanium (Ti)-Dissolved			100.7		%		80-120	13-OCT-19
Tungsten (W)-Dissolved			102.9		%		80-120	13-OCT-19
Uranium (U)-Dissolved			95.9		%		80-120	13-OCT-19
Vanadium (V)-Dissolved			103.7		%		80-120	13-OCT-19
Zinc (Zn)-Dissolved			102.4		%		80-120	13-OCT-19
Zirconium (Zr)-Dissolved			97.9		%		80-120	13-OCT-19
WG3189750-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	13-OCT-19
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	13-OCT-19
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	13-OCT-19
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	13-OCT-19
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	13-OCT-19
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	13-OCT-19
Boron (B)-Dissolved			<0.010		mg/L		0.01	13-OCT-19
Cadmium (Cd)-Dissolved			<0.000005C		mg/L		0.000005	13-OCT-19
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	13-OCT-19
Cesium (Cs)-Dissolved			<0.000010		mg/L		0.00001	13-OCT-19
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	13-OCT-19
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	13-OCT-19
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	13-OCT-19
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	13-OCT-19
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	13-OCT-19
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	13-OCT-19
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	13-OCT-19
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	13-OCT-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R4869993								
WG3189750-1 MB		**NP**						
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	13-OCT-19
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	13-OCT-19
Phosphorus (P)-Dissolved			<0.050		mg/L		0.05	13-OCT-19
Potassium (K)-Dissolved			<0.050		mg/L		0.05	13-OCT-19
Rubidium (Rb)-Dissolved			<0.00020		mg/L		0.0002	13-OCT-19
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	13-OCT-19
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	13-OCT-19
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	13-OCT-19
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	13-OCT-19
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	13-OCT-19
Sulfur (S)-Dissolved			<0.50		mg/L		0.5	13-OCT-19
Tellurium (Te)-Dissolved			<0.00020		mg/L		0.0002	13-OCT-19
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	13-OCT-19
Thorium (Th)-Dissolved			<0.00010		mg/L		0.0001	13-OCT-19
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	13-OCT-19
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	13-OCT-19
Tungsten (W)-Dissolved			<0.00010		mg/L		0.0001	13-OCT-19
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	13-OCT-19
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	13-OCT-19
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	13-OCT-19
Zirconium (Zr)-Dissolved			<0.00020		mg/L		0.0002	13-OCT-19
MET-T-CCMS-VA	**Water**							
Batch R4873468								
WG3190268-2 LCS								
Aluminum (Al)-Total			101.6		%		80-120	17-OCT-19
Antimony (Sb)-Total			107.1		%		80-120	17-OCT-19
Arsenic (As)-Total			100.6		%		80-120	17-OCT-19
Barium (Ba)-Total			110.4		%		80-120	17-OCT-19
Beryllium (Be)-Total			101.8		%		80-120	17-OCT-19
Bismuth (Bi)-Total			100.0		%		80-120	17-OCT-19
Boron (B)-Total			116.0		%		80-120	17-OCT-19
Cadmium (Cd)-Total			101.0		%		80-120	17-OCT-19
Calcium (Ca)-Total			103.4		%		80-120	17-OCT-19
Cesium (Cs)-Total			98.3		%		80-120	17-OCT-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R4873468								
WG3190268-2 LCS								
Chromium (Cr)-Total			98.7		%		80-120	17-OCT-19
Cobalt (Co)-Total			92.8		%		80-120	17-OCT-19
Copper (Cu)-Total			91.8		%		80-120	17-OCT-19
Iron (Fe)-Total			86.2		%		80-120	17-OCT-19
Lead (Pb)-Total			102.1		%		80-120	17-OCT-19
Lithium (Li)-Total			107.2		%		80-120	17-OCT-19
Magnesium (Mg)-Total			101.0		%		80-120	17-OCT-19
Manganese (Mn)-Total			100.6		%		80-120	17-OCT-19
Molybdenum (Mo)-Total			97.9		%		80-120	17-OCT-19
Nickel (Ni)-Total			95.4		%		80-120	17-OCT-19
Phosphorus (P)-Total			104.2		%		80-120	17-OCT-19
Potassium (K)-Total			102.8		%		80-120	17-OCT-19
Rubidium (Rb)-Total			104.1		%		80-120	17-OCT-19
Selenium (Se)-Total			90.8		%		80-120	17-OCT-19
Silicon (Si)-Total			102.3		%		80-120	17-OCT-19
Silver (Ag)-Total			99.0		%		80-120	17-OCT-19
Sodium (Na)-Total			96.0		%		80-120	17-OCT-19
Strontium (Sr)-Total			104.8		%		80-120	17-OCT-19
Sulfur (S)-Total			92.5		%		80-120	17-OCT-19
Tellurium (Te)-Total			106.8		%		80-120	17-OCT-19
Thallium (Tl)-Total			100.1		%		80-120	17-OCT-19
Thorium (Th)-Total			93.8		%		80-120	17-OCT-19
Tin (Sn)-Total			102.1		%		80-120	17-OCT-19
Titanium (Ti)-Total			97.2		%		80-120	17-OCT-19
Tungsten (W)-Total			95.2		%		80-120	17-OCT-19
Uranium (U)-Total			96.8		%		80-120	17-OCT-19
Vanadium (V)-Total			101.9		%		80-120	17-OCT-19
Zinc (Zn)-Total			97.1		%		80-120	17-OCT-19
Zirconium (Zr)-Total			94.7		%		80-120	17-OCT-19
WG3190268-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	17-OCT-19
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	17-OCT-19
Arsenic (As)-Total			<0.00010		mg/L		0.0001	17-OCT-19
Barium (Ba)-Total			<0.00010		mg/L		0.0001	17-OCT-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R4873468								
WG3190268-1 MB								
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	17-OCT-19
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	17-OCT-19
Boron (B)-Total			<0.010		mg/L		0.01	17-OCT-19
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	17-OCT-19
Calcium (Ca)-Total			<0.050		mg/L		0.05	17-OCT-19
Cesium (Cs)-Total			<0.000010		mg/L		0.00001	17-OCT-19
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	17-OCT-19
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	17-OCT-19
Copper (Cu)-Total			<0.00050		mg/L		0.0005	17-OCT-19
Iron (Fe)-Total			<0.010		mg/L		0.01	17-OCT-19
Lead (Pb)-Total			<0.000050		mg/L		0.00005	17-OCT-19
Lithium (Li)-Total			<0.0010		mg/L		0.001	17-OCT-19
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	17-OCT-19
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	17-OCT-19
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	17-OCT-19
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	17-OCT-19
Phosphorus (P)-Total			<0.050		mg/L		0.05	17-OCT-19
Potassium (K)-Total			<0.050		mg/L		0.05	17-OCT-19
Rubidium (Rb)-Total			<0.00020		mg/L		0.0002	17-OCT-19
Selenium (Se)-Total			<0.000050		mg/L		0.00005	17-OCT-19
Silicon (Si)-Total			<0.10		mg/L		0.1	17-OCT-19
Silver (Ag)-Total			<0.000010		mg/L		0.00001	17-OCT-19
Sodium (Na)-Total			<0.050		mg/L		0.05	17-OCT-19
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	17-OCT-19
Sulfur (S)-Total			<0.50		mg/L		0.5	17-OCT-19
Tellurium (Te)-Total			<0.00020		mg/L		0.0002	17-OCT-19
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	17-OCT-19
Thorium (Th)-Total			<0.00010		mg/L		0.0001	17-OCT-19
Tin (Sn)-Total			<0.00010		mg/L		0.0001	17-OCT-19
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	17-OCT-19
Tungsten (W)-Total			<0.00010		mg/L		0.0001	17-OCT-19
Uranium (U)-Total			<0.000010		mg/L		0.00001	17-OCT-19
Vanadium (V)-Total			<0.00050		mg/L		0.0005	17-OCT-19
Zinc (Zn)-Total			<0.0030		mg/L		0.003	17-OCT-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R4873468								
WG3190268-1 MB								
Zirconium (Zr)-Total			<0.00020		mg/L		0.0002	17-OCT-19
Batch R4874053								
WG3194289-2 LCS								
Aluminum (Al)-Total			104.6		%		80-120	18-OCT-19
Antimony (Sb)-Total			106.0		%		80-120	18-OCT-19
Arsenic (As)-Total			98.6		%		80-120	18-OCT-19
Barium (Ba)-Total			102.3		%		80-120	18-OCT-19
Beryllium (Be)-Total			102.9		%		80-120	18-OCT-19
Bismuth (Bi)-Total			97.6		%		80-120	18-OCT-19
Boron (B)-Total			104.8		%		80-120	18-OCT-19
Cadmium (Cd)-Total			99.0		%		80-120	18-OCT-19
Calcium (Ca)-Total			104.2		%		80-120	18-OCT-19
Cesium (Cs)-Total			108.5		%		80-120	18-OCT-19
Chromium (Cr)-Total			102.8		%		80-120	18-OCT-19
Cobalt (Co)-Total			100.9		%		80-120	18-OCT-19
Copper (Cu)-Total			100.4		%		80-120	18-OCT-19
Iron (Fe)-Total			105.0		%		80-120	18-OCT-19
Lead (Pb)-Total			101.7		%		80-120	18-OCT-19
Lithium (Li)-Total			105.0		%		80-120	18-OCT-19
Magnesium (Mg)-Total			104.4		%		80-120	18-OCT-19
Manganese (Mn)-Total			102.6		%		80-120	18-OCT-19
Molybdenum (Mo)-Total			101.4		%		80-120	18-OCT-19
Nickel (Ni)-Total			99.4		%		80-120	18-OCT-19
Phosphorus (P)-Total			113.0		%		80-120	18-OCT-19
Potassium (K)-Total			105.0		%		80-120	18-OCT-19
Rubidium (Rb)-Total			101.0		%		80-120	18-OCT-19
Selenium (Se)-Total			98.1		%		80-120	18-OCT-19
Silicon (Si)-Total			109.7		%		80-120	18-OCT-19
Silver (Ag)-Total			106.5		%		80-120	18-OCT-19
Sodium (Na)-Total			106.4		%		80-120	18-OCT-19
Strontium (Sr)-Total			108.5		%		80-120	18-OCT-19
Sulfur (S)-Total			109.1		%		80-120	18-OCT-19
Tellurium (Te)-Total			100.1		%		80-120	18-OCT-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R4874053								
WG3194289-2 LCS								
Thallium (Tl)-Total			98.3		%		80-120	18-OCT-19
Thorium (Th)-Total			101.6		%		80-120	18-OCT-19
Tin (Sn)-Total			102.8		%		80-120	18-OCT-19
Titanium (Ti)-Total			102.1		%		80-120	18-OCT-19
Tungsten (W)-Total			100.8		%		80-120	18-OCT-19
Uranium (U)-Total			100.9		%		80-120	18-OCT-19
Vanadium (V)-Total			103.1		%		80-120	18-OCT-19
Zinc (Zn)-Total			96.3		%		80-120	18-OCT-19
Zirconium (Zr)-Total			101.3		%		80-120	18-OCT-19
WG3194289-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	18-OCT-19
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	18-OCT-19
Arsenic (As)-Total			<0.00010		mg/L		0.0001	18-OCT-19
Barium (Ba)-Total			<0.00010		mg/L		0.0001	18-OCT-19
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	18-OCT-19
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	18-OCT-19
Boron (B)-Total			<0.010		mg/L		0.01	18-OCT-19
Cadmium (Cd)-Total			<0.0000050		mg/L		0.000005	18-OCT-19
Calcium (Ca)-Total			<0.050		mg/L		0.05	18-OCT-19
Cesium (Cs)-Total			<0.000010		mg/L		0.00001	18-OCT-19
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	18-OCT-19
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	18-OCT-19
Copper (Cu)-Total			<0.00050		mg/L		0.0005	18-OCT-19
Iron (Fe)-Total			<0.010		mg/L		0.01	18-OCT-19
Lead (Pb)-Total			<0.000050		mg/L		0.00005	18-OCT-19
Lithium (Li)-Total			<0.0010		mg/L		0.001	18-OCT-19
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	18-OCT-19
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	18-OCT-19
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	18-OCT-19
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	18-OCT-19
Phosphorus (P)-Total			<0.050		mg/L		0.05	18-OCT-19
Potassium (K)-Total			<0.050		mg/L		0.05	18-OCT-19
Rubidium (Rb)-Total			<0.00020		mg/L		0.0002	18-OCT-19
Selenium (Se)-Total			<0.000050		mg/L		0.00005	18-OCT-19

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R4874053								
WG3194289-1 MB								
Silicon (Si)-Total			<0.10		mg/L		0.1	18-OCT-19
Silver (Ag)-Total			<0.000010		mg/L		0.00001	18-OCT-19
Sodium (Na)-Total			<0.050		mg/L		0.05	18-OCT-19
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	18-OCT-19
Sulfur (S)-Total			<0.50		mg/L		0.5	18-OCT-19
Tellurium (Te)-Total			<0.00020		mg/L		0.0002	18-OCT-19
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	18-OCT-19
Thorium (Th)-Total			<0.00010		mg/L		0.0001	18-OCT-19
Tin (Sn)-Total			<0.00010		mg/L		0.0001	18-OCT-19
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	18-OCT-19
Tungsten (W)-Total			<0.00010		mg/L		0.0001	18-OCT-19
Uranium (U)-Total			<0.000010		mg/L		0.00001	18-OCT-19
Vanadium (V)-Total			<0.00050		mg/L		0.0005	18-OCT-19
Zinc (Zn)-Total			<0.0030		mg/L		0.003	18-OCT-19
Zirconium (Zr)-Total			<0.00020		mg/L		0.0002	18-OCT-19
NH3-F-VA	**Water**							
Batch R4873461								
WG3191630-2 LCS								
Ammonia, Total (as N)			110.6		%		85-115	17-OCT-19
WG3191630-1 MB								
Ammonia, Total (as N)			<0.0050		mg/L		0.005	17-OCT-19
NO2-L-IC-N-VA	**Water**							
Batch R4868268								
WG3189825-2 LCS								
Nitrite (as N)			95.6		%		90-110	12-OCT-19
WG3189825-1 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	12-OCT-19
Batch R4873149								
WG3191946-2 LCS								
Nitrite (as N)			101.0		%		90-110	16-OCT-19
WG3191946-1 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	16-OCT-19
NO3-L-IC-N-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-L-IC-N-VA	**Water**							
Batch R4868268								
WG3189825-2 LCS								
Nitrate (as N)			96.0		%		90-110	12-OCT-19
WG3189825-1 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	12-OCT-19
P-T-PRES-COL-VA	**Water**							
Batch R4871797								
WG3191559-2 LCS								
Phosphorus (P)-Total			100.5		%		80-120	16-OCT-19
WG3191559-1 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	16-OCT-19
PH-PCT-VA	**Water**							
Batch R4872266								
WG3189835-2 CRM		**VA-PH7-BUF**						
pH			7.02		pH		6.9-7.1	16-OCT-19
SO4-IC-N-VA	**Water**							
Batch R4868268								
WG3189825-2 LCS								
Sulfate (SO4)			96.7		%		90-110	12-OCT-19
WG3189825-1 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	12-OCT-19
TDS-VA	**Water**							
Batch R4874190								
WG3193072-2 LCS								
Total Dissolved Solids			101.1		%		85-115	17-OCT-19
WG3193072-1 MB								
Total Dissolved Solids			<10		mg/L		10	17-OCT-19
TKN-F-VA	**Water**							
Batch R4872355								
WG3191555-2 LCS								
Total Kjeldahl Nitrogen			103.2		%		75-125	16-OCT-19
WG3191555-1 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	16-OCT-19

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
pH by Meter (Automated)							
	1	10-OCT-19 10:25	16-OCT-19 10:25	0.25	144	hours	EHTR-FM
	2	10-OCT-19 12:00	16-OCT-19 10:25	0.25	142	hours	EHTR-FM
	3	10-OCT-19 12:00	16-OCT-19 10:25	0.25	142	hours	EHTR-FM
Anions and Nutrients							
Nitrite in Water by IC (Low Level)							
	2	10-OCT-19 12:00	16-OCT-19 14:21	3	6	days	EHT

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2364065 were received on 10-OCT-19 20:30.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Chain of Custody (COC) / Analytical Request Form

Terrace Shipping X 4
Coolers

COC Number: 17 -

Page of

ALS Environmental
www.alsglobal.com
Canada Toll Free: 1 800 668 9878

Report To	Contact and company name below will appear on the final report
Company:	Regional District of Kitimat-Stikine
Contact:	Chris Kerr
Phone:	250-641-4141
	Company address below will appear on the final report
Street:	4545 Lazelle Avenue
City/Province:	Terrace/BC
Postal Code:	V8G4E1
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	Regional District of Kitimat-Stikine
Contact:	Erin Blaney

Report Format / Distribution	
Select Report Format:	☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ YES ☐ NO
☑ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	eblaney@rdks.bc.ca
Email 2	ckerr@rdks.bc.ca
Email 3	sprouse@rdks.bc.ca
Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	anne-maries@rdks.bc.ca
Email 2	ckerr@rdks.bc.ca; eblaney@rdks.bc.ca

Project Information	
ALS Account # / Quote #:	
Job #:	Thornhill Groundwater
PO / AFE:	
LSD:	

Oil and Gas Required Fields (client use)	
AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (lab use only): **ALS Contact:** **Sampler:** Chris Kerr

Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days): 4 day [P4-20%] ☐ | 3 day [P3-25%] ☐ | 2 day [P2-50%] ☐

EMERGENCY: 1 Business day [E1 - 100%] ☐ | Same Day, Weekend or Statutory holiday [E2 -200% (Laboratory opening fees may apply)] ☐

Date and Time Required for all E&P TATs:

For tests that can not be performed according to the service level selected, you will be contacted.

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	F/P	P	F	P	P	P	P	P	P	P	P	P		F		SAMPLES ON HOLD	Sample is hazardous (please provide further detail)	NUMBER OF CONTAINERS
					Dissolved metals	Total Metals	dissolved hardness	Ammonia	Chloride	Fluoride	Nitrate	Nitrite	Total Kjeldahl Nitrogen	Total phosphorus	COD	Total Dissolved Solids	Sulphate	Alkalinity	pH, Conductivity				
	BH-96-2	10/10/19	10:25	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			
	DUP	"	12:00	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			
	Field Blank	"	12:00	Water				R						R				R	R			

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)
Are samples taken from a Regulated DW System? ☐ YES ☑ NO	British Columbia Approved and Working Water Quality Guidelines (MAY, 2015)
Are samples for human consumption/ use? ☐ YES ☑ NO	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☑ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
2.5	3.1	7.1	5.1	4	6	6	

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: C Kerr	Date: Oct 10/19	Time: 12:25	Received by: Jennifer Broussea	Date: Oct. 10/19	Time: 12:25	Received by: CW	Date: Oct 10	Time: 20:30

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

SEPT 2017 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form.**

APPENDIX F

Historic Analytical Results

Table F-1: Historic Groundwater Analytical Results
2019 Thornhill Transfer Station Annual Monitoring Program
Regional District of Kitimat-Stikine

Location				Thornhill Landfill																							
Monitoring Well				BH96-3																							
Sample ID	CSR Aquatic Life Standard, Freshwater (AW-F)	CSR Drinking Water Standard (DW)	Units	BH96-3	BH96-3	BH96-3	BH96-3	BH96-3	BH96-3	BH96-3	BH96-3	BH96-3	BH96-3	BH96-3	BH96-3	BH96-3	BH96-3	BH96-3	BH96-3	BH96-3	BH96-3	BH96-3	BH96-3	BH96-3	BH96-3	BH96-3	BH96-3
Laboratory ID				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sample Date				1-Oct-96	1-Jun-97	4-Dec-97	4-May-98	24-Sep-98	27-Jan-99	1-Apr-99	1-Nov-99	17-Mar-00	15-Aug-00	15-Aug-00	8-Dec-00	7-May-01	1-Dec-01	1-Apr-02	1-Jun-02	1-Jan-03	1-Mar-03	1-Mar-03	3-Aug-03	1-Dec-03	14-May-04	18-Oct-04	1-Jun-05	1-Nov-05
QAQC				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	FDA	FD	-	-	-	-	-	-
Conventional Parameters																											
Conductivity	-	-	uS/cm	136	874	583	470	382	-	218	-	290	-	-	-	359	255	64	255	317	305	320	743	680	760	771	582	656
Hardness (Total as CaCO3)	-	-	mg/L	44.8	248	164	153	153	156	80	104	92	118	54	139	101	99	92	549	143	127	-	230	241	255	303	202	290
Hardness (Dissolved as CaCO3)	-	-	mg/L	44.8	248	164	153	153	156	80	104	92	118	54	139	101	99	92	549	143	127	-	230	241	255	303	202	290
pH	-	-	-	6.54	6.48	6.26	7.38	6.92	-	-	-	6.41	6.58	7.97	6.58	6.62	6.41	7.34	6.40	6.60	6.44	7.20	6.95	6.20	6.63	6.5	6.59	7.2
Total Suspended Solids	-	-	mg/L	30	1,710	1,100	368	1,970	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	337	-	136
Total Dissolved Solids	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Alkalinity, Total (as CaCO3)	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ammonia, (as N)	1.3 - 18.5	-	mg/L	0.82	24.8	9.73	6.45	3.99	1.8	1.9	-	1.7	1.4	0.03	1.5	1.1	1.4	1.24	0.94	1.00	1.10	0.77	4.60	5.80	6.97	7.17	5.81	3.89
Bromide (Br)	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride (Cl)	1500	-	mg/L	2.3	71.2	35.4	19.3	16.1	11	8.1	7.5	6.8	15.2	0.9	7.7	6.3	4.7	4.7	0.7	9.4	9.6	8.9	55.6	63.3	43.8	35	24	24.4
Fluoride (F)	2.0-3.0 (e)	-	mg/L	-	-	-	-	-	-	-	-	<0.05	0.81	0.1	<0.05	<0.05	< 0.05	<0.05	0.17	<0.05	<0.05	-	4.1	0.06	<0.05	-	<0.05	-
Nitrate (as N)	400	10	mg/L	<0.005	0.021	0.009	0.045	<0.005	0.03	<0.05	<0.05	-	<0.05	0.25	<0.05	<0.05	< 0.05	<0.05	<0.05	<0.05	0.27	<0.02	<0.05	<0.05	<0.05	<0.002	<0.05	0.009
Nitrite (as N)	0.2 - 0.8	1	mg/L	0.069	0.009	0.056	0.019	0.001	<0.034	<0.002	0.002	-	0.009	<0.002	0.28	0.008	0.003	<0.05	<0.05	0.006	0.027	0.006	<0.002	<0.002	<0.002	<0.002	<0.002	0.009
Nitrate + Nitrite (as N)	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Kjeldahl Nitrogen	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Phosphorus (P)-Total	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulfate (SO4)	128 - 429	500	mg/L	16.4	1	3	11	8	7.8	8.8	19.8	16.3	3.1	8.8	16.5	13.5	15.1	14.9	4.2	5.9	10.9	9.1	1.4	1.1	2.5	26.7	10.3	15.8
Total coliforms	-	-	MPN/100m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E. coli	-	-	MPN/100m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Biological Oxygen Demand (BOD)	-	-	mg/L	-	-	-	-	58	-	13	<10	11	51	-	29	17	< 0.01	<0.01	19	30	28	<6	308	-	34	10	25	-
Chemical Oxygen Demand (COD)	-	-	mg/L	-	-	-	-	251	165	117	-	111	102	-	47	-	< 10	15	49	85	137	66	664	-	61	53	544	125
Phenols (4AAP)			mg/L																									
Dissolved Metals																											
Aluminum	-	9.5	mg/L	0.008	0.08	<0.005	<0.005	<0.005	0.11	0.01	0.007	0.11	0.006	0.078	0.006	0.11	0.008	0.019	0.008	0.013	0.016	0.0027	0.04	2.41	< 0.005	0.001	0.006	0.0004
Antimony	0.09	0.006	mg/L	-	<0.2	0.0003	0.0001	<0.0001	<0.015	<0.001	<0.001	<0.001	<0.001	-	<0.001	< 0.001	< 0.001	<0.001	<0.001	<0.001	<0.001	0.0007	<0.001	< 0.001	< 0.001	0.000121	0.0003	0.000247
Arsenic	0.05	0.01	mg/L	0.0054	<0.2	0.0026	0.0021	0.001	<0.04	0.002	<0.001	0.012	0.003	-	0.001	0.005	< 0.001	0.001	0.001	<0.001	<0.001	0.0302	0.006	0.024	0.002	0.0015	0.003	0.0007
Barium	10	1	mg/L	0.02	0.23	0.12	0.1	0.08	0.062	0.033	0.033	0.68	0.036	0.016	0.031	0.033	0.028	0.026	0.4	0.038	0.032	0.0348	0.12	0.086	0.12	0.143	0.113	0.0965
Beryllium	0.0015	0.008	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	< 0.001	<0.001	<0.001	<0.001	<0.001	<0.00002	<0.001	< 0.001	< 0.001	<0.00002	< 0.0002	<0.00002
Bismuth	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	-	< 0.001	<0.00002	< 0.0002	<0.00002
Boron	12	5	mg/L	<0.1	-	-	-	-	0.062	0.05	<0.05	0.13	<0.05	0.18	<0.05	0.07	< 0.05	<0.05	2.01	< 0.05	<0.05	-	<0.05	< 0.05	0.06	0.076	0.06	0.059
Cadmium	0.0005 - 0.004	0.005	mg/L	<0.0002	<0.002	<0.0002	<0.0002	<0.0002	<0.0001	<0.0002	<0.0002	0.0003	<0.0002	<0.0002	<0.0002	0.0004	< 0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.00002	<0.0002	0.0028	< 0.0002	0.00002	0.00013	0.00027
Calcium	-	-	mg/L	12.6	74.1	47.4	43.5	43.1	44	22.9	28	26.4	35.6	10.9	37.8	26.8	26.7	24.4	158	38.8	32.5	-	61.3	66	69.1	84.8	54.3	80.5
Cesium	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	0.01	0.05	mg/L	<0.001	<0.01	<0.001	<0.001	<0.001	0.003	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	< 0.001	<0.001	0.002	0.001	<0.001	<0.00002	<0.001	0.005	< 0.001	<0.0002	0.0004	0.0007
Cobalt	0.04	0.001	mg/L	<0.02	0.01	<0.01	<0.01	<0.01	<0.003	0.003	0.002	0.003	0.005	-	0.002	0.002	0.002	-	0.004	<0.001	0.001	0.00174	0.007	0.007	0.005	0.0048	0.0032	0.0047
Copper	0.02 - 0.09	1.5	mg/L	0.001	<0.01	<0.001	0.002	<0.001	0.035	0.001	<0.001	0.003	0.002	-	<0.001	<0.001	< 0.001	<0.001	0.006	<0.001	<0.001	0.0025	<0.001	0.075	0.001	0.00046	0.0012	0.00245
Iron	-	6.5	mg/L	0.03	15	7.12	0.03	1.23	8.53	2.26	0.15	2.62	8.24	0.08	0.11	4.76	2.22	4.61	0.37	4.43	0.49	-	6.75	37.2	< 0.05	0.089	1.03	0.016
Lead	0.04 - 0.16	0.01	mg/L	<0.001	<0.01	<0.001	<0.001	<0.001	<0.02	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	< 0.001	<0.001	<0.001	<0.001	<0.001	0.00014	<0.001	0.009	< 0.001	<0.00001	< 0.0002	<0.00001
Lithium	-	0.008	mg/L	<0.02	-	-	-	-	-	-	-	-	-	-	-	<0.001	-	-	0.002	0.001	0.002	0.00135	<0.001	-	0.002	0.00165	0.0016	0.00183
Magnesium	-	-	mg/L	3.24	15.4	11	10.8	11	11.3	5.52	8.29	6.43	7.13	6.43	10.7	8.28	7.8	7.56	37.4	11.3	11.00	-	18.60	18.40	20	22.2	16.2	21.0
Manganese	-	1.5	mg/L	1.65	13.5	0.61	8.39	7.64	6.88	3.05	2.89	2.7	5.0	0.015	2.66	2.61	2.77	2.13	3.4	3.8	2.74	3.04	10.3	10.4	9.13	12.4	8.6	8.1
Mercury	0.00025	0.001	mg/L	<0.00005	<0.00005	0.00004	<0.00001	<0.00001	<0.00005	<0.00005	<0.00005	<0.00002	<0.00002	-	<0.00002	<0.00002	< 0.00002	<0.00002	<0.00002	<0.00002	<0.00002	-	<0.00002	< 0.00002	< 0.02	0.00005	< 0.02	<0.00005
Molybdenum	10	0.25	mg/L	<0.03	<0.03	<0.03	<0.03	<0.03	<0.004	<0.001	<0.001	0.002	<0.001	-	<0.001	<0.001	< 0.001	<0.001	0.0009	<0.001	0.0037	0.00637	0.0009	0.0013	0.0022	0.00071	0.0011	0.00053
Nickel	0.25 - 1.5	0.08	mg/L	<0.02	<0.02	0.02	<0.02	<0.05	0.014	0.004	0.002	0.004	0.006	-	0.004	0.002	0.003	0.007	0.008	0.013	0.009	0.00309	0.007	0.023	0.006	0.00532	0.0065	0.00465
Phosphorus	-	-	mg/L	-	-	-	-	-	-	-	-	0.11	<0.01	0.1	0.07	0.42	0.08	0.08	0.16	0.05	0.12	-	0.17	3.01	< 0.15	<0.1	0.05	<0.1
Potassium	-	-	mg/L	-	-	-	-	-	5.9	1.37	1.72	1.38	1.57	6.86	1.51	1.46	1.67	1.5	71	1.73	1.75	-	3.7	3.6	4.2	5.0	4.5	4.0
Rubidium	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	0.02	0.01	mg/L	<0.0005	<0.01	<0.0005	<0.0005	<0.0005	<0.001	<0.002	<0.002	<0.002	<0.002	0	<0.002	<0.002	< 0.002	<0.002	<0.002	<0.002	<0.002	<0.0002	<0.001	< 0.001	< 0.001	0.3	< 0.0002	0.0003
Silicon	-	-	mg/L	-	-	-	-	-	-	-	-	8.36	16.3	9.08	15.5	13.2	13.3	12.5	15	13.7	13.8	-	15.8	20.6	15.9	-	15.6	-
Silver	0.0005 - 0.015	0.02	mg/L	<0.0001	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	<0.0001	<0.0001	< 0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	< 0.0001	< 0.00025	<0.00002	< 0.00005	<0.00002
Sodium	-	200	mg/L	5	-	-	-	-	18.5	8.82	10	11.3	7.67	34.5	10.2	8.96	8.75	8.59	120	10.3	11.4	-	28.9	24.2	28.0	33.0	24.0	25.4
Strontium	-	2.5	mg/L	-	-	-	-	-	-	-	-	0.19	0.026	0.13	0.2	0.17	0.17	0.15	1.05	0.18	0.17	0.213	0.44	0.41	0.44	0.481	0.366	0.368
Sulfur	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tellerium	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	0.003	-	mg/L	-	-	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	<0.0001	<0.0001	0.002	<0.001	<0.001	<0.001	<0.001	0.000002	<0.0001	< 0.0001	< 0.0001	0.000009	< 0.00002	0.000034
Thorium	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	-	2.5	mg/L	-	-	-	-	-	-	-	-	<0.001	<0.001	-	<0.001	<0.001	0.0015	<0.0005	<0.0005	<0.0005	<0.0005	0.00004	<0.001	< 0.001	< 0.001	-	< 0.0002	-
Titanium	1	-	mg/L	-	-	<0.01	<0.01	<0.01	<0.003	<0.001	<0.001	0.002	<0.001	0.003	<0.001	0.002	< 0.001	<0.001	<0.001	<0.001	<0.001	-	0.001	0.046	< 0.001	<0.003	0.0006	<0.003
Tungsten	-	0.003	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	0.085	0.02	mg/L	-	-	0.0011	0.00009	0.00004	-	<0.0005	<0.0005	<0.0005	<0.0005	0.0029	<0.0005	<0.0005	< 0.001	<0.001	<0.001	<0.001	<0.001	0.000183	<0.0005	0.0006	0.0028	0.000644	0.0004	0.000569
Vanadium	-	0.02	mg/L	<0.03	-	<0.03	<0.03	<0.03	<0.003	<0.001	<0.001	0.002	<0.001	0.001	<0.001	<0.001	< 0.0005	<0.0005	0.004	<0.0005	<0.0005	0.00104	<0.001	0.012	< 0.001	0.00017	0.0003	0.00024
Zinc	0.075 - 2.4	3	mg/L	0.006	<0.005	<0.005	0.01	<0.005	0.026	0.007	0.007	0.35	0.005	-	0.007	<0.005	< 0.001	<0.001	<0.001	<0.001	0.011	0.0078	0.013	0.14	0.005	0.0048	0.011	0.0175
Zirconium	-	-	mg/L	-	-	-	-	-	-	-	-	<0.01	<0.01	-	<0.01	<0.01	< 0.005	0.008	<0.01	<0.01	<0.01	-	<0.01	< 0.01	< 0.01	<0.005	< 0.002	<0.005

NOTES

BC CSR AW-F	BC Contaminated Sites Regulation Water Quality Guidelines for Protection of Freshwater Aquatic Life
BC CSR LW	BC Contaminated Sites Regulation Water Quality Guidelines for Protection of Livestock
BC CSR DW	BC Contaminated Sites Regulation Water Quality Guidelines for Drinking Water

Italics indicate that the laboratory detection limit exceeds the applicable standard.
Standards shown are from the BC Contaminated Sites Regulation (CSR; BC Reg. 375/96, O.C. 1480/96 and M40/2019, includes amendments up to BC Regs. 11/2019 and 13/2019, updated to 24 Jan 2019)

QAQC = quality assurance/quality control; FD = field duplicate;

Table F-1: Historic Groundwater Analytical Results
2019 Thornhill Transfer Station Annual Monitoring Program
Regional District of Kitimat-Stikine

Location Monitoring Well Sample ID Laboratory ID Sample Date QAQC	CSR Aquatic Life Standard, Freshwater (AW-F)	CSR Drinking Water Standard (DW)	Units	BH96-3 - 1-Jun-06 -	BH96-3 - 2-Jan-07 -	BH96-3 - 18-Jun-07 -	BH96-3 - 27-May-08 -	BH96-3 - 10-Oct-08 -	BH96-3 - 26-Aug-09 -	BH96-3 - 22-Feb-10 -	BH96-3 - 15-Jun-10 -	BH96-3 - 25-Oct-10 -	BH96-3 - 15-Feb-11 -	BH96-3 - 22-Feb-12 -	BH96-3 - 8-May-12 -	BH96-3 - 4-Jan-13 -	BH96-3 - 15-Apr-13 -	BH96-3 - 6-Jun-13 -	BH96-3 - 22-Oct-13 -	BH96-3 - 6-May-14 -	BH96-3 - 29-Oct-14 -	BH96-3 - 28-Mar-15 -	BH96-3 - 29-Aug-15 -	BH96-3 - 29-Nov-15 -
Conventional Parameters																								
Conductivity	-	-	uS/cm	500	547	451	528	880	815	617	734	840	686	574	475	609	572	539	675	862	774	592	767	644
Hardness (Total as CaCO3)	-	-	mg/L	153	174	154	195	390	367	288	246	327	277	194	187	230	226	220	269	373	295	249	503	254
Hardness (Dissolved as CaCO3)	-	-	mg/L	153	174	154	195	390	367	288	246	327	277	194	187	230	226	220	269	373	295	249	503	254
pH	-	-	-	7.35	6.2	6.47	6.6	6.9	6.6	6.5	6.3	7.3	6.5	6.5	6.2	6.6	6.5	6.5	6.5	6.7	6.5	6.7	6.5	6.6
Total Suspended Solids	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	360	-	980	1,560	2,000	540	180	5500	22000
Total Dissolved Solids	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Alkalinity, Total (as CaCO3)	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ammonia, (as N)	1.3 - 18.5	-	mg/L	-	-	-	2.9	11.8	10.1	8.6	9.6	8.07	8	6.1	6.5	7.04	7.27	7.26	8.05	<0.03	11.1	-	7.62	0.66
Bromide (Br)	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride (Cl)	1500	-	mg/L	16.4	17.9	14.9	42	69	53	39	41.3	35	28.7	19.7	16	18.5	12	13.6	16	37.4	33.9	22	80.8	99.4
Fluoride (F)	2.0-3.0 (e)	-	mg/L	<0.05	<0.05	0.06	<0.1	-	<0.1	<0.1	0.14	0.05	<0.1	<0.1	<0.1	ND	0.057	<0.1	<0.1	<0.1	<0.1	ND	<0.10	0.12
Nitrate (as N)	400	10	mg/L	<0.1	<0.05	<0.05	0.24	-	0.08	ND	<0.1	0.27	<0.1	<0.1	<0.1	ND	0.12	0.198	0.86	<0.02	0.022	0.54	0.28	0.06
Nitrite (as N)	0.2 - 0.8	1	mg/L	<0.002	0.012	<0.002	0.016	0.005	0.08	ND	<0.01	0.026	<0.01	<0.01	<0.01	ND	0.083	0.016	<0.01	<0.01	ND	ND	<0.01	<0.01
Nitrate + Nitrite (as N)	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Kjeldahl Nitrogen	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Phosphorus (P)-Total	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulfate (SO4)	128 - 429	500	mg/L	12.8	17.8	12.4	8.1	13.0	8.8	9.3	11.2	21.0	16.3	5.5	13.4	31.1	27.9	33.0	26.9	36.3	ND	20.5	37	35
Total coliforms	-	-	MPN/100m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E. coli	-	-	MPN/100m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Biological Oxygen Demand (BOD)	-	-	mg/L	20	47	24.5	32	136	79	21	50	21	51	130	105	49	<4	50	46	220	130	9.9	<0.0001	380
Chemical Oxygen Demand (COD)	-	-	mg/L	284	351	4370	127	126	317	346	227	181	550	546	434	158	809	290	324	416	248	250	>1500	363
Phenols (4AAP)			mg/L																					
Dissolved Metals																								
Aluminum	-	9.5	mg/L	< 0.005	<0.005	0.013	<0.01	0.074	0.006	0.013	ND	0.012	0.008	0.006	0.007	<0.003	0.0068	<0.003	0.0053	<0.003	0.016	ND	<0.005	0.005
Antimony	0.09	0.006	mg/L	< 0.001	< 0.001	0.001	<0.0006	0.0003	ND	ND	ND	ND	<0.0005	<0.0005	0.00448	0.0023	0.000159	<0.0005	<0.0005	<0.0005	<0.0005	0.0001	0.0011	0.0004
Arsenic	0.05	0.01	mg/L	0.002	0.003	0.029	0.002	0.0091	0.0039	0.0019	0.0011	0.001	0.0042	0.0027	0.00099	0.00173	0.00228	0.0159	0.0028	0.034	0.00864	0.0036	0.0045	0.0032
Barium	10	1	mg/L	0.1	0.12	0.12	0.103	0.253	0.355	0.193	0.226	0.237	0.202	0.194	0.128	0.141	0.0169	0.188	0.18	0.224	0.144	0.114	0.238	0.261
Beryllium	0.0015	0.008	mg/L	< 0.001	<0.001	<0.001	<0.0004	<0.00005	ND	ND	ND	ND	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	ND	<0.0001	<0.0001
Bismuth	-	-	mg/L	< 0.001	<0.001	<0.001	-	0.00009	ND	ND	ND	ND	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	ND	<0.0001	<0.0001
Boron	12	5	mg/L	0.08	0.1	0.09	0.066	<0.3	0.137	0.142	0.175	0.311	0.139	0.165	0.167	0.112	0.186	0.089	0.122	0.099	0.128	0.098	0.229	0.083
Cadmium	0.0005 - 0.004	0.005	mg/L	< 0.0002	<0.0002	<0.0002	0.00016	0.00005	0.00085	0.0003	0.00006	0.00113	0.00001	0.00016	0.000128	0.00008	0.000132	0.00001	0.000033	0.000015	0.000055	0.00003	0.0003	0.00024
Calcium	-	-	mg/L	42.3	48.4	42.6	56.1	75.4	84.7	93.7	67.9	95.9	77.8	54.3	46.3	65.8	12.3	56.4	80.9	88.9	81.5	68	85	80
Cesium	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	0.01	0.05	mg/L	< 0.001	<0.001	0.001	<0.001	<0.0005	ND	ND	ND	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	ND	<0.0005	<0.0005
Cobalt	0.04	0.001	mg/L	0.005	0.003	0.006	0.0019	0.00388	0.0036	0.0041	0.0033	0.0032	<0.0005	<0.0005	<0.0005	0.0078	0.000048	0.00285	0.00919	0.00994	0.00218	0.00079	0.00898	0.00539
Copper	0.02 - 0.09	1.5	mg/L	< 0.001	0.001	0.004	0.0859	0.0037	0.149	0.0679	0.008	0.0557	0.0015	0.0017	0.0285	0.00494	0.00028	0.00025	0.00105	0.00062	0.00352	0.0005	0.0009	0.003
Iron	-	6.5	mg/L	< 0.05	0.55	0.11	0.25	12.2	6.11	3.33	0.026	0.066	13.6	6.02	0.287	3.5	<0.005	14.7	6.25	17.6	12.5	9.95	0.475	0.073
Lead	0.04 - 0.16	0.01	mg/L	< 0.001	<0.001	<0.001	0.0002	0.00056	0.0002	0.0004	ND	0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.00055	ND	<0.0001	0.0002
Lithium	-	0.008	mg/L	< 0.001	<0.001	<0.005	0.0009	<0.003	ND	ND	ND	ND	<0.005	<0.005	0.0052	<0.005	0.00156	<0.005	<0.005	<0.005	<0.005	0.0012	0.0014	0.0008
Magnesium	-	-	mg/L	11.6	12.9	11.6	11.4	19.9	21.1	23.1	16.8	22.1	20.0	13.3	11.8	16.7	10.5	15.1	19.8	26.1	21.8	16.8	19.7	13.2
Manganese	-	1.5	mg/L	7.8	9.0	7.6	7.4	14.9	14.1	14.5	12.9	16.6	13.5	11.4	7.9	11.4	0.025	9.7	13.8	15.7	12.2	9.1	16.4	5.79
Mercury	0.00025	0.001	mg/L	< 0.02	<0.00002	<0.00002	<0.00006	-	ND	0.00012	ND	ND	<0.00001	<0.00001	<0.00001	0.000013	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	ND	<0.00002	<0.00002
Molybdenum	10	0.25	mg/L	< 0.0005	0.0008	0.0037	0.0007	0.0014	0.001	ND	ND	ND	<0.001	<0.001	0.0011	<0.001	0.00591	0.0018	0.0021	0.0021	<0.001	0.0005	0.0028	0.0011
Nickel	0.25 - 1.5	0.08	mg/L	0.004	0.002	0.005	0.004	0.0081	0.005	0.005	0.003	0.008	0.004	0.005	0.003	0.006	0.00066	0.005	0.0067	0.0067	0.0075	0.0026	0.0094	0.0049
Phosphorus	-	-	mg/L	< 0.15	<0.15	<0.15	-	0.436	-	-	-	-	0.022	0.013	0.012	0.036	0.059	<0.01	0.024	0.632	0.076	ND	<0.02	<0.02
Potassium	-	-	mg/L	4.0	4.3	4.3	-	6.8	7.1	6.9	6.6	8.6	6.1	4.7	4.2	5.2	9.9	4.9	6.9	5.8	6.0	4.27	8.28	7.13
Rubidium	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	0.02	0.01	mg/L	< 0.001	<0.001	<0.001	-	<0.0002	ND	0.0002	ND	0.0002	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.00011	<0.0001	0.00013	0.00014	ND	<0.0005	<0.0005
Silicon	-	-	mg/L	4.9	5.2	5.1	-	6.2	6.8	7.5	5.8	8.4	8.1	6.5	5.8	7.3	3.8	7.2	8.6	9.8	8.5	8.7	8	5.4
Silver	0.0005 - 0.015	0.02	mg/L	< 0.00025	<0.00025	<0.00025	0.00008	<0.00003	ND	ND	ND	ND	<0.000005	<0.000005	<0.000005	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	0.00006	<0.00005	<0.00005
Sodium	-	200	mg/L	17.6	17.8	16.0	14.1	42.1	32.7	29.1	25.1	34.4	26.2	18.3	16.4	19.8	54.5	18.7	23.5	26.2	26.8	19.5	20.7	14.8
Strontium	-	2.5	mg/L	0.32	0.34	0.32	-	0.54	0.566	0.534	0.508	0.575	0.513	0.4	0.357	0.452	0.149	0.419	0.517	0.572	0.585	0.424	0.596	0.576
Sulfur	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8.4	ND	4	3	11
Tellerium	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	0.003	-	mg/L	< 0.0001	<0.0001	<0.0001	0.0001	<0.00001	ND	ND	ND	ND	<0.00005	<0.00005	<0.00005	<0.00005	0.000003	<0.005	<0.005	<0.005	<0.005	ND	<0.00002	<0.00002
Thorium	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	-	2.5	mg/L	< 0.001	<0.001	<0.001	-	0.00013	ND	ND	ND	ND	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	ND	<0.0001	<0.0002
Titanium	1	-	mg/L	< 0.001	<0.001	<0.001	<0.02	0.008	ND	ND	ND	ND	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	ND	<0.0002	<0.005
Tungsten	-	0.003	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	0.085	0.02	mg/L	< 0.0005	<0.0005	0.0007	0.0003	0.0008	0.0008	0.0005	0.0005	0.0004	0.0005	0.0004	0.00034	0.00079	0.00244	0.00072	0.0012	0.00117	0.00023	0.00015	<0.005	0.00015
Vanadium	-	0.02	mg/L	< 0.001	<0.001	<0.001	<0.002	0.001	ND	ND	ND	ND	<0.005	ND	ND	<0.005	0.00074	<0.005	<0.005	<0.005	<0.005	ND	0.00141	<0.001
Zinc	0.075 - 2.4	3	mg/L	0.01	0.006	0.011	0.03	0.0046	0.091	0.075	0.021	0.476	0.011	0.028	0.0171	0.016	0.0016	0.0104	0.0141	0.0067	0.0095	0.007	<0.001	0.063
Zirconium	-	-	mg/L	< 0.01	<0.01	<0.01	-	-	ND	ND	ND	ND	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	ND	0.055	<0.0001

NOTES

BC CSR AW-F	BC Contaminated Sites Regulation Water Quality Guidelines for Protection of Freshwater Aquatic Life
BC CSR LW	BC Contaminated Sites Regulation Water Quality Guidelines for Protection of Livestock
BC CSR DW	BC Contaminated Sites Regulation Water Quality Guidelines for Drinking Water

Italics indicate that the laboratory detection limit exceeds the applicable standard.
Standards shown are from the BC Contaminated Sites Regulation (CSR; BC Reg. 375/96, O.C. 1480/96 and M40/2019, includes amendments up to BC Regs. 11/2019 and 13/2019, updated to 24 Jan 2019)

QAQC = quality assurance/quality control; FD = field duplicate;

Table F-2: Historic Groundwater Analytical Results
2019 Thornhill Trasnfer Station Annual Monitoring Program
Regional District of Kitimat-Stikine

Location				Thornhill Landfill												
Monitoring Well				Goodwin Well												
Sample ID	CSR Aquatic Life Standard, Freshwater, (AW-F)	CSR Drinking Water Standard (DW)	Units	Goodwin Well	Goodwin Well	Goodwin Well	Goodwin Well	Goodwin Well	Goodwin Well	Goodwin Well	Goodwin Well	Goodwin Well	Goodwin Well	Goodwin Well	Goodwin Well	Goodwin Well
Laboratory ID				-	-	-	-	-	-	-	-	-	-	-	-	-
Sample Date				1-Jun-96	1-May-98	15-Aug-00	1-Dec-01	1-Dec-03	27-May-08	26-Aug-09	15-Jun-10	25-Oct-10	24-Nov-10	24-May-12	25-Jul-16	24-Aug-17
QAQC				-	-	-	-	-	-	-	-	-	-	-	-	-
Conventional Parameters																
Conductivity	-	-	uS/cm	-	475	-	427	413	415	439	-	-	466	-	449	447
Hardness (Total as CaCO3)	-	-	mg/L	-	51.1	37	49	44	39.6	70.9	-	-	59	-	70.5	65.4
Hardness (Dissolved as CaCO3)	-	-	mg/L	-	51.1	37	49	44	39.6	70.9	-	-	59	-	70.5	65.4
pH	-	-	-	-	8.06	8.3	8.22	8.15	8.9	8.2	-	-	8.4	-	8.3	8.4
Total Suspended Solids	-	-	mg/L	7	34	-	-	-	-	-	-	-	-	-	<1.0	1.4
Total Dissolved Solids	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Alkalinity, Total (as CaCO3)	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Ammonia, (as N)	1.3 - 18.5	-	mg/L	<0.1	0.052	0.07	0.06	<0.01	<0.03	ND	-	-	0.04	-	0.041	<0.03
Bromide (Br)	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride (Cl)	1500	-	mg/L	27	28.2	31.8	28.9	28.7	28.8	8	-	-	24	-	32.7	31.1
Fluoride (F)	2.0-3.0 (e)	-	mg/L	-	-	0.6	0.6	0.69	0.79	0.56	-	-	0.73	-	0.63	0.59
Nitrate (as N)	400	10	mg/L	-	0.007	<0.05	<0.05	<0.05	<0.1	<0.1	-	-	<0.1	-	<0.01	0.034
Nitrite (as N)	0.2 - 0.8	1	mg/L	-	0.016	<0.002	<0.002	<0.002	<0.01	<0.01	-	-	<0.01	-	<0.01	<0.01
Nitrate + Nitrite (as N)	-	-	mg/L	<0.05	0.023	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	-
Total Kjeldahl Nitrogen	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Phosphorus (P)-Total	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulfate (SO4)	128 - 429	500	mg/L	35	35	37.5	34.1	32.3	26.4	-	-	-	33	-	32	31.7
Total coliforms	-	-	MPN/100m	-	-	-	-	-	-	-	<1.1	>23.1	>23.1	>23.0	-	-
E. coli	-	-	MPN/100m	-	-	-	-	-	-	-	<1.1	<1.1	<1.1	<1.1	-	-
Biological Oxygen Demand (BOD)	-	-	mg/L	-	-	<10	<10	<10	<6	ND	-	-	-	-	<4.0	<4.0
Chemical Oxygen Demand (COD)	-	-	mg/L	-	-	<25	<25	<25	<30	ND	-	-	<30	-	<20	<20
Phenols (4AAP)			mg/L													
Dissolved Metals																
Aluminum	-	9.5	mg/L	0.2	0.111	0.025	0.02	0.059	0.014	0.024	-	-	0.014	-	<0.005	0.0074
Antimony	0.09	0.006	mg/L	<0.001	<0.0001	<0.001	<0.001	< 0.001	<0.0006	ND	-	-	<0.0005	-	<0.0001	<0.00020
Arsenic	0.05	0.01	mg/L	<0.001	0.0027	0.002	0.002	0.002	0.0024	0.0023	-	-	0.002	-	0.002	0.00211
Barium	10	1	mg/L	<0.1	0.03	0.016	0.02	0.023	0.016	0.073	-	-	0.028	-	0.025	0.0229
Beryllium	0.0015	0.008	mg/L	<0.001	<0.005	<0.001	<0.001	< 0.001	<0.0004	ND	-	-	<0.0001	-	<0.0001	<0.00010
Bismuth	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	<0.0001	<0.00010
Boron	12	5	mg/L	-	-	0.17	0.17	0.1	0.227	0.146	-	-	-	-	0.155	0.121
Cadmium	0.0005 - 0.004	0.005	mg/L	<0.001	<0.0002	<0.0002	<0.0002	< 0.0002	<0.00002	ND	-	-	0.00004	-	0.00003	0.00001
Calcium	-	-	mg/L	14	12.6	9.8	11.8	11	7.4	16.5	-	-	14.3	-	17.2	16
Cesium	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	0.01	0.05	mg/L	<0.02	<0.001	<0.001	<0.001	< 0.001	0.001	ND	-	-	<0.001	-	<0.0005	<0.00050
Cobalt	0.04	0.001	mg/L	<0.02	<0.01	<0.01	<0.01	< 0.001	<0.0001	ND	-	-	<0.0005	-	<0.00005	<0.00010
Copper	0.02 - 0.09	1.5	mg/L	<0.01	0.004	0.004	0.002	0.006	0.0189	0.0053	-	-	0.0015	-	0.002	0.0194
Iron	-	6.5	mg/L	<0.1	0.06	<0.05	<0.05	0.14	<0.04	ND	-	-	0.01	-	<0.010	<0.010
Lead	0.04 - 0.16	0.01	mg/L	0.002	<0.001	<0.001	<0.001	< 0.001	0.0007	ND	-	-	0.0003	-	<0.0001	<0.00020
Lithium	-	0.008	mg/L	-	-	-	-	-	-	-	-	-	-	-	0.0013	0.0012
Magnesium	-	-	mg/L	5	4.8	3	4.8	4.01	7.61	5.86	-	-	5.75	-	6.72	6.19
Manganese	-	1.5	mg/L	0.05	0.04	0.04	0.043	0.008	0.0156	0.102	-	-	0.132	-	0.0412	0.00178
Mercury	0.00025	0.001	mg/L	-	<0.00001	<0.00002	<0.00003	< 0.00002	<0.00006	ND	-	-	<0.00002	-	<0.00002	<0.000010
Molybdenum	10	0.25	mg/L	0.02	<0.03	0.019	0.016	0.014	0.0206	0.017	-	-	0.023	-	0.0192	0.0161
Nickel	0.25 - 1.5	0.08	mg/L	<0.01	<0.05	<0.001	<0.002	< 0.001	<0.001	ND	-	-	<0.001	-	<0.0002	<0.00040
Phosphorus	-	-	mg/L	-	-	<0.01	0.09	0.43	-	-	-	-	-	-	<0.02	<0.050
Potassium	-	-	mg/L	<5	-	1.72	2.51	1.97	-	2.78	-	-	2.91	-	3	2.67
Rubidium	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	0.02	0.01	mg/L	-	<0.0005	<0.002	<0.003	< 0.001	<0.001	ND	-	-	<0.0001	-	<0.0005	<0.00050
Silicon	-	-	mg/L	-	-	9.86	8.2	6.75	-	4.12	-	-	4.19	-	4.3	4.4
Silver	0.0005 - 0.015	0.02	mg/L	<0.01	<0.0001	<0.0001	<0.0002	< 0.0001	<0.00008	ND	-	-	<0.00002	-	<0.00005	<0.000050
Sodium	-	200	mg/L	91	-	48.1	75.9	61.5	69.4	71.9	-	-	86	-	87.2	72.6
Strontium	-	2.5	mg/L	-	-	0.088	0.095	0.084	-	0.116	-	-	0.116	-	0.122	0.12
Sulfur	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	12	11.2
Tellerium	-	-	mg/L	-	-	<0.001	<0.001	< 0.001	-	-	-	-	-	-	-	<0.00050
Thallium	0.003	-	mg/L	-	<0.0001	<0.0001	<0.0001	< 0.0001	<0.0001	ND	-	-	<0.00005	-	<0.00002	<0.000020
Thorium	-	-	mg/L	-	-	<0.0005	<0.0005	< 0.0005	-	-	-	-	-	-	-	<0.00010
Tin	-	2.5	mg/L	-	-	<0.001	<0.001	< 0.001	-	ND	-	-	<0.005	-	<0.0002	0.00032
Titanium	1	-	mg/L	<0.01	<0.01	<0.001	<0.001	0.002	-	ND	-	-	<0.005	-	<0.005	<0.0050
Tungsten	-	0.003	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	0.085	0.02	mg/L	-	0.00009	0.0007	0.0009	0.0008	0.0006	0.0011	-	-	0.001	-	0.00094	0.00112
Vanadium	-	0.02	mg/L	<0.01	<0.03	<0.001	<0.001	< 0.001	<0.002	ND	-	-	<0.005	-	<0.001	<0.0010
Zinc	0.075 - 2.4	3	mg/L	<0.01	<0.005	<0.005	<0.005	0.009	0.01	0.018	-	-	<0.005	-	<0.004	0.0145
Zirconium	-	-	mg/L	-	-	<0.01	<0.01	< 0.01	-	ND	-	-	<0.0005	-	<0.0001	<0.00010

NOTES

BC CSR AW-F	BC Contaminated Sites Regulation Water Quality Guidelines for Protection of Freshwater Aquatic Life
BC CSR LW	BC Contaminated Sites Regulation Water Quality Guidelines for Protection of Livestock
BC CSR DW	BC Contaminated Sites Regulation Water Quality Guidelines for Drinking Water

Italics indicate that the laboratory detection limit exceeds the applicable standard.
Standards shown are from the BC Contaminated Sites Regulation (CSR; BC Reg. 375/96, O.C. 1480/96 and M40/2019, includes amendments up to BC Regs. 11/2019 and 13/2019, updated to 24 Jan 2019)

QAQC = quality assurance/quality control; FD = field duplicate;

Table F-3: Historic Groundwater Analytical Results
2018 Thornhill Transfer Station Annual Monitoring Program
Regional District of Kitimat-Stikine

Location				Thornhill Landfill										
Monitoring Well				Reinhardt Well										
Sample ID	CSR Aquatic Life Standard, Freshwater (AW-F)	CSR Drinking Water Standard (DW)	Units	Reinhardt Well -	Reinhardt Well -	Reinhardt Well -	Reinhardt Well -	Reinhardt Well -	Reinhardt Well -	Reinhardt Well -	Reinhardt Well -	Reinhardt Well -	Reinhardt Well -	Reinhardt Well -
Laboratory ID														
Sample Date				1-Jun-96	1-May-98	15-Aug-00	1-Dec-03	27-May-08	26-Aug-09	15-Jun-10	25-Oct-10	24-May-12	25-Jul-16	24-Aug-17
QAQC				-	-	-	-	-	-	-	-	-	-	-
Conventional Parameters														
Conductivity	-	-	uS/cm	-	181	-	161	156	156	-	-	-	180	181
Hardness (Total as CaCO3)	-	-	mg/L	-	83.3	65	70	63.6	61.7	-	-	-	86.6	77
Hardness (Dissolved as CaCO3)	-	-	mg/L	-	83.3	65	70	63.6	61.7	-	-	-	86.6	77
pH	-	-	-	-	7.69	7.81	7.65	8.1	7.7	-	-	-	7.9	8.1
Total Suspended Solids	-	-	mg/L	<5	<1	-	-	-	-	-	-	-	<1.0	<1.0
Total Dissolved Solids	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Alkalinity, Total (as CaCO3)	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Ammonia, (as N)	1.3 - 18.5	-	mg/L	<0.1	<0.005	0.02	0.02	<0.03	ND	-	-	-	<0.03	<0.03
Bromide (Br)	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Chloride (Cl)	1500	-	mg/L	12.2	9.4	9.2	9.2	6.6	5.8	-	-	-	10.6	15
Fluoride (F)	2.0-3.0 (e)	-	mg/L	-	-	<0.05	0.06	<0.1	ND	-	-	-	<0.10	<0.10
Nitrate (as N)	400	10	mg/L	-	0.077	0.05	0.07	<0.1	ND	-	-	-	0.051	0.046
Nitrite (as N)	0.2 - 0.8	1	mg/L	-	0.077	<0.002	<0.002	<0.01	ND	-	-	-	<0.01	<0.01
Nitrate + Nitrite (as N)	-	-	mg/L	0.07	0.015	0.05	0.07	-	-	-	-	-	-	-
Total Kjeldahl Nitrogen	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Total Phosphorus (P)-Total	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Sulfate (SO4)	128 - 429	500	mg/L	2.6	2	3.1	2.7	2.8	-	-	-	-	3.2	2.9
Total coliforms	-	-	MPN/100m	-	-	-	-	-	-	<1.1	<1.1	<1.1	-	-
E. coli	-	-	MPN/100m	-	-	-	-	-	-	<1.1	<1.1	<1.1	-	-
Biological Oxygen Demand (BOD)	-	-	mg/L	-	-	<10	<10	<6	ND	-	-	-	<4.0	<4.0
Chemical Oxygen Demand (COD)	-	-	mg/L	-	-	<25	<25	<30	ND	-	-	-	<20	<20
Phenols (4AAP)			mg/L											
Dissolved Metals														
Aluminum	-	9.5	mg/L	<0.1	<0.005	0.006	0.009	<0.01	ND	-	-	-	<0.005	<0.0050
Antimony	0.09	0.006	mg/L	<0.001	<0.0001	<0.001	< 0.001	<0.0006	ND	-	-	-	0.0001	<0.00020
Arsenic	0.05	0.01	mg/L	<0.001	0.0004	<0.001	< 0.001	<0.001	0.0005	-	-	-	<0.0005	0.00053
Barium	10	1	mg/L	<0.1	0.02	0.014	0.024	0.019	0.085	-	-	-	0.022	0.0211
Beryllium	0.0015	0.008	mg/L	<0.001	<0.005	<0.001	< 0.001	<0.0004	ND	-	-	-	<0.0001	<0.00010
Bismuth	-	-	mg/L	-	-	-	-	-	-	-	-	-	<0.0001	<0.00010
Boron	12	5	mg/L	-	-	<0.05	< 0.05	0.004	ND	-	-	-	0.007	0.0148
Cadmium	0.0005 - 0.004	0.005	mg/L	<0.0002	<0.001	<0.0002	< 0.0002	<0.00002	ND	-	-	-	0.00005	<0.000010
Calcium	-	-	mg/L	33	29.8	23.6	24.8	24.2	29.2	-	-	-	30.9	27.5
Cesium	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Chromium	0.01	0.05	mg/L	<0.02	<0.001	<0.001	< 0.001	0.002	ND	-	-	-	0.0008	0.00067
Cobalt	0.04	0.001	mg/L	*<0.02*	*<0.01*	*<0.001*	*< 0.001*	*<0.0001*	ND	-	-	-	<0.00005	<0.00010
Copper	0.02 - 0.09	1.5	mg/L	<0.01	0.006	0.002	0.009	0.004	0.006	-	-	-	0.0048	0.00353
Iron	-	6.5	mg/L	<0.1	<0.03	<0.05	< 0.05	0.06	ND	-	-	-	<0.010	<0.010
Lead	0.04 - 0.16	0.01	mg/L	<0.001	<0.001	<0.001	< 0.001	0.0002	ND	-	-	-	0.0002	<0.00020
Lithium	-	0.008	mg/L	-	-	-	-	-	-	-	-	-	0.0007	0.00062
Magnesium	-	-	mg/L	2.3	2.1	1.36	1.82	1.98	2.08	-	-	-	2.3	2.01
Manganese	-	1.5	mg/L	<0.1	<0.005	0.006	< 0.001	0.005	ND	-	-	-	0.0005	0.0003
Mercury	0.00025	0.001	mg/L	-	<0.00001	<0.00002	< 0.00002	<0.00006	ND	-	-	-	<0.00002	<0.000010
Molybdenum	10	0.25	mg/L	<0.01	<0.03	<0.001	< 0.0005	0.0005	ND	-	-	-	0.0005	0.00045
Nickel	0.25 - 1.5	0.08	mg/L	<0.01	<0.05	<0.001	< 0.001	<0.001	ND	-	-	-	<0.0002	<0.00040
Phosphorus	-	-	mg/L	-	-	<0.01	0.38	-	-	-	-	-	<0.02	<0.050
Potassium	-	-	mg/L	<5	-	0.61	0.8	-	1.02	-	-	-	1.18	1.01
Rubidium	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-
Selenium	0.02	0.01	mg/L	-	<0.0005	<0.002	< 0.001	<0.001	ND	-	-	-	<0.0005	<0.00050
Silicon	-	-	mg/L	-	-	11.4	8.58	-	5.41	-	-	-	5	5.2
Silver	0.0005 - 0.015	0.02	mg/L	<0.01	<0.0001	<0.0001	< 0.0001	<0.00008	ND	-	-	-	<0.00005	<0.000050
Sodium	-	200	mg/L	1	-	1.57	2.25	2.77	3.18	-	-	-	4.06	3.49
Strontium	-	2.5	mg/L	-	-	0.08	0.076	-	0.09	-	-	-	0.09	0.0833
Sulfur	-	-	mg/L	-	-	-	-	-	-	-	-	-	<1	<3.0
Tellerium	-	-	mg/L	-	-	<0.001	< 0.001	-	-	-	-	-	-	<0.00050
Thallium	0.003	-	mg/L	-	<0.0001	<0.0001	< 0.0001	<0.0001	ND	-	-	-	<0.00002	<0.000020
Thorium	-	-	mg/L	-	-	<0.0005	< 0.0005	-	-	-	-	-	-	<0.00010
Tin	-	2.5	mg/L	-	-	<0.001	< 0.001	-	ND	-	-	-	<0.0002	<0.00020
Titanium	1	-	mg/L	<0.01	<0.01	<0.001	0.001	<0.02	ND	-	-	-	<0.005	<0.0050
Tungsten	-	0.003		-	-	-	-	-	-	-	-	-	-	-
Uranium	0.085	0.02	mg/L	-	0.00107	<0.0005	< 0.0005	<0.0001	0.0001	-	-	-	0.00011	0.000099
Vanadium	-	0.02	mg/L	<0.01	<0.03	<0.001	< 0.001	<0.002	ND	-	-	-	<0.001	<0.0010
Zinc	0.075 - 2.4	3	mg/L	0.04	0.031	0.044	0.034	0.015	0.043	-	-	-	0.032	0.0242
Zirconium	-	-	mg/L	-	-	<0.01	< 0.01	-	ND	-	-	-	<0.0001	<0.00010

NOTES

BC CSR AW-F	BC Contaminated Sites Regulation Water Quality Guidelines for Protection of Freshwater Aquatic Life
BC CSR LW	BC Contaminated Sites Regulation Water Quality Guidelines for Protection of Livestock
BC CSR DW	BC Contaminated Sites Regulation Water Quality Guidelines for Drinking Water

Italics indicate that the laboratory detection limit exceeds the applicable standard.
Standards shown are from the BC Contaminated Sites Regulation (CSR; BC Reg. 375/96, O.C. 1480/96 and M40/2019, includes amendments up to BC Regs. 11/2019 and 13/2019, updated to 24 Jan 2019)

QAQC = quality assurance/quality control; FD = field duplicate;

Table F-4: Historic Surface Water Analytical Results
2019 Thornhill Transfer Station Annual Monitoring Program
Regional District of Kitimat-Stikine

Location	BCWQG Aquatic Life - Freshwater (Chronic - Long-term average)	Notes	BCWQG Aquatic Life - Freshwater (Short-term maximum)	Notes	BCWQG -Drinking Water	Notes	Units	Thornhill Landfill SW-16			
Site Name								SW-16	SW-16	SW-16	SW-16
Sample ID								-	-	-	-
Laboratory ID								22-Mar-16	25-Jul-16	13-Oct-16	28-Mar-17
Sample Date								-	-	-	-
QAQC											
Conventional Parameters											
Conductivity	-		-		-		uS/cm	125	140	107	82.7
Hardness (Total as CaCO3)	-		-		-		mg/L	57.3	66.7	45.1	31
pH	6.5-9.0		-		6.5 - 8.5		-	7.6	7.7	7.6	7.3
Total Suspended Solids	-		**25 mg/L (backgr. 25-250 mg/l)) (i)**		-		mg/L	<1.0	1.4	<1.0	4.4
Ammonia, Total (as N)	0.9 - 1.86	pH/T*	**9.65 - 16**	pH/T*	-		mg/L	0.67	<0.03	<0.03	0.36
Chloride (Cl)	150		**600**		<250	AO	mg/L	5	3.7	1.8	2.5
Fluoride (F)	-		**1.09 - 1.45**	H	1.5		mg/L	<0.10	<0.10	<0.10	<0.10
Nitrate (as N)	3		**32.8**		10		mg/L	0.63	0.35	0.11	0.098
Nitrite (as N)	0.02 - 0.08	Cl	**0.06 - 0.24**	Cl	1		mg/L	<0.01	<0.01	<0.01	<0.01
Sulfate (SO4)	128 - 309	H	-		<500	AO	mg/L	2.5	2.7	2.3	1.5
Biological Oxygen Demand (BOD)	-		-		-			<4.0	<4.0	<4.0	<4.0
Chemical Oxygen Demand (COD)	-		-		-			30	<20	<20	<20
Total Metals											
Aluminum	0.05	pH	**0.1**	pH	9.5		mg/L	0.124	0.078	0.039	0.622
Antimony	0.009		-		-		mg/L	<0.0001	0.0001	0.0002	<0.0001
Arsenic	0.005		-		0.01		mg/L	<0.0005	<0.0005	<0.0005	<0.0005
Barium	1		-		-		mg/L	0.025	0.026	0.018	0.023
Beryllium	0.00013		-		-		mg/L	<0.0001	<0.0001	<0.0001	<0.0001
Bismuth	-		-		-		mg/L	<0.0001	<0.0001	<0.0001	<0.0001
Boron	1.2		-		5		mg/L	0.086	0.117	0.028	0.05
Cadmium	0.18 - 0.26	H	**0.47 - 0.79**	H	0.005		mg/L	0.00001	0.00002	0.00002	<0.00001
Calcium	-		-		-		mg/L	20	24.1	16.5	10.5
Chromium	0.001 $^{Cr\ VI}$ 0.0089 $^{Cr\ III}$	V	-		-		mg/L	<0.0005	<0.0005	<0.0005	0.0007
Cobalt	0.004		**0.11**		-		mg/L	0.00012	0.00012	0.00005	0.00029
Copper	0.00004	H	**0.00708 - 0.01450**	H	1		mg/L	0.0009	0.0009	0.001	0.0019
Iron	-		**1**		<0.3	AO	mg/L	0.19	0.22	0.1	0.64
Lead	0.0057 - 0.0079	H	**0.0611 - 0.1174**	H	0.01		mg/L	<0.0001	<0.0001	<0.0001	0.0002
Lithium	-		-		-		mg/L	0.0001	<0.0001	<0.0001	0.0003
Magnesium	-		-		-		mg/L	1.74	1.53	0.95	1.19
Manganese	0.74 - 0.9	H	**0.88 - 1.28**	H	<0.05	AO	mg/L	0.0131	0.0151	0.0132	0.0553
Mercury	0.0001		-		0.001		mg/L	<0.00002	<0.00002	<0.00002	<0.00002
Molybdenum	2		-		0.25		mg/L	0.0006	0.0007	0.0005	0.0003
Nickel	0.025 - 0.15		-		-		mg/L	0.0004	<0.0002	<0.0002	0.0008
Phosphorus	0.005-0.015		-		0.01	AO	mg/L	*<0.02*	*<0.02*	0.02	*<0.05*
Potassium	-		-		-		mg/L	3.05	2.11	0.95	1.39
Selenium	0.002		-		0.01	MAC	mg/L	<0.0005	<0.0005	<0.0005	<0.0005
Silicon	-		-		-		mg/L	3.5	3.6	2.7	3.5
Silver	0.00005, 0.0015	H	0.0001, 0.003	H	-		mg/L	<0.00005	<0.00005	<0.00005	<0.00005
Sodium	-		-		<200	AO	mg/L	6.19	4.23	1.73	2.62
Strontium	-		-		-		mg/L	0.075	0.089	0.06	0.046
Sulfur	-		-		-		mg/L	<1	1	<1	<1
Tellurium	-		-		-		mg/L	-	-	-	<0.0002
Thallium	0.0008		-		-		mg/L	<0.00002	<0.00002	<0.00002	<0.00002
Thorium	-		-		-		mg/L	-	-	-	<0.0001
Tin	-		-		-		mg/L	<0.0002	<0.0002	<0.0002	<0.0002
Titanium	-		-		-		mg/L	<0.005	<0.005	<0.005	0.025
Uranium	0.0005		-		-		mg/L	0.00005	0.00008	0.00005	0.00004
Vanadium	-		-		-		mg/L	0.001	<0.001	<0.001	0.002
Zinc	0.0075 - 0.0398	H	**0.033 - 0.0653**	H	<5.0	AO	mg/L	<0.004	<0.004	<0.004	<0.004
Zirconium	-		-		-		mg/L	0.0003	<0.0001	<0.0001	0.0002

NOTES

BCWQG AWF Long-term — BC Water Quality Guidelines for Freshwater Aquatic Life - Chronic Long-term Average
BCWQG AWF Short-term — BC Water Quality Guidelines for Freshwater Aquatic Life - Short-term Maximum
BCWQG DW — BC Water Quality Guidelines for Drinking Water
Italics indicate that the laboratory detection limit exceeds the applicable standard.
British Columbia Approved and Working (or interim) Water Quality Guidelines (BC
H = standard is hardness dependent; pH = standard is pH dependent; Cl = standard is chloride dependent; T = standard varies with
V = Standard is valence dependent VI refers to chromium VI and III refers to chromium III; Ca = standard is calcium dependent
* = for ammonia guideline, an average temperature of 10 degrees Celsius and a pH of 7.5 was chosen where no data was available
MAC = Maximum Acceptable Concentration
AO = Aesthetic Objective
QAQC = Quality Assurance and Control; FDA = Field Duplicate Available; FD = Field Duplicate

Table F-5: Historic Surface Water Analytical Results
2019 Thornhill Transfer Station Annual Monitoring Program
Regional District of Kitimat-Stikine

Location Site Name Sample ID Laboratory ID Sample Date QAQC	BCWQG Aquatic Life - Freshwater (Chronic - Long-term average)	Notes	BCWQG Aquatic Life - Freshwater (Short-term maximum)	Notes	BCWQG -Drinking Water	Notes	Units	Thornhill Landfill SW-18 SW-18 - 22-Mar-16 -	SW-18 - 13-Oct-16 -	SW-18 - 28-Mar-17 -	SW-18 - 24-Aug-17 -
Conventional Parameters											
Conductivity	-		-		-		uS/cm	119	111	76.5	92
Hardness (Total as CaCO3)	-		-		-		mg/L	58.6	47.9	30.3	40.7
pH	6.5-9.0		-		6.5 - 8.5		-	7.6	7.5	7.3	7.7
Total Suspended Solids	-		**25 mg/L (backgr. 25-250 mg/l)) (j)**		-		mg/L	4.3	<1.0	5.8	3.2
Ammonia, Total (as N)	0.9 - 1.86	pH/T*	**9.65 - 16**	pH/T*	-		mg/L	0.5	<0.03	0.27	<0.03
Chloride (Cl)	150		**600**		<250	AO	mg/L	3.9	2	2.2	1.2
Fluoride (F)	-		**1.09 - 1.45**	H	1.5		mg/L	<0.10	<0.10	<0.10	<0.10
Nitrate (as N)	3		**32.8**		10		mg/L	0.63	0.099	0.09	0.13
Nitrite (as N)	0.02 - 0.08	Cl	**0.06 - 0.24**	Cl	1		mg/L	<0.01	<0.01	<0.01	<0.01
Sulfate (SO4)	128 - 309	H	-		<500	AO	mg/L	2.4	2.6	1.4	1.6
Biological Oxygen Demand (BOD)	-		-		-		mg/L	<4.0	<4.0	<4.0	<4.0
Chemical Oxygen Demand (COD)	-		-		-		mg/L	<20	<20	<20	<20
Total Metals											
Aluminum	0.05	pH	**0.1**	pH	9.5		mg/L	**0.137**	0.035	**0.509**	0.0837
Antimony	0.009		-		-		mg/L	<0.0001	0.0002	<0.0001	<0.00020
Arsenic	0.005		-		0.01		mg/L	<0.0005	<0.0005	<0.0005	<0.00050
Barium	1		-		-		mg/L	0.023	0.019	0.02	0.0168
Beryllium	0.00013		-		-		mg/L	<0.0001	<0.0001	<0.0001	<0.00010
Bismuth	-		-		-		mg/L	<0.0001	<0.0001	<0.0001	<0.00010
Boron	1.2		-		5		mg/L	0.078	0.022	0.042	0.0466
Cadmium	0.18 - 0.26	H	**0.47 - 0.79**	H	0.005		mg/L	<0.00001	<0.00001	<0.00001	<0.000010
Calcium	-		-		-		mg/L	20.7	17.6	10.3	14.8
Chromium	0.001 $^{Cr\ VI}$ 0.0089 $^{Cr\ III}$	V	-		-		mg/L	<0.0005	<0.0005	0.0007	<0.00050
Cobalt	0.004		**0.11**		-		mg/L	0.00012	<0.00005	0.00029	<0.00010
Copper	0.00004	H	**0.00708 - 0.01450**	H	1		mg/L	0.0011	0.0011	0.002	0.00086
Iron	-		**1**		<0.3	AO	mg/L	0.23	0.11	0.63	0.132
Lead	0.0057 - 0.0079	H	**0.0611 - 0.1174**	H	0.01		mg/L	<0.0001	<0.0001	0.0002	<0.00020
Lithium	-		-		-		mg/L	0.0002	<0.0001	0.0003	<0.00010
Magnesium	-		-		-		mg/L	1.68	0.96	1.12	0.874
Manganese	0.74 - 0.86	H	**0.87 - 1.19**	H	<0.05	AO	mg/L	0.0163	0.0119	0.0398	0.0102
Mercury	0.0001		-		0.001		mg/L	<0.00002	<0.00002	<0.00002	<0.000010
Molybdenum	2		-		0.25		mg/L	0.0006	0.0006	0.0003	0.00043
Nickel	0.025 - 0.15		-		-		mg/L	0.0004	<0.0002	0.0008	<0.00040
Phosphorus	0.005-0.015		-		0.01	AO	mg/L	0.04	*<0.02*	*<0.05*	*<0.050*
Potassium	-		-		-		mg/L	2.77	0.96	1.23	1.01
Selenium	0.002		-		0.01	MAC	mg/L	<0.0005	<0.0005	<0.0005	<0.00050
Silicon	-		-		-		mg/L	4	2.9	3.3	3.3
Silver	0.00005, 0.0015	H	**0.0001, 0.003**	H	-		mg/L	<0.00005	<0.00005	<0.00005	<0.000050
Sodium	-		-		<200	AO	mg/L	5.45	1.69	2.33	1.77
Strontium	-		-		-		mg/L	0.071	0.06	0.041	0.0529
Sulfur	-		-		-		mg/L	2	<1	<1	<3.0
Tellurium	-		-		-		mg/L	-	-	<0.0002	<0.00050
Thallium	0.0008		-		-		mg/L	<0.00002	<0.00002	<0.00002	<0.000020
Thorium	-		-		-		mg/L	-	-	<0.0001	<0.00010
Tin	-		-		-		mg/L	<0.0002	<0.0002	<0.0002	<0.00020
Titanium	-		-		-		mg/L	0.005	<0.005	0.015	<0.0050
Uranium	0.0005		-		-		mg/L	0.00006	0.00006	0.00004	0.00005
Vanadium	-		-		-		mg/L	0.001	<0.001	0.001	<0.0010
Zinc	0.0075 - 0.0398	H	**0.033 - 0.0653**	H	<5.0	AO	mg/L	<0.004	<0.004	<0.004	0.0043
Zirconium	-		-		-		mg/L	<0.0001	<0.0001	0.0002	<0.00010

NOTES

BCWQG AWF Long-term	BC Water Quality Guidelines for Freshwater Aquatic Life - Chronic Long-term Average
BCWQG AWF Short-term	BC Water Quality Guidelines for Freshwater Aquatic Life - Short-term Maximum
BCWQG DW	BC Water Quality Guidelines for Drinking Water

Italics indicate that the laboratory detection limit exceeds the applicable standard.
British Columbia Approved and Working (or interim) Water Quality Guidelines (BC WQG),
H = standard is hardness dependent; pH = standard is pH dependent; Cl = standard is chloride dependent; T = standard varies with
V = Standard is valence dependent VI refers to chromium VI and III refers to chromium III; Ca = standard is calcium dependent
* = for ammonia guideline, an average temperature of 10 degrees Celsius and a pH of 7.5 was chosen where no data was available
MAC = Maximum Acceptable Concentration
AO = Aesthetic Objective
QAQC = Quality Assurance and Control; FDA = Field Duplicate Available; FD = Field Duplicate

Table F-6: Historic Surface Water Analytical Results
2019 Thornhill Transfer Station Annual Monitoring Program
Regional District of Kitimat-Stikine

Location Site Name Sample ID Laboratory ID Sample Date QAQC	BCWQG Aquatic Life - Freshwater (Chronic - Long-term average)	Notes	BCWQG Aquatic Life - Freshwater (Short-term maximum)	Notes	BCWQG -Drinking Water	Notes	Units	Thornhill Landfill SW-22 SW-22 - 22-Mar-16 -
Conventional Parameters								
Conductivity	-		-		-		uS/cm	1840
Hardness (Total as CaCO3)	-		-		-		mg/L	590
pH	6.5-9.0		-		6.5 - 8.5		-	8.1
Total Suspended Solids	-		**25 mg/L (backgr. 25 250 mg/l)) (i)**		-		mg/L	2.8
Ammonia, Total (as N)	1.86	pH/T*	**4.67**	pH/T*	-		mg/L	**38.5**
Chloride (Cl)	150		**600**		<250	AO	mg/L	167
Fluoride (F)	-		**1.09 - 1.45**	H	1.5		mg/L	0.11
Nitrate (as N)	3		**32.8**		10		mg/L	9.19
Nitrite (as N)	0.02 - 0.08	Cl	**0.06 - 0.24**	Cl	1		mg/L	0.029
Sulfate (SO4)	128 - 309	H	-		<500	AO	mg/L	26.9
Biological Oxygen Demand (BOD)	-		-		-		mg/L	48
Chemical Oxygen Demand (COD)	-		-		-		mg/L	139
Total Metals								
Aluminum	0.05	pH	**0.1**	pH	9.5		mg/L	**0.14**
Antimony	0.009		-		-		mg/L	0.0004
Arsenic	0.005		-		0.01		mg/L	0.0012
Barium	1		-		-		mg/L	0.311
Beryllium	0.00013		-		-		mg/L	<0.0001
Bismuth	-		-		-		mg/L	<0.0001
Boron	1.2		-		5		mg/L	3.68
Cadmium	0.18 - 0.26	H	**0.47 - 0.79**	H	0.005		mg/L	0.00004
Calcium	-		-		-		mg/L	179
Chromium	0.001 $^{Cr\ VI}$ 0.0089 $^{Cr\ III}$	V	-		-		mg/L	0.002
Cobalt	0.004		**0.11**		-		mg/L	0.00326
Copper	0.00004	H	**0.00708 - 0.01450**	H	1		mg/L	0.0028
Iron	-		**1**		<0.3	AO	mg/L	0.97
Lead	0.0057 - 0.0079	H	**0.0611 - 0.1174**	H	0.01		mg/L	<0.0001
Lithium	-		-		-		mg/L	0.002
Magnesium	-		-		-		mg/L	34.6
Manganese	3.2 - 3.2	H	**7.04**	H	<0.05	AO	mg/L	2.59
Mercury	0.0001		-		0.001		mg/L	<0.00002
Molybdenum	2		-		0.25		mg/L	0.001
Nickel	0.025 - 0.15		-		-		mg/L	0.0092
Phosphorus	0.005-0.015		-		0.01	AO	mg/L	0.05
Potassium	-		-		-		mg/L	87.2
Selenium	0.002		-		0.01	MAC	mg/L	<0.0005
Silicon	-		-		-		mg/L	11.1
Silver	0.00005, 0.0015	H	0.0001, 0.003	H	-		mg/L	<0.00005
Sodium	-		-		<200	AO	mg/L	178
Strontium	-		-		-		mg/L	1.11
Sulfur	-		-		-		mg/L	16
Thallium	0.0008		-		-		mg/L	<0.00002
Tin	-		-		-		mg/L	0.0002
Titanium	-		-		-		mg/L	0.006
Uranium	0.0005		-		-		mg/L	0.0002
Vanadium	-		-		-		mg/L	0.001
Zinc	0.0075 - 0.0398	H	**0.033 - 0.0653**	H	<5.0	AO	mg/L	0.009
Zirconium	-		-		-		mg/L	0.0006

NOTES

BCWQG AWF Long-term	BC Water Quality Guidelines for Freshwater Aquatic Life - Chronic Long-term Average
BCWQG AWF Short-term	BC Water Quality Guidelines for Freshwater Aquatic Life - Short-term Maximum
BCWQG DW	BC Water Quality Guidelines for Drinking Water

Italics indicate that the laboratory detection limit exceeds the applicable standard.
British Columbia Approved and Working (or interim) Water Quality Guidelines (BC WQG),
H = standard is hardness dependent; pH = standard is pH dependent; Cl = standard is chloride dependent; T = standard varies with
V = Standard is valence dependent VI refers to chromium VI and III refers to chromium III; Ca = standard is calcium dependent
* = for ammonia guideline, an average temperature of 10 degrees Celsius and a pH of 7.5 was chosen where no data was available
MAC = Maximum Acceptable Concentration
AO = Aesthetic Objective
QAQC = Quality Assurance and Control; FDA = Field Duplicate Available; FD = Field Duplicate

Table F-7: Historic Surface Water Analytical Results
2019 Thornhill Transfer Station Annual Monitoring Program
Regional District of Kitimat-Stikine

Location / Site Name / Sample ID / Laboratory ID / Sample Date / QAQC	BCWQG Aquatic Life - Freshwater (Chronic - Long-term average)	Notes	BCWQG Aquatic Life - Freshwater (Short-term maximum)	Notes	BCWQG -Drinking Water	Notes	Units	Thornhill Landfill / SW-23	
								SW-23 - 24-Aug-17 -	SW-23 - 28-Mar-17 -
Conventional Parameters									
Conductivity	-		-		-		uS/cm	100	71.6
Hardness (Total as CaCO3)	-		-		-		mg/L	45.8	26.7
pH	6.5-9.0		-		6.5 - 8.5		-	7.5	7.1
Total Suspended Solids	-		**25 mg/L (backgr. 25-250 mg/l)) (i)**		-		mg/L	7.5	5.4
Ammonia, Total (as N)	1.59 - 1.86	pH/T*	**12.7 - 19.1**	pH/T*	-		mg/L	<0.03	0.16
Chloride (Cl)	150		**600**		<250	AO	mg/L	1.3	3.6
Fluoride (F)	-		**1.09 - 1.45**	H	1.5		mg/L	<0.10	<0.10
Nitrate (as N)	3		**32.8**		10		mg/L	0.082	0.07
Nitrite (as N)	0.02 - 0.08	Cl	**0.06 - 0.24**	Cl	1		mg/L	<0.01	<0.01
Sulfate (SO4)	128 - 309	H	-		<500	AO	mg/L	2.1	1.6
Biological Oxygen Demand (BOD)	-		-		-		mg/L	<4.0	<4.0
Chemical Oxygen Demand (COD)	-		-		-		mg/L	<20	<20
Total Metals									
Aluminum	0.05	pH	**0.1**	pH	9.5		mg/L	**0.305**	**0.848**
Antimony	0.009		-		-		mg/L	<0.00020	<0.0001
Arsenic	0.005		-		0.01		mg/L	<0.00050	<0.0005
Barium	1		-		-		mg/L	0.0159	0.018
Beryllium	0.00013		-		-		mg/L	<0.00010	<0.0001
Bismuth	-		-		-		mg/L	<0.00010	<0.0001
Boron	1.2		-		5		mg/L	0.0223	0.03
Cadmium	0.18 - 0.26	H	**0.47 - 0.79**	H	0.005		mg/L	0.000011	<0.00001
Calcium	-		-		-		mg/L	16.7	8.7
Chromium	0.001 $^{Cr\ VI}$ 0.0089 $^{Cr\ III}$	V	-		-		mg/L	<0.00050	0.0009
Cobalt	0.004		**0.11**		-		mg/L	0.00018	0.0004
Copper	0.00004	H	**0.00708 - 0.01450**	H	1		mg/L	0.00143	0.0025
Iron	-		**1**		<0.3	AO	mg/L	0.479	0.93
Lead	0.0057 - 0.0079	H	**0.0611 - 0.1174**	H	0.01		mg/L	<0.00020	0.0002
Lithium	-		-		-		mg/L	0.0002	0.0005
Magnesium	-		-		-		mg/L	0.988	1.2
Manganese	0.72 - 0.81	H	**0.83 - 1.04**	H	<0.05	AO	mg/L	0.0279	0.0873
Mercury	0.0001		-		0.001		mg/L	<0.000010	<0.00002
Molybdenum	2		-		0.25		mg/L	0.00098	0.0007
Nickel	0.025 - 0.15		-		-		mg/L	0.00041	0.0011
Phosphorus	0.005-0.015		-		0.01	AO	mg/L	<0.050	<0.05
Potassium	-		-		-		mg/L	0.89	1.2
Selenium	0.002		-		0.01	MAC	mg/L	<0.00050	<0.0005
Silicon	-		-		-		mg/L	3.5	3.9
Silver	0.00005, 0.0015	H	0.0001, 0.003	H	-		mg/L	<0.000050	<0.00005
Sodium	-		-		<200	AO	mg/L	1.82	2.92
Strontium	-		-		-		mg/L	0.0441	0.03
Sulfur	-		-		-		mg/L	<3.0	<1
Tellurium	-		-		-		mg/L	<0.00050	<0.0002
Thallium	0.0008		-		-		mg/L	<0.000020	<0.00002
Thorium	-		-		-		mg/L	<0.00010	<0.0001
Tin	-		-		-		mg/L	<0.00020	<0.0002
Titanium	-		-		-		mg/L	0.0086	0.026
Uranium	0.0005		-		-		mg/L	0.000132	0.00018
Vanadium	-		-		-		mg/L	0.0012	0.002
Zinc	0.0075 - 0.0398	H	**0.033 - 0.0653**	H	<5.0	AO	mg/L	<0.0040	0.004
Zirconium	-		-		-		mg/L	<0.00010	0.0004

NOTES

BCWQG AWF Long-term — BC Water Quality Guidelines for Freshwater Aquatic Life - Chronic Long-term Average
BCWQG AWF Short-term — BC Water Quality Guidelines for Freshwater Aquatic Life - Short-term Maximum
BCWQG DW — BC Water Quality Guidelines for Drinking Water

Italics indicate that the laboratory detection limit exceeds the applicable standard.
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* = for ammonia guideline, an average temperature of 10 degrees Celsius and a pH of 7.5 was chosen where no data was available
MAC = Maximum Acceptable Concentration
AO = Aesthetic Objective
QAQC = Quality Assurance and Control; FDA = Field Duplicate Available; FD = Field Duplicate

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Appendix B

April 6th, 2020 PRJ20027

Megan Haley, BSc., P. Chem.
Solid Waste Manager
Regional District of Kitimat-Stikine
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Dear Ms. Haley,

Re: Thornhill Landfill 2019 Greenhouse Gas (GHG) Emissions Reduction Quantification Report

Sperling Hansen Associates (SHA) is pleased to submit this letter report for the *Thornhill Landfill 2019 Greenhouse Gas (GHG) Emissions Reduction Quantification.*

1 BACKGROUND

1.1 Site Location

The Regional District of Kitimat-Stikine (RDKS) Thornhill Landfill (Landfill) is located approximately 8 km southeast of downtown Terrace and is operated on a 13.3 ha land parcel leased from B.C. Lands. This landfill was closed in June 2017 using a low permeability clay cap system.

Based on Sperling Hansen Associates (SHA) assessment, the estimated peak methane generation of 223 tonnes/year at the Thornhill Landfill occurred in 2016. This quantity of methane generation is far below the 1,000 tonnes/year threshold set by the BC Ministry of Environment (ENV). Therefore, this site was not required to install an active landfill gas (LFG) management system. As a result, the progressive closure of this site included an LFG collection and venting system below the clay cap to passively exhaust the generated gas to the atmosphere.

1.2 GHG Emission Reduction Initiative

Even though the Landfill was not mandated to destroy/ oxidize the generated methane at the site, the RDKS has retained SHA to complete an advanced LFG generation assessment for this landfill, and based on the SHA's recommendation, installed and commissioned a low-cost, low-flow solar powered candlestick flare system in summer of 2019. Candlestick flares are known to have a high methane destruction efficiency, therefore; the RDKS has been reducing its annual carbon footprint by collection and thermal combustion of the generated methane at the Landfill

since August 2019. Furthermore, the RDKS has plans to place a fabricated biocover system over the entire landfill's footprint to further reduce the fugitive methane emissions from this site.

This letter report presents GHG emissions reduction realized by the solar flare system at this facility between August and December 2019.

2 OPEN FLARE SYSTEM AT THE THORNHILL LANDFILL

According to the BC LFG Management Protocol developed by the CRA, a candlestick flare has 96% methane destruction efficiency (CRA, 2013). This applies to periods during which the flare sustains a flame at temperature of 260 °C and higher.

The flare that is installed at the Landfill is a CF-5 Solar Spark Candlestick Flare. This open flare is capable of combusting LFG at flow rates between 5 standard cubic feet per minute (scfm) to 90 scfm containing minimum of 30% methane. The system also includes a solar-powered continuous-ignition system, a solar-powered vacuum fan, and a thermocouple with a data logger kit. The fan provides a minimum continues flow rate of 10 to 12 scfm. Therefore, an LFG flow rate of 10 scfm or higher will continuously flow through the flare as long as the fan is in operating status. The data logging system records the flare temperature with one temperature reading every 5 minutes.

Furthermore, a control and metering station consisting of a QED precision wellhead is installed at the Thornhill Landfill flare station. The precision wellhead, along with a Landtec GEM2000+ (or GEM5000) gas analyser, allows for monitoring of the LFG flow rate and the gas composition

Photos 1&2 - QED Precision Wellhead (left) and Solar Spark Flare at the Thornhill Landfill (right)

(i.e. methane content). Photos 1&2 show the control and monitoring device as well as the candlestick flare system during installation at the Thornhill Landfill.

3 FLARE MONITORING DATA FOR 2019

3.1 Flare Temperature Data

The flare temperature data was measured continuously and logged every 5 minutes from Aug 20th to the end of December 2019. As suggested in BC's existing LFG flare protocol (CRA, 2013), SHA used 260°C as a threshold temperature below which the flare was considered not to be operating. Figure 1 below illustrates the 2019 (Aug – Dec) flare thermocouple recorded data at the Landfill.

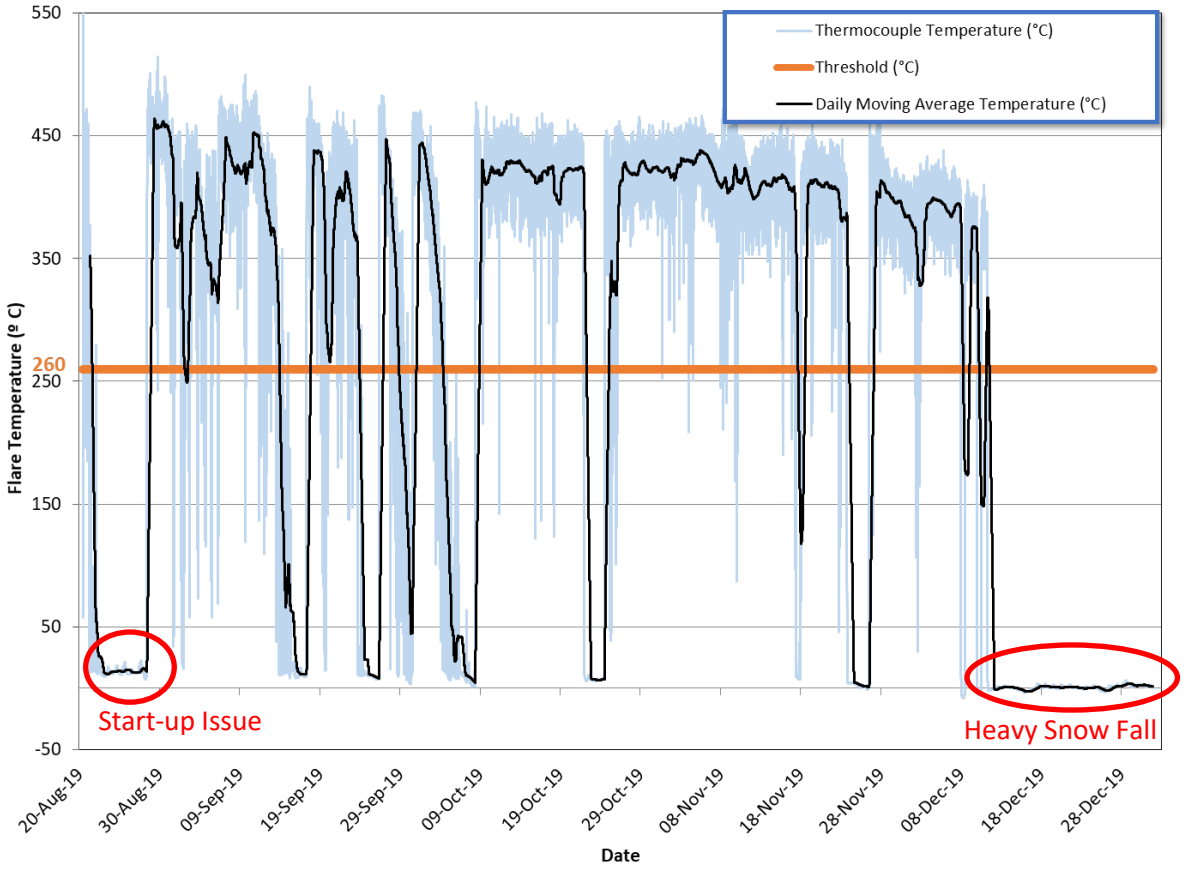

Figure 1 - Thornhill Landfill Flare Thermocouple Recorded Temperature Data (2019)

Based on the recorded flare temperature data, the Thornhill Landfill flare has operated for approximately 2,000 hours of the total 3,200 hours that this flare has been in place between Aug 20th and Dec 31st of 2019. This is equivalent to a 63.1% operational status and 36.9% down time in this period. As indicated in Figure 1, the majority of the downtime relates to periods with heavy snow fall when the solar panels were unable to recharge the fan's battery. The flare run time calculations are summarized in Table 1.

Table 1 – Summary of the Thornhill Landfill Flare Run Time for 2019

	number of 5-minute records	hours/year	Days/year	% of 2019 (Aug – Dec)
Total	38,461	3,205	133.5	36.6%
Temp. > 260 °C	24,284	2,024	84.3	63.1%
Temp. < 260 °C (Down time)	14,177	1,181	49.2	36.9%

3.2 Landfill Gas Quality and Flow Rate Data

The composition and flow rate of the LFG collected and combusted at the Thornhill Landfill was measured using a Landtec GEM2000+ LFG analyzer. SHA conducted field readings one day after installation of the flare. The methane concentration in the collected LFG during the monitoring event on Aug 20th, 2019 as 31.4%.

It is important to note that the Landfill's LFG collection system has been open and passively venting / breathing aerobically since the final closure construction in 2016/2017. Therefore, we expected that the semi-actively collected LFG to have a lower methane concentration initially and reaching approximately 40 to 45% within a few weeks of flare installation continuous operation. Nevertheless, adopting a conservative approach, we used the collected information from the monitoring event to quantify the total methane captured and flared at the Thornhill Landfill in 2019.

Table 2 below shows the collected LFG composition and flow rate data from the Landfill on Aug 20th, 2019.

Table 2 – LFG Flow Rate and Composition at the Thornhill Landfill

Date/Time	Gas Composition (%)				Flow Rate (scfm)
	CH_4	CO_2	O_2	Balance	
Aug 20th, 2019	**31.4**	25.5	2.2	40.9	**11-15 (Avg. 13)**

4 GHG EMISSION REDUCTION QUANTIFICATION

The total methane that was combusted at the Thornhill Landfill flare during 2019 (Aug – Dec) was calculated based on the following parameters:

1. LFG flow rate
2. Methane content in the collected LFG
3. Methane density at standard temperature and pressure (i.e. 15 °C and 1 atm (CRA, 2013))
4. Flare run time and methane destruction efficiency

Based on the collected data and the flare installation date and the total run time during 2019, SHA estimates that a total of 9.1 tonnes of methane was combusted at the Thornhill Landfill in this year. Therefore, the total GHG emissions reduction achieved by the Thornhill flare in 2019 is 228 tonnes of carbon dioxide equivalent (CO_2-e). The GHG offset calculation is based on the methane global warming potential (GWP) of 25 (ENV, 2014).
Assuming the same flare performance for a full year, we estimated that a total annual GHG emissions reduction of 624 tonnes of CO_2-e will be achieved in 2020, unless mitigation measures for the snow fall impact are implemented.

A summary of the aforementioned parameters and the calculated values are presented below:

Open Flare Destruction Efficiency:	96	%
Thornhill Flare Down Time in 2019:	36.9	% (of 133.5 days)
Methane GWP:	25	tonne/tonne
Methane Density:	0.678	kg/m^3
Standard Pressure:	1	atm
Standard Temperature:	15	°C
Average LFG Flow Rate:	13	scfm
Average Methane Content:	31.4	% by volume
Average LFG Flow Rate:	22.1	m^3/hr
Total Methane Collected in 2019 (Aug – Dec):	22,228	m^3
Total Methane Collected in 2019 (Aug – Dec):	15.1	tonnes/year
Total Methane Destructed in 2019 (Aug – Dec):	9.1	tonnes/year
Total GHG Emission Reduction in 2019 (Aug – Dec):	**228**	**tonnes CO_2-e in 2019**
Total Estimated Methane Collected (Annual):	60,753	m3
Total Estimated Methane Collected (Annual):	41.2	tonnes/year
Total Methane Destructed (Annual):	25.0	tonnes/year
Future GHG Emission Reduction (Estimated Annual):	**624**	**tonnes CO2-e/year**

5 CONCLUSION AND RECOMMENDATIONS

Thornhill Landfill clay cap system was installed in 2016/ 2017 with a passive LFG collection system allowing gas pressure to relief and venting to the atmosphere. SHA assisted the RDKS to purchase and install a low-cost solar flare system. Flare system was successfully commissioned on August 19, 2019. The monitoring data showed that the flare has had an efficiency of 63.1% between August and December 2019.

Based on conservative assumptions about gas composition data, we estimated that a total GHG emissions reduction of 228 tonnes CO_2-e was achieved in 2019. Furthermore, we estimated that this flare facility will achieve a total GHG emissions reduction of 624 tonnes/year CO_2-e in a full-year time period. Therefore, the system will continue to achieve substantial GHG emissions

reduction should the flare system continue to be well maintained and operated throughout the year. SHA recommends that annual inspection and maintenance programmes to be completed as per the flare manufacturer's recommendations.

The RDKS will continue to log flare temperature data which is essential for quantification of the annual GHG offsets. We also recommend that the LFG flow rate and composition data be collected on a quarterly basis. The gas quality and flow rate may be affected by a rapid barometric pressure change. Therefore, having more monitoring events throughout the year would secure a more reliable quantification of the annual GHG emission reductions.

Additionally, SHA and RDKS are currently looking into placement of a fabricated biocover system over the Landfills closure system. The Fabricated biocover system will achieve more than 75% oxidation of the fugitive methane from the cover soil through application of methanotrophic bacteria. SHA estimated that this initiative will result in an approximately 1,000 tonnes of CO_2-e/year additional GHG emissions reduction. The biocover system is planned to be installed in summer 2020.

We very much enjoyed working with you on this project. Should you have any questions or comments about this letter report or require any further information, please do not hesitate to contact the undersigned.

Yours truly,
SPERLING HANSEN ASSOCIATES

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Vice President

References:

CRA (2013). Landfill Gas Management Protocol, Prepared for PCT. March 2013. #079736

ENV (2014). 2014 B.C. Best Practices Methodology for Quantifying Greenhouse Gas Emissions, Ministry of Environment, Victoria, B.C. November, 2014