

2020 CLOSED THORNHILL LANDFILL ANNUAL REPORT

June 2021

Prepared for:

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Strategy
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Thornhill Landfill Overview

The Thornhill Landfill is in the final stages of closure, with most of the landfill closed in 2015 and final soil cover application and vegetation seeding occurring currently. Final closure is anticipated for 2023. The Thornhill 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, consolidated, and then hauled to Forceman Ridge Waste Management Facility (WMF) for final disposal. Waste is no longer discharged at the Thornhill location. Waste is managed in accordance with the Regional District Kitimat-Stikine Solid Waste Management Plan (1995). The Thornhill Transfer Station also has a residential drop off area for garbage, yard and garden materials, metal (including large appliances and propane tanks), and clean wood.

Landfill operations are regulated by the Ministry of Environment and Climate Change Strategy's Operation Certificate MR-4057, issued in February 1976 and most recently amended in December 2020.



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 conducted in accordance with the Operational Certificate. The water quality monitoring program, which includes groundwater, surface water, and leachate monitoring, are discussed in the *Thornhill Landfill 2020 Annual Environmental Effects Monitoring Report*, prepared by Golder Associates and contained 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. The *Thornhill Landfill 2020 Greenhouse Gas Emissions Reduction Quantification* report, prepared by Sperling Hansen Associates (SHA), is contained in Appendix B.

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1.0 Introduction

This annual report for the closed Thornhill Landfill covers the period from January to December 2020. It has been prepared to fulfill the requirements of the facility's Operational Certificate MR-4057, issued by the Ministry of Environment and Climate Change Strategy (MOECCS) and most recently amended in December 2020. Waste is no longer discharged to the Thornhill Landfill and septage is no longer accepted at the facility. Garbage and compostable organics are collected, consolidated, and hauled to the Forceman Ridge Waste Management Facility (WMF). 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. Metal collected at the Transfer Station 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 2020;
- Total volume or tonnage of organics collected and diverted during 2020;
- Total volume or tonnage of metals and clean wood collected and diverted during 2020;
- Occurrences or observations of wildlife attempting to access the facility;
- Results and evaluation of water quality monitoring programs by GolderAssociates, contained in Appendix A; and
- Quantification of greenhouse gas (GHG) emissions by Sperling Hansen Associates (SHA), contained in Appendix B.

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 refuse, clean wood, metal, and organics.

2.1 Solid Waste Disposal

Solid waste from Terrace and the greater Terrace area is hauled to the Thornhill Transfer Station where it is sorted, compacted, and hauled to the Forceman Ridge WMF. Controlled waste from Terrace and area is hauled directly to Forceman Ridge WMF. The annual totals from January through to December 2020 for municipal solid waste, organics, clean wood, and metal received at the Thornhill Transfer Station are shown in Table 1. Qualitative descriptions for these materials are included below.

Table 1: Thornhill Transfer Station Waste Discharge Quantities for 2020

Material	2020 Quantity (tonnes)	
Waste Discharge		
Garbage	8,844.79	
Construction and Demolition waste	1,343.87	
Diverted Materials		
Clean Wood		28.91
Organics		1656.04
Metal		317
Total		
Total Consolidated Landfill Waste	10,188.66*	
Total Materials Diverted		2,001.95

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

2.1.1 Garbage

Garbage is defined as discharged materials, substances or objects not including controlled wastes, restricted wastes or prohibited wastes. Per the bylaw, these items are defined as:

- 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;
- 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 2020, 8,844.79 tonnes of garbage were collected and consolidated at the Thornhill Transfer Station.

2.1.2 Construction and Demolition

Construction and demolition (C&D) waste is mainly wood waste and other 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 2020, 1,343.87 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, as follows: consolidated at the Thornhill Transfer Station, collected in curbside pick-up, collected by commercial haulers, or deposited at designated Extended Producer Responsibility (EPR) Depots and private recycling facilities.

3.1 Metals

In 2020, a total of 317 tonnes of metal was collected at the transfer station, including propane tanks, white goods, and scrap metal. Ozone depleting substances are removed from all applicable metal materials (i.e., fridges) prior to collection by a scrap metal recycler.

3.2 Clean Wood Waste

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

In 2020, 28.91 tonnes total of clean wood waste was collected and diverted.

3.3 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. Residential organic waste is collected curbside, or residents can self-haul their organics to the Thornhill Transfer Station. Organics collection for businesses and industry is through contracted commercial haulers or by businesses self-hauling directly at the Transfer Station. Organic waste is consolidated at the Transfer Station and hauled to the Forceman Ridge Compost Facility.

In 2020, 1,656.04 tonnes of organic waste were 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, which inhibits 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 mammalian wildlife in 2020. There was very minimal vector activity from birds, including raptor species (bald eagles), and corvid species (crows and ravens).

5.0 Environmental Monitoring Report

Environmental monitoring for the Thornhill Transfer Station was conducted by the RDKS Environmental Technician, following Ministry of Environment and Climate Change Strategy, 2013 British Columbia Field Sampling Manual. In-situ and laboratory data for groundwater, surface water, and leachate monitoring have been analyzed, reviewed and interpreted in *Thornhill Landfill 2020 Annual Environmental Effects Monitoring Report*, prepared by Golder Associates. This report is contained 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 RDKS installed a solar-powered candlestick flare system in summer of 2019. The *Thornhill Landfill 2020 Greenhouse Gas Emissions Reduction Quantification* report, prepared 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. 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.

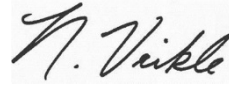
During the summer of 2020, final cover was applied to approximately 20% of the closed Landfill. Final cover consisted of finished compost from the Forceman Ridge Compost Facility, mixed with native soils, and finished with a native seed blend. The resulting closed section is vegetating successfully. An additional 20% will be closed in 2021 using finished compost, local soils and native seed blend. The remaining stages of final closure are anticipated for subsequent years, with final closure of the entire Landfill anticipated for 2023.

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Appendix A. Thornhill Landfill 2020 Annual Environmental Effects Monitoring Report (Golder Associates, 2021)



REPORT

Thornhill Landfill, Thornhill, BC

2020 Annual Environmental Effects Monitoring Report

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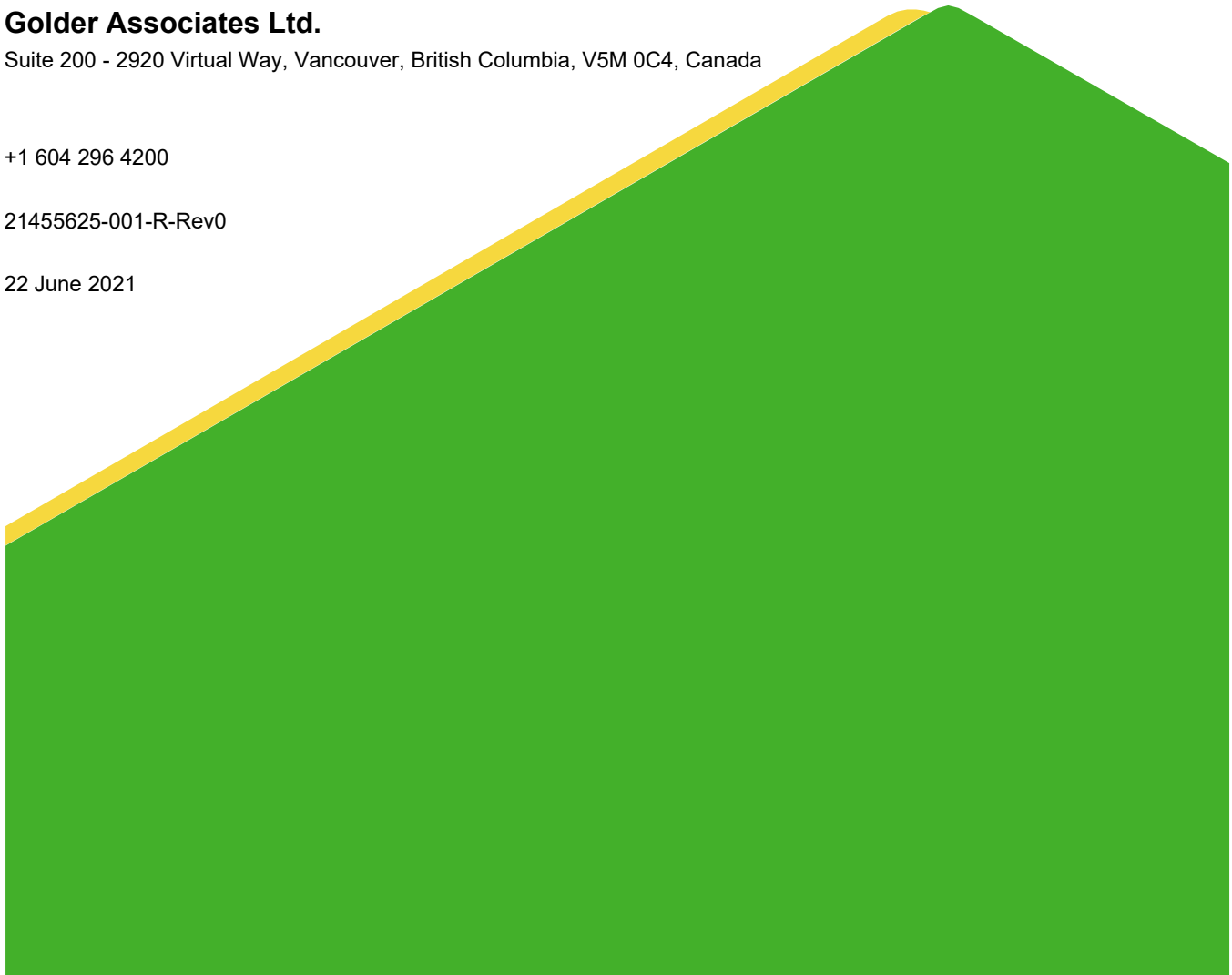
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Executive Summary

The 2020 monitoring program at the closed Thornhill Landfill indicates that the 2020 results follow historic trends and confirm previous findings by Sperling Hansen Associates in 2017.

The results of the 2020 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 dissolved aluminum for some sampling rounds in 2020, these results are not considered to be related to the Landfill based on the lower aluminum concentrations associated with seepage from the leachate pond.

Groundwater quality data is only available for one monitoring well located downgradient of the closed 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, appeared to rise in groundwater at BH96-2 up until 2017, but has since declined and is present at 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.

Recommendations to improve the monitoring program are provided, which include the development of a groundwater monitoring program and installation of one to three additional monitoring wells.

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 March 2021. 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 March 2021, 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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APPENDIX A

Landfill Operational Certificate

APPENDIX B

BC Water Atlas – Water Well Records

APPENDIX C

Borehole Logs

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Historic Analytical Results

1.0 INTRODUCTION

Golder Associates Ltd. (Golder) was retained by the Regional District of Kitimat-Stikine (RDKS) to prepare the 2020 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. The Ministry of Environment and Climate Change Strategy (ENV) requires annual landfill reporting, as specified in Operational Certificate No. MR-4057, amended 15 December 2020 (the “OC”). 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 be finalized in 2022.

An EEM Program is 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 15 December 2020 OC, the objective of the EEM Program is to determine the potential effects of the Landfill on the receiving environment. The scope of work for the EEM Program is:

- **Surface Water Monitoring:** Collection and analysis of four surface water samples from upstream and downstream of the Landfill and from the leachate collection system and effluent discharge weir, conducted three times per year, in the spring, summer and fall.
- **Groundwater Monitoring:** The Landfill OC calls for the preparation of a groundwater monitoring plan and in the interim, for groundwater monitoring at one location (BH96-2). The 2020 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 OC holder (RDKS) is required to conduct a QAQC program to determine the acceptability of the data required by the OC.
- **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 OC (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 and groundwater monitoring and sampling, and quality assurance and control (QAQC) during the 2020 monitoring year. Chemical analysis of surface water and groundwater samples was conducted by ALS Environmental Ltd. The RDKS provided Golder with historic and 2020 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 OC:

- Summary of the regulatory framework and the OC 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 2019 (Golder 2020). 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
- The 1997 Thornhill Landfill hydro geotechnical investigation (SHA 1997)
- The 2017 Thornhill Landfill annual environmental effects monitoring report (SHA 2018)

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 be

finalized in 2022. The Site accepts local refuse, where 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 16 m 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 silt and clay unit underlying the Landfill was tested by SHA (1997) and yielded a reported average hydraulic conductivity 4.2×10^{-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 in 1997 are described as follows:

- BH96-3 – destroyed when Transfer Station was constructed; 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 – currently in use; 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). This well is no longer in use due to it being consistently dry. 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 2020. During the 2020 program, one downgradient groundwater monitoring well (BH96-2) and five surface water locations (SW-3, -1, -21, -17, and -6) were sampled. Historically, one upgradient well was also sampled (BH96-3), but this well was destroyed during the Transfer Station construction in 2016 and is no longer available for sampling. Historically, additional select surface water sampling locations have been sampled. Two nearby domestic water wells, located upgradient to the south of the landfill, 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 <i>UTM</i>	Northing <i>UTM</i>	Elevation (approximate) <i>metres above sea level</i>	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 – 2020	Downgradient
SW-3	Surface Water	533198	6038389	-	1996 – 2020	Downgradient
SW-1	Surface Water	533702	6038575	-	1996 – 2020	Sidegradient
SW-21	Surface Water	533182	6038522	-	1996 – 2020	Downgradient
SW-17	Surface Water	533031	6038804	-	1996 – 2020	Downgradient
SW-6	Surface Water	532615	6039310	-	1996 – 2020	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 2020.

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 OC (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
<u>SW-3</u>	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 the leachate seep entering this pond.
<u>SW-1</u>	Cross-gradient to the Landfill: Background location.
<u>SW-21</u>	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).
<u>SW-6</u>	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 2020.

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 OC (APPENDIX A).

Deviations from Landfill OC requirements

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

- The Landfill OC calls for the development of a groundwater monitoring plan, with interim monitoring at two monitoring wells. During the 2020 monitoring year, monitoring was only carried out at one downgradient monitoring well location (BH96-2). The RDKS plans to install additional monitoring wells, including a replacement upgradient and one additional down-gradient monitoring well in July 2021.
- SW-17 was sampled in 2020 although not required in the Landfill OC.

2.2 Groundwater Sampling

The 2020 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; it was last sampled in 2015. This sampling location has not been replaced. The RDKS received an amended/updated Operational Certificate from ENV in December 2020. Golder understands that the RDKS plans to replace this location in 2021. Monitoring locations are shown in Figure 2.

Groundwater sampling is conducted seasonally (see Section 2.1) by RDKS field staff in April or May (Spring), July or August (Summer) and October or November (Fall), 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 calibration, 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, 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 OC. Analytical results and laboratory certificates of analysis for 2020 are presented in APPENDIX D and APPENDIX E respectively.

Table 3: Analytical Parameters Selected for BH96-2 in 2020

Parameter	Season		
	Spring	Summer*	Fall
<u>Dissolved metals including mercury</u>	✓	✓	✓
<u>Dissolved Hardness</u>	✓	✓	✓
<u>Total metals including mercury</u>	✓	✓	✓
<u>Alkalinity</u>	✓	✓	✓
<u>Chloride (Cl)</u>	✓	✓	✓
<u>Fluoride (F)</u>	✓	✓	✓
<u>Sulphate (SO₄)</u>	✓	✓	✓
<u>pH</u>	✓	✓	✓
<u>Conductivity</u>	✓	✓	✓
<u>Total Dissolved Solids (TDS)</u>	✓	✓	✓
<u>Chemical Oxygen Demand (COD)</u>	✓	✓	✓
<u>Ammonia (NH₃), Nitrate (NO₃), Nitrite (NO₂), Total Kjeldahl Nitrogen (TKN)</u>	✓	✓	✓
<u>Total Phosphorous</u>	✓	✓	✓

Notes:

Underlined parameters indicate parameters required, in accordance with landfill OC.

× indicates parameter was not analysed in the laboratory.

✓ indicates parameter was analysed.

*BH96-2 was sampled at the beginning of September as opposed to during the regular summer period (July/August).

Deviations from Landfill OC requirements

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

- BH96-2 was sampled in spring (April) and fall (October). A summer sample at the location was sampled at the beginning of September, which is just outside the required summer period (July/August). This deviation from the OC is not considered a significant. However, it is noted for completeness.

The Landfill OC 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 yet been replaced. The RDKS anticipates installing a replacement upgradient well in 2021.

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), early September (Summer) and October (Fall) 2020, in conjunction with collection of 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 sampling, 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). 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 OC:

Table 4: Analytical Parameters selected for Surface Water Samples in 2020

Parameter	Season		
	Spring	Summer*	Fall
<u>Dissolved metals including mercury</u>	✓	✓	✓
<u>Dissolved Hardness</u>	✓	✓	✓
<u>Total metals including mercury</u>	✓	✓	✓
<u>Total Hardness</u>	✓	✓	✓
<u>Alkalinity</u>	✓	✓	✓
<u>Chloride (Cl)</u>	✓	✓	✓
<u>Fluoride (F)</u>	✓	✓	✓
<u>Sulphate (SO₄)</u>	✓	✓	✓
<u>pH</u>	✓	✓	✓
<u>Conductivity</u>	✓	✓	✓
<u>Total Suspended Solids (TSS)</u>	✓	✓	✓
<u>Biological Oxygen Demand (BOD)</u>	✓	✓	✓
<u>Chemical Oxygen Demand (COD)</u>	✓	✓	✓
<u>Ammonia (NH₃), Nitrate (NO₃), Nitrite (NO₂), Total Kjeldahl Nitrogen (TKN)</u>	✓	✓	✓
<u>Total Phosphorous</u>	✓	✓	✓
<u>Ortho Phosphorous</u>	✓	✓	✓

Notes:

Underlined parameters indicate parameters required, in accordance with Landfill OC.

× indicates parameter was not analysed.

✓ indicates parameter was analysed.

*Surface water locations were sampled at the beginning of September outside the regular summer period (July/August).

Deviations from Landfill OC requirements

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

Surface water locations were sampled in spring (April) and fall (October). Surface water samples were collected at the beginning of September which falls just outside the regular summer period (July/August) identified in the OC. This deviation is not considered a significant. However, it is noted for completeness.

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 OC 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 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 footvalves 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 OC 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:

$$RPD (\%) = \left| \left(\frac{x1 - x2}{\text{average}(x1, x2)} \right) \right| \times 100$$

where x1 is the original sample result and x2 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 x1 is the original sample result, x2 is the blind field duplicate result and LRL is the laboratory reporting limit.

In 2020, the BC Ministry of Environment and Climate Change Strategy (ENV) updated the British Columbia Laboratory Manual which contains recommended Data Quality Objectives (DQOs) for laboratories duplicate RPDs (ENV 2020). 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 OC requirements

The 2020 QAQC program at the Site generally followed the requirements described in the Landfill OC; however, the following deviations occurred with respect to duplicate and blank samples:

- Trip blanks were not required as part of the OC. However, one trip blank sample was submitted in addition to field blanks during each sampling event.

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 1 February 2021). 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. 131/2020 and BC Reg. 161/2020, 1 February 2021]).

Drinking Water (Current and Future)

ENV Protocol 21 (BC ENV 2017a) 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 known to be used for farming purposes. Based on the available information, CSR irrigation water use (IW) and livestock watering (LW) water use are 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 (BC ENV 2017b), 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 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 OC, 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 2020 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 cannot 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	BH96-2	BH96-3 (Destroyed)
Top of Casing Elevation (mASL)	175	202
Jun 1996 1	165 (10)	189.1 (12.9)
Oct 1996 1	166.3 (8.7)	190.4 (11.6)
Jun 1997 1	165.5 (9.5)	190.2 (11.8)
Mar-18	-	-
Jul-18	165.63 (9.37)	-
Sep-18	165.49 (9.51)	-
Apr-19	165.42 (9.58)	-
Jul-19	165.88 (9.12)	-
Aug-19	165.84 (9.16)	-
Nov-19	165.83 (9.17)	-
Apr-20	165.92 (9.08)	-
Sep-20	164.37 (10.63)	-
Oct-20	165.87 (9.13)	-

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 2020 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 cross-gradient groundwater conditions. The only monitoring well considered upgradient is the former 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 (APPENDIX D, Table D-1).

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 cross-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 (APPENDIX D, Tables D-2 through D-6). A summary of parameters that were greater than the BC WQG are shown in Table 6**Error! Reference source not found.**

Table 6: Surface Water Exceedances of BC WQG

Parameter/Guideline		Field		Nitrate	NH ₃	Total					Dissolved		
		pH	Dissolved Oxygen	(as N)		As	B	Cr	Fe	Mn	Al	Fe	
AW-F (Long-term avg.)		<u>6.5 - 9.0</u>	8	3	<u>0.53 - 1.86</u>	-	<u>1.2</u>	<u>0.001</u>	-	<u>0.70 - 4.13</u>	<u>0.05</u>	-	
AW -F (Short-term max.)		6.5 - 9.0	5	32.8	3.61 - 23.9	0.005	-	-	1	0.77 - 9.37	0.1	0.35	
DW		-	-	10	-	0.01	5	0.05	0.3	0.05	9.5	0.3	
SW-1	Cross-gradient	Apr-20	7.1	17	0.017	<0.005	<0.0001	<0.01	<0.0001	0.027	0.0014	0.031	<0.01
SW-3	Facility Sample		6.5	0.4	<0.05	61	0.0091	1.9	0.0010	45	4.2	0.0061	39
SW-21	Downgradient		7.6	6.6	4.7	24	0.00072	1.2	0.00044	0.37	0.43	0.011	0.11
SW-17			7.4	17	0.12	0.021	0.00011	<0.01	0.00019	0.14	0.0082	0.032	0.032
SW-6			7.1	15	0.082	0.011	0.00012	<0.01	0.00022	0.19	0.011	0.034	0.038
SW-1	Cross-gradient	Sep-20	7.1	5.5	0.033	<0.005	<0.0001	<0.01	<0.0001	0.052	0.0041	0.031	0.011
SW-3	Facility Sample		6.4	2.2	<0.025	47	0.011	1.8	0.0013	43	3.8	0.012	39
SW-21	Downgradient		7.4	4.5	2.9	10	0.00074	0.81	0.00042	0.21	0.29	0.025	0.068
SW-17			7.7	9.3	0.35	0.019	0.00015	0.025	0.00013	0.16	0.012	0.064	0.10
SW6			7.5	9.7	0.085	<0.005	0.00015	<0.01	0.00016	0.18	0.011	0.052	0.066
SW-1	Cross-gradient	Oct-20	7.6	6.6	0.048	0.0079	<0.0001	<0.01	<0.0001	0.070	0.0046	0.038	0.016
SW-3	Facility Sample		6.5	6	<0.05	47	0.0091	1.8	0.00092	45	3.8	0.036	45
SW-21	Downgradient		7.3	3.9	3.3	0.096	0.00066	0.58	0.00046	0.39	0.35	0.032	0.088
SW-17			7.7	6.3	0.34	0.017	0.00015	0.022	0.00018	0.19	0.014	0.064	0.096
SW-6			7.7	5.5	0.12	0.013	0.00020	<0.01	0.00017	0.20	0.014	0.059	0.081

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, NH₃ = Ammonia, Al = Aluminum, As = Arsenic, Fe = Iron, Mn = Manganese, P = PhosphorousUnderlined 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):

- Dissolved oxygen (SW-1);
- pH, dissolved oxygen, ammonia (SW-3 and SW-21) and nitrate (SW-21);
- Total arsenic, boron, chromium (SW-3) and total iron and manganese (SW3 and SW-21); and
- Dissolved oxygen, dissolved aluminum (SW-6 and SW-17).

3.4 Results of Quality Assurance/Quality Control Analysis

Surface water and groundwater field duplicates were collected in 2020 to assess variability introduced through sampling and handling procedures. The surface water duplicate samples were collected at surface water station SW-3 in April and September 2020 and at SW-1 in October 2020. The groundwater duplicate sample was collected at BH96-2 in April 2020. 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-3 in April 2020 indicated the following parameters above the acceptable DQOs:

- Total Phosphorus
- Total Aluminum
- Total Cadmium
- Total Selenium
- Dissolved Selenium

The surface water duplicate sample at SW-3 in September 2020 indicated the following parameters above the acceptable DQOs:

- TSS
- BOD
- Total Selenium
- Total Titanium
- Dissolved Zinc

The surface water duplicate sample at SW-1 in October 2020 indicated the following parameters above the acceptable DQOs:

- TSS
- Nitrate
- Total Ammonia
- Total Kjeldahl Nitrogen
- Total Titanium

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

- COD
- Nitrate
- Total metals including
 - Aluminum, Barium, Bismuth, Cesium, Chromium, Cobalt, Copper, Iron, Lithium, Manganese, Nickel, Rubidium, Selenium, Silicon, Silver, Thallium, Thorium, Tin, Vanadium, and Zinc
- Dissolved metals including
 - Copper, Lead, and Zinc

These results are indicative of sample heterogeneity in each sample pair. It is unclear if this was caused by sampling methodology or environmental factors such as suspended solids. In addition to the field duplicate samples, two trip and four field blank samples were submitted in 2020. None of the parameters exceeded the LDL in the blank samples with the exception of one parameter (ammonia) which was detected at less than two times the LDL in all field blank samples. The field QA/QC results indicate that sampling methodology or environmental factors such as total suspended solids have introduced bias into the geochemical results. As a result, all data is considered to be biased and does not show good reproducibility.

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 Certificates 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 apparent bias caused by the poor reproducibility has been considered in the interpretation and evaluation of the geochemical results in this monitoring 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 2020.

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 (2018) 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, except aluminum and sulphate. Aluminum and sulphate are lower at SW-3 than downstream, suggesting the source of these constituents is unrelated to the Landfill.

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) except for total iron and aluminum. While the total iron concentrations observed at SW-3 and to a lesser extent at SW-21 appear to be attributed to the Landfill, the difference between the relatively low levels of iron at downstream location SW-6 and background may be a function of natural variability rather than the Landfill. These trends are consistent with those observed in previous years.

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. Minor 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, with the exception of total iron for SW-3 (Figure 4-E) which shows a slightly increasing trend. In contrast, dissolved iron (Figure 4-F) and sulphate (Figure 4-D) in groundwater have demonstrated a slight overall decline at BH96-2. 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, appeared to be increasing slightly (but still remaining at low concentrations) in groundwater at BH96-2 up until 2017 but has since returned to historical concentrations (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 the BC WQG for dissolved aluminum in some sampling rounds in 2020, these results are considered to be partly caused by other unknown conditions not directly related to Landfill leachate effects. This is because:

- Lower concentrations of dissolved aluminum were observed in surface water closer to the Landfill (at SW-21) for most sampling rounds in 2020 relative to SW-6; and
- In the case of total aluminum, background concentrations (at SW-1) have also sometimes exceeded BC WQG (July 2020).

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

Chloride, which is a typical indicator of Landfill leachate, appeared to rise in groundwater at this well up until 2017, but has since declined and is present at low concentrations (on the order of 2 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 2020 monitoring program indicates that leachate emanating in surface water from the Landfill appears to be attenuated before it reaches the Thornhill Creek water system, which is consistent with assessments completed in previous years. 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 not evaluated due to the lack of available monitoring wells in this unit.

All analytical results obtained in 2020 follow historic trends and confirm previous findings for the Site.

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

- Based on the current Landfill OC the Permittee is required to implement a new groundwater monitoring program by 30 November 2021. Under the current OC, 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.
- Given the field QA/QC results and generally poor reproducibility of some samples, Golder recommends reviewing sample collection and handling procedures to increase data quality in coming years.

Due to recent changes in the BC Water Quality Guidelines, Golder recommends reviewing all applicable regulatory guidelines on a regular basis with respect to parameters required under the OC. Where required, the parameters presented in the OC should be amended where necessary to allow for adequate comparison with applicable regulatory requirements. For example, Golder recommends that dissolved organic carbon be added to allow for a proper comparison to the BC WQG copper guidelines.

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.

Golder Associates Ltd.



Alexander Kaul, PGeo
Geochemist

Jill Sacré, MSc, PGeo
Principal, Senior Hydrogeologist

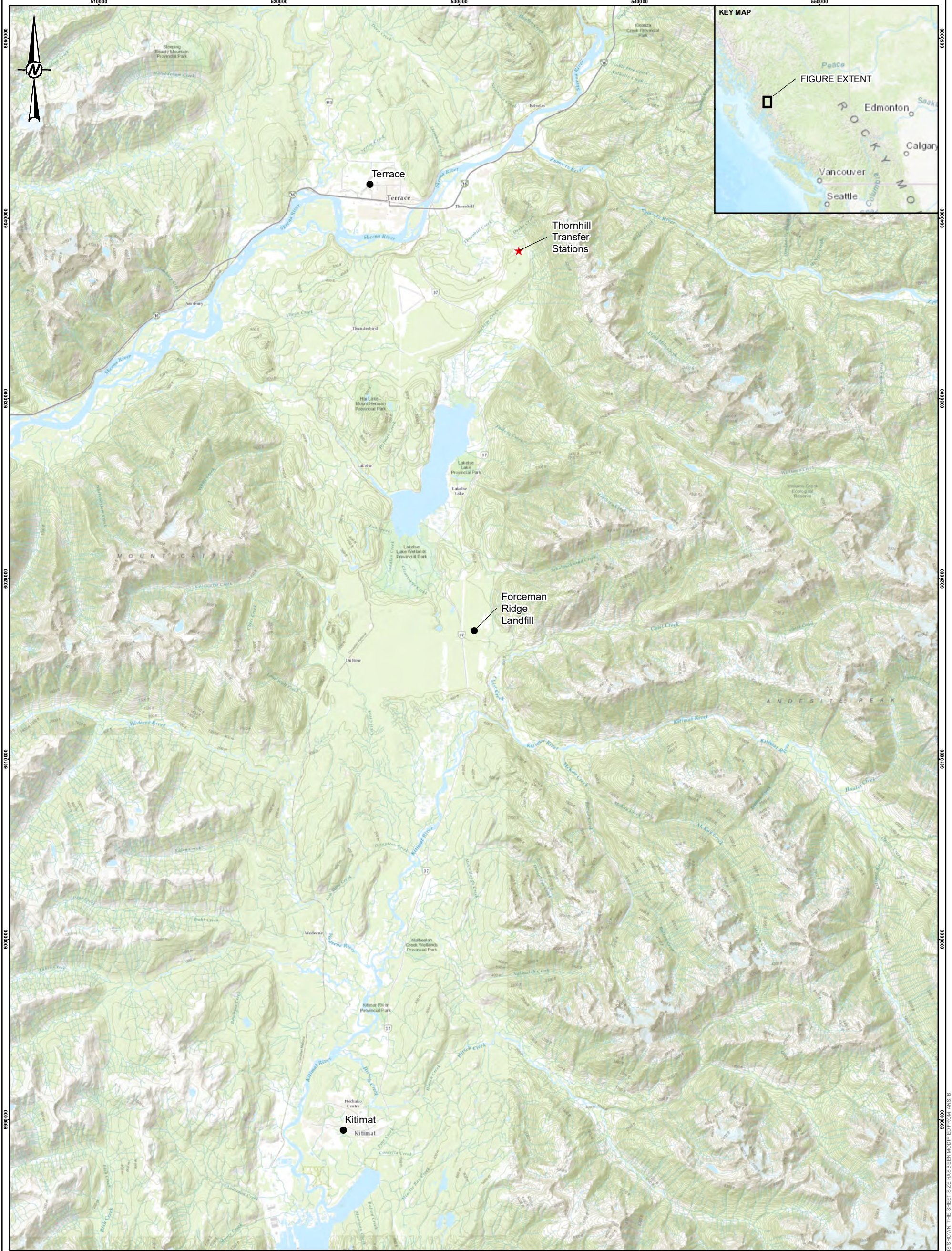
AK/JS/asd

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[https://golderassociates.sharepoint.com/sites/142260/project files/6 deliverables/issued to client_for wp/21455625-001-r-rev0/21455625-001-r-rev0-2020 annual thornhill rpt 22jun_21.docx](https://golderassociates.sharepoint.com/sites/142260/project%20files/6%20deliverables/issued%20to%20client_for_wp/21455625-001-r-rev0/21455625-001-r-rev0-2020%20annual%20thornhill%20rpt%2022jun_21.docx)

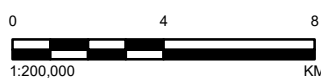
7.0 REFERENCES

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- LEGEND**
- ★ SITE LOCATION
 - POINT OF INTEREST

NOT FOR CONSTRUCTION



NOTE(S)

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

CLIENT
REGIONAL DISTRICT OF KITIMAT-STIKINE

PROJECT
2020 THORNHILL TRANSFER STATION ANNUAL MONITORING REPORT

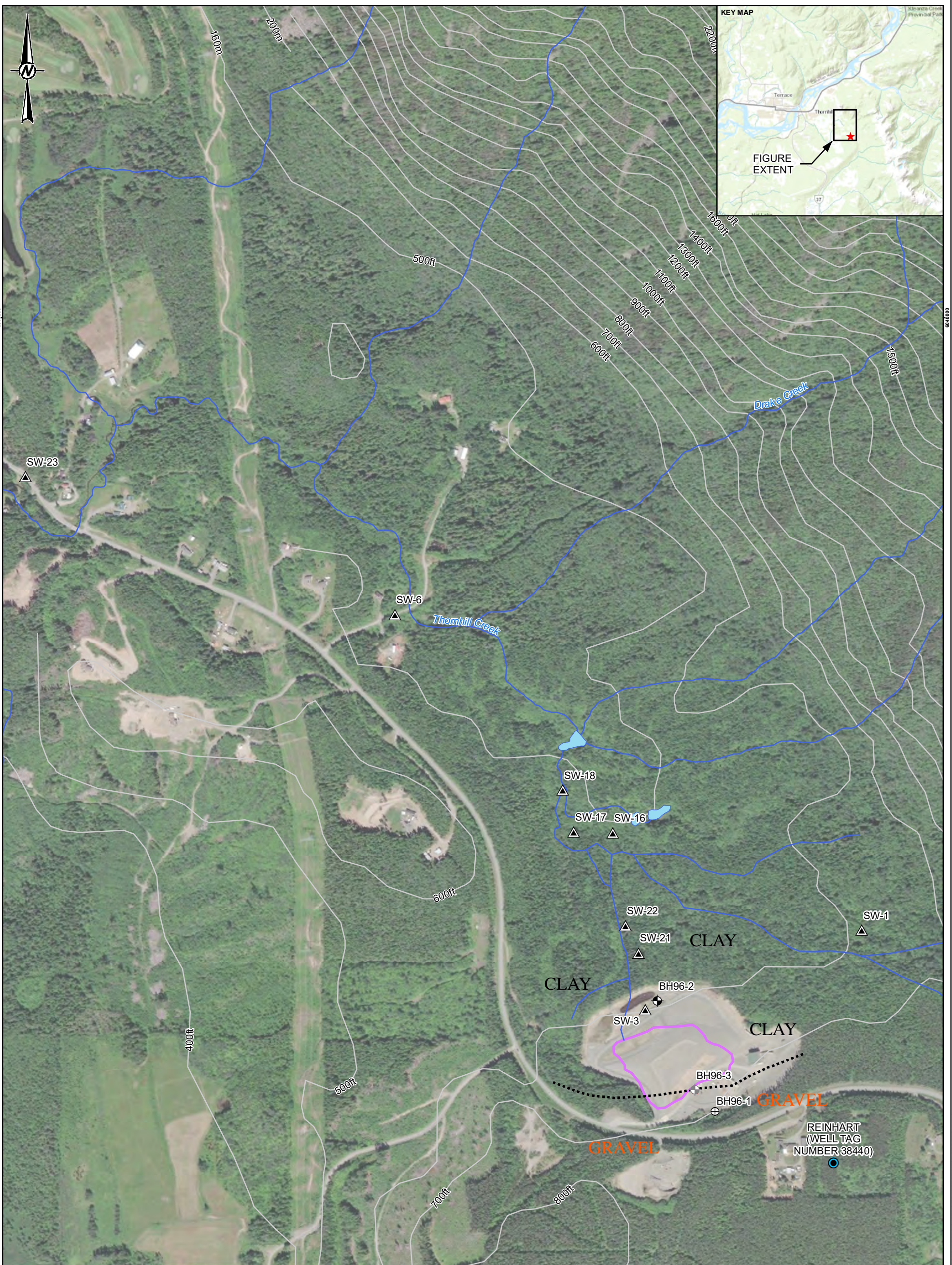
CONSULTANT	YYYY-MM-DD	2021-06-18
	DESIGNED	AK
	PREPARED	CB
	REVIEWED	AK
	APPROVED	JS

TITLE
REGIONAL LOCATION MAP

PROJECT NO.	CONTROL	REV.	FIGURE
21455625	3002	0	1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM A3 IS

25mm



- LEGEND**
- WATERCOURSE
 - CONTOUR
 - WATERBODY
 - LANDFILL FOOTPRINT
 - - - DEFINES CHANGE IN SURFACE GEOLOGY
- SAMPLE LOCATIONS**
- ⊕ BOREHOLE
 - ⊕ MONITORING WELL
 - ⊕ MONITORING WELL (DESTROYED)
 - ▲ SURFACE WATER
 - DOMESTIC WATER WELL

NOT FOR CONSTRUCTION



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

CLIENT
REGIONAL DISTRICT OF KITIMAT-STIKINE

PROJECT
2020 THORNHILL TRANSFER STATION ANNUAL MONITORING REPORT

CONSULTANT



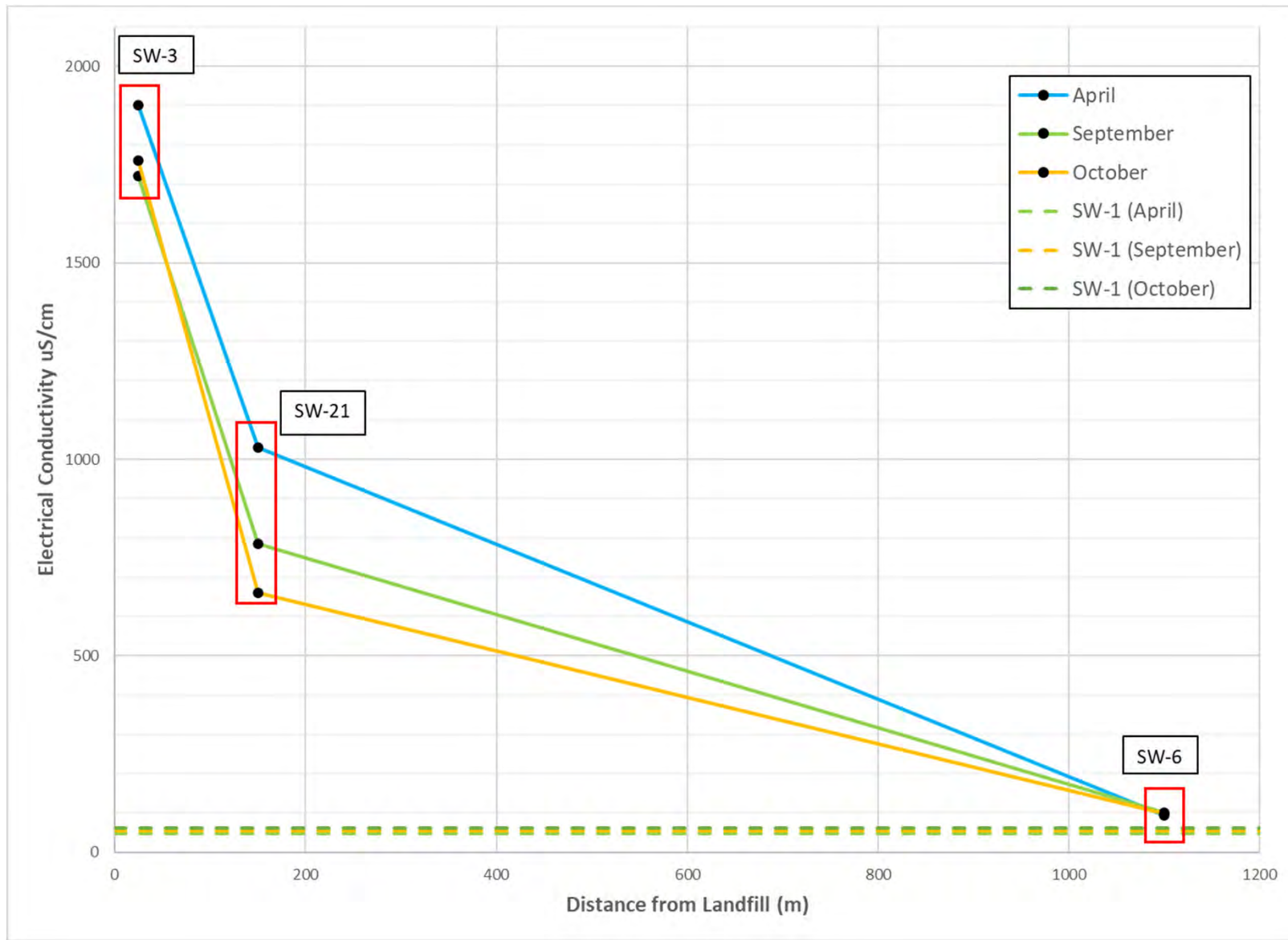
YYYY-MM-DD	2021-06-18
DESIGNED	AK
PREPARED	CB/CN
REVIEWED	AK
APPROVED	JS

TITLE
SAMPLING LOCATIONS

PROJECT NO.	CONTROL	REV.	FIGURE
21455625	3002	0	2

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM A3S18

25mm



CLIENT
REGIONAL DISTRICT OF KITIMAT-STIKINE

PROJECT
2020 THORNHILL TRANSFER STATION ANNUAL
MONITORING REPORT

CONSULTANT

YYYY-MM-DD 2021-May-07



PREPARED AK

DESIGN MO

REVIEW AK

APPROVED JS

TITLE

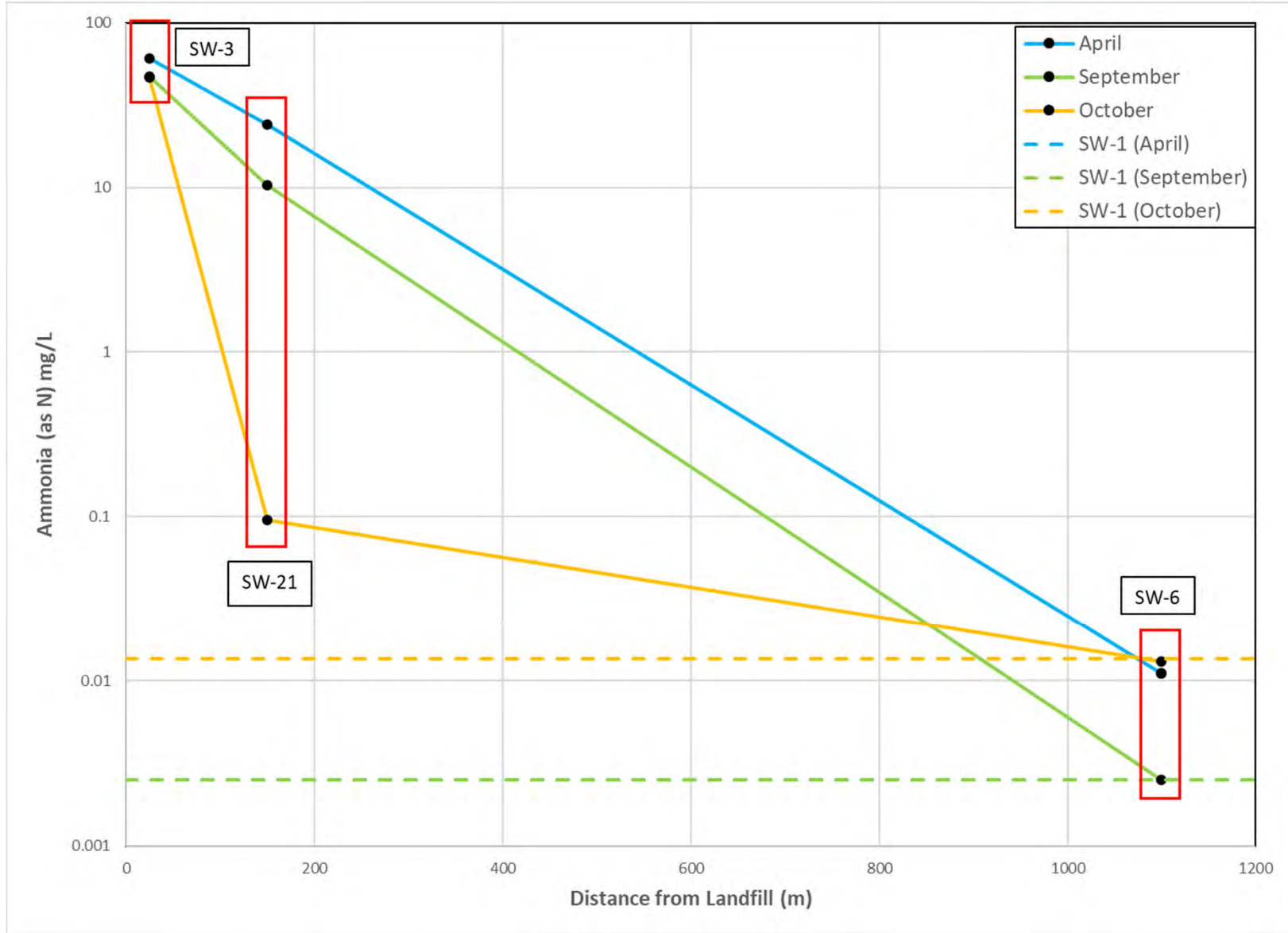
PLOT OF ELECTRICAL CONDUCTIVITY VERSUS DISTANCE

PROJECT No.
21455625

CONTROL
3000

Rev
0

FIGURE
3-A



CLIENT
REGIONAL DISTRICT OF KITIMAT-STIKINE

PROJECT
2020 THORNHILL TRANSFER STATION ANNUAL
MONITORING REPORT

CONSULTANT

YYYY-MM-DD 2021-May-07



PREPARED AK

DESIGN MO

REVIEW AK

APPROVED JS

TITLE

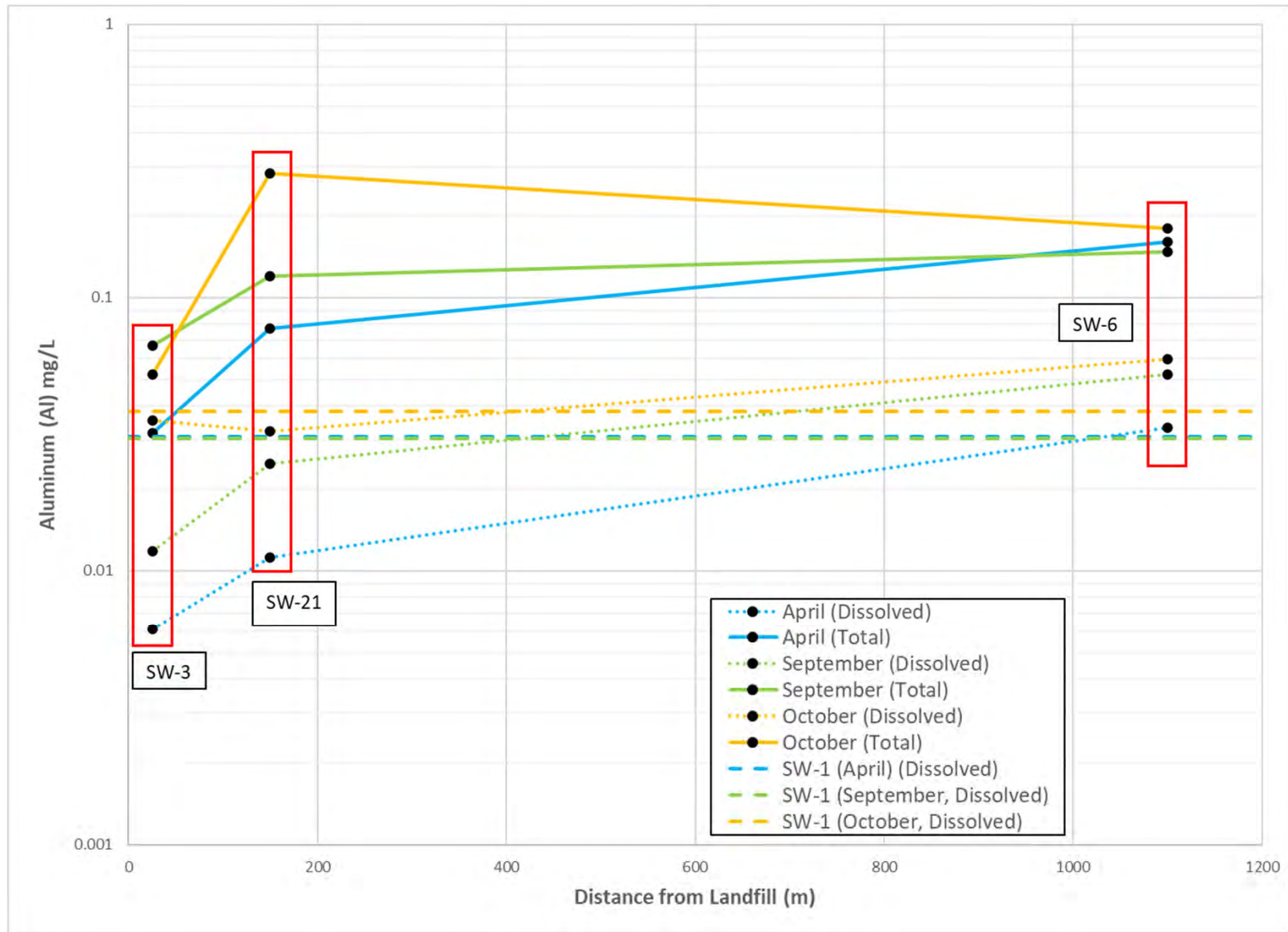
**PLOT OF AMMONIA CONCENTRATIONS VERSUS
DISTANCE**

PROJECT No.
21455625

CONTROL
3000

Rev
0

FIGURE
3-B



CLIENT
REGIONAL DISTRICT OF KITIMAT-STIKINE

PROJECT
2020 THORNHILL TRANSFER STATION ANNUAL
MONITORING REPORT

CONSULTANT

YYYY-MM-DD 2021-May-07



PREPARED AK

DESIGN MO

REVIEW AK

APPROVED JS

TITLE

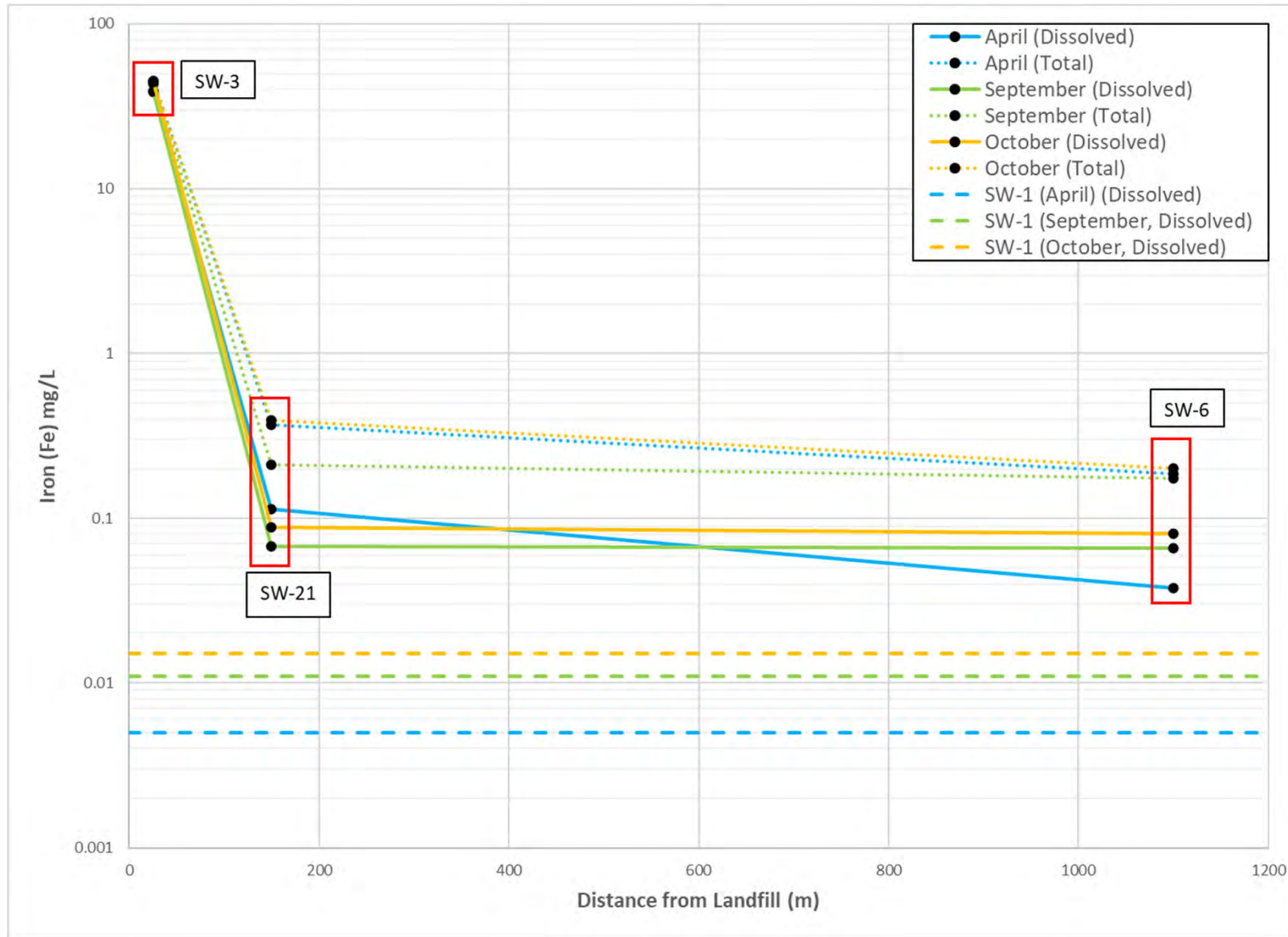
**PLOT OF ALUMINUM CONCENTRATIONS VERSUS
DISTANCE**

PROJECT No.
21455625

CONTROL
3000

Rev
0

FIGURE
3-C



CLIENT
REGIONAL DISTRICT OF KITIMAT-STIKINE

PROJECT
2020 THORNHILL TRANSFER STATION ANNUAL
MONITORING REPORT

CONSULTANT

YYYY-MM-DD 2021-May-07

TITLE

PLOT OF IRON CONCENTRATIONS VERSUS DISTANCE



PREPARED AK

DESIGN MO

REVIEW AK

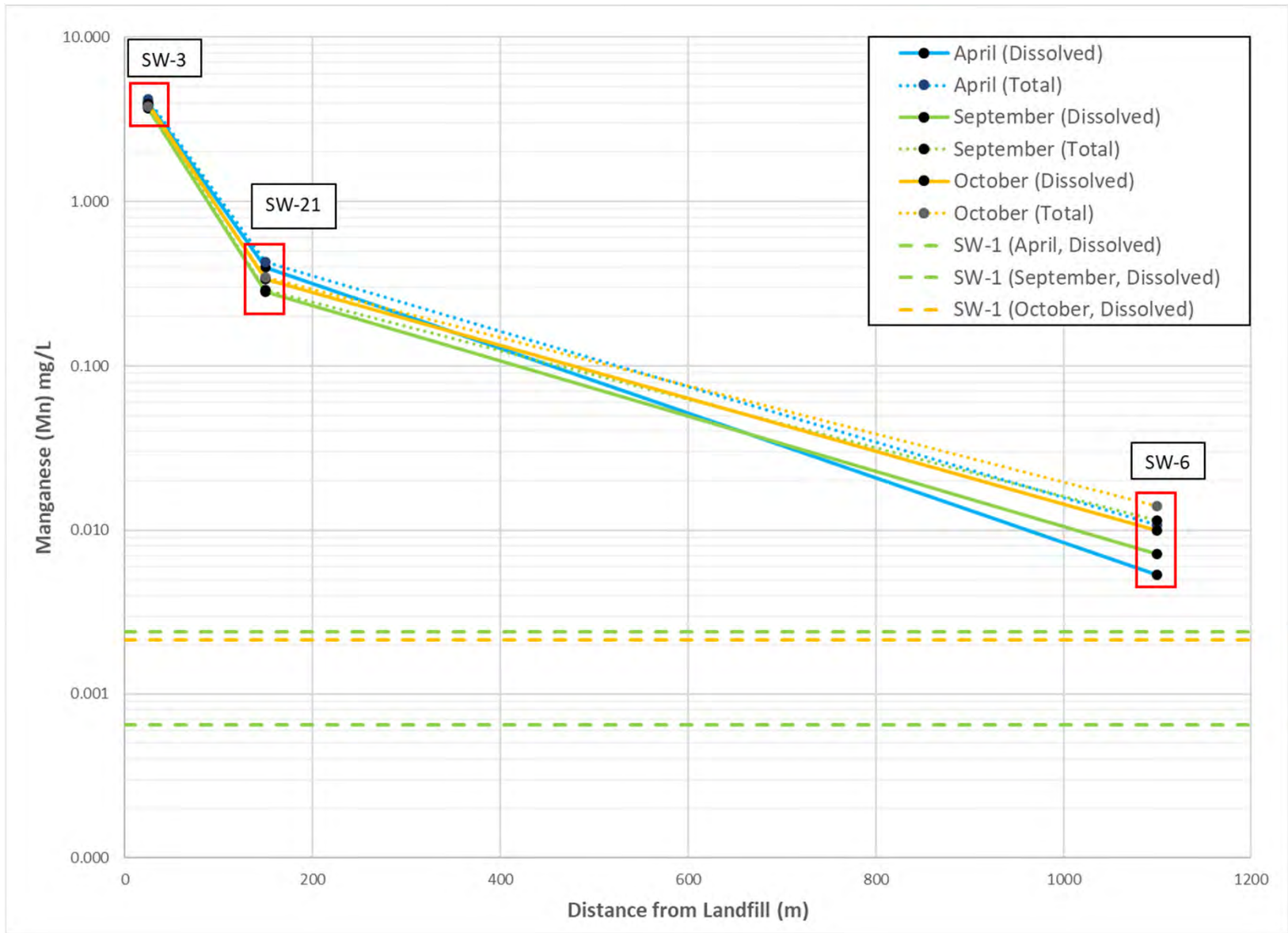
APPROVED JS

PROJECT No.
21455625

CONTROL
3000

Rev
0

FIGURE
3-D



CLIENT
REGIONAL DISTRICT OF KITIMAT-STIKINE

PROJECT
2020 THORNHILL TRANSFER STATION ANNUAL
MONITORING REPORT

CONSULTANT

YYYY-MM-DD 2021-May-07



PREPARED AK

DESIGN MO

REVIEW AK

APPROVED JS

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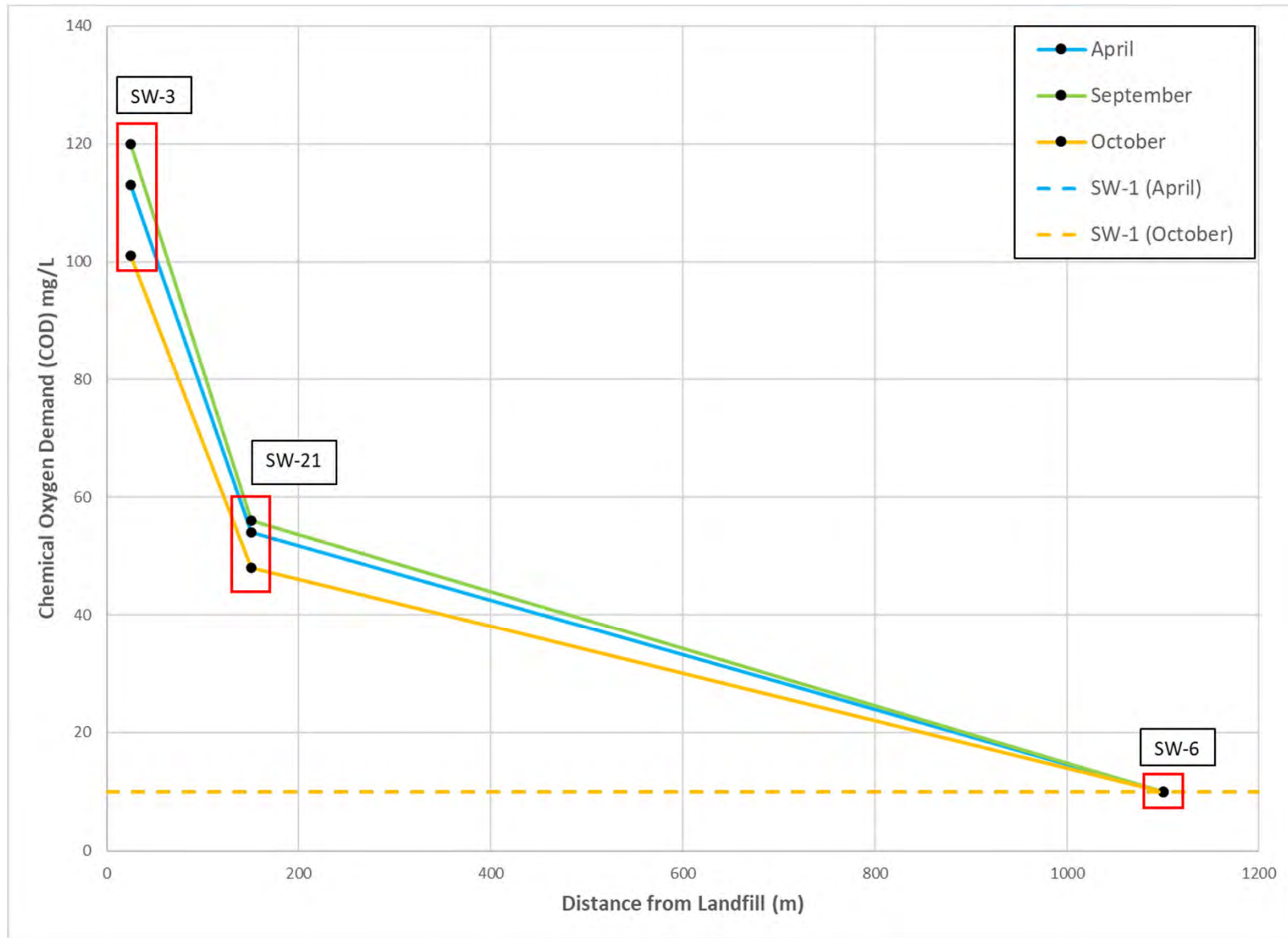
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DISTANCE**

PROJECT No.
21455625

CONTROL
3000

Rev
0

FIGURE
3-E



CLIENT
REGIONAL DISTRICT OF KITIMAT-STIKINE

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CONSULTANT

YYYY-MM-DD 2021-May-07



PREPARED AK

DESIGN MO

REVIEW AK

APPROVED JS

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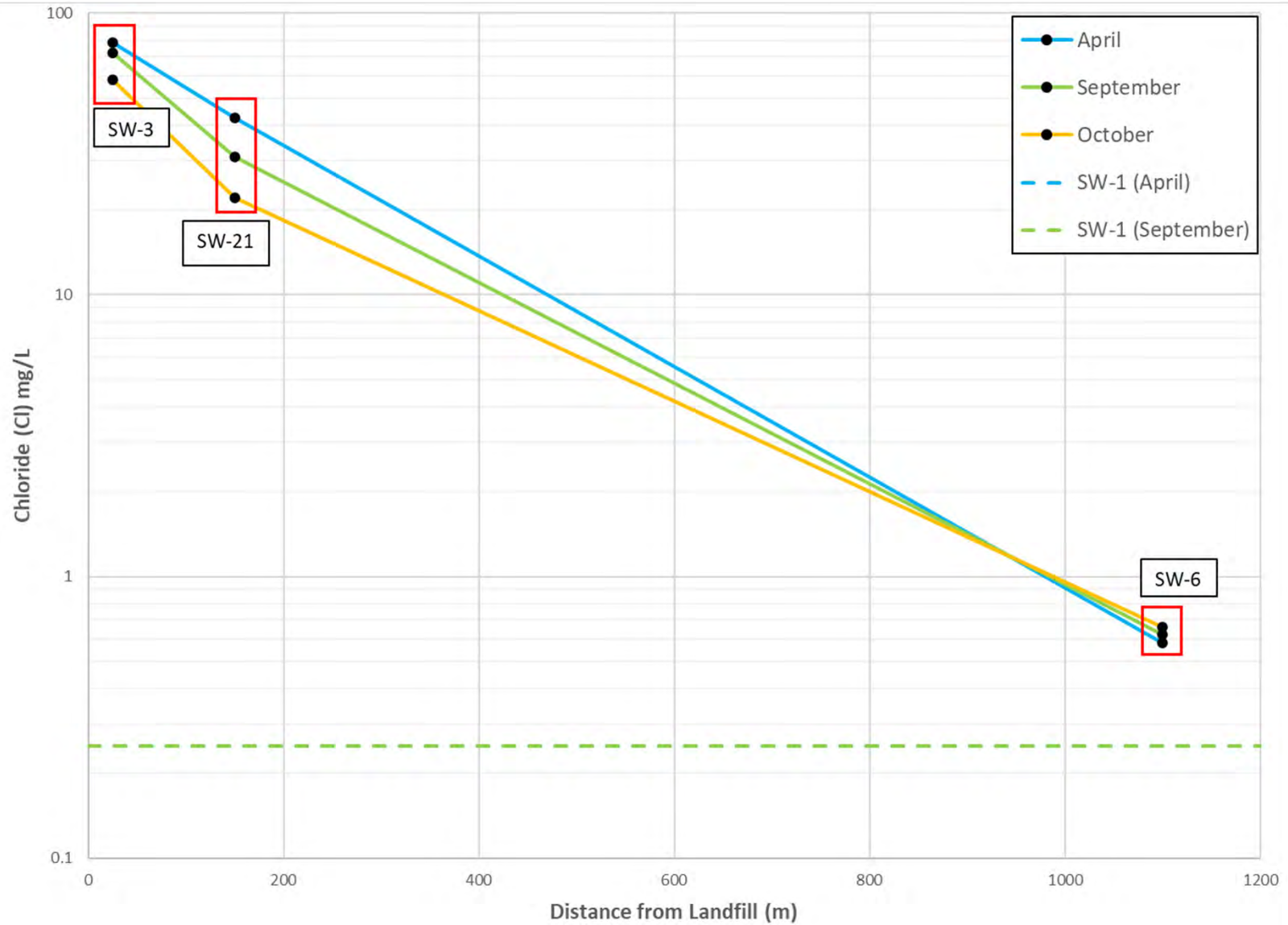
**PLOT OF CHEMICAL OXIDATION DEMAND VERSUS
DISTANCE**

PROJECT No.
21455625

CONTROL
3000

Rev
0

FIGURE
3-F



CLIENT
REGIONAL DISTRICT OF KITIMAT-STIKINE

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MONITORING REPORT

CONSULTANT

YYYY-MM-DD 2021-May-07



PREPARED AK

DESIGN MO

REVIEW AK

APPROVED JS

TITLE

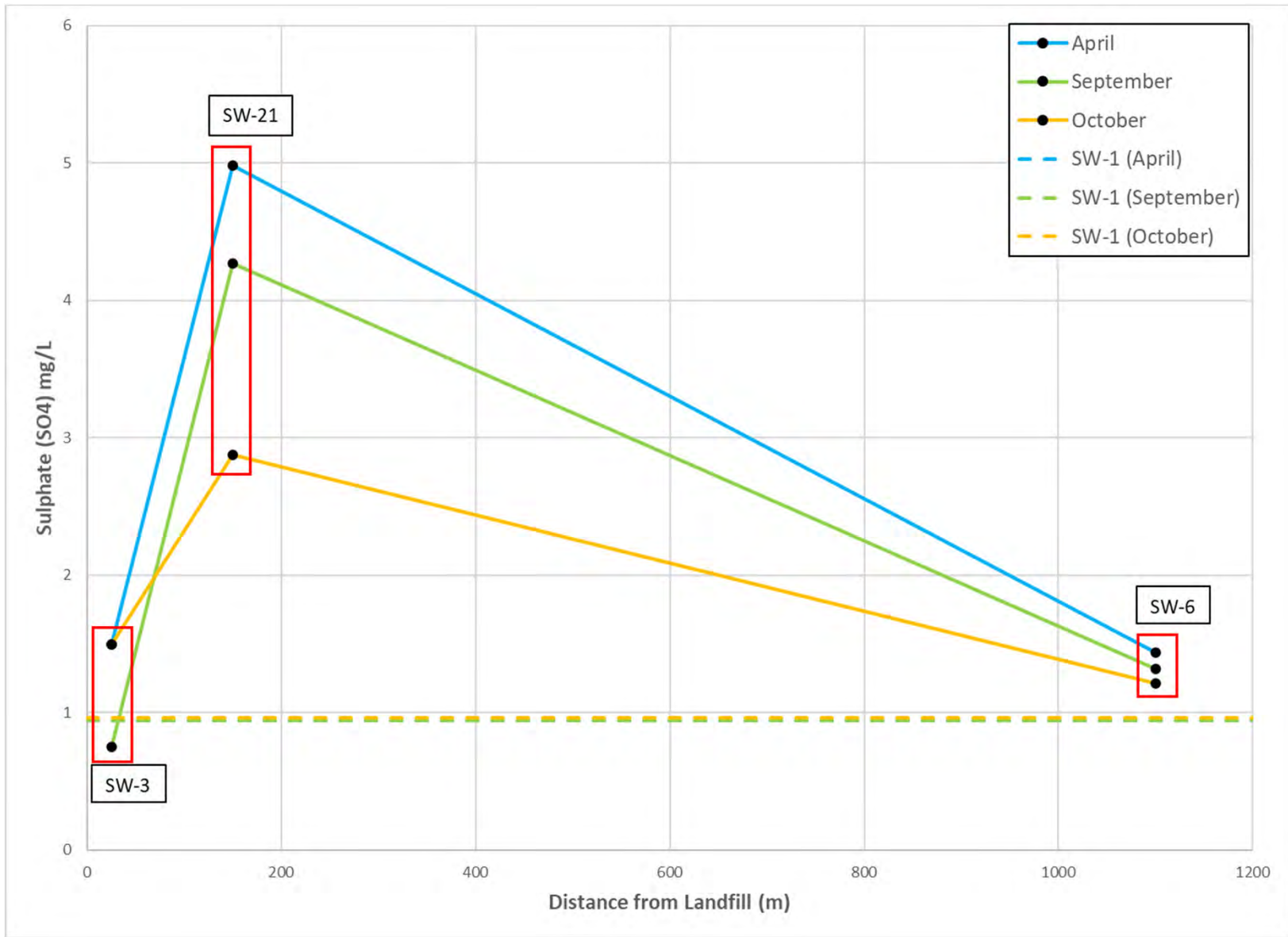
**PLOT OF CHLORIDE CONCENTRATIONS VERSUS
DISTANCE**

PROJECT No.
21455625

CONTROL
3000

Rev
0

FIGURE
3-G



CLIENT
REGIONAL DISTRICT OF KITIMAT-STIKINE

PROJECT
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MONITORING REPORT

CONSULTANT

YYYY-MM-DD 2021-May-07



PREPARED AK

DESIGN MO

REVIEW AK

APPROVED JS

TITLE

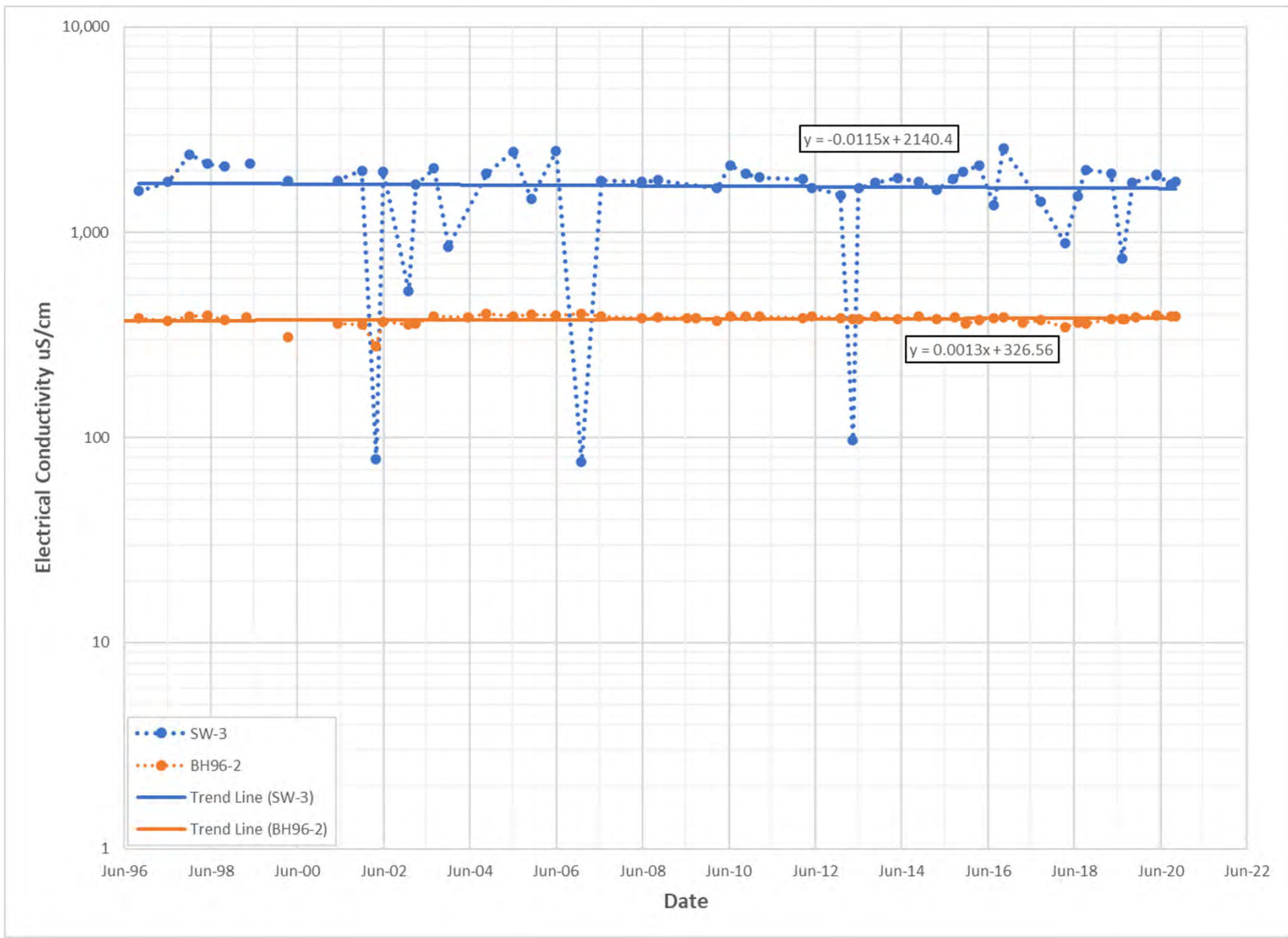
**PLOT OF SULPHATE CONCENTRATIONS VERSUS
DISTANCE**

PROJECT No.
21455625

CONTROL
3000

Rev
0

FIGURE
3-H



CLIENT
REGIONAL DISTRICT OF KITIMAT-STIKINE

PROJECT
2020 THORNHILL TRANSFER STATION ANNUAL
MONITORING REPORT

CONSULTANT

YYYY-MM-DD 2021-May-07

TITLE

TIME SERIES PLOT OF ELECTRICAL CONDUCTIVITY



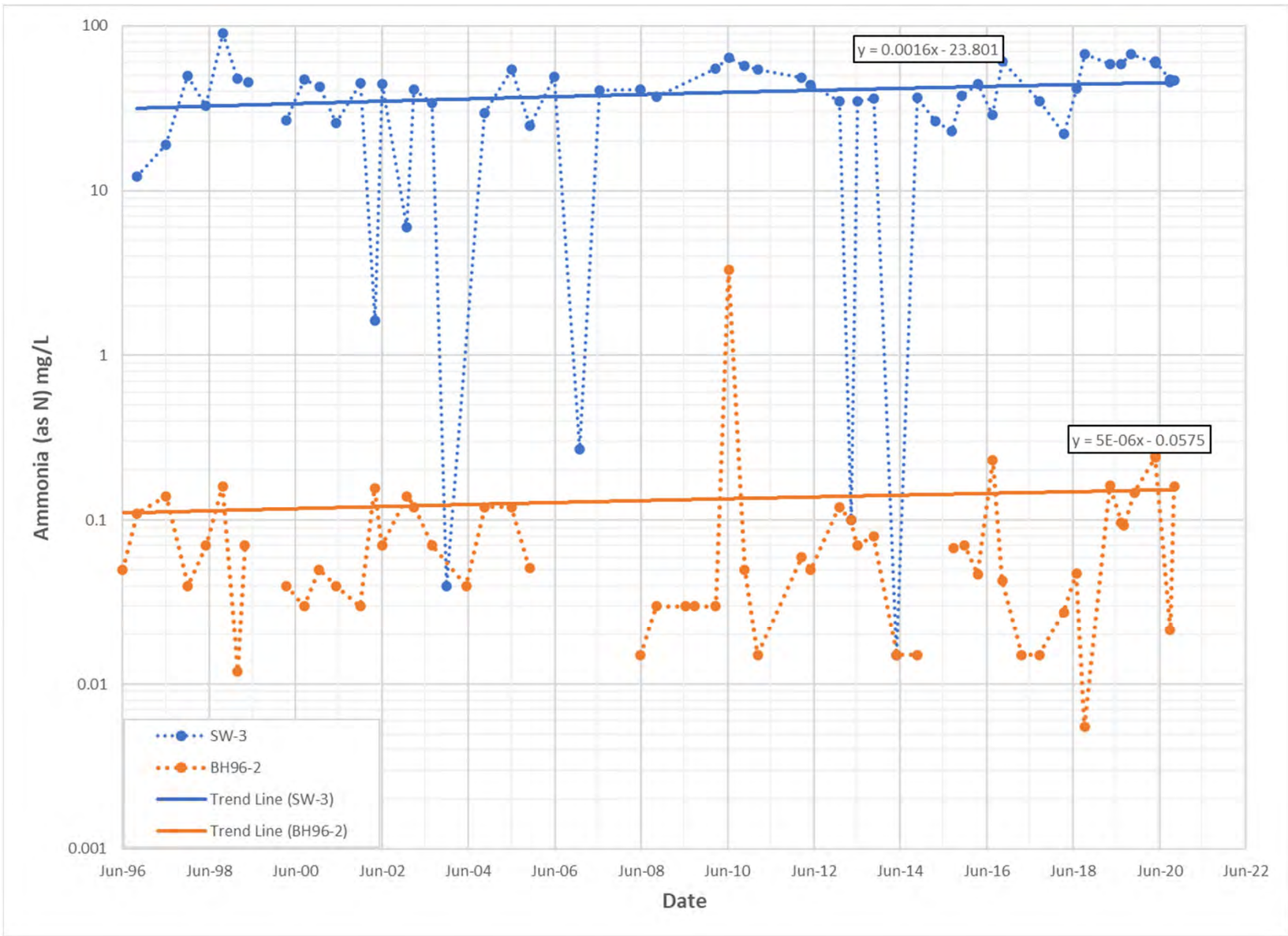
PREPARED AK
DESIGN MO
REVIEW AK
APPROVED JS

PROJECT No.
21455625

CONTROL
3000

Rev
0

FIGURE
4-A



CLIENT
REGIONAL DISTRICT OF KITIMAT-STIKINE

PROJECT
2020 THORNHILL TRANSFER STATION ANNUAL
MONITORING REPORT

CONSULTANT

YYYY-MM-DD 2021-May-07

TITLE

TIME SERIES PLOT OF AMMONIA CONCENTRATIONS



PREPARED AK

DESIGN MO

REVIEW AK

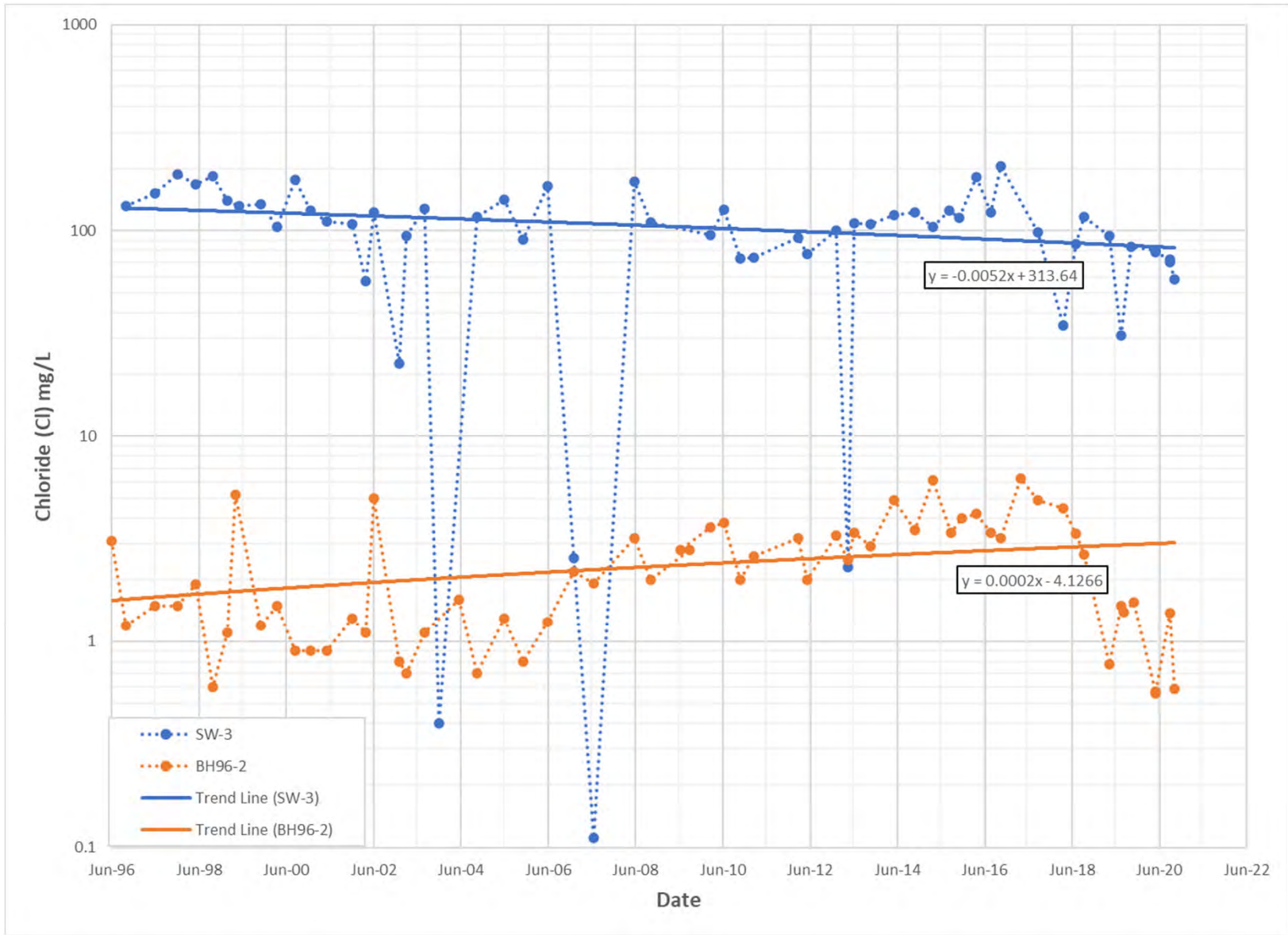
APPROVED JS

PROJECT No.
21455625

CONTROL
3000

Rev
0

FIGURE
4-B



CLIENT
REGIONAL DISTRICT OF KITIMAT-STIKINE

PROJECT
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MONITORING REPORT

CONSULTANT

YYYY-MM-DD 2021-May-07



PREPARED AK

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REVIEW AK

APPROVED JS

TITLE

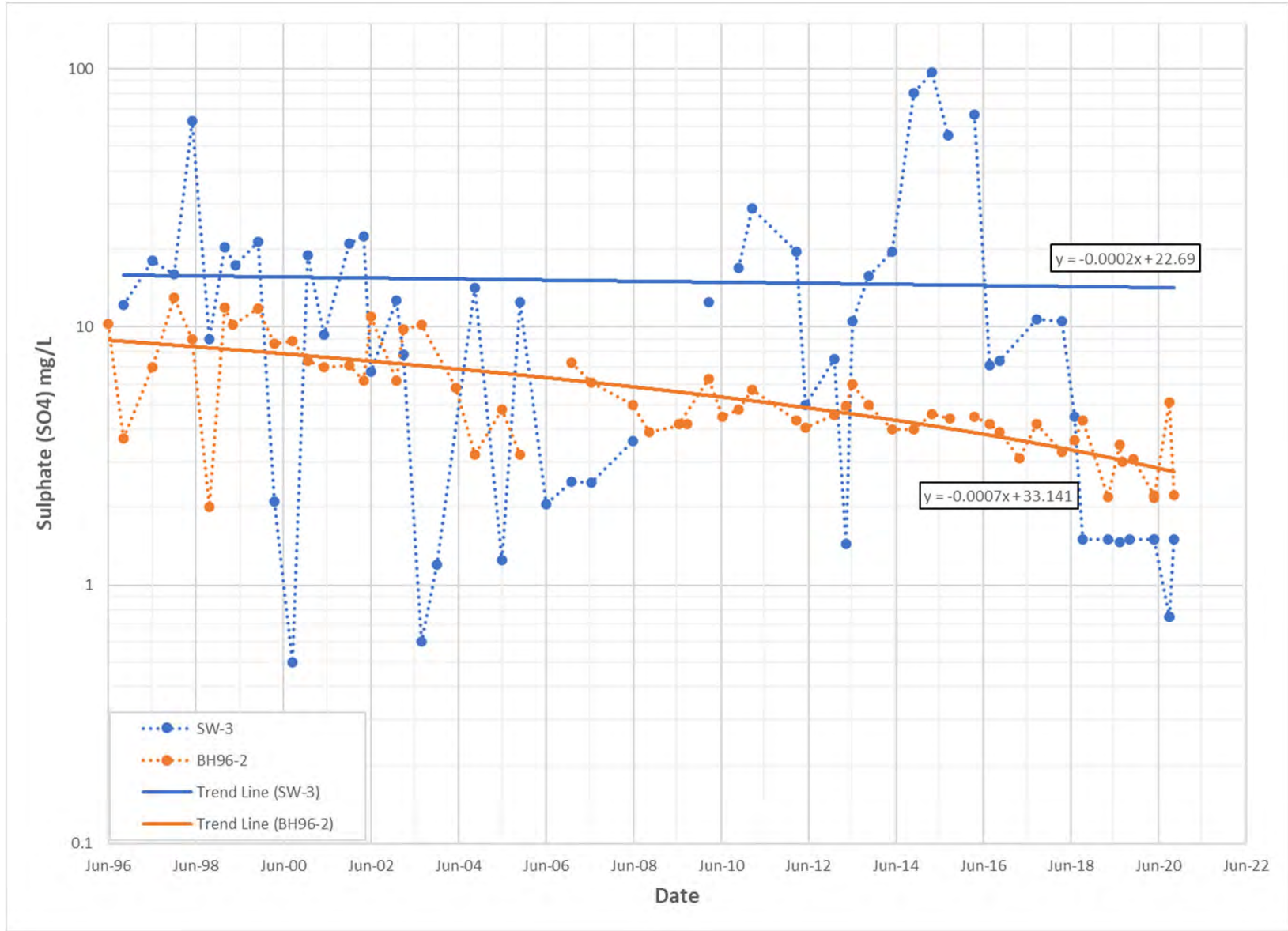
TIME SERIES PLOT OF CHLORIDE CONCENTRATIONS

PROJECT No.
21455625

CONTROL
3000

Rev
0

FIGURE
4-C



CLIENT
REGIONAL DISTRICT OF KITIMAT-STIKINE

PROJECT
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MONITORING REPORT

CONSULTANT

YYYY-MM-DD 2021-May-07



PREPARED AK

DESIGN MO

REVIEW AK

APPROVED JS

TITLE

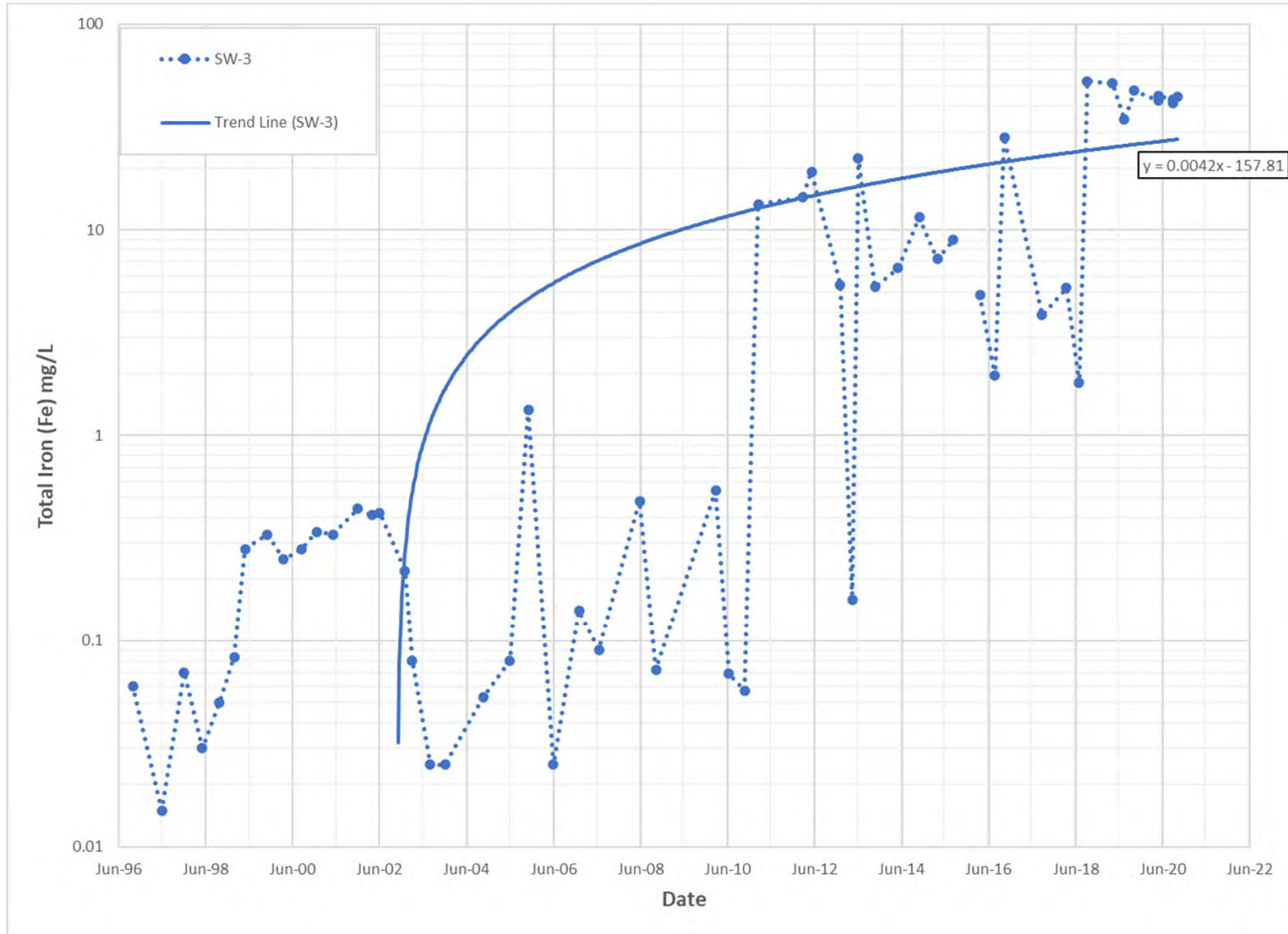
TIME SERIES PLOT OF SULPHATE CONCENTRATIONS

PROJECT No.
21455625

CONTROL
3000

Rev
0

FIGURE
4-D



CLIENT
REGIONAL DISTRICT OF KITIMAT-STIKINE

PROJECT
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MONITORING REPORT

CONSULTANT

YYYY-MM-DD 2021-May-07



PREPARED AK

DESIGN MO

REVIEW AK

APPROVED JS

TITLE

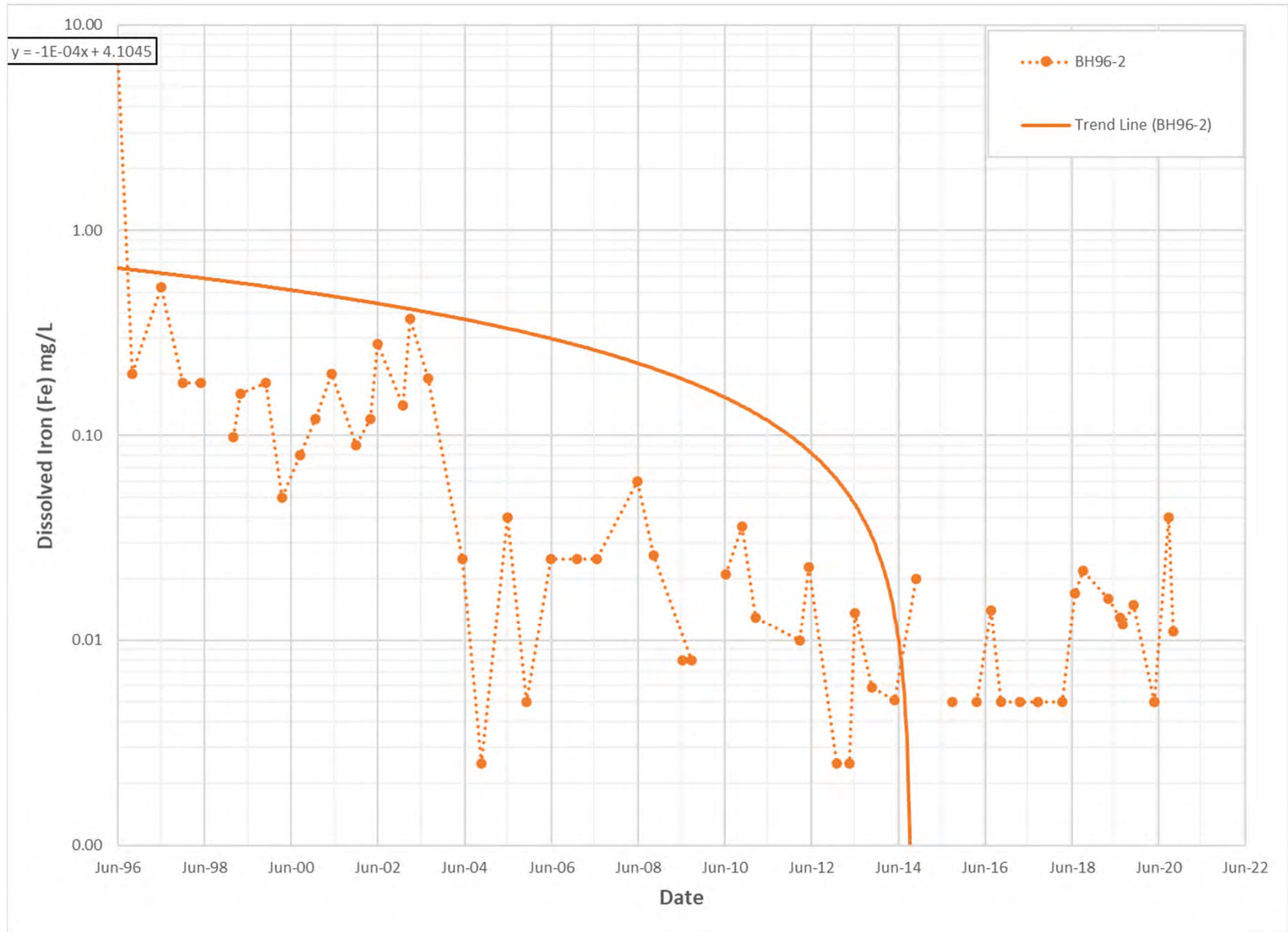
**TIME SERIES PLOT OF TOTAL IRON CONCENTRATIONS
AT SW-3**

PROJECT No.
21455625

CONTROL
3000

Rev
0

FIGURE
4-E



CLIENT
REGIONAL DISTRICT OF KITIMAT-STIKINE

PROJECT
2020 THORNHILL TRANSFER STATION ANNUAL
MONITORING REPORT

CONSULTANT

YYYY-MM-DD 2021-May-07



PREPARED AK

DESIGN MO

REVIEW AK

APPROVED JS

TITLE

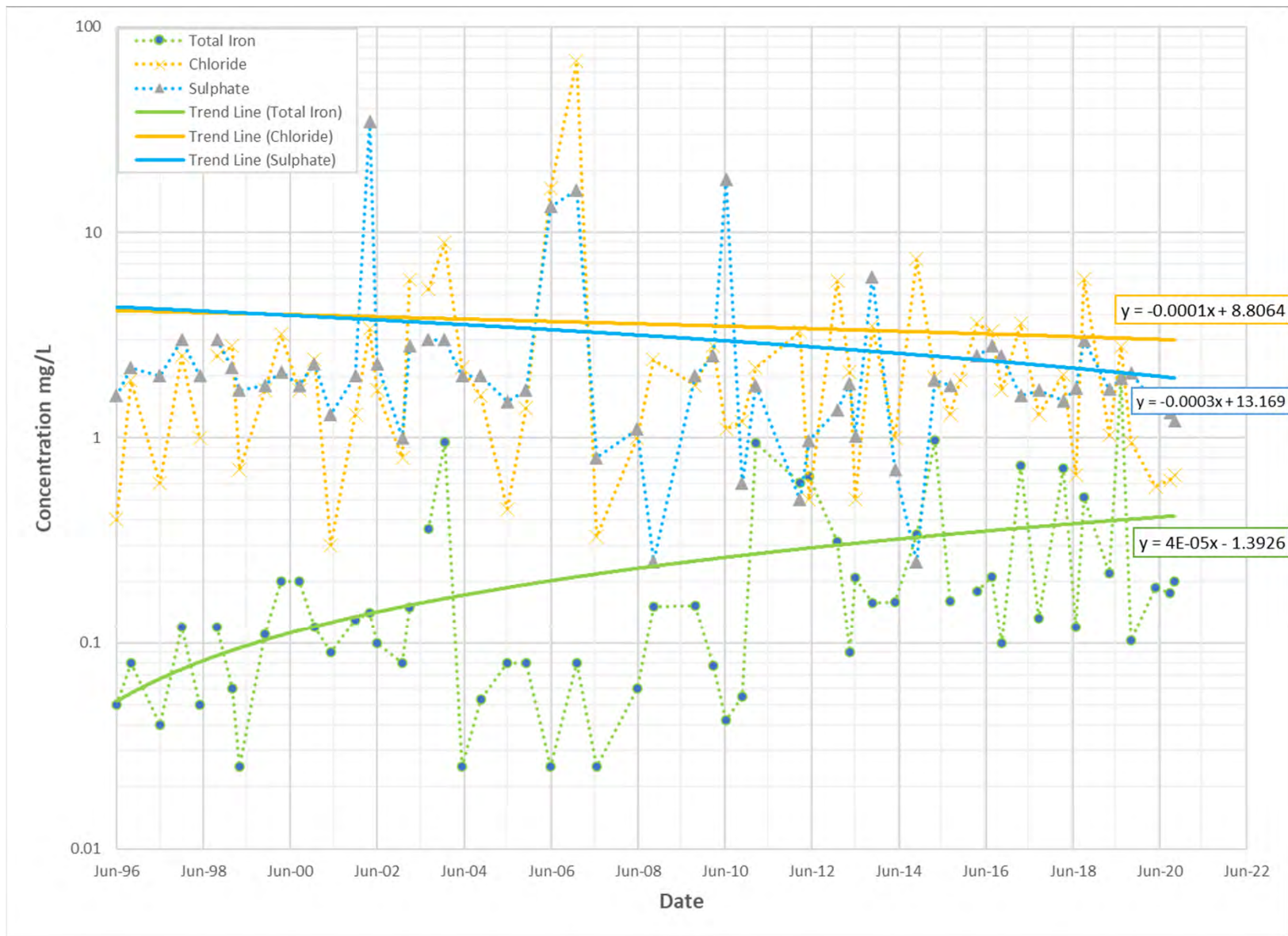
**TIME SERIES PLOT OF DISSOLVED IRON
CONCENTRATIONS AT BH96-2**

PROJECT No.
21455625

CONTROL
3000

Rev
0

FIGURE
4-F



CLIENT
REGIONAL DISTRICT OF KITIMAT-STIKINE

PROJECT
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YYYY-MM-DD 2021-May-07



PREPARED AK

DESIGN MO

REVIEW AK

APPROVED JS

TITLE

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

PROJECT No.
21455625

CONTROL
3000

Rev
0

FIGURE
5

APPENDIX A

Landfill Operational Certificate



December 15, 2020

Tracking Number: 393927

Authorization Number: 4057

REGISTERED MAIL

REGIONAL DISTRICT of KITIMAT-STIKINE
300-4545 Lazelle Avenue
Terrace, BC V8G 4E1

Dear Operational Certificate Holder:

Enclosed is Amended Operational Certificate 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. An annual fee will be determined according to the Permit Fees Regulation.

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. This Operational Certificate is issued pursuant to the provisions of the *Environmental Management Act* to ensure compliance with Section 120(3) of that statute, which makes it an offence to discharge waste, from a prescribed industry or activity, without proper authorization. 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.

When a spill occurs, or there is an imminent risk of one occurring, the responsible person must ensure that it is reported in accordance with the Spill Reporting Regulation. Additional information on spill reporting requirements is available at gov.bc.ca/reportaspill

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.

Administration of this Operational Certificate will be carried out by staff from the Environmental Protection Division's Regional Operations Branch. Plans, data and reports pertinent to the Operational Certificate are to be submitted by email or electronic transfer to the Director, designated Officer, or as further instructed. To meet the reporting requirements in a form and manner acceptable to the Director, reports and notifications

related to the administration of this authorization must be submitted electronically to the following ministry email addresses:

- EnvAuthorizationsReporting@gov.bc.ca for monitoring and annual reports
- EnvironmentalCompliance@gov.bc.ca for non-compliance reports.

For further information about how to submit data and reports, please refer to <http://www2.gov.bc.ca/gov/content/environment/waste-management/waste-discharge-authorization/data-and-report-submissions>.

Please be reminded that the director may require the Operational Certificate Holder to do one or more of the following at any time:

- repair, alter, remove, improve or add to existing works, or to construct new works, and to submit plans and specifications for works specified in this authorization.
- conduct monitoring, and may specify procedures for monitoring and analysis, and procedures or requirements respecting the handling, treatment, transportation, discharge or storage of waste.
- provide security in the amount and form, and subject to the conditions, specified by the director.
- conduct studies and to report information in accordance with the specifications of the director.
- recycle certain wastes and recover certain reusable resources, including energy potential from wastes, in accordance with the specifications of the director.

For more information about how the Ministry will assess compliance with your Operational Certificate please refer to gov.bc.ca/environmentalcompliance.

For more information about how to make changes to your Operational Certificate and to access waste discharge amendment forms and guidance, please refer to gov.bc.ca/wastedischarge-authorizations.

Yours truly,



Karen Moores, P.Ag.
for Director, *Environmental Management Act*
Authorizations - North Region



MINISTRY OF ENVIRONMENT
AND CLIMATE CHANGE
STRATEGY

OPERATIONAL CERTIFICATE

4057

Under the Provisions of the Environmental Management Act

REGIONAL DISTRICT of KITIMAT-STIKINE

Terrace, British Columbia

V8G 4E1

Is Authorized to discharge refuse to ground from a Landfill located near Thornhill British Columbia, subject to the requirements listed below. Contravention of any of these requirements is a violation of the Environmental Management Act and may lead to prosecution.

Capitalized terms referred to in this authorization are defined in the attached Glossary. Other terms used in this authorization have the same meaning as those defined in the *Environmental Management Act* and applicable regulations.

Where this authorization provides that the Director may require an action to be carried out, the Operational Certificate Holder must carry out the action in accordance with the requirements of the Director.

This Authorization supersedes and replaces all previous versions of Operational Certificate 4057 issued under Section 28 of the Environmental Management Act.

GLOSSARY

"Officer: means: An Officer as defined by Section 1(1) of the *Environmental Management Act*.

"Province" means: Her Majesty the Queen in right of British Columbia;

"Qualified Professional " means: a person who:

(a) Is an engineer, scientist or technologist specializing in a particular applied

Date issued: February 2, 1976
Date amended: December 15, 2020
(most recent)

Karen Moores, P.Ag.
for Director, *Environmental Management Act*
Authorizations - North Region

science or technology;

(b) Is registered in British Columbia with a professional organization, is acting under that organization's code of ethics and is subject to disciplinary action by that organization;

(c) Through suitable education, experience, accreditation and knowledge respecting solid waste management and related engineering disciplines for the management of leachate, surface water, ground water, storm water, and landfill gas and other specialist disciplines, may reasonably be relied upon to provide advice within his or her area of expertise and to carry out duties or functions in those areas; and

(d) Provides the completed Declaration of Competency and Conflict of Interest Disclosure Statements.

All documents submitted to the Director by a Qualified Professional must be signed by the author(s).

“Regulatory Document” means: any document that the Operational Certificate Holder is required to provide to the Director or the Province pursuant to: (i) this Authorization; (ii) any regulation made under the Environmental Management Act that regulates the Facility described in this Authorization or the discharge of waste from that Facility; or (iii) any order issued under the Environmental Management Act directed against the Operational Certificate Holder that is related to the Facility described in this Authorization or the discharge of waste from that Facility

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

2. **AUTHORIZED DISCHARGE**

2.1 **Authorized Source**

This section applies to the discharge of refuse from a landfill operation. The site reference number for this discharge is E208844. The authorization to

Date issued: February 2, 1976
Date amended: December 15, 2020
(most recent)



Karen Moores, P.Ag.
for Director, *Environmental Management Act*
Authorizations - North Region

discharge municipal solid waste ceased upon commissioning of the Forceman Ridge landfill.

- 2.1.1 The maximum rate of discharge is 0 tonnes per week. Waste discharge to the landfill is not authorized.
- 2.1.2 The characteristics of the waste which was discharged are those of typical municipal waste.
- 2.1.3 The Authorized Works are a Closed Landfill with final cover, a site drainage system to direct any leachate from the closed section of the landfill into the wetland for managing and treating, a drainage system to direct surface runoff from the Transfer Station into the wetland, a passive gas management system and related appurtenances approximately located as shown on Site Plan.
- 2.1.4 The Authorized Works also include fencing of the closed landfill lagoon area.

3. **GENERAL REQUIREMENT**

3.1 **Maintenance of Works and Emergency Procedures**

All works must be complete and intact.

The Operational Certificate Holder must regularly inspect the Authorized Works and maintain them in good working order.

In the event of an emergency or other condition which prevents normal operation of the Authorized Works or leads to an unauthorized discharge, the Operational Certificate Holder must take remedial action immediately to restore the normal operation of the Authorized Works and to prevent any unauthorized discharges. The Operational Certificate Holder must immediately report the emergency or other condition and the remedial action that has and will be taken to the EnvironmentalCompliance@gov.bc.ca email address or as otherwise instructed by the Director.

3.2 **Bypasses**

Date issued: February 2, 1976
Date amended: December 15, 2020
(most recent)



Karen Moores, P.Ag.
for Director, *Environmental Management Act*
Authorizations - North Region

The Operational Certificate Holder must not allow any discharge authorized by this authorization to bypass the Authorized Works, except with the prior written approval of the Director.

3.3 **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 meters 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.

3.3.1 **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:

- I. Mitigation to meet standards or
- II. 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.

4. **OPERATIONAL REQUIREMENT**

4.1 **Site Preparation and Restoration**

Date issued: February 2, 1976
Date amended: December 15, 2020
(most recent)



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for Director, *Environmental Management Act*
Authorizations - North Region

4.1.1 To prevent unauthorized dumping, the Operational Certificate Holder must ensure that the site is made inaccessible to the public in a manner that is acceptable to the Director.

4.1.2 The Operational Certificate Holder must provide surface water diversionary works, firebreaks and site restoration to the satisfaction of the Director.

4.1.3 The Operational Certificate Holder must inspect the landfill site a minimum of annually for any potential berm or slope failures or leachate. The inspection records must be included in the annual report.

4.2 **Wildlife Nuisance**

The Director may require the Operational Certificate Holder to construct or modify works, or follow specific operating instructions, if the Director is of the opinion that there is a possibility of nuisance or hazard being caused by bears or other animals that are attracted to the site.

4.3 **Open Burning Prohibition**

The Operational Certificate Holder must not allow the open burning of waste at the site caused by any means, including a deliberate or accidental action by the Operational Certificate Holder or others. The Operational Certificate Holder must immediately extinguish all fires of this nature and notify the Director within 24 hours.

4.4 **Groundwater Impacts**

The Operational Certificate Holder must not impact groundwater at the property boundary (or as otherwise specified by the Director) by leachate beyond levels specified by the Director.

4.5 **Sampling Procedures**

The Operational Certificate Holder must carry out sampling in accordance with the procedures described in the "British Columbia Field Sampling Manual for Continuous Monitoring and the Collection of Air, Air-Emission, Water, Wastewater, Soil, Sediment, and Biological Samples, 2013 Edition (Permittee)" or most recent edition, or by alternative procedures as authorized by the Director.

Date issued: February 2, 1976
Date amended: December 15, 2020
(most recent)



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for Director, *Environmental Management Act*
Authorizations - North Region

A copy of the above manual is available on the Ministry web page at <https://www2.gov.bc.ca/gov/content/environment/research-monitoring-reporting/monitoring/laboratory-standards-quality-assurance/bc-field-sampling-manual>

4.6 **Analytical Procedures**

The Operational Certificate Holder must carry out analyses in accordance with procedures described in the "British Columbia Laboratory Manual (2015 Permittee Edition)", or the most recent edition or by alternative procedures as authorized by the Director.

A copy of the above manual is available on the Ministry web page at <https://www2.gov.bc.ca/gov/content/environment/research-monitoring-reporting/monitoring/laboratory-standards-quality-assurance/bc-field-sampling-manual>.

5. **Environmental Effect Monitoring**

The Operational Certificate Holder 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 Operational Certificate Holder shall submit the results of the studies, including analysis and interpretation, to the Director, by June 30 of each following year.

5.1 **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	<u>Inorganics</u> 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. <u>Organics</u>	Once per Season: Spring (March- April) Summer (July –Aug.) Fall (October – Nov.)

Date issued: February 2, 1976
Date amended: December 15, 2020
(most recent)



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	Biological oxygen demand (BOD ₅), chemical oxygen demand (COD) <u>Field Parameters</u> Conductivity, pH, temperature, dissolved oxygen, turbidity	
--	---	--

5.2 Groundwater Monitoring

For the purpose of supporting groundwater modeling and to detect any significant impacts on the environment from leachate in the groundwater, the Operational Certificate Holder 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 October 1, 2021 and shall be implemented by November 30, 2021 (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	<u>Inorganics</u> Dissolved 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. <u>Organics</u> Chemical oxygen demand (COD), <u>Field Parameters</u> Conductivity, pH, water elevation, temperature, dissolved oxygen	Once per Season: Spring (March- April) Summer (July –Aug.) Fall (October – Nov.)

5.3 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 Operational Certificate and Section 2(d) of the Environmental Data Quality Assurance Regulation.

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Date amended: December 15, 2020
(most recent)



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- 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 must be submitted to the laboratory; one of the pairs 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 must 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 must be made to determine and control the source of contamination.

6. **REPORTING REQUIREMENTS**

The Operational Certificate Holder must submit all data required to be submitted under this section by email to the Ministry's Routine Environmental Reporting Submission Mailbox (RERSM) at envauthorizationsreporting@gov.bc.ca or as otherwise instructed by the Director. For guidelines on how to properly name the files and email subject lines or for more information visit the Ministry website:

<https://www2.gov.bc.ca/gov/content/environment/waste-management/waste-discharge-authorization/data-and-report-submissions/routine-environmental-reporting-submission-mailbox>

6.1 **Annual Reporting**

The Operational Certificate Holder must, by June 30th each year, submit to the Director an Annual Report for the previous calendar year. The first Annual Report will be required by June 30, 2021. The report must contain at least the following information if applicable:

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for Director, *Environmental Management Act*
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- a) the type and tonnage of waste received, transferred, recycled and discharged for the proceeding such calendar year; “if no waste is received, this must be noted in the annual report”
- b) occurrences or observations of wildlife, including burrowing/scavenging (medium and large carnivores) at the facility;
- c) the results of all monitoring programs as specified in this Authorization. The Operational Certificate Holder must ensure that data interpretation and trend analysis, as well as an evaluation of the impacts of the discharges on the receiving environment in the previous year, is included in such results and carried out by a Qualified Professional;
- d) the methods and amounts of leachate collection, treatment and disposal, if applicable
- e) any unauthorized dumping; and
- f) results from annually inspection for any potential berm or slope failures or leachate.

6.2 **Non-compliance Notification**

The Operational Certificate Holder must immediately notify the Director or designate by email at EnvironmentalCompliance@gov.bc.ca, or as otherwise instructed by the Director of any non-compliance with the requirements of this Authorization and take remedial action to remedy any effects of such non-compliance.

The Operational Certificate Holder must provide the Director with written confirmation of all such non-compliance events, including available test results within 24 hours of the original notification by email at EnvironmentalCompliance@gov.bc.ca, or as otherwise instructed by the Director.

6.3 **Non-compliance Reporting**

If the Operational Certificate Holder fails to comply with any of the requirements of this Authorization, the Operational Certificate Holder must, within 30 days of such non-compliance, submit to the director a written report that includes, but is not necessarily limited to, the following:

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- a) all relevant test results obtained by the Operational Certificate Holder related to the non-compliance,
- b) an explanation of the most probable cause(s) of the non-compliance, and
- c) a description of remedial action planned and/or taken by the Operational Certificate Holder to prevent similar non-compliance(s) in the future.

The Operational Certificate Holder must submit all non-compliance reporting required to be submitted under this section by email to the Ministry's Compliance Reporting Submission Mailbox (CRSM) at EnvironmentalCompliance@gov.bc.ca or as otherwise instructed by the Director. For guidelines on how to report a non-compliance or for more information visit the Ministry website:

<https://www2.gov.bc.ca/gov/content/environment/waste-management/waste-discharge-authorization/data-and-report-submissions/compliance-reporting-mailbox>

6.4 **Spill Reporting**

The Operational Certificate Holder must immediately report all spills to the environment (as defined in the Spill Reporting Regulation) in accordance with the Spill Reporting Regulation, which among other things, requires notification to Emergency Management BC at 1-800-663-3456.

6.5 **Landfill Closure Plan**

The Operational Certificate Holder must submit to the Director an updated Closure Plan Assessment prepared by an independent Qualified Professional by March 31, 2021. The Closure Plan Assessment must, as a minimum, include the following:

- i) proposed end-use of the landfill after closure;
- ii) estimated and/or anticipated total volume and tonnes of waste received at the landfill during operations, and life of the landfill (i.e. closure date);

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(most recent)



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- iii) current final cover on site, including, the thickness and permeability of barrier layers and drainage layers, and information on topsoil, vegetative cover and erosion prevention controls;
- iv) current description of procedures for alternative waste disposal facilities;
- 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, 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) if applicable, 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.

6.6 **Site Decommissioning**

In accordance with Section 40 of the *Environmental Management Act* and Part 2 of the Contaminated Sites Regulation, the Operational Certificate Holder must submit a site profile to the manager at least 10 days prior to decommissioning the facilities authorized in Section 2.

7. **Closure Requirement**

7.1 **Closure Funding**

The Operational Certificate Holder shall ensure that sufficient funds will be available to provide for all closure and post-closure requirements as outlined in the

Date issued: February 2, 1976
Date amended: December 15, 2020
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closure plan required by Section 6.5, plus a reasonable contingency for any remediation which may be required.

8. **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.

9. **PUBLICATION OF DOCUMENTS**

The Ministry of Environment and Climate Change Strategy publishes Regulatory Documents on its website for the purpose of research, public education and to provide transparency in the administration of environmental laws. The Operational Certificate Holder acknowledges that the Province may publish any Regulatory Documents submitted by the Operational Certificate Holder excluding information that would be exempted from disclosure if the document was disclosed pursuant to a request under section 5 of the *Freedom of Information and Protection of Privacy Act*, and the Operational Certificate Holder consents to such publication by the Province.

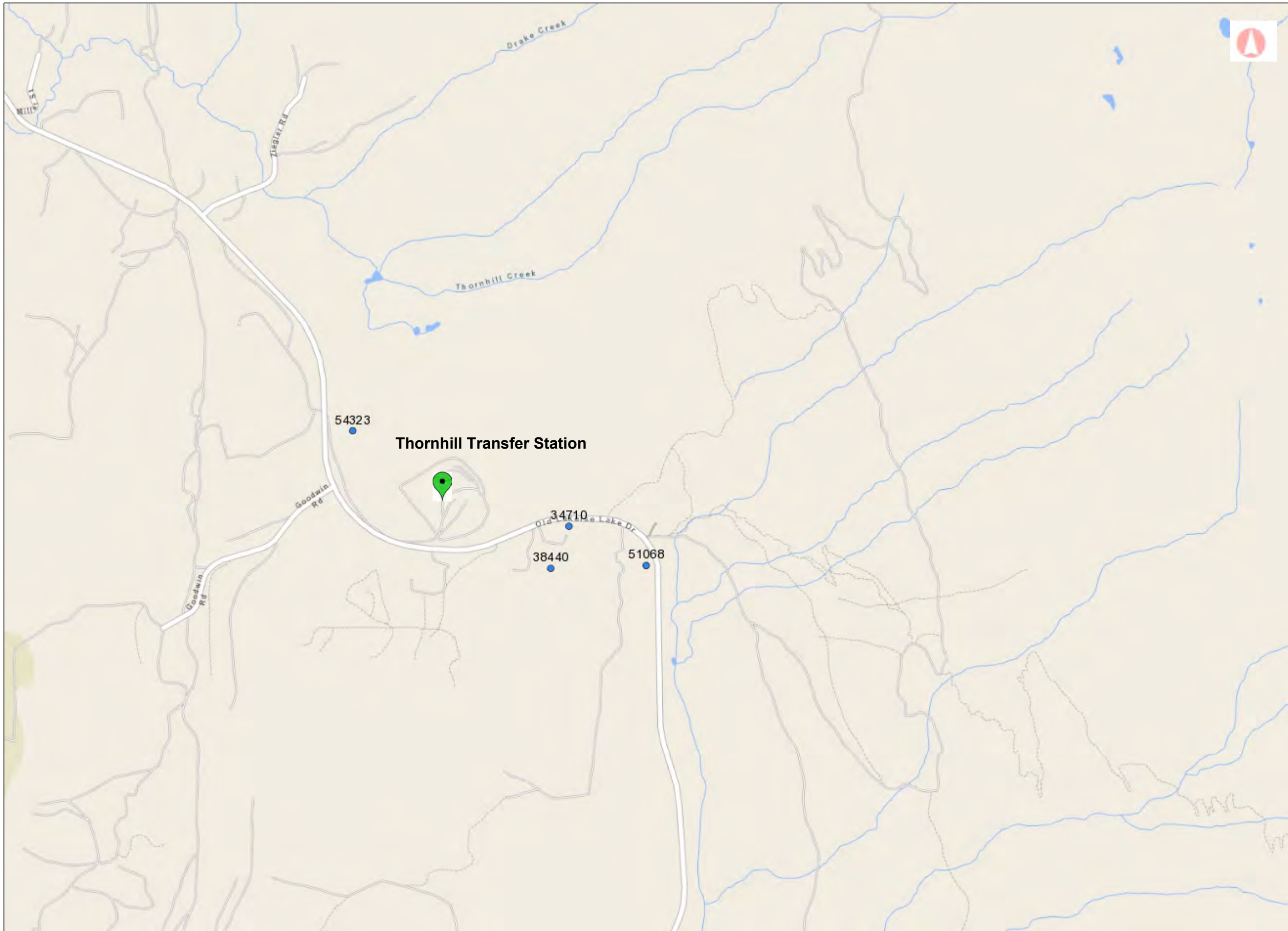
Date issued: February 2, 1976
Date amended: December 15, 2020
(most recent)



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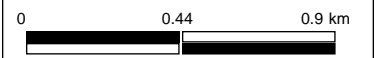
APPENDIX B

**BC Water Atlas – Water Well
Records**



Legend

- Water Wells - All



1: 21,557

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Datum: NAD83
 Projection: WGS_1984_Web_Mercator_Auxiliary_Sp here

Key Map of British Columbia





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:

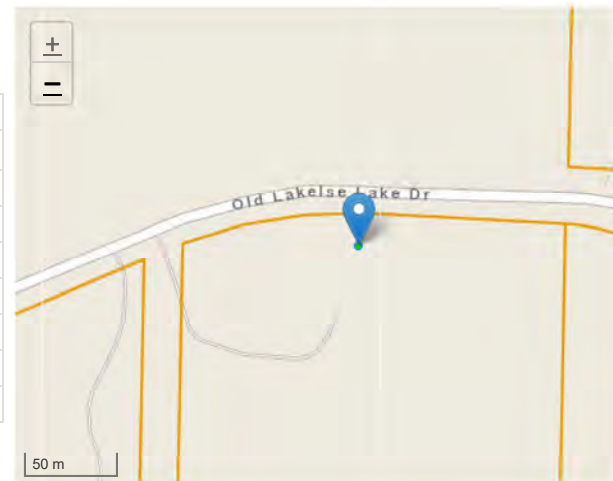
Town/City:

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: 1031048433



[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

Backfill Material Above Surface Seal:

Surface Seal Installation Method:

Backfill Depth:

Surface Seal Thickness:

Surface Seal Length:

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:

Sealant Material:

Method of Decommission:

Backfill Material:

Decommission Details:

Comments

Disclaimer

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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:

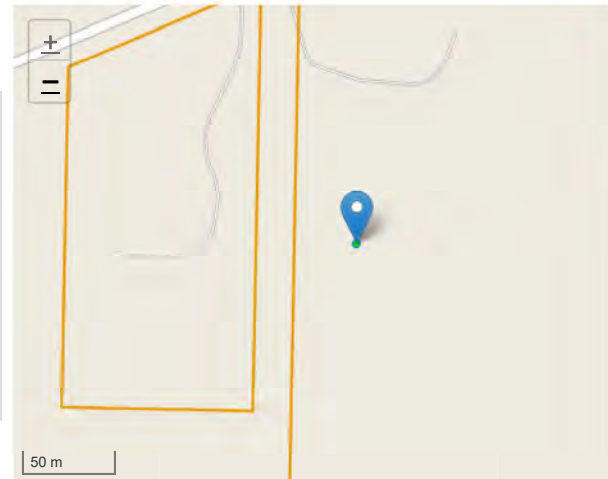
Town/City:

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: 1031048433



[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

Backfill Material Above Surface Seal:

Surface Seal Installation Method:

Backfill Depth:

Surface Seal Thickness:

Surface Seal Length:

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:

Sealant Material:

Method of Decommission:

Backfill Material:

Decommission Details:

Comments

LOTS OF WATER, HARD

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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:

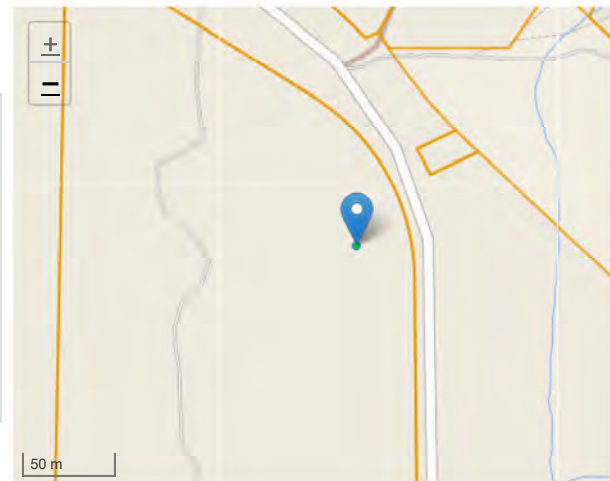
Town/City: JACK PINE FLATS

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: 1031048433



[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

Backfill Material Above Surface Seal:

Surface Seal Installation Method:

Backfill Depth:

Surface Seal Thickness:

Surface Seal Length:

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:

Sealant Material:

Method of Decommission:

Backfill Material:

Decommission Details:

Comments

DRY HOLE

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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

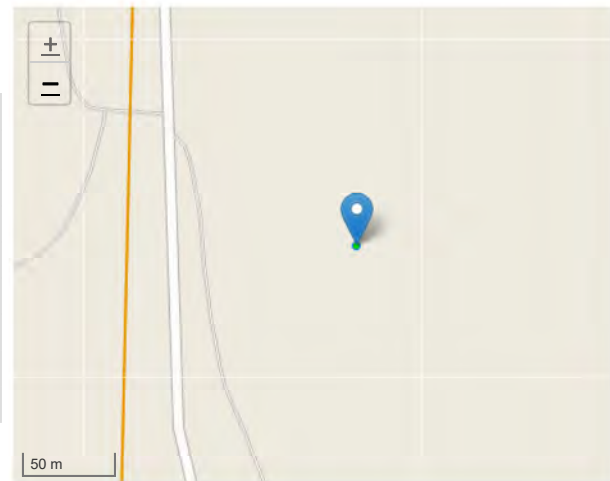
Town/City: TERRACE

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: 1031048433


[Leaflet](#) | Powered by [Esri](#) | Government of British Columbia, DataBC, GeoBC

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

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

Comments

DRY HOLE

Disclaimer

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APPENDIX C

Borehole Logs

APPENDIX D

Analytical Results

Table D-1: Groundwater Analytical Results
2020 Thornhill Transfer Station Annual Monitoring Program
Regional District of Kitimat-Stikine

Table with columns for Location, Monitoring Location, Sample Date, Sample Name, QAQC, Laboratory ID, and various parameters (Field Measured, Conventional Parameters, Major Ions, Nutrients, Total Metals, Dissolved Metals) across multiple dates from 2003 to 2018.

BC Contaminated Sites Regulation Water Quality Guidelines for Protection of Freshwater Aquatic Life

BC Contaminated Sites Regulation Water Quality Guidelines for Drinking Water

Standards shown are from the BC Contaminated Sites Regulation (CSR; BC Reg. 375/96, O.C. 1480/96 and M271/2004, as updated [includes amendments up to BC Reg. 131/2020 and BC Reg. 161/2020, updated to 1 February 2021])

QAQC = quality assurance/quality control; FD = field duplicate;

Table D-1: Groundwater Analytical Results
2020 Thornhill Transfer Station Annual Monitoring Program
Regional District of Kitimat-Stikine

Table with columns: Location (Monitoring Location, Sample Date, Sample Name, QAQC, Laboratory ID), Unit, and 10 analytical dates (2018-09-10 to 2019-11-06). Rows include Field Measured, Conventional Parameters, Major Ions, Nutrients, Total Metals, and Dissolved Metals.

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

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 M271/2004, as updated [includes amendments up to BC Reg. 131/2020 and BC Reg. 161/2020, updated to 1 February 2021])

QAQC = quality assurance/quality control; FD = field duplicate;

Table D-2: Surface Water Analytical Results
2020 Thornhill Transfer Station Annual Monitoring Program
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Main data table with columns for Monitoring Location, Sample ID, Laboratory ID, QAQC, Sample Date, Unit, BCWQG Aquatic Life (Freshwater/Chronic/Long-term average), BCWQG Aquatic Life (Short-term maximum), BCWQG Drinking Water, and 12 SW-3 sample dates (2000-12-20 to 2004-10-18). Rows include Field Measured, Conventional Parameters, Major Ions, Nutrients, Total Metals, and Dissolved Metals.

NOTES
BC Water Quality Guidelines for Freshwater Aquatic Life - Chronic Long-term Average

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

(b) = guideline is a minimum value, unless the background concentration or value is lower.

(b) = guideline is hardness dependent. The guideline range shown is based on the hardness range observed in the dataset (21 to 801 mg/L). The guideline is calculated based on the individual hardness value for each sample.

(b) = for some samples, water hardness was greater than 250 mg/L. At this hardness, no BC ENV water quality guideline has been established for sulphate; however, the observed data were screened against the guideline for very hard water (i.e., 429 mg/L) for comparative purposes.

(b) = guideline is chloride dependent. The guideline range shown is based on the chloride concentration range observed in the dataset (0.1110 to 206.0000 mg/L). The guideline is calculated based on the individual chloride concentration in each sample.

(b) = the ammonia guideline is pH and temperature dependent. The guideline that results in the minimum ammonia guideline (0.13 mg-N/L) is based on the combination of field pH (10.2) and water temperature (13.3°C). Guidelines calculated with temperature and pH values falling outside the defined range (i.e., pH 6.0 to 10.0 and temperature 0°C to 30°C) should be used with caution, as the WQG does not necessarily accurately reflect toxic effects at the low and high pH and temperature extremes. The guideline is calculated based on the individual field pH and temperature measurements for each sample.

(b) = the ammonia guideline is pH and temperature dependent. The guideline that results in the minimum ammonia guideline (0.69 mg-N/L) is based on the combination of field pH (10.2) and water temperature (13.3°C). Guidelines calculated with temperature and pH values falling outside the defined range (i.e., pH 6.0 to 10.0 and temperature 0°C to 30°C) should be used with caution, as the WQG does not necessarily accurately reflect toxic effects at the low and high pH and temperature extremes. The guideline is calculated based on the individual field pH and temperature measurements for each sample.

(b) = guideline is for chromium VI.

(b) = Since 2019, the total copper guideline is calculated using a bioligand model. The model calculation is based on dissolved organic carbon and hardness. Because dissolved organic carbon was not collected and analyzed in 2020, the 2019 guideline calculation based on hardness only was utilized.

Table D-2: Surface Water Analytical Results
2020 Thornhill Transfer Station Annual Monitoring Program
Regional District of Kitimat-Stikine

Table with 17 columns: Location, Monitoring Location, Sample ID, Laboratory ID, QAQC, Sample Date, Unit, BCWQG Aquatic Life - Freshwater (Chronic Long-term average), BCWQG Aquatic Life - Freshwater (Short-term maximum), BCWQG - Drinking Water, and 12 SW-3 sample columns (SW-3_2005-06-01_N to SW-3_2011-02-15_N). Rows include Field Measured (pH, Temperature, Dissolved oxygen, etc.), Conventional Parameters (pH, Specific conductivity, etc.), Major Ions (Bromide, Calcium, Chloride, etc.), Nutrients (Nitrate, Nitrite, Total ammonia, etc.), Total Metals (Aluminum, Antimony, Arsenic, etc.), and Dissolved Metals (Aluminum, Antimony, Arsenic, etc.).

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

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
(6) = guideline is a minimum value, unless the background concentration or value is lower.

(6) = guideline is hardness dependent. The guideline range shown is based on the hardness range observed in the dataset (21 to 801 mg/L). The guideline is calculated based on the individual hardness value for each sample.

(6) = for some samples, water hardness was greater than 250 mg/L. At this hardness, no BC ENV water quality guideline has been established for sulphate; however, the observed data were screened against the guideline for very hard water (i.e., 429 mg/L) for comparative purposes.

(6) = guideline is chloride dependent. The guideline range shown is based on the chloride concentration range observed in the dataset (0.1110 to 206.0000 mg/L). The guideline is calculated based on the individual chloride concentration in each sample.

(6) = the ammonia guideline is pH and temperature dependent. The guideline that results in the minimum ammonia guideline (0.13 mg-N/L) is based on the combination of field pH (10.2) and water temperature (13.3°C). Guidelines calculated with temperature and pH values falling outside the defined range (i.e., pH 6.0 to 10.0 and temperature 0°C to 30°C) should be used with caution, as the WQG does not necessarily accurately reflect toxic effects at the low and high pH and temperature extremes. The guideline is calculated based on the individual field pH and temperature measurements for each sample.

(6) = the ammonia guideline is pH and temperature dependent. The guideline that results in the minimum ammonia guideline (0.69 mg-N/L) is based on the combination of field pH (10.2) and water temperature (13.3°C). Guidelines calculated with temperature and pH values falling outside the defined range (i.e., pH 6.0 to 10.0 and temperature 0°C to 30°C) should be used with caution, as the WQG does not necessarily accurately reflect toxic effects at the low and high pH and temperature extremes. The guideline is calculated based on the individual field pH and temperature measurements for each sample.

(6) = guideline is for chromium VI.
(6) = Since 2019, the total copper guideline is calculated using a bioligand model. The model calculation is based on dissolved organic carbon and hardness. Because dissolved organic carbon was not collected and analyzed in 2020, the 2019 guideline calculation based on hardness only was utilized.

Table with columns for Monitoring Location, Sample ID, Laboratory ID, QAQC, Sample Date, and various chemical parameters (pH, Temperature, Dissolved oxygen, Conductivity, etc.) across 12 sampling events.

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

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
(8) = guideline is a minimum value, unless the background concentration or value is lower.
(9) = guideline is hardness dependent. The guideline range shown is based on the hardness range observed in the dataset (21 to 801 mg/L). The guideline is calculated based on the individual hardness value for each sample.
(10) = for some samples, water hardness was greater than 250 mg/L. At this hardness, no BC ENV water quality guideline has been established for sulphate; however, the observed data were screened against the guideline for very hard water (i.e., 429 mg/L) for comparative purposes.
(11) = guideline is chloride dependent. The guideline range shown is based on the chloride concentration range observed in the dataset (0.1110 to 206.0000 mg/L). The guideline is calculated based on the individual chloride concentration in each sample.
(12) = the ammonia guideline is pH and temperature dependent. The guideline that results in the minimum ammonia guideline (0.13 mg-N/L) is based on the combination of field pH (10.2) and water temperature (13.3°C). Guidelines calculated with temperature and pH values falling outside the defined range (i.e., pH 6.0 to 10.0 and temperature 0°C to 30°C) should be used with caution, as the WQG does not necessarily accurately reflect toxic effects at the low and high pH and temperature extremes. The guideline is calculated based on the individual field pH and temperature measurements for each sample.
(13) = the ammonia guideline is pH and temperature dependent. The guideline that results in the minimum ammonia guideline (0.69 mg-N/L) is based on the combination of field pH (10.2) and water temperature (13.3°C). Guidelines calculated with temperature and pH values falling outside the defined range (i.e., pH 6.0 to 10.0 and temperature 0°C to 30°C) should be used with caution, as the WQG does not necessarily accurately reflect toxic effects at the low and high pH and temperature extremes. The guideline is calculated based on the individual field pH and temperature measurements for each sample.
(14) = guideline is for chromium VI.
(15) = Since 2019, the total copper guideline is calculated using a bioligand model. The model calculation is based on dissolved organic carbon and hardness. Because dissolved organic carbon was not collected and analyzed in 2020, the 2019 guideline calculation based on hardness only was utilized.

Table D-2: Surface Water Analytical Results
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Table with columns: Location, Monitoring Location, Sample ID, Laboratory ID, QAQC, Sample Date, Unit, BCWQG Aquatic Life, BCWQG Aquatic Life - Freshwater, BCWQG - Drinking Water, and various chemical parameters (pH, Temperature, Dissolved oxygen, Conductivity, etc.) across multiple dates from 2016 to 2020.

NOTES
BC Water Quality Guidelines for Freshwater Aquatic Life - Chronic Long-term Average
BCWQG AWF Long-term
BCWQG AWF Short-term
BCWQG DW
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
(b) = guideline is a minimum value, unless the background concentration or value is lower.
(b) = guideline is hardness dependent. The guideline range shown is based on the hardness range observed in the dataset (21 to 801 mg/L). The guideline is calculated based on the individual hardness value for each sample.
(b) = for some samples, water hardness was greater than 250 mg/L. At this hardness, no BC ENV water quality guideline has been established for sulphate; however, the observed data were screened against the guideline for very hard water (i.e., 429 mg/L) for comparative purposes.
(b) = guideline is chloride dependent. The guideline range shown is based on the chloride concentration range observed in the dataset (0.1110 to 206.0000 mg/L). The guideline is calculated based on the individual chloride concentration in each sample.
(b) = the ammonia guideline is pH and temperature dependent. The guideline that results in the minimum ammonia guideline (0.13 mg-N/L) is based on the combination of field pH (10.2) and water temperature (13.3°C). Guidelines calculated with temperature and pH values falling outside the defined range (i.e., pH 6.0 to 10.0 and temperature 0°C to 30°C) should be used with caution, as the WQG does not necessarily accurately reflect toxic effects at the low and high pH and temperature extremes. The guideline is calculated based on the individual field pH and temperature measurements for each sample.
(b) = the ammonia guideline is pH and temperature dependent. The guideline that results in the minimum ammonia guideline (0.69 mg-N/L) is based on the combination of field pH (10.2) and water temperature (13.3°C). Guidelines calculated with temperature and pH values falling outside the defined range (i.e., pH 6.0 to 10.0 and temperature 0°C to 30°C) should be used with caution, as the WQG does not necessarily accurately reflect toxic effects at the low and high pH and temperature extremes. The guideline is calculated based on the individual field pH and temperature measurements for each sample.
(b) = guideline is for chromium VI.
(b) = Since 2019, the total copper guideline is calculated using a bioligand model. The model calculation is based on dissolved organic carbon and hardness. Because dissolved organic carbon was not collected and analyzed in 2020, the 2019 guideline calculation based on hardness only was utilized.

Table D-2: Surface Water Analytical Results
2020 Thornhill Transfer Station Annual Monitoring Program
Regional District of Kitimat-Stikine

Table with columns: Location Monitoring Location, Sample ID, Laboratory ID, QAQC, Sample Date, Unit, BCWQG Aquatic Life - Freshwater (Chronic Long-term average), BCWQG Aquatic Life - Freshwater (Short-term maximum), BCWQG - Drinking Water, and five columns of analytical data for various parameters like pH, Temperature, Dissolved oxygen, etc.

NOTES

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
(4) = guideline is a minimum value, unless the background concentration or value is lower.
(5) = guideline is hardness dependent. The guideline range shown is based on the hardness range observed in the dataset (21 to 801 mg/L). The guideline is calculated based on the individual hardness value for each sample.
(6) = for some samples, water hardness was greater than 250 mg/L. At this hardness, no BC ENV water quality guideline has been established for sulphate; however, the observed data were screened against the guideline for very hard water (i.e., 429 mg/L) for comparative purposes.
(7) = guideline is chloride dependent. The guideline range shown is based on the chloride concentration range observed in the dataset (0.1110 to 206.0000 mg/L). The guideline is calculated based on the individual chloride concentration in each sample.
(8) = the ammonia guideline is pH and temperature dependent. The guideline that results in the minimum ammonia guideline (0.13 mg-N/L) is based on the combination of field pH (10.2) and water temperature (13.3°C). Guidelines calculated with temperature and pH values falling outside the defined range (i.e., pH 6.0 to 10.0 and temperature 0°C to 30°C) should be used with caution, as the WQG does not necessarily accurately reflect toxic effects at the low and high pH and temperature extremes. The guideline is calculated based on the individual field pH and temperature measurements for each sample.
(9) = the ammonia guideline is pH and temperature dependent. The guideline that results in the minimum ammonia guideline (0.69 mg-N/L) is based on the combination of field pH (10.2) and water temperature (13.3°C). Guidelines calculated with temperature and pH values falling outside the defined range (i.e., pH 6.0 to 10.0 and temperature 0°C to 30°C) should be used with caution, as the WQG does not necessarily accurately reflect toxic effects at the low and high pH and temperature extremes. The guideline is calculated based on the individual field pH and temperature measurements for each sample.
(10) = guideline is for chromium VI.
(11) = Since 2019, the total copper guideline is calculated using a bioinorganic model. The model calculation is based on dissolved organic carbon and hardness. Because dissolved organic carbon was not collected and analyzed in 2020, the 2019 guideline calculation based on hardness only was utilized.

Table D-3: Surface Water Analytical Results
2020 Thornhill Transfer Station Annual Monitoring Program
Regional District of Kitimat-Stikine

Location Monitoring Location Sample ID Laboratory ID QAQC Date	Unit	BCWQG Aquatic Life - Freshwater (Chronic - Long-term average)	BCWQG Aquatic Life - Freshwater (Short-term maximum)	BCWQG - Drinking Water	Thornhill Landfill									
					SW-1									
					SW-1_1996-10-01_N	SW-1_1997-06-01_N	SW-1_1997-12-04_N	SW-1_1998-05-04_N	SW-1_1998-09-24_N_A	SW-1_1998-09-24_N_B	SW-1_1999-01-27_N	SW-1_1999-04-01_N	SW-1_1999-11-01_N	
Field Measured														
pH	-	6.5 - 9.0	6.5 - 9.0	-	-	-	-	-	-	-	-	-	-	-
Temperature	°C	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved oxygen	mg/L	8.0	5.0	-	-	-	-	-	-	-	-	-	-	-
Conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-
Redox potential	mV	-	-	-	-	-	-	-	-	-	-	-	-	-
Conventional Parameters														
pH	-	6.5 - 9.0	6.5 - 9.0	-	7.5	6.8	7.0	7.1	7.5	7.0	-	-	-	-
Specific conductivity	µS/cm	-	-	-	60	42	64	31	28	67	-	41	-	-
Hardness, as CaCO ₃	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Total alkalinity, as CaCO ₃	mg/L	20 ^(a)	-	-	-	-	-	-	-	-	-	-	-	-
Total suspended solids	mg/L	-	-	-	7.0	2.0	13	3.0	-	<1.0	-	-	-	-
Hardness, as CaCO ₃ (Total)	mg/L	-	-	-	26	16	29	15	15	34	29	22	27	-
Major Ions														
Bromide	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride	mg/L	150	600	-	<0.5	<0.5	0.90	0.80	0.17	1.0	<1.0	0.30	0.30	-
Fluoride	mg/L	-	0.40 - 0.99 ^(b)	1.5	-	-	-	-	-	-	-	-	-	-
Magnesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate	mg/L	128 - 218 ^(b)	-	-	1.4	<1.0	2.0	1.0	0.79	3.0	<1.0	1.0	1.2	-
Nutrients														
Nitrate	mg-N/L	3.0	33	10	0.029	0.011	0.38	0.018	0.017	0.025	0.080	<0.05	0.10	-
Nitrite	mg-N/L	0.020 ^(a)	0.060 ^(a)	1.0	0.0010	<0.001	0.0050	0.0010	<0.005	0.0010	<0.005	<0.002	<0.002	-
Total ammonia	mg-N/L	0.58 - 2.0 ^(d)	3.0 - 26 ^(e)	-	0.020	0.0090	0.040	<0.005	<0.005	0.0050	<0.005	0.020	-	-
Total Kjeldahl nitrogen	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Total phosphorus	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved phosphorus	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Orthophosphate	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Biochemical oxygen demand	mg/L	-	-	-	<5.0	<5.0	<5.0	-	<10	<10	<10	<10	<10	<10
Chemical oxygen demand	mg/L	-	-	-	<20	24	<20	<10	<25	-	<25	<25	<25	-
Total Metals														
Aluminum	mg/L	-	-	-	0.026	<0.05	0.024	0.059	0.070	0.016	<0.02	0.028	0.029	-
Antimony	mg/L	0.0090	-	0.0060	-	<0.2	<0.0001	<0.0001	<0.05	<0.0001	<0.015	<0.001	<0.001	-
Arsenic	mg/L	-	0.0050	0.010	<0.0001	<0.2	<0.0001	<0.0001	0.00050	<0.0001	<0.04	<0.001	<0.001	-
Barium	mg/L	1.0	-	2.0	0.020	0.010	0.020	0.010	0.0090	0.030	0.018	0.013	0.017	-
Beryllium	mg/L	0.00013	-	-	<0.005	<0.005	<0.005	<0.005	<0.001	<0.005	<0.001	<0.001	<0.001	-
Bismuth	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	1.2	-	5.0	<0.1	-	-	-	<0.01	-	<0.008	<0.05	<0.05	-
Cadmium	mg/L	-	-	0.0070	<0.0002	<0.002	0.00070	<0.0002	<0.005	<0.0002	<0.0001	<0.0002	<0.0002	-
Calcium	mg/L	-	-	-	9.3	5.7	10	5.3	5.3	12	10	7.8	9.5	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	0.0010 ^(f)	-	0.050 ^(f)	<0.001	<0.01	<0.001	<0.001	<0.0005	<0.001	<0.002	<0.001	<0.001	-
Cobalt	mg/L	0.0040	0.11	-	<0.02	<0.01	<0.01	<0.01	<0.005	0.01	0.040	<0.001	<0.002	-
Copper	mg/L	see note (h)	see note (h)	2.0	<0.001	<0.01	<0.001	0.0010	0.0012	0.0010	0.0020	0.0010	0.0010	-
Iron	mg/L	-	1.0	-	<0.03	<0.03	<0.03	<0.03	0.018	<0.03	0.021	<0.05	<0.05	-
Lead	mg/L	0.0035 - 0.0044 ^(b)	0.0044 - 0.028 ^(b)	0.0050	<0.001	<0.01	<0.001	<0.001	<0.0005	<0.001	<0.02	<0.001	<0.001	-
Lithium	mg/L	-	-	-	<0.02	-	-	-	-	-	-	-	-	-
Magnesium	mg/L	-	-	-	0.64	0.39	0.79	0.40	0.40	0.90	0.77	0.59	0.75	-
Manganese	mg/L	0.8 - 1.9	-	0.12	<0.005	<0.005	0.0060	<0.005	0.0020	<0.005	0.0070	0.0010	0.0040	-
Mercury	mg/L	0.000010	-	0.0010	<0.00005	<0.00005	<0.00001	<0.00001	-	<0.00001	<0.00005	<0.00005	<0.00005	-
Molybdenum	mg/L	1.0	2.0	-	<0.03	<0.03	<0.03	<0.03	<0.01	<0.03	<0.004	<0.001	<0.001	-
Nickel	mg/L	0.025 ^(b)	-	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.008	<0.001	<0.001	-
Potassium	mg/L	-	-	-	-	-	-	-	0.50	-	0.80	0.54	0.67	-
Rubidium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/L	0.0020	-	0.050	<0.0005	<0.01	<0.0005	<0.0005	<0.05	<0.0005	<0.001	<0.002	<0.002	-
Silicon	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver	mg/L	0.000050 ^(b)	0.00010 ^(b)	-	<0.0001	<0.001	<0.0001	<0.0001	<0.01	<0.0001	<0.0001	<0.0001	<0.0001	-
Sodium	mg/L	-	-	-	<2.0	-	-	-	0.80	-	1.2	0.91	0.96	-
Strontium	mg/L	-	-	7.0	-	-	-	-	-	-	-	-	-	-
Sulphur	mg/L	-	-	-	-	-	-	0.33	-	0.55	-	-	-	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	0.00080	-	-	<0.0001	-	<0.0001	<0.0001	<0.001	<0.001	<0.0001	<0.0001	<0.0001	-
Thorium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	-	-	-	-	-	-	<0.001	<0.001	<0.001	-
Titanium	mg/L	-	-	-	<0.01	<0.002	<0.01	<0.003	<0.001	<0.001	0.0010	0.0010	0.0010	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	0.0085	-	0.020	0.000020	-	0.000010	-	<0.0005	<0.001	<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	-
Zinc	mg/L	0.0075	0.033	-	<0.005	0.0020	<0.005	0.0060	<0.005	<0.012	0.012	0.0060	<0.005	-
Zirconium	mg/L	-	-	-	-	-	-	-	-	-	<0.01	<0.01	<0.01	-
Dissolved Metals														
Aluminum	mg/L	0.0074 - 0.050 ⁽ⁱ⁾	0.024 - 0.10 ⁽ⁱ⁾	-	-	-	-	-	-	-	-	-	-	-
Antimony	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Bismuth	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/L	0.000039 - 0.00011 ^(b)	0.000055 - 0.00024 ^(b)	-	-	-	-	-	-	-	-	-	-	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron	mg/L	-	0.35	-	-	-	-	-	-	-	-	-	-	-
Lead	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Lithium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Manganese	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Molybdenum	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Rubidium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/L	-	-	-	-									

Table D-3: Surface Water Analytical Results
2020 Thornhill Transfer Station Annual Monitoring Program
Regional District of Kitimat-Stikine

Location Monitoring Location Sample ID Laboratory ID QAQC Date	Unit	BCWQG Aquatic Life - Freshwater (Chronic - Long-term average)	BCWQG Aquatic Life - Freshwater (Short-term maximum)	BCWQG - Drinking Water	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	
					SW-1_2016-03-22_N	SW-1_2016-07-25_N	SW-1_2016-10-13_N	SW-1_2017-03-28_N	SW-1_2017-08-24_N	L2070515-1	L2124909-1	L2163156-1	L2313871-1	
					2016-03-22	2016-07-25	2016-10-13	2017-03-28	2017-08-24	2018-03-19	2018-07-04	2018-09-10	2019-07-17	
Field Measured														
pH	-	6.5 - 9.0	6.5 - 9.0	-	-	-	-	-	-	-	-	6.2	7.5	7.5
Temperature	°C	-	-	-	-	-	-	-	-	-	-	8.7	12	11
Dissolved oxygen	mg/L	8.0	5.0	-	-	-	-	-	-	-	-	7.8	-	8.1
Conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	37	73	62
Redox potential	mV	-	-	-	-	-	-	-	-	-	-	442	-	242
Conventional Parameters														
pH	-	6.5 - 9.0	6.5 - 9.0	-	7.0	7.3	7.3	7.2	7.4	7.8	7.6	7.6	7.6	7.8
Specific conductivity	µS/cm	-	-	-	70	80	84	57	66	66	53	88	88	85
Hardness, as CaCO ₃	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Total alkalinity, as CaCO ₃	mg/L	20 ^(a)	-	-	-	-	-	-	-	-	27	56	37	42
Total suspended solids	mg/L	-	-	-	1.5	<1.0	<1.0	<1.0	<1.0	<3.0	<3.0	3.0	5.8	5.8
Hardness, as CaCO ₃ (Total)	mg/L	-	-	-	39	40	36	25	31	30	26	39	39	39
Major Ions														
Bromide	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	<0.05
Calcium	mg/L	-	-	-	-	-	-	-	-	88	9.2	14	14	14
Chloride	mg/L	150	600	-	<1.0	<1.0	1.2	<1.0	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5
Fluoride	mg/L	-	0.40 - 0.99 ^(b)	1.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.02	<0.02	<0.02	<0.02	0.023
Magnesium	mg/L	-	-	-	-	-	-	-	-	17	0.68	0.98	0.95	0.95
Potassium	mg/L	-	-	-	-	-	-	-	-	28	0.70	1.1	0.86	0.86
Sodium	mg/L	-	-	-	-	-	-	-	-	49	1.0	1.3	1.3	1.3
Sulphate	mg/L	128 - 218 ^(b)	-	-	1.5	1.1	1.4	1.2	<1.0	1.3	0.77	3.3	3.3	3.3
Nutrients														
Nitrate	mg-N/L	3.0	33	10	0.020	0.061	0.053	0.026	0.022	0.17	0.024	1.00	0.039	0.039
Nitrite	mg-N/L	0.020 ^(c)	0.060 ^(c)	1.0	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001	<0.001	0.0018	<0.001	<0.001
Total ammonia	mg-N/L	0.58 - 2.0 ^(d)	3.0 - 26 ^(e)	-	<0.03	<0.03	0.057	<0.03	<0.03	0.0056	<0.005	0.014	<0.005	<0.005
Total Kjeldahl nitrogen	mg-N/L	-	-	-	-	-	-	-	-	<0.05	<0.05	0.21	0.085	0.085
Total phosphorus	mg-P/L	-	-	-	0.030	<0.02	0.020	<0.05	<0.05	<0.05	0.0023	0.0083	0.0061	0.0061
Dissolved phosphorus	mg-P/L	-	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05
Orthophosphate	mg-P/L	-	-	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001
Biochemical oxygen demand	mg/L	-	-	-	<4.0	<4.0	<4.0	<4.0	<4.0	<2.0	<2.0	<2.0	<2.0	<2.0
Chemical oxygen demand	mg/L	-	-	-	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Total Metals														
Aluminum	mg/L	-	-	-	0.045	0.24	0.029	0.032	0.053	0.030	0.036	0.094	0.054	0.054
Antimony	mg/L	0.0090	-	0.0060	<0.0001	0.00010	0.00020	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Arsenic	mg/L	-	0.0050	0.010	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0001	<0.0001	0.00017	<0.0001	<0.0001
Barium	mg/L	1.0	-	2.0	0.022	0.028	0.024	0.018	0.021	0.019	0.021	0.034	0.032	0.032
Beryllium	mg/L	0.00013	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Bismuth	mg/L	-	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Boron	mg/L	1.2	-	5.0	0.0070	0.019	0.14	0.030	0.18	<0.01	<0.02	<0.01	<0.01	<0.01
Cadmium	mg/L	-	-	0.0070	0.000010	0.000090	<0.00001	<0.00001	<0.00001	<0.000005	<0.000005	0.000065	<0.000005	<0.000005
Calcium	mg/L	-	-	-	14	14	13	8.7	11	10	8.6	14	14	14
Cesium	mg/L	-	-	-	-	-	-	-	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Chromium	mg/L	0.0010 ^(f)	-	0.050 ^(f)	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00047	<0.0001	0.00013	0.00010	0.00010
Cobalt	mg/L	0.0040	0.11	-	<0.00005	0.00021	<0.00005	<0.00005	<0.0001	<0.0001	<0.0001	0.00015	<0.0001	<0.0001
Copper	mg/L	see note (h)	see note (h)	2.0	0.0013	0.0033	0.0010	0.0011	0.00061	<0.0005	0.00051	0.0016	0.00068	0.00068
Iron	mg/L	-	1.0	-	0.050	0.34	0.040	0.020	0.057	0.025	0.024	0.20	0.060	0.060
Lead	mg/L	0.0035 - 0.0044 ^(b)	0.0044 - 0.028 ^(b)	0.0050	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Lithium	mg/L	-	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001
Magnesium	mg/L	-	-	-	1.1	1.0	0.88	0.79	0.79	0.74	0.69	1.0	0.99	0.99
Manganese	mg/L	0.8 - 1.9	-	0.12	0.0064	0.030	0.017	0.013	0.0095	0.0015	0.0035	0.054	0.0095	0.0095
Mercury	mg/L	0.000010	-	0.0010	<0.00002	<0.00002	<0.00002	<0.00002	<0.00001	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005
Molybdenum	mg/L	1.0	2.0	-	0.00060	0.00020	0.00050	0.00010	0.00020	0.00016	0.00015	0.00023	0.00034	0.00034
Nickel	mg/L	0.025 ^(b)	-	-	<0.0002	0.00030	<0.0002	<0.0002	<0.0004	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Potassium	mg/L	-	-	-	1.3	0.95	0.82	0.59	0.79	0.61	0.71	1.1	0.91	0.91
Rubidium	mg/L	-	-	-	-	-	-	-	-	0.00071	0.00085	0.0017	0.0011	0.0011
Selenium	mg/L	0.0020	-	0.050	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.00005	<0.00005	0.000095	0.000081	0.000081
Silicon	mg/L	-	-	-	3.1	3.0	2.4	2.5	2.6	2.4	2.4	2.7	2.7	2.7
Silver	mg/L	0.000050 ^(b)	0.00010 ^(b)	-	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Sodium	mg/L	-	-	-	2.3	1.4	1.3	0.89	1.1	0.99	1.0	1.3	1.3	1.3
Strontium	mg/L	-	-	7.0	0.049	0.056	0.055	0.038	0.045	0.042	0.039	0.064	0.056	0.056
Sulphur	mg/L	-	-	-	1.0	<1.0	<1.0	<1.0	<3.0	0.54	<0.5	1.1	<0.5	<0.5
Tellurium	mg/L	-	-	-	-	-	-	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Thallium	mg/L	0.00080	-	-	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Thorium	mg/L	-	-	-	-	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Tin	mg/L	-	-	-	<0.0002	0.00030	<0.0002	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Titanium	mg/L	-	-	-	<0.005	0.013	<0.005	<0.005	<0.005	0.00092	0.00089	<0.003	0.0016	0.0016
Tungsten	mg/L	-	-	-	-	-	-	-	-	0.00019	<0.0001	<0.0001	<0.0001	<0.0001
Uranium	mg/L	0.0085	-	0.020	<0.00002	0.000050	0.000020	<0.00002	<0.00002	<0.00001	0.000011	0.000023	0.000017	0.000017
Vanadium	mg/L	-	-	-	<0.001	0.0010	<0.001	<0.001	<0.001	<0.0005	<0.0005	0.00066	0.00054	0.00054
Zinc	mg/L	0.0075	0.033	-	<0.004	0.0070	<0.004	<0.004	0.0066	<0.003	<0.003	<0.003	<0.003	<0.003
Zirconium	mg/L	-	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.00006	<0.00006	<0.00006	<0.00006	<0.00006
Dissolved Metals														
Aluminum	mg/L	0.0074 - 0.050 ⁽ⁱ⁾	0.024 - 0.10 ⁽ⁱ⁾	-	-	-	-	-	-	0.0023	0.024	0.043	0.027	0.027
Antimony	mg/L	-	-	-	-	-	-	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Arsenic	mg/L	-	-	-	-	-	-	-	-	0.00060	<0.0001	<0.0001	<0.0001	<0.0001
Barium	mg/L	-	-	-	-	-	-	-	-	0.26	0.020	0.037	0.029	0.029
Beryllium	mg/L	-	-	-	-	-	-	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Bismuth	mg/L	-	-	-	-	-	-	-	-	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Boron	mg/L	-	-	-	-	-	-	-	-	0.96	<0.01	<0.01	<0.01	<0.01
Cadmium	mg/L	0.000039 - 0.00011												

Table D-3: Surface Water Analytical Results
2020 Thornhill Transfer Station Annual Monitoring Program
Regional District of Kitimat-Stikine

Monitoring Location Sample ID Laboratory ID QAQC Date	Unit	BCWQG Aquatic Life - Freshwater (Chronic - Long-term average)	BCWQG Aquatic Life - Freshwater (Short-term maximum)	BCWQG - Drinking Water						
					SW-1	SW-1	SW-1	SW-1	DUP	
					L2364066-1	VA20A5788-001	VA20B4463-001	VA20B7656-001	VA20B7656-006	
					2019-10-10	2020-04-30	2020-09-01	FDA	FD	
Field Measured										
pH	-	6.5 - 9.0	6.5 - 9.0	-	8.3	7.1	7.1	7.6	7.6	
Temperature	°C	-	-	-	7.5	4.4	10	9.3	9.3	
Dissolved oxygen	mg/L	8.0	5.0	-	11	17	5.5	6.6	6.6	
Conductivity	µS/cm	-	-	-	44	30	39	42	42	
Redox potential	mV	-	-	-	167	363	272	182	182	
Conventional Parameters										
pH	-	6.5 - 9.0	6.5 - 9.0	-	7.7	7.5	7.5	7.5	7.5	
Specific conductivity	µS/cm	-	-	-	65	48	55	61	62	
Hardness, as CaCO ₃	mg/L	-	-	-	-	23	25	30	29	
Total alkalinity, as CaCO ₃	mg/L	20 ^(a)	-	-	30	23	27	29	31	
Total suspended solids	mg/L	-	-	-	<3.0	<3.0	<3.0	58	<3.0	
Hardness, as CaCO ₃ (Total)	mg/L	-	-	-	30	23	25	29	28	
Major Ions										
Bromide	mg/L	-	-	-	-	<0.05	<0.05	-	-	
Calcium	mg/L	-	-	-	11	8.4	9.1	11	11	
Chloride	mg/L	150	600	-	<0.5	<0.5	<0.5	<0.5	<0.5	
Fluoride	mg/L	-	0.40 - 0.99 ^(b)	1.5	<0.02	0.023	0.020	<0.02	0.023	
Magnesium	mg/L	-	-	-	0.78	0.54	0.63	0.75	0.75	
Potassium	mg/L	-	-	-	0.76	0.55	0.65	0.80	0.81	
Sodium	mg/L	-	-	-	1.1	0.88	1.0	1.1	1.1	
Sulphate	mg/L	128 - 218 ^(b)	-	-	1.0	0.94	0.94	0.96	0.96	
Nutrients										
Nitrate	mg-N/L	3.0	33	10	0.053	0.017	0.033	0.048	0.038	
Nitrite	mg-N/L	0.020 ^(c)	0.060 ^(c)	1.0	<0.001	<0.001	<0.001	<0.001	<0.001	
Total ammonia	mg-N/L	0.58 - 2.0 ^(d)	3.0 - 26 ^(e)	-	<0.005	<0.005	<0.005	0.014	0.0079	
Total Kjeldahl nitrogen	mg-N/L	-	-	-	0.077	<0.05	<0.05	0.14	<0.05	
Total phosphorus	mg-P/L	-	-	-	0.0024	<0.002	0.0028	<0.002	0.0021	
Dissolved phosphorus	mg-P/L	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	
Orthophosphate	mg-P/L	-	-	-	<0.001	<0.001	<0.001	0.0012	<0.001	
Biochemical oxygen demand	mg/L	-	-	-	<2.0	<2.0	<2.0	<2.0	<2.0	
Chemical oxygen demand	mg/L	-	-	-	<20	<20	<20	<20	<20	
Total Metals										
Aluminum	mg/L	-	-	-	0.040	0.046	0.061	0.099	0.092	
Antimony	mg/L	0.0090	-	0.0060	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Arsenic	mg/L	-	0.0050	0.010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Barium	mg/L	1.0	-	2.0	0.021	0.014	0.019	0.019	0.020	
Beryllium	mg/L	0.00013	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Bismuth	mg/L	-	-	-	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	
Boron	mg/L	1.2	-	5.0	<0.01	<0.01	<0.01	<0.01	<0.01	
Cadmium	mg/L	-	-	0.0070	<0.00005	<0.00005	<0.00005	0.000053	0.000094	
Calcium	mg/L	-	-	-	11	8.4	9.0	11	10	
Cesium	mg/L	-	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Chromium	mg/L	0.0010 ^(f)	-	0.050 ^(f)	0.00012	<0.0001	<0.0001	0.00011	<0.0001	
Cobalt	mg/L	0.0040	0.11	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Copper	mg/L	see note (h)	see note (h)	2.0	0.00061	0.00075	0.00067	0.00089	0.00089	
Iron	mg/L	-	1.0	-	0.030	0.027	0.052	0.084	0.070	
Lead	mg/L	0.0035 - 0.0044 ^(b)	0.0044 - 0.028 ^(b)	0.0050	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	
Lithium	mg/L	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	
Magnesium	mg/L	-	-	-	0.71	0.59	0.65	0.69	0.70	
Manganese	mg/L	0.8 - 1.9	-	0.12	0.0044	0.0014	0.0041	0.0049	0.0046	
Mercury	mg/L	0.000010	-	0.0010	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	
Molybdenum	mg/L	1.0	2.0	-	0.00019	0.00025	0.00019	0.00041	0.00040	
Nickel	mg/L	0.025 ^(b)	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Potassium	mg/L	-	-	-	0.68	0.58	0.68	0.72	0.74	
Rubidium	mg/L	-	-	-	0.00089	0.00060	0.00085	0.00095	0.00080	
Selenium	mg/L	0.0020	-	0.050	0.00052	<0.00005	<0.00005	<0.00005	0.000074	
Silicon	mg/L	-	-	-	2.5	2.3	2.5	2.9	2.9	
Silver	mg/L	0.000050 ^(b)	0.00010 ^(b)	-	<0.00001	0.000020	<0.00001	<0.00001	<0.00001	
Sodium	mg/L	-	-	-	1.0	0.93	1.00	1.0	1.1	
Strontium	mg/L	-	-	7.0	0.041	0.033	0.038	0.042	0.042	
Sulphur	mg/L	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	
Tellurium	mg/L	-	-	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
Thallium	mg/L	0.00080	-	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	
Thorium	mg/L	-	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Tin	mg/L	-	-	-	0.00052	<0.0001	<0.0001	<0.0001	<0.0001	
Titanium	mg/L	-	-	-	0.00075	0.00068	0.00027	0.00036	0.00028	
Tungsten	mg/L	-	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Uranium	mg/L	0.0085	-	0.020	0.000013	0.000015	0.000017	0.000022	0.000021	
Vanadium	mg/L	-	-	-	<0.0005	<0.0005	<0.0005	0.00063	0.00057	
Zinc	mg/L	0.0075	0.033	-	<0.003	<0.003	<0.003	<0.003	0.0031	
Zirconium	mg/L	-	-	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
Dissolved Metals										
Aluminum	mg/L	0.0074 - 0.050 ^(g)	0.024 - 0.10 ^(g)	-	0.033	0.031	0.031	0.038	0.038	
Antimony	mg/L	-	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Arsenic	mg/L	-	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Barium	mg/L	-	-	-	0.022	0.013	0.019	0.019	0.020	
Beryllium	mg/L	-	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Bismuth	mg/L	-	-	-	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	
Boron	mg/L	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	
Cadmium	mg/L	0.000039 - 0.00011 ^(b)	0.000055 - 0.00024 ^(b)	-	<0.000005	<0.000005	0.0000097	<0.000005	<0.000005	
Cesium	mg/L	-	-	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	
Chromium	mg/L	-	-	-	<0.0001	0.00012	<0.0001	<0.0001	0.00020	
Cobalt	mg/L	-	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Copper	mg/L	-	-	-	0.00072	0.00064	0.00080	0.00074	0.00080	
Iron	mg/L	-	0.35	-	0.024	<0.01	0.011	0.015	0.016	
Lead	mg/L	-	-	-	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	
Lithium	mg/L	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	
Manganese	mg/L	-	-	-	0.0048	0.00065	0.0024	0.0021	0.0021	
Mercury	mg/L	-	-	-	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	
Molybdenum	mg/L	-	-	-	0.00021	0.00023	0.00017	0.00043	0.00040	
Nickel	mg/L	-	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Rubidium	mg/L	-	-	-	0.00090	0.00060	0.00082	0.00079	0.00093	
Selenium	mg/L	-	-	-	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	
Silicon	mg/L	-	-	-	2.5	2.2	2.4	2.7	2.6	
Silver	mg/L	-	-	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	
Strontium	mg/L	-	-	-	0.044	0.031	0.039	0.045	0.047	
Sulphur	mg/L	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	
Tellurium	mg/L	-	-	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
Thallium	mg/L	-	-	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	
Thorium	mg/L	-	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Tin	mg/L	-	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Titanium	mg/L	-	-	-	0.00031	<0.0003	<0.0003	0.00042	0.00032	
Tungsten	mg/L	-	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Uranium	mg/L	-	-	-	0.000013	0.000012	0.000014	0.000021	0.000020	
Vanadium	mg/L	-	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Zinc	mg/L	-	-	-	<0.001	<0.001	0.0028	0.0019	<0.001	
Zirconium	mg/L	-	-	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	

NOTES

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

BCWQG AWF Long-term

BCWQG AWF Short-term

BCWQG DW

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

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 ammonia guideline, an average temperature of 10 degrees Celsius and a pH of 7.5 was chosen where no

MAC = Maximum Acceptable Concentration

AO = Aesthetic Objective

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

(a) = guideline is a minimum value, unless the background concentration or value is lower.

(b) = guideline is hardness dependent. The guideline range shown is based on the hardness range observed in the dataset (21 to 801 mg/L). The guideline is calculated based on the individual hardness value for each sample.

(c) = for some samples, water hardness was greater than 250 mg/L. At this hardness, no BC ENV water quality guideline has been established for sulphate; however, the observed data were screened against the guideline for very hard water (i.e., 429 mg/L) for comparative purposes.

(d) = guideline is chloride dependent. The guideline range shown is based on the chloride concentration range observed in the dataset (0.1110 to 206.0000 mg/L). The guideline is calculated based on the individual chloride concentration in each sample.

(e) = the ammonia guideline is pH and temperature dependent. The guideline that results in the minimum ammonia guideline (0.13 mg-N/L) is based on the combination of field pH (10.2) and water temperature (13.3°C). Guidelines calculated with temperature and pH values falling outside the defined range (i.e., pH 6.0 to 10.0 and temperature 0°C to 30°C) should be used with caution, as the WQG does not necessarily accurately reflect toxic effects at the low and high pH and temperature extremes. The guideline is calculated based on the individual field pH and temperature measurements for each sample.

(f) = the ammonia guideline is pH and temperature dependent. The guideline that results in the minimum ammonia guideline (0.69 mg-N/L) is based on the combination of field pH (10.2) and water temperature (13.3°C). Guidelines calculated with temperature and pH values falling outside the defined range (i.e., pH 6.

Table D-4: Surface Water Analytical Results
2020 Thornhill Transfer Station Annual Monitoring Program
Regional District of Kitimat-Stikine

Location Monitoring Location Sample ID Laboratory ID QAQC Sample Date	Unit	BCWQG Aquatic Life - Freshwater (Chronic - Long- term average)	BCWQG Aquatic Life - Freshwater (Short-term maximum)	BCWQG - Drinking Water	SW-21	SW-21	SW-21	SW-21	SW-21	SW-21	SW-21	SW-21	
					SW-21_2010-06-15_N	SW-21_2010-10-25_N	SW-21_2011-02-15_N	SW-21_2012-02-22_N	SW-21_2012-05-08_N	SW-21_2013-01-04_N	SW-21_2013-04-15_N	SW-21_2013-06-06_N	
					2010-06-15	2010-10-25	2011-02-15	2012-02-22	2012-05-08	2013-01-04	2013-04-15	2013-06-06	
Field Measured													
pH	-	6.5 - 9.0	6.5 - 9.0	-	-	-	-	-	-	-	-	-	-
Temperature	°C	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved oxygen	mg/L	8.0	5.0	-	-	-	-	-	-	-	-	-	-
Conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-
Redox potential	mV	-	-	-	-	-	-	-	-	-	-	-	-
Conventional Parameters													
pH	-	6.5 - 9.0	6.5 - 9.0	-	7.9	8.1	7.6	7.9	7.8	7.6	7.8	8.0	8.0
Specific conductivity	µS/cm	-	-	-	1,199	1,540	895	1,090	1,020	1,360	1,260	1,210	1,210
Hardness, as CaCO ₃	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Total alkalinity, as CaCO ₃	mg/L	20 ^(a)	-	-	-	-	-	-	-	-	-	-	-
Total suspended solids	mg/L	-	-	-	-	-	-	-	-	<1.0	-	7.8	-
Hardness, as CaCO ₃ (Total)	mg/L	-	-	-	358	424	310	283	272	357	394	476	-
Concentration of effluent lethal to 50% of rainbow trout - pH adjusted	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Rainbow trout 96 h static acute test - lc50	mg/L	-	-	-	-	-	-	-	-	71	-	-	-
Major Ions													
Bromide	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Chloride	mg/L	150	600	-	110	89	41	60	59	108	74	104	-
Fluoride	mg/L	-	0.76 - 1.9 ^(b)	1.5	0.16	0.040	<0.1	<0.1	<0.1	<0.1	0.069	<0.1	-
Magnesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate	mg/L	128 - 429 ^(b, c)	-	-	4.5	12	18	11	6.8	8.5	8.8	6.7	-
Nutrients													
Nitrate	mg-N/L	3.0	33	10	9.2	5.5	15	10	7.7	22	15	4.5	4.5
Nitrite	mg-N/L	0.10 - 0.20 ^(d)	0.30 - 0.60 ^(e)	1.0	0.11	0.047	0.047	0.038	0.057	0.041	0.062	0.013	0.013
Total ammonia	mg-N/L	0.37 - 1.9 ^(f)	1.9 - 22 ^(g)	-	3.3	29	4.7	18	15	11	13	1.7	1.7
Total Kjeldahl nitrogen	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	-
Total phosphorus	mg-P/L	-	-	-	-	-	0.021	0.031	0.025	0.022	<0.01	0.11	-
Dissolved phosphorus	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-
Orthophosphate	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-
Biochemical oxygen demand	mg/L	-	-	-	17	<4.0	<4.0	15	16	5.8	<6.0	10	-
Chemical oxygen demand	mg/L	-	-	-	198	102	77	54	39	61	59	47	-
Total Metals													
Aluminum	mg/L	-	-	-	0.012	0.019	0.19	0.44	0.16	0.020	0.033	0.056	-
Antimony	mg/L	0.0090	-	0.0060	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0006	<0.0007	-
Arsenic	mg/L	-	0.0050	0.010	0.00050	0.00060	0.00020	0.00040	0.00044	0.00032	0.00041	0.00061	-
Barium	mg/L	1.0	-	2.0	0.31	0.23	0.079	0.17	0.15	0.14	0.17	0.11	-
Beryllium	mg/L	0.00013	-	-	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-
Bismuth	mg/L	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-
Boron	mg/L	1.2	-	5.0	1.4	2.2	1.1	1.5	1.2	1.2	1.8	1.6	-
Cadmium	mg/L	-	-	0.0070	0.00026	0.00023	0.000050	0.000060	0.000032	0.000036	0.000029	0.000076	-
Calcium	mg/L	-	-	-	94	125	98	88	85	109	120	148	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	0.0010 ^(h)	-	0.050 ⁽ⁱ⁾	0.0010	0.003	0.0010	<0.001	<0.001	<0.001	<0.001	<0.001	-
Cobalt	mg/L	0.0040	0.11	-	0.0015	0.0014	0.00080	0.0011	0.00081	0.00094	0.0011	0.0012	-
Copper	mg/L	see note (h)	see note (h)	2.0	0.044	0.080	0.0030	0.0038	0.0019	0.0024	0.0020	0.0030	-
Iron	mg/L	-	1.0	-	0.023	0.045	0.26	0.89	0.63	0.065	0.21	0.15	-
Lead	mg/L	0.0038 - 0.020 ^(b)	0.013 - 0.42 ^(b)	0.0050	-	0.00020	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	-
Lithium	mg/L	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-
Magnesium	mg/L	-	-	-	21	23	16	15	15	20	23	26	-
Manganese	mg/L	0.8 - 1.9	-	0.12	0.19	1.3	0.091	0.67	0.88	0.19	0.55	0.42	-
Mercury	mg/L	0.000010	-	0.0010	0.00003	0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	-
Molybdenum	mg/L	1.0	2.0	-	-	-	<0.001	<0.001	<0.001	<0.001	0.00035	<0.001	-
Nickel	mg/L	0.025 - 0.15 ^(b)	-	-	0.0060	0.010	0.0040	0.0050	0.0039	0.0044	0.0055	0.0053	-
Potassium	mg/L	-	-	-	51	51	37	35	31	41	46	57	-
Rubidium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/L	0.0020	-	0.050	0.00010	0.00010	<0.0001	<0.0001	<0.0001	<0.0004	<0.0004	0.00016	-
Silicon	mg/L	-	-	-	4.1	6.7	5.9	5.8	5.5	5.1	6.3	7.3	-
Silver	mg/L	0.000050 - 0.0015 ^(b)	0.00010 - 0.0030 ^(b)	-	-	-	0.0000080	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	-
Sodium	mg/L	-	-	-	92	98	56	61	55	74	87	104	-
Strontium	mg/L	-	-	7.0	0.71	0.85	0.57	0.58	0.73	0.77	0.90	0.90	-
Sulphur	mg/L	-	-	-	-	6.0	7.0	4.8	4.1	<15	<75	3.5	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	0.00080	-	-	-	-	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	-
Thorium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-
Titanium	mg/L	-	-	-	-	-	0.0070	0.017	0.0055	<0.005	<0.005	<0.005	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	0.0085	-	0.020	0.00020	0.00010	0.00010	<0.0001	<0.0001	0.00014	0.00011	0.00021	-
Vanadium	mg/L	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-
Zinc	mg/L	0.0075 - 0.19	0.033 - 0.28	-	0.032	0.044	<0.005	0.0050	<0.005	<0.005	<0.005	<0.005	-
Zirconium	mg/L	-	-	-	-	-	<0.0005	0.0023	0.00054	<0.0005	<0.0005	<0.0005	-
Dissolved Metals													
Aluminum	mg/L	0.050 ^(j)	0.10 ^(j)	-	-	-	-	-	-	-	-	-	-
Antimony	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Barium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Bismuth	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/L	0.000074 - 0.00046 ^(b)	0.00014 - 0.0026 ^(b)	-	-	-	-	-	-	-	-	-	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Copper	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Iron	mg/L	-	0.35	-	-	-	-	-	-	-	-	-	-
Lead	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Lithium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Manganese	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Mercury	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Molybdenum	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Nickel	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Rubidium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Silicon	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Silver	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Strontium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Thorium	mg/L	-	-	-	-								

Table D-4: Surface Water Analytical Results
2020 Thornhill Transfer Station Annual Monitoring Program
Regional District of Kitimat-Stikine

Table with columns for Location, Monitoring Location, Sample ID, Laboratory ID, QAQC, Sample Date, Field Measured (pH, Temperature, Dissolved oxygen, Conductivity, Redox potential), Conventional Parameters (pH, Specific conductivity, Hardness, Total alkalinity, Total suspended solids, etc.), Major Ions (Bromide, Calcium, Chloride, Fluoride, Magnesium, Potassium, Sodium, Sulphate), Nutrients (Nitrate, Nitrite, Total ammonia, Total Kjeldahl nitrogen, Total phosphorus, Dissolved phosphorus, Orthophosphate, Biochemical oxygen demand, Chemical oxygen demand), Total Metals (Aluminum, Antimony, Arsenic, Barium, Beryllium, Bismuth, Boron, Cadmium, Calcium, Cesium, Chromium, Cobalt, Copper, Iron, Lead, Lithium, Magnesium, Manganese, Mercury, Molybdenum, Nickel, Potassium, Rubidium, Selenium, Silicon, Silver, Sodium, Strontium, Sulphur, Tellurium, Thallium, Thorium, Tin, Titanium, Tungsten, Uranium, Vanadium, Zinc, Zirconium), Dissolved Metals (Aluminum, Antimony, Arsenic, Barium, Beryllium, Bismuth, Boron, Cadmium, Cesium, Chromium, Cobalt, Copper, Iron, Lead, Lithium, Manganese, Mercury, Molybdenum, Nickel, Rubidium, Selenium, Silicon, Silver, Strontium, Sulphur, Tellurium, Thallium, Thorium, Tin, Titanium, Tungsten, Uranium, Vanadium, Zinc, Zirconium), Ungrouped Analytes (Concentration of effluent lethal to 50% of rainbow trout - pH adjusted), and Toxicity (Rainbow trout 96 h static acute test - lc50).

NOTES
BC Water Quality Guidelines for Freshwater Aquatic Life - Chronic Long-term Average
BC Water Quality Guidelines for Freshwater Aquatic Life - Short-term Maximum
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
(4) = guideline is a minimum value, unless the background concentration or value is lower.
(5) = guideline is hardness dependent. The guideline range shown is based on the hardness range observed in the dataset (21 to 801 mg/L). The guideline is calculated based on the individual hardness value for each sample.
(6) = for some samples, water hardness was greater than 250 mg/L. At this hardness, no BC ENV water quality guideline has been established for sulphate; however, the observed data were screened against the guideline for very hard water (i.e., 429 mg/L) for comparative purposes.
(7) = guideline is chloride dependent. The guideline range shown is based on the chloride concentration range observed in the dataset (0.1110 to 206.0000 mg/L). The guideline is calculated based on the individual chloride concentration in each sample.
(8) = the ammonia guideline is pH and temperature dependent. The guideline that results in the minimum ammonia guideline (0.13 mg-N/L) is based on the combination of field pH (10.2) and water temperature (13.3°C). Guidelines calculated with temperature and pH values falling outside the defined range (i.e., pH 6.0 to 10.0 and temperature 0°C to 30°C) should be used with caution, as the WQG does not necessarily accurately reflect toxic effects at the low and high pH and temperature extremes. The guideline is calculated based on the individual field pH and temperature measurements for each sample.
(9) = the ammonia guideline is pH and temperature dependent. The guideline that results in the minimum ammonia guideline (0.69 mg-N/L) is based on the combination of field pH (10.2) and water temperature (13.3°C). Guidelines calculated with temperature and pH values falling outside the defined range (i.e., pH 6.0 to 10.0 and temperature 0°C to 30°C) should be used with caution, as the WQG does not necessarily accurately reflect toxic effects at the low and high pH and temperature extremes. The guideline is calculated based on the individual field pH and temperature measurements for each sample.
(10) = guideline is for chromium VI.
(11) = Since 2019, the total copper guideline is calculated using a bioligand model. The model calculation is based on dissolved organic carbon and hard

Table D-5: Surface Water Analytical Results
2020 Thornhill Transfer Station Annual Monitoring Program

Table with 13 columns: Location Monitoring Location, Sample ID, Laboratory ID, QAQC, Sample Date, Unit, BCWQG Aquatic Life - Freshwater (Chronic - Long-term average), BCWQG Aquatic Life - Freshwater (Short-term maximum), BCWQG - Drinking Water, and 9 SW-17 samples from 1996-11-01 to 2013-10-22. Rows include Field Measured, Conventional Parameters, Major Ions, Nutrients, Total Metals, and Dissolved Metals.

NOTES

BC Water Quality Guidelines for Freshwater Aquatic Life - Chronic Long-term Average
BCWQG AWF Long-term
BC Water Quality Guidelines for Freshwater Aquatic Life - Short-term
BCWQG AWF 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
H = standard is hardness dependent; pH = standard is pH dependent; Cl = standard is chloride dependent; T
V = Standard is valence dependent VI refers to chromium VI and III refers to chromium III; Ca = standard is
* = for ammonia guideline, an average temperature of 10 degrees Celsius and a pH of 7.5 was chosen where
MAC = Maximum Acceptable Concentration
AO = Aesthetic Objective
QAQC = Quality Assurance and Control; FDA = Field Duplicate Available; FD = Field Duplicate
(a) = guideline is a minimum value, unless the background concentration or value is lower.
(b) = guideline is hardness dependent. The guideline range shown is based on the hardness range observed
in the dataset (21 to 801 mg/L). The guideline is calculated based on the individual hardness value for each
sample.
(c) = for some samples, water hardness was greater than 250 mg/L. At this hardness, no BC ENV water
quality guideline has been established for sulphate; however, the observed data were screened against the
guideline for very hard water (i.e., 429 mg/L) for comparative purposes.
(d) = guideline is chloride dependent. The guideline range shown is based on the chloride concentration range
observed in the dataset (0.1110 to 206.0000 mg/L). The guideline is calculated based on the individual
chloride concentration in each sample.
(e) = the ammonia guideline is pH and temperature dependent. The guideline that results in the minimum
ammonia guideline (0.13 mg-N/L) is based on the combination of field pH (10.2) and water temperature
(13.3°C). Guidelines calculated with temperature and pH values falling outside the defined range (i.e., pH 6.0
to 10.0 and temperature 0°C to 30°C) should be used with caution, as the WQG does not necessarily
accurately reflect toxic effects at the low and high pH and temperature extremes. The guideline is calculated
based on the individual field pH and temperature measurements for each sample.
(f) = the ammonia guideline is pH and temperature dependent. The guideline that results in the minimum
ammonia guideline (0.69 mg-N/L) is based on the combination of field pH (10.2) and water temperature
(13.3°C). Guidelines calculated with temperature and pH values falling outside the defined range (i.e., pH 6.0
to 10.0 and temperature 0°C to 30°C) should be used with caution, as the WQG does not necessarily
accurately reflect toxic effects at the low and high pH and temperature extremes. The guideline is calculated
based on the individual field pH and temperature measurements for each sample.
(g) = guideline is for chromium VI.
(h) = Since 2019, the total copper guideline is calculated using a bioligand model. The model calculation is based on dissolved organic carbon and hardness. Because dissolved organic carbon was not collected and analyzed in 2020, the 2019 guideline calculation

Table D-5: Surface Water Analytical Results
2020 Thornhill Transfer Station Annual Monitoring Program

Table with columns: Location, Monitoring Location, Sample ID, Laboratory ID, QAQC, Sample Date, Unit, BCWQG Aquatic Life - Freshwater (Chronic - Long-term average), BCWQG Aquatic Life - Freshwater (Short-term maximum), Regional BCWQG - Drinking Water, District of Kitimat-Stikine, SW-17 (multiple), and Field Measured (multiple). Rows include pH, Temperature, Dissolved oxygen, Co-uctivity, Redox potential, Conventional Parameters, Major Ions, Nutrients, Total Metals, and Dissolved Metals.

NOTES

BCWQG AWF Long-term Average
BCWQG AWF Short-term Maximum
BCWQG DW

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

H = standard is hardness dependent; pH = standard is pH dependent; Cl = standard is chloride dependent; T V = Standard is valence dependent VI refers to chromium VI and III refers to chromium III; Ca = standard is * = for ammonia guideline, an average temperature of 10 degrees Celsius and a pH of 7.5 was chosen where
MAC = Maximum Acceptable Concentration
AO = Aesthetic Objective

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

(a) = guideline is a minimum value, unless the background concentration or value is lower.

(b) = guideline is hardness dependent. The guideline range shown is based on the hardness range observed in the dataset (21 to 801 mg/L). The guideline is calculated based on the individual hardness value for each sample.

(c) = for some samples, water hardness was greater than 250 mg/L. At this hardness, no BC ENV water quality guideline has been established for sulphate; however, the observed data were screened against the guideline for very hard water (i.e., 429 mg/L) for comparative purposes.

(d) = guideline is chloride dependent. The guideline range shown is based on the chloride concentration range observed in the dataset (0.1110 to 206.0000 mg/L). The guideline is calculated based on the individual chloride concentration in each sample.

(e) = the ammonia guideline is pH and temperature dependent. The guideline that results in the minimum ammonia guideline (0.13 mg-N/L) is based on the combination of field pH (10.2) and water temperature (13.3°C). Guidelines calculated with temperature and pH values falling outside the defined range (i.e., pH 6.0 to 10.0 and temperature 0°C to 30°C) should be used with caution, as the WQG does not necessarily accurately reflect toxic effects at the low and high pH and temperature extremes. The guideline is calculated based on the individual field pH and temperature measurements for each sample.

(f) = the ammonia guideline is pH and temperature dependent. The guideline that results in the minimum ammonia guideline (0.69 mg-N/L) is based on the combination of field pH (10.2) and water temperature (13.3°C). Guidelines calculated with temperature and pH values falling outside the defined range (i.e., pH 6.0 to 10.0 and temperature 0°C to 30°C) should be used with caution, as the WQG does not necessarily accurately reflect toxic effects at the low and high pH and temperature extremes. The guideline is calculated based on the individual field pH and temperature measurements for each sample.

(g) = guideline is for chromium VI.

(h) = Since 2019, the total copper guideline is calculated using a bioinquant model. The model calculation is base

Table D-6: Surface Water Analytical Results
2020 Thornhill Transfer Station Annual Monitoring Program
Regional District of Kitimat-Stikine

Table with columns for Location Monitoring Location, Sample Name, Laboratory ID, QAQC Sample Date, Unit, BCWQG Aquatic Life - Freshwater (Chronic - Long-term average), BCWQG Aquatic Life - Freshwater (Short-term maximum), BCWQG - Drinking Water, and Thornhill Landfill SW-6. Rows include Field Measured, Conventional Parameters, Major Ions, Nutrients and Biological Indicators, Total Metals, and Dissolved Metals.

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

(a) = guideline is a minimum value, unless the background concentration or value is lower.

(b) = guideline is hardness dependent. The guideline range shown is based on the hardness range observed in the dataset (21 to 801 mg/L). The guideline is calculated based on the individual hardness value for each sample.

(c) = for some samples, water hardness was greater than 250 mg/L. At this hardness, no BC ENV water quality guideline has been established for sulphate; however, the observed data were screened against the guideline for very hard water (i.e., 429 mg/L) for comparative purposes.

(d) = guideline is chloride dependent. The guideline range shown is based on the chloride concentration range observed in the dataset (0.1110 to 206.0000 mg/L). The guideline is calculated based on the individual chloride concentration in each sample.

(e) = the ammonia guideline is pH and temperature dependent. The guideline that results in the minimum ammonia guideline (0.13 mg-N/L) is based on the combination of field pH (10.2) and water temperature (13.3°C). Guidelines calculated with temperature and pH values falling outside the defined range (i.e., pH 6.0 to 10.0 and temperature 0°C to 30°C) should be used with caution, as the WQG does not necessarily accurately reflect toxic effects at the low and high pH and temperature extremes. The guideline is calculated based on the individual field pH and temperature measurements for each sample.

(f) = the ammonia guideline is pH and temperature dependent. The guideline that results in the minimum ammonia guideline (0.69 mg-N/L) is based on the combination of field pH (10.2) and water temperature (13.3°C). Guidelines calculated with temperature and pH values falling outside the defined range (i.e., pH 6.0 to 10.0) should be used with caution.

(g) = guideline is for chromium VI.

(h) = Since 2019, the total copper guideline is calculated using a bioinvariant model. The model calculation is based on dissolved organic carbon and hardness. Because dissolved organic carbon was not collected and analyzed in 2020, the 2019 guideline calculation based on hardness only was utilized.

Table with columns for Location, Monitoring Location, Sample Name, Laboratory ID, QAQC Sample Date, Unit, BCWQG Aquatic Life - Freshwater (Chronic - Long-term average), BCWQG Aquatic Life - Freshwater (Short-term maximum), BCWQG - Drinking Water, and 10 SW-6 sampling dates. Rows include Field Measured (pH, Temperature, Dissolved oxygen, Conductivity, Redox potential), Conventional Parameters (pH, Specific conductivity, Hardness, Total alkalinity, Total suspended solids), Major Ions (Bromide, Calcium, Chloride, Fluoride, Magnesium, Potassium, Sodium, Sulphate), Nutrients and Biological Indicators (Nitrate, Nitrite, Total ammonia, Total Kjeldahl nitrogen, Total phosphorus, Dissolved phosphorus, Orthophosphate, Biochemical oxygen demand, Chemical oxygen demand), and Total Metals (Aluminum, Antimony, Arsenic, Barium, Beryllium, Bismuth, Boron, Cadmium, Calcium, Cesium, Chromium, Cobalt, Copper, Iron, Lead, Lithium, Magnesium, Manganese, Mercury, Molybdenum, Nickel, Potassium, Rubidium, Selenium, Silicon, Silver, Sodium, Strontium, Sulphur, Tellurium, Thallium, Thorium, Tin, Titanium, Tungsten, Uranium, Vanadium, Zinc, Zirconium).

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
(a) = guideline is a minimum value, unless the background concentration or value is lower.
(b) = guideline is hardness dependent. The guideline range shown is based on the hardness range observed in the dataset (21 to 801 mg/L). The guideline is calculated based on the individual hardness value for each sample.
(c) = for some samples, water hardness was greater than 250 mg/L. At this hardness, no BC ENV water quality guideline has been established for sulphate; however, the observed data were screened against the guideline for very hard water (i.e., 429 mg/L) for comparative purposes.
(d) = guideline is chloride dependent. The guideline range shown is based on the chloride concentration range observed in the dataset (0.1110 to 206.0000 mg/L). The guideline is calculated based on the individual chloride concentration in each sample.
(e) = the ammonia guideline is pH and temperature dependent. The guideline that results in the minimum ammonia guideline (0.13 mg-N/L) is based on the combination of field pH (10.2) and water temperature (13.3°C). Guidelines calculated with temperature and pH values falling outside the defined range (i.e., pH 6.0 to 10.0 and temperature 0°C to 30°C) should be used with caution, as the WQG does not necessarily accurately reflect toxic effects at the low and high pH and temperature extremes. The guideline is calculated based on the individual field pH and temperature measurements for each sample.
(f) = the ammonia guideline is pH and temperature dependent. The guideline that results in the minimum ammonia guideline (0.69 mg-N/L) is based on the combination of field pH (10.2) and water temperature (13.3°C). Guidelines calculated with temperature and pH values falling outside the defined range (i.e., pH 6.0 to 10.0) should be used with caution, as the WQG does not necessarily accurately reflect toxic effects at the low and high pH and temperature extremes. The guideline is calculated based on the individual field pH and temperature measurements for each sample.
(g) = guideline is for chromium VI.
(h) = Since 2019, the total copper guideline is calculated using a bioinorganic model. The model calculation is based on dissolved organic carbon and hardness. Because dissolved organic carbon was not collected and analyzed in 2020, the 2019 guideline calculation based on hardness only was utilized.

Table D-6: Surface Water Analytical Results
2020 Thornhill Transfer Station Annual Monitoring Program
Regional District of Kitimat-Stikine

Main data table with columns for Monitoring Location, Unit, BCWQG Aquatic Life - Freshwater (Chronic - Long-term average), BCWQG Aquatic Life - Freshwater (Short-term maximum), BCWQG - Drinking Water, and various SW-6 sampling dates (2003-03-01 to 2006-06-01). Rows include Field Measured parameters (pH, Temperature, Dissolved oxygen, etc.), Conventional Parameters (pH, Specific conductivity, Hardness, etc.), Major Ions (Bromide, Calcium, Chloride, etc.), Nutrients and Biological Indicators (Nitrate, Nitrite, Ammonia, etc.), and Dissolved Metals (Aluminum, Antimony, Arsenic, etc.).

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
(a) = guideline is a minimum value, unless the background concentration or value is lower.
(b) = guideline is hardness dependent. The guideline range shown is based on the hardness range observed in the dataset (21 to 801 mg/L). The guideline is calculated based on the individual hardness value for each sample.
(c) = for some samples, water hardness was greater than 250 mg/L. At this hardness, no BC ENV water quality guideline has been established for sulphate; however, the observed data were screened against the guideline for very hard water (i.e., 429 mg/L) for comparative purposes.
(d) = guideline is chloride dependent. The guideline range shown is based on the chloride concentration range observed in the dataset (0.1110 to 206.0000 mg/L). The guideline is calculated based on the individual chloride concentration in each sample.
(e) = the ammonia guideline is pH and temperature dependent. The guideline that results in the minimum ammonia guideline (0.13 mg-N/L) is based on the combination of field pH (10.2) and water temperature (13.3°C). Guidelines calculated with temperature and pH values falling outside the defined range (i.e., pH 6.0 to 10.0 and temperature 0°C to 30°C) should be used with caution, as the WQG does not necessarily accurately reflect toxic effects at the low and high pH and temperature extremes. The guideline is calculated based on the individual field pH and temperature measurements for each sample.
(f) = the ammonia guideline is pH and temperature dependent. The guideline that results in the minimum ammonia guideline (0.69 mg-N/L) is based on the combination of field pH (10.2) and water temperature (13.3°C). Guidelines calculated with temperature and pH values falling outside the defined range (i.e., pH 6.0 to 10.0) should be used with caution, as the WQG does not necessarily accurately reflect toxic effects at the low and high pH and temperature extremes. The guideline is calculated based on the individual field pH and temperature measurements for each sample.
(g) = guideline is for chromium VI.
(h) = Since 2019, the total copper guideline is calculated using a bioinorganic model. The model calculation is based on dissolved organic carbon and hardness. Because dissolved organic carbon was not collected and analyzed in 2020, the 2019 guideline calculation based on hardness only was utilized.

Table with 14 columns: Monitoring Location, Unit, BCWQG Aquatic Life - Freshwater (Chronic - Long-term average), BCWQG Aquatic Life - Freshwater (Short-term maximum), BCWQG - Drinking Water, and 9 SW-6 sampling dates (2007-01-02, 2007-06-18, 2008-05-27, 2008-10-10, 2009-09-24, 2010-02-22, 2010-06-15, 2010-10-25, 2011-02-15). Rows include Field Measured, Conventional Parameters, Major Ions, Nutrients and Biological Indicators, Total Metals, and Dissolved Metals.

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
(a) = guideline is a minimum value, unless the background concentration or value is lower.
(b) = guideline is hardness dependent. The guideline range shown is based on the hardness range observed in the dataset (21 to 801 mg/L). The guideline is calculated based on the individual hardness value for each sample.

(c) = for some samples, water hardness was greater than 250 mg/L. At this hardness, no BC ENV water quality guideline has been established for sulphate; however, the observed data were screened against the guideline for very hard water (i.e., 429 mg/L) for comparative purposes.

(d) = guideline is chloride dependent. The guideline range shown is based on the chloride concentration range observed in the dataset (0.1110 to 206.0000 mg/L). The guideline is calculated based on the individual chloride concentration in each sample.

(e) = the ammonia guideline is pH and temperature dependent. The guideline that results in the minimum ammonia guideline (0.13 mg-N/L) is based on the combination of field pH (10.2) and water temperature (13.3°C). Guidelines calculated with temperature and pH values falling outside the defined range (i.e., pH 6.0 to 10.0 and temperature 0°C to 30°C) should be used with caution, as the WQG does not necessarily accurately reflect toxic effects at the low and high pH and temperature extremes. The guideline is calculated based on the individual field pH and temperature measurements for each sample.

(f) = the ammonia guideline is pH and temperature dependent. The guideline that results in the minimum ammonia guideline (0.69 mg-N/L) is based on the combination of field pH (10.2) and water temperature (13.3°C). Guidelines calculated with temperature and pH values falling outside the defined range (i.e., pH 6.0 to 10.0) should be used with caution, as the WQG does not necessarily accurately reflect toxic effects at the low and high pH and temperature extremes. The guideline is calculated based on the individual field pH and temperature measurements for each sample.

(g) = guideline is for chromium VI.
(h) = Since 2019, the total copper guideline is calculated using a bioinorganic model. The model calculation is based on dissolved organic carbon and hardness. Because dissolved organic carbon was not collected and analyzed in 2020, the 2019 guideline calculation based on hardness only was utilized.

Table with columns for Monitoring Location, Sample Name, Laboratory ID, QAQC Sample Date, Unit, BCWQG Aquatic Life - Freshwater (Chronic - Long-term average), BCWQG Aquatic Life - Freshwater (Short-term maximum), BCWQG - Drinking Water, and various parameters (pH, Temperature, Dissolved oxygen, Conductivity, Redox potential, Conventional Parameters, Major Ions, Nutrients and Biological Indicators, Total Metals, Dissolved Metals) across multiple sampling dates (SW-6).

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
(b) = guideline is a minimum value, unless the background concentration or value is lower.
(b) = guideline is hardness dependent. The guideline range shown is based on the hardness range observed in the dataset (21 to 801 mg/L). The guideline is calculated based on the individual hardness value for each sample.
(c) = for some samples, water hardness was greater than 250 mg/L. At this hardness, no BC ENV water quality guideline has been established for sulphate; however, the observed data were screened against the guideline for very hard water (i.e., 429 mg/L) for comparative purposes.
(d) = guideline is chloride dependent. The guideline range shown is based on the chloride concentration range observed in the dataset (0.1110 to 206.0000 mg/L). The guideline is calculated based on the individual chloride concentration in each sample.
(e) = the ammonia guideline is pH and temperature dependent. The guideline that results in the minimum ammonia guideline (0.13 mg-N/L) is based on the combination of field pH (10.2) and water temperature (13.3°C). Guidelines calculated with temperature and pH values falling outside the defined range (i.e., pH 6.0 to 10.0 and temperature 0°C to 30°C) should be used with caution, as the WQG does not necessarily accurately reflect toxic effects at the low and high pH and temperature extremes. The guideline is calculated based on the individual field pH and temperature measurements for each sample.
(f) = the ammonia guideline is pH and temperature dependent. The guideline that results in the minimum ammonia guideline (0.69 mg-N/L) is based on the combination of field pH (10.2) and water temperature (13.3°C). Guidelines calculated with temperature and pH values falling outside the defined range (i.e., pH 6.0 to 10.0) should be used with caution, as the WQG does not necessarily accurately reflect toxic effects at the low and high pH and temperature extremes. The guideline is calculated based on the individual field pH and temperature measurements for each sample.
(g) = guideline is for chromium VI.
(h) = Since 2019, the total copper guideline is calculated using a bioinorganic model. The model calculation is based on dissolved organic carbon and hardness. Because dissolved organic carbon was not collected and analyzed in 2020, the 2019 guideline calculation based on hardness only was utilized.

Sample Location Sample Name Laboratory ID Sample Collection Date	Units	RDL	BH96-2 BH-96-2 VA20A5787-001 4/30/2020	BH96-2 DUP VA20A5787-002 4/30/2020	Mean	RPD (%)	DF (unitless)
Conventional Parameters							
Hardness, as CaCO3	mg/L	0.6	107	108	107.5	1	n/c
Hardness, as CaCO3 (Total)	mg/L	0.6	253	221	237	14	n/c
pH	pH units	0.1	8.28	8.26	8.27	0	n/c
Specific conductivity	uS/cm	2	393	394	393.5	0	n/c
Total alkalinity, as CaCO3	mg/L	1	231	232	231.5	0	n/c
Total dissolved solids	mg/L	20	604	596	600	1	n/c
Major Ions							
Bromide	mg/L	0.05	< 0.050	< 0.050	n/c	n/c	0
Calcium	mg/L	0.05	16.1	15.8	15.95	2	n/c
Chloride	mg/L	0.5	0.56	0.57	0.565	n/c	0.02
Fluoride	mg/L	0.02	0.179	0.176	0.1775	2	n/c
Magnesium	mg/L	0.005	16.4	16.7	16.55	2	n/c
Potassium	mg/L	0.05	11.6	11.2	11.4	4	n/c
Sodium	mg/L	0.05	44.4	45.8	45.1	3	n/c
Sulphate	mg/L	0.3	2.18	2.22	2.2	2	n/c
Nutrients							
Chemical oxygen demand	mg/L	20	33	53	43	47	n/c
Dissolved phosphorus	mg/L	0.05	< 0.050	< 0.050	n/c	n/c	0
Nitrate	mg/L	0.005	0.0361	0.0404	0.03825	11	n/c
Nitrite	mg/L	0.001	0.0176	0.0226	0.0201	25	n/c
Total ammonia	mg/L	0.005	0.245	0.239	0.242	2	n/c
Total Kjeldahl nitrogen	mg/L	0.05	1.46	1.44	1.45	1	n/c
Total phosphorus	mg/L	0.05	1.34	1.36	1.35	1	n/c
Total Metals							
Aluminum	mg/L	0.003	52.2	36.9	44.55	34	n/c
Antimony	mg/L	0.0001	0.00046	0.00043	0.000445	7	n/c
Arsenic	mg/L	0.0001	0.0183	0.017	0.01765	7	n/c
Barium	mg/L	0.0001	0.338	0.263	0.3005	25	n/c
Beryllium	mg/L	0.0001	0.00112	0.00097	0.001045	14	n/c
Bismuth	mg/L	0.00005	0.000431	0.000223	0.000327	64	n/c
Boron	mg/L	0.01	0.158	0.154	0.156	3	n/c
Cadmium	mg/L	0.000005	0.00333	0.00291	0.00312	13	n/c
Calcium	mg/L	0.05	33.3	32.4	32.85	3	n/c
Cesium	mg/L	0.00001	0.00446	0.00273	0.003595	48	n/c
Chromium	mg/L	0.0001	0.0607	0.0404	0.05055	40	n/c
Cobalt	mg/L	0.0001	0.0386	0.0286	0.0336	30	n/c
Copper	mg/L	0.0005	0.128	0.101	0.1145	24	n/c
Iron	mg/L	0.01	76.9	51.4	64.15	40	n/c
Lead	mg/L	0.00005	0.0243	0.0198	0.02205	20	n/c
Lithium	mg/L	0.001	0.0479	0.0316	0.03975	41	n/c
Magnesium	mg/L	0.005	41.3	33.9	37.6	20	n/c
Manganese	mg/L	0.0001	2.27	1.78	2.025	24	n/c
Mercury	mg/L	0.000005	0.0000974	0.0000986	0.000098	1	n/c
Molybdenum	mg/L	0.00005	0.00118	0.00123	0.001205	4	n/c
Nickel	mg/L	0.0005	0.0855	0.0606	0.07305	34	n/c
Potassium	mg/L	0.05	15.8	15.6	15.7	1	n/c
Rubidium	mg/L	0.0002	0.0199	0.0135	0.0167	38	n/c
Selenium	mg/L	0.00005	0.00031	0.000197	0.0002535	45	n/c
Silicon	mg/L	0.1	67	47.7	57.35	34	n/c
Silver	mg/L	0.00001	0.000553	0.000289	0.000421	63	n/c
Sodium	mg/L	0.05	50.7	54	52.35	6	n/c
Strontium	mg/L	0.0002	0.313	0.304	0.3085	3	n/c
Sulphur	mg/L	0.5	0.96	0.6	0.78	n/c	0.72
Tellurium	mg/L	0.0002	< 0.00020	< 0.00020	n/c	n/c	0
Thallium	mg/L	0.00001	0.000204	0.000148	0.000176	32	n/c
Thorium	mg/L	0.0001	0.00228	0.00155	0.001915	38	n/c
Tin	mg/L	0.0001	0.0008	0.00044	0.00062	58	n/c
Titanium	mg/L	0.0003	0.278	0.272	0.275	2	n/c
Tungsten	mg/L	0.0001	< 0.00010	< 0.00010	n/c	n/c	0
Uranium	mg/L	0.00001	0.00388	0.00378	0.00383	3	n/c
Vanadium	mg/L	0.0005	0.107	0.0788	0.0929	30	n/c
Zinc	mg/L	0.003	0.263	0.199	0.231	28	n/c
Zirconium	mg/L	0.0012	< 0.00120	< 0.00020	n/c	n/c	0.83
Dissolved Metals							
Aluminum	mg/L	0.001	0.007	0.0077	0.00735	10	n/c
Antimony	mg/L	0.0001	0.00015	0.00016	0.000155	n/c	0.1
Arsenic	mg/L	0.0001	0.00516	0.0052	0.00518	1	n/c
Barium	mg/L	0.0001	0.0238	0.0281	0.02595	17	n/c
Beryllium	mg/L	0.0001	< 0.000100	< 0.000100	n/c	n/c	0
Bismuth	mg/L	0.00005	< 0.000050	< 0.000050	n/c	n/c	0
Boron	mg/L	0.01	0.131	0.128	0.1295	2	n/c
Cadmium	mg/L	0.000005	0.0000113	0.0000093	0.0000103	19	n/c
Cesium	mg/L	0.00001	< 0.000010	< 0.000010	n/c	n/c	0
Chromium	mg/L	0.0001	< 0.00010	< 0.00010	n/c	n/c	0
Cobalt	mg/L	0.0001	0.00013	0.00014	0.000135	n/c	0.1
Copper	mg/L	0.0002	0.00042	0.00504	0.00273	169	n/c
Iron	mg/L	0.01	< 0.010	< 0.010	n/c	n/c	0
Lead	mg/L	0.00005	< 0.000050	0.000112	0.000112	77	n/c
Lithium	mg/L	0.001	0.0017	0.0017	0.0017	n/c	0
Manganese	mg/L	0.0001	0.0976	0.0967	0.09715	1	n/c
Mercury	mg/L	0.000005	< 0.0000050	< 0.0000050	n/c	n/c	0
Molybdenum	mg/L	0.00005	0.00389	0.00389	0.00389	0	n/c
Nickel	mg/L	0.0005	< 0.00050	< 0.00050	n/c	n/c	0
Rubidium	mg/L	0.0002	0.00041	0.00042	0.000415	2	n/c
Selenium	mg/L	0.00005	< 0.000050	< 0.000050	n/c	n/c	0
Silicon	mg/L	0.05	4	4.05	4.025	1	n/c
Silver	mg/L	0.00001	< 0.000010	< 0.000010	n/c	n/c	0
Strontium	mg/L	0.0002	0.201	0.2	0.2005	0	n/c
Sulphur	mg/L	0.5	< 0.50	< 0.50	n/c	n/c	0
Tellurium	mg/L	0.0002	< 0.00020	< 0.00020	n/c	n/c	0
Thallium	mg/L	0.00001	< 0.000010	< 0.000010	n/c	n/c	0
Thorium	mg/L	0.0001	< 0.00010	< 0.00010	n/c	n/c	0
Tin	mg/L	0.0001	< 0.00010	< 0.00010	n/c	n/c	0
Titanium	mg/L	0.0003	< 0.00030	< 0.00030	n/c	n/c	0
Tungsten	mg/L	0.0001	0.00013	0.00013	0.00013	n/c	0
Uranium	mg/L	0.00001	0.00201	0.00206	0.002035	2	n/c
Vanadium	mg/L	0.0005	0.00119	0.00122	0.001205	2	n/c
Zinc	mg/L	0.001	< 0.0010	0.0026	n/c	89	n/c
Zirconium	mg/L	0.0002	< 0.00020	< 0.00020	n/c	n/c	0

Notes:

QA/QC = quality assurance/quality control; FDA =

Laboratory Reporting Limit indicates the minimum concentration that could be measured by

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-7d: Quality Control Analytical Results
2020 Thornhill Transfer Station Annual Monitoring Program
Regional District of Kitimat-Stikine

Sample Location Sample Name Sample Collection Date Sample Matrix	Units	RDL	SW-1 DUP 10/7/2020 WS	SW-1 SW-1 10/7/2020 WS	Mean	RPD (%)	DF (unitless)
Conventional Parameters							
Hardness, as CaCO ₃	mg/L	0.6	29.3	29.5	29.4	1	n/c
Hardness, as CaCO ₃ (Total)	mg/L	0.6	28.4	29.4	28.9	3	n/c
pH	pH units	0.1	7.46	7.48	7.47	0	n/c
Specific conductivity	uS/cm	2	61.7	61.1	61.4	1	n/c
Total alkalinity, as CaCO ₃	mg/L	1	30.6	29.2	29.9	5	n/c
Total suspended solids	mg/L	3	< 3.0	58.4	58.4	180	n/c
Major Ions							
Calcium	mg/L	0.05	10.5	10.6	10.55	1	n/c
Chloride	mg/L	0.5	< 0.50	< 0.50	n/c	n/c	0
Fluoride	mg/L	0.02	0.023	< 0.020	0.023	n/c	0.15
Magnesium	mg/L	0.005	0.75	0.749	0.7495	0	n/c
Potassium	mg/L	0.05	0.812	0.798	0.805	2	n/c
Sodium	mg/L	0.05	1.12	1.14	1.13	2	n/c
Sulphate	mg/L	0.3	0.96	0.96	0.96	0	n/c
Nutrients							
Biochemical oxygen demand	mg/L	2	< 2.0	< 2.0	n/c	n/c	0
Chemical oxygen demand	mg/L	20	< 20	< 20	n/c	n/c	0
Dissolved phosphorus	mg/L	0.05	< 0.050	< 0.050	n/c	n/c	0
Nitrate	mg/L	0.005	0.038	0.0483	0.04315	24	n/c
Nitrite	mg/L	0.001	< 0.0010	< 0.0010	n/c	n/c	0
Orthophosphate	mg/L	0.001	< 0.0010	0.0012	0.0012	n/c	0.2
Total ammonia	mg/L	0.005	0.0079	0.0136	0.01075	53	n/c
Total Kjeldahl nitrogen	mg/L	0.05	< 0.050	0.138	0.138	94	n/c
Total phosphorus	mg/L	0.05	< 0.050	< 0.050	n/c	n/c	0
Total phosphorus	mg/L	0.002	0.0021	< 0.0020	0.0021	n/c	0.05
Total Metals							
Aluminum	mg/L	0.003	0.0917	0.0988	0.09525	7	n/c
Antimony	mg/L	0.0001	< 0.00010	< 0.00010	n/c	n/c	0
Arsenic	mg/L	0.0001	< 0.00010	< 0.00010	n/c	n/c	0
Barium	mg/L	0.0001	0.0195	0.019	0.01925	3	n/c
Beryllium	mg/L	0.0001	< 0.000100	< 0.000100	n/c	n/c	0
Bismuth	mg/L	0.00005	< 0.000050	< 0.000050	n/c	n/c	0
Boron	mg/L	0.01	< 0.010	< 0.010	n/c	n/c	0
Cadmium	mg/L	0.000005	0.0000094	0.0000053	0.00000735	n/c	0.82
Calcium	mg/L	0.05	10.2	10.6	10.4	4	n/c
Cesium	mg/L	0.00001	< 0.000010	< 0.000010	n/c	n/c	0
Chromium	mg/L	0.0001	< 0.00010	0.00011	0.00011	n/c	0.1
Cobalt	mg/L	0.0001	< 0.00010	< 0.00010	n/c	n/c	0
Copper	mg/L	0.0005	0.00089	0.00089	0.00089	n/c	0
Iron	mg/L	0.01	0.07	0.084	0.077	18	n/c
Lead	mg/L	0.00005	< 0.000050	< 0.000050	n/c	n/c	0
Lithium	mg/L	0.001	< 0.0010	< 0.0010	n/c	n/c	0
Magnesium	mg/L	0.005	0.702	0.693	0.6975	1	n/c
Manganese	mg/L	0.0001	0.00462	0.00492	0.00477	6	n/c
Mercury	mg/L	0.000005	< 0.0000050	< 0.0000050	n/c	n/c	0
Molybdenum	mg/L	0.00005	0.000404	0.000414	0.000409	2	n/c
Nickel	mg/L	0.0005	< 0.00050	< 0.00050	n/c	n/c	0
Potassium	mg/L	0.05	0.736	0.72	0.728	2	n/c
Rubidium	mg/L	0.0002	0.0008	0.00095	0.000875	17	n/c
Selenium	mg/L	0.00005	0.000074	< 0.000050	0.000074	n/c	0.48
Silicon	mg/L	0.1	2.87	2.9	2.885	1	n/c
Silver	mg/L	0.00001	< 0.000010	< 0.000010	n/c	n/c	0
Sodium	mg/L	0.05	1.06	1.03	1.045	3	n/c
Strontium	mg/L	0.0002	0.0415	0.0419	0.0417	1	n/c
Sulphur	mg/L	0.5	< 0.50	< 0.50	n/c	n/c	0
Tellurium	mg/L	0.0002	< 0.00020	< 0.00020	n/c	n/c	0
Thallium	mg/L	0.00001	< 0.000010	< 0.000010	n/c	n/c	0
Thorium	mg/L	0.0001	< 0.00010	< 0.00010	n/c	n/c	0
Tin	mg/L	0.0001	< 0.00010	< 0.00010	n/c	n/c	0
Titanium	mg/L	0.0003	0.0028	0.00364	0.00322	26	n/c
Tungsten	mg/L	0.0001	< 0.00010	< 0.00010	n/c	n/c	0
Uranium	mg/L	0.00001	0.000021	0.000022	0.0000215	5	n/c
Vanadium	mg/L	0.0005	0.00057	0.00063	0.0006	n/c	0.12
Zinc	mg/L	0.003	0.0031	< 0.0030	0.0031	n/c	0.033
Zirconium	mg/L	0.0002	< 0.00020	< 0.00020	n/c	n/c	0
Dissolved Metals							
Aluminum	mg/L	0.001	0.0378	0.0382	0.038	1	n/c
Antimony	mg/L	0.0001	< 0.00010	< 0.00010	n/c	n/c	0
Arsenic	mg/L	0.0001	< 0.00010	< 0.00010	n/c	n/c	0
Barium	mg/L	0.0001	0.02	0.019	0.0195	5	n/c
Beryllium	mg/L	0.0001	< 0.000100	< 0.000100	n/c	n/c	0
Bismuth	mg/L	0.00005	< 0.000050	< 0.000050	n/c	n/c	0
Boron	mg/L	0.01	< 0.010	< 0.010	n/c	n/c	0
Cadmium	mg/L	0.000005	< 0.0000050	< 0.0000050	n/c	n/c	0
Cesium	mg/L	0.00001	< 0.000010	< 0.000010	n/c	n/c	0
Chromium	mg/L	0.0001	0.0002	< 0.00010	0.0002	n/c	1
Cobalt	mg/L	0.0001	< 0.00010	< 0.00010	n/c	n/c	0
Copper	mg/L	0.0002	0.0008	0.00074	0.00077	8	n/c
Iron	mg/L	0.01	0.016	0.015	0.0155	n/c	0.1
Lead	mg/L	0.00005	< 0.000050	< 0.000050	n/c	n/c	0
Lithium	mg/L	0.001	< 0.0010	< 0.0010	n/c	n/c	0
Manganese	mg/L	0.0001	0.00214	0.00214	0.00214	0	n/c
Mercury	mg/L	0.000005	< 0.0000050	< 0.0000050	n/c	n/c	0
Molybdenum	mg/L	0.00005	0.000398	0.000427	0.0004125	7	n/c
Nickel	mg/L	0.0005	< 0.00050	< 0.00050	n/c	n/c	0
Rubidium	mg/L	0.0002	0.00093	0.00079	0.00086	16	n/c
Selenium	mg/L	0.00005	< 0.000050	< 0.000050	n/c	n/c	0
Silicon	mg/L	0.05	2.58	2.65	2.615	3	n/c
Silver	mg/L	0.00001	< 0.000010	< 0.000010	n/c	n/c	0
Strontium	mg/L	0.0002	0.0466	0.0449	0.04575	4	n/c
Sulphur	mg/L	0.5	< 0.50	< 0.50	n/c	n/c	0
Tellurium	mg/L	0.0002	< 0.00020	< 0.00020	n/c	n/c	0
Thallium	mg/L	0.00001	< 0.000010	< 0.000010	n/c	n/c	0
Thorium	mg/L	0.0001	< 0.00010	< 0.00010	n/c	n/c	0
Tin	mg/L	0.0001	< 0.00010	< 0.00010	n/c	n/c	0
Titanium	mg/L	0.0003	0.00032	0.00042	0.00037	n/c	0.33
Tungsten	mg/L	0.0001	< 0.00010	< 0.00010	n/c	n/c	0
Uranium	mg/L	0.00001	0.00002	0.000021	0.0000205	5	n/c
Vanadium	mg/L	0.0005	< 0.00050	< 0.00050	n/c	n/c	0
Zinc	mg/L	0.001	< 0.0010	0.0019	0.0019	n/c	0.9
Zirconium	mg/L	0.0002	< 0.00020	< 0.00020	n/c	n/c	0

Notes:
 QA/QC = quality assurance/quality control; FDA
 Laboratory Reporting Limit indicates the minimum concentration that could be measured
 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
 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

2020 Certificates of Analysis

CERTIFICATE OF ANALYSIS

Work Order : **VA20A5787**
Client : **Regional District of Kitimat-Stikine**
Contact : **Mary Tress**
Address : **# 300 - 4545 Lazelle Avenue**
 Terrace BC Canada V8G 4E1
Telephone : **----**
Project : **Thornhill Groundwater**
PO : **----**
C-O-C number : **----**
Sampler : **Mary Tress**
Site :
Quote number : **Q62338**
No. of samples received : **3**
No. of samples analysed : **3**

Page : **1 of 6**
Laboratory : **Vancouver - Environmental**
Account Manager : **Amber Springer**
Address : **8081 Lougheed Highway**
 Burnaby BC Canada V5A 1W9
Telephone : **+1 604 253 4188**
Date Samples Received : **04-May-2020 09:45**
Date Analysis Commenced : **04-May-2020**
Issue Date : **11-May-2020 14:32**

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Bruna Botti	Analyst	Inorganics - Water Quality, Burnaby, British Columbia
Caitlin Macey	Team Leader - Inorganics	Inorganics - Water Quality, Burnaby, British Columbia
Evan Ben-Oliel	Metal Analyst	Metals, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	Inorganics - Water Quality, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Inorganics - Water Quality, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Shaneel Dayal	Metal Analyst	Metals, Burnaby, British Columbia



General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

<i>Unit</i>	<i>Description</i>
-	No Unit
µS/cm	Microsiemens per centimetre
mg/L	milligrams per litre
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in reports identified as "**Preliminary Report**" are considered authorized for use.

Qualifiers

<i>Qualifier</i>	<i>Description</i>
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.
DTMF	Dissolved concentration exceeds total for field-filtered metals sample. Metallic contaminants may have been introduced to dissolved sample during field filtration.



Analytical Results

Sub-Matrix: Water					Client sample ID		BH-96-2	DUP	Travel Blank	----	----
(Matrix: Water)					Client sampling date / time		30-Apr-2020 14:30	30-Apr-2020 12:00	30-Apr-2020	----	----
Analyte	CAS Number	Method	LOR	Unit	VA20A5787-001	VA20A5787-002	VA20A5787-003	-----	-----		
					Result	Result	Result	----	----		
Physical Tests											
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	231	232	<1.0	----	----		
conductivity	----	E100	2.0	µS/cm	393	394	<2.0	----	----		
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L	253	221	<0.60	----	----		
pH	----	E108	0.10	pH units	8.28	8.26	5.41	----	----		
solids, total dissolved [TDS]	----	E162	10	mg/L	604	596	<10	----	----		
hardness (as CaCO3), dissolved	----	EC100	0.60	mg/L	107	108	----	----	----		
Anions and Nutrients											
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.245	0.239	<0.0050	----	----		
bromide	24959-67-9	E235.Br-L	0.050	mg/L	<0.050	<0.050	<0.050	----	----		
chloride	16887-00-6	E235.Cl	0.50	mg/L	0.56	0.57	<0.50	----	----		
fluoride	16984-48-8	E235.F	0.020	mg/L	0.179	0.176	<0.020	----	----		
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	1.46	1.44	<0.050	----	----		
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.0361	0.0404	<0.0050	----	----		
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	0.0176	0.0226	<0.0010	----	----		
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	1.48	1.54	<0.0020	----	----		
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	2.18	2.22	<0.30	----	----		
Total Metals											
aluminum, total	7429-90-5	E420	0.0030	mg/L	52.2	36.9	<0.0030	----	----		
antimony, total	7440-36-0	E420	0.00010	mg/L	0.00046	0.00043	<0.00010	----	----		
arsenic, total	7440-38-2	E420	0.00010	mg/L	0.0183	0.0170	<0.00010	----	----		
barium, total	7440-39-3	E420	0.00010	mg/L	0.338	0.263	<0.00010	----	----		
beryllium, total	7440-41-7	E420	0.000100	mg/L	0.00112	0.000970	<0.000100	----	----		
bismuth, total	7440-69-9	E420	0.000050	mg/L	0.000431	0.000223	<0.000050	----	----		
boron, total	7440-42-8	E420	0.010	mg/L	0.158	0.154	<0.010	----	----		
cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.00333	0.00291	<0.0000050	----	----		
calcium, total	7440-70-2	E420	0.050	mg/L	33.3	32.4	<0.050	----	----		
cesium, total	7440-46-2	E420	0.000010	mg/L	0.00446	0.00273	<0.000010	----	----		
chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L	0.0607	0.0404	<0.00010	----	----		
cobalt, total	7440-48-4	E420	0.00010	mg/L	0.0386	0.0286	<0.00010	----	----		
copper, total	7440-50-8	E420	0.00050	mg/L	0.128	0.101	<0.00050	----	----		



Analytical Results

Sub-Matrix: Water					Client sample ID	BH-96-2	DUP	Travel Blank	----	----
(Matrix: Water)					Client sampling date / time	30-Apr-2020 14:30	30-Apr-2020 12:00	30-Apr-2020	----	----
Analyte	CAS Number	Method	LOR	Unit	VA20A5787-001	VA20A5787-002	VA20A5787-003	-----	-----	
					Result	Result	Result	---	---	
Total Metals										
iron, total	7439-89-6	E420	0.010	mg/L	76.9	51.4	<0.010	----	----	
lead, total	7439-92-1	E420	0.000050	mg/L	0.0243	0.0198	<0.000050	----	----	
lithium, total	7439-93-2	E420	0.0010	mg/L	0.0479	0.0316	<0.0010	----	----	
magnesium, total	7439-95-4	E420	0.0050	mg/L	41.3	33.9	<0.0050	----	----	
manganese, total	7439-96-5	E420	0.00010	mg/L	2.27	1.78	<0.00010	----	----	
mercury, total	7439-97-6	E508	0.0000050	mg/L	0.0000974	0.0000986	<0.0000050	----	----	
molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00118	0.00123	<0.000050	----	----	
nickel, total	7440-02-0	E420	0.00050	mg/L	0.0855	0.0606	<0.00050	----	----	
phosphorus, total	7723-14-0	E420	0.050	mg/L	1.34	1.36	<0.050	----	----	
potassium, total	7440-09-7	E420	0.050	mg/L	15.8	15.6	<0.050	----	----	
rubidium, total	7440-17-7	E420	0.00020	mg/L	0.0199	0.0135	<0.00020	----	----	
selenium, total	7782-49-2	E420	0.000050	mg/L	0.000310	0.000197	<0.000050	----	----	
silicon, total	7440-21-3	E420	0.10	mg/L	67.0	47.7	<0.10	----	----	
silver, total	7440-22-4	E420	0.000010	mg/L	0.000553	0.000289	<0.000010	----	----	
sodium, total	7440-23-5	E420	0.050	mg/L	50.7	54.0	<0.050	----	----	
strontium, total	7440-24-6	E420	0.00020	mg/L	0.313	0.304	<0.00020	----	----	
sulfur, total	7704-34-9	E420	0.50	mg/L	0.96	0.60	<0.50	----	----	
tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	<0.00020	----	----	
thallium, total	7440-28-0	E420	0.000010	mg/L	0.000204	0.000148	<0.000010	----	----	
thorium, total	7440-29-1	E420	0.00010	mg/L	0.00228	0.00155	<0.00010	----	----	
tin, total	7440-31-5	E420	0.00010	mg/L	0.00080	0.00044	<0.00010	----	----	
titanium, total	7440-32-6	E420	0.00030	mg/L	0.278	0.272	<0.00030	----	----	
tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	----	----	
uranium, total	7440-61-1	E420	0.000010	mg/L	0.00388	0.00378	<0.000010	----	----	
vanadium, total	7440-62-2	E420	0.00050	mg/L	0.107	0.0788	<0.00050	----	----	
zinc, total	7440-66-6	E420	0.0030	mg/L	0.263	0.199	<0.0030	----	----	
zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00120 ^{DLM}	<0.00020	<0.00020	----	----	
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0070	0.0077	----	----	----	
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00015	0.00016	----	----	----	
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00516	0.00520	----	----	----	



Analytical Results

Sub-Matrix: Water					Client sample ID	BH-96-2	DUP	Travel Blank	----	----
(Matrix: Water)										
Client sampling date / time					30-Apr-2020 14:30	30-Apr-2020 12:00	30-Apr-2020	----	----	
Analyte	CAS Number	Method	LOR	Unit	VA20A5787-001	VA20A5787-002	VA20A5787-003	-----	-----	
					Result	Result	Result	---	---	
Dissolved Metals										
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0238	0.0281	----	----	----	
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<0.000100	----	----	----	
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	----	----	----	
boron, dissolved	7440-42-8	E421	0.010	mg/L	0.131	0.128	----	----	----	
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.0000113	0.0000093	----	----	----	
calcium, dissolved	7440-70-2	E421	0.050	mg/L	16.1	15.8	----	----	----	
cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.000010	<0.000010	----	----	----	
chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L	<0.00010	<0.00010	----	----	----	
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	0.00013	0.00014	----	----	----	
copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00042	0.00504	----	----	----	
iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	----	----	----	
lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	0.000112	----	----	----	
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0017	0.0017	----	----	----	
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	16.4	16.7	----	----	----	
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.0976	0.0967	----	----	----	
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	----	----	----	
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00389 ^{DTC}	0.00389 ^{DTMF}	----	----	----	
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	----	----	----	
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	<0.050	----	----	----	
potassium, dissolved	7440-09-7	E421	0.050	mg/L	11.6	11.2	----	----	----	
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00041	0.00042	----	----	----	
selenium, dissolved	7782-49-2	E421	0.000050	mg/L	<0.000050	<0.000050	----	----	----	
silicon, dissolved	7440-21-3	E421	0.050	mg/L	4.00	4.05	----	----	----	
silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	----	----	----	
sodium, dissolved	7440-23-5	E421	0.050	mg/L	44.4	45.8	----	----	----	
strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.201	0.200	----	----	----	
sulfur, dissolved	7704-34-9	E421	0.50	mg/L	<0.50	<0.50	----	----	----	
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<0.00020	----	----	----	
thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	----	----	----	
thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	----	----	----	
tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	----	----	----	



Analytical Results

Sub-Matrix: Water

Client sample ID

(Matrix: Water)

					BH-96-2	DUP	Travel Blank	----	----
					30-Apr-2020 14:30	30-Apr-2020 12:00	30-Apr-2020	----	----
Analyte	CAS Number	Method	LOR	Unit	VA20A5787-001	VA20A5787-002	VA20A5787-003	-----	-----
					Result	Result	Result	---	---
Dissolved Metals									
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	----	----	----
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	0.00013	0.00013	----	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.00201	0.00206	----	----	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	0.00119	0.00122	----	----	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	<0.0010	0.0026	----	----	----
zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	<0.00020	<0.00020	----	----	----
dissolved mercury filtration location	----	EP509	-	-	Field	Field	----	----	----
dissolved metals filtration location	----	EP421	-	-	Field	Field	----	----	----
Aggregate Organics									
chemical oxygen demand [COD]	----	E559	20	mg/L	33	53	<20	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

CERTIFICATE OF ANALYSIS

Work Order : **VA20A5788**
Client : **Regional District of Kitimat-Stikine**
Contact : **Mary Tress**
Address : **# 300 - 4545 Lazelle Avenue**
 Terrace BC Canada V8G 4E1
Telephone : **----**
Project : **Thornhill Transfer Station Surface Water**
PO : **----**
C-O-C number : **----**
Sampler : **Mary Tress**
Site :
Quote number : **Q62338**
No. of samples received : **7**
No. of samples analysed : **7**

Page : **1 of 10**
Laboratory : **Vancouver - Environmental**
Account Manager : **Amber Springer**
Address : **8081 Lougheed Highway**
 Burnaby BC Canada V5A 1W9
Telephone : **+1 604 253 4188**
Date Samples Received : **04-May-2020 09:45**
Date Analysis Commenced : **04-May-2020**
Issue Date : **11-May-2020 14:35**

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Bruna Botti	Analyst	Inorganics - Water Quality, Burnaby, British Columbia
Caitlin Macey	Team Leader - Inorganics	Inorganics - Water Quality, Burnaby, British Columbia
Cristina Alexandre	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Evan Ben-Oliel	Metal Analyst	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics - Water Quality, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Shaneel Dayal	Metal Analyst	Metals, Burnaby, British Columbia



General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

<i>Unit</i>	<i>Description</i>
-	No Unit
µS/cm	Microsiemens per centimetre
mg/L	milligrams per litre
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in reports identified as "Preliminary Report" are considered authorized for use.

Qualifiers

<i>Qualifier</i>	<i>Description</i>
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
RRV	Reported result verified by repeat analysis.



Analytical Results

Sub-Matrix: Water					Client sample ID				
(Matrix: Water)					SW-1	SW-3	SW-6	SW-21	SW-17
Client sampling date / time					30-Apr-2020 11:30	30-Apr-2020 13:00	30-Apr-2020 08:50	30-Apr-2020 12:05	30-Apr-2020 09:45
Analyte	CAS Number	Method	LOR	Unit	VA20A5788-001	VA20A5788-002	VA20A5788-003	VA20A5788-004	VA20A5788-005
					Result	Result	Result	Result	Result
Physical Tests									
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	22.5	960	43.5	473	37.2
conductivity	----	E100	2.0	µS/cm	47.8	1900	93.1	1030	79.8
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L	23.4	586	46.6	356	38.9
pH	----	E108	0.10	pH units	7.48	6.88	7.84	8.18	7.74
solids, total suspended [TSS]	----	E160-H	3.0	mg/L	<3.0	78.6	3.4	3.6	3.4
hardness (as CaCO3), dissolved	----	EC100	0.60	mg/L	23.2	552	43.3	335	36.7
Anions and Nutrients									
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	<0.0050	60.6	0.0110	24.2	0.0213
bromide	24959-67-9	E235.Br-L	0.050	mg/L	<0.050	0.573	<0.050	0.341	<0.050
chloride	16887-00-6	E235.Cl	0.50	mg/L	<0.50	78.7	0.58	42.6	0.60
fluoride	16984-48-8	E235.F	0.020	mg/L	0.023	<0.200 ^{DLDS}	0.024	<0.100 ^{DLDS}	0.024
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	<0.050	63.0	0.086	22.2	0.098
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.0168	<0.0500 ^{DLDS}	0.0821	4.74	0.119
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0010	<0.0100 ^{DLDS}	0.0013	0.102	0.0017
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	<0.0020	0.248	0.0056	0.0422	0.0062
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	0.94	<3.00 ^{DLDS}	1.44	4.98	1.36
Total Metals									
aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0460	0.0320	0.160	0.0772	0.124
antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	0.00011	<0.00010	0.00011	<0.00010
arsenic, total	7440-38-2	E420	0.00010	mg/L	<0.00010	0.00912	0.00012	0.00072	0.00011
barium, total	7440-39-3	E420	0.00010	mg/L	0.0140	0.788	0.0146	0.144	0.0147
beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
boron, total	7440-42-8	E420	0.010	mg/L	<0.010	1.89	<0.010	1.17	<0.010
cadmium, total	7440-43-9	E420	0.0000050	mg/L	<0.0000050	0.0000081	<0.0000050	0.0000185	<0.0000050
calcium, total	7440-70-2	E420	0.050	mg/L	8.40	177	17.4	109	14.3
cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	0.000240	0.000013	0.000104	0.000011
chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L	<0.00010	0.00100	0.00022	0.00044	0.00019
cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	0.00267	0.00011	0.00135	<0.00010



Analytical Results

Sub-Matrix: Water

Client sample ID

(Matrix: Water)

					SW-1	SW-3	SW-6	SW-21	SW-17
Client sampling date / time					30-Apr-2020 11:30	30-Apr-2020 13:00	30-Apr-2020 08:50	30-Apr-2020 12:05	30-Apr-2020 09:45
Analyte	CAS Number	Method	LOR	Unit	VA20A5788-001	VA20A5788-002	VA20A5788-003	VA20A5788-004	VA20A5788-005
					Result	Result	Result	Result	Result
Total Metals									
copper, total	7440-50-8	E420	0.00050	mg/L	0.00075	0.00064	0.00119	0.00223	0.00090
iron, total	7439-89-6	E420	0.010	mg/L	0.027	44.7	0.186	0.368	0.140
lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
lithium, total	7439-93-2	E420	0.0010	mg/L	<0.0010	0.0022	<0.0010	<0.0010	<0.0010
magnesium, total	7439-95-4	E420	0.0050	mg/L	0.592	35.2	0.752	20.3	0.772
manganese, total	7439-96-5	E420	0.00010	mg/L	0.00141	4.21	0.0107	0.430	0.00819
mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000245	0.000259	0.000428	0.000584	0.000326
nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	0.00508	<0.00050	0.00313	<0.00050
phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	0.271	<0.050	<0.050	<0.050
potassium, total	7440-09-7	E420	0.050	mg/L	0.582	68.0	0.749	34.4	0.831
rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00060	0.0474	0.00092	0.0220	0.00092
selenium, total	7782-49-2	E420	0.000050	mg/L	<0.000050	0.000118	0.000058	0.000070	<0.000050
silicon, total	7440-21-3	E420	0.10	mg/L	2.29	11.6	2.87	5.59	3.09
silver, total	7440-22-4	E420	0.000010	mg/L	0.000020	<0.000010	<0.000010	<0.000010	<0.000010
sodium, total	7440-23-5	E420	0.050	mg/L	0.931	113	1.16	65.8	1.29
strontium, total	7440-24-6	E420	0.00020	mg/L	0.0332	1.15	0.0387	0.649	0.0436
sulfur, total	7704-34-9	E420	0.50	mg/L	<0.50	0.94	<0.50	2.66	<0.50
tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	0.00016	<0.00010	0.00018	<0.00010
titanium, total	7440-32-6	E420	0.00030	mg/L	0.00068	0.00194	0.00548	0.00170	0.00422
tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
uranium, total	7440-61-1	E420	0.000010	mg/L	0.000015	0.000085	0.000068	0.000211	0.000060
vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	0.00162	0.00072	<0.00050	0.00069
zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	0.00042	<0.00020	<0.00020	<0.00020
Dissolved Metals									
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0310	0.0061	0.0335	0.0112	0.0322
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00010	0.00011	<0.00010	<0.00010	<0.00010



Analytical Results

Sub-Matrix: Water					Client sample ID	SW-1	SW-3	SW-6	SW-21	SW-17
(Matrix: Water)										
Client sampling date / time					30-Apr-2020 11:30	30-Apr-2020 13:00	30-Apr-2020 08:50	30-Apr-2020 12:05	30-Apr-2020 09:45	
Analyte	CAS Number	Method	LOR	Unit	VA20A5788-001	VA20A5788-002	VA20A5788-003	VA20A5788-004	VA20A5788-005	
					Result	Result	Result	Result	Result	
Dissolved Metals										
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	<0.00010	0.00850	<0.00010	0.00067	<0.00010	
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0132	0.741	0.0134	0.154	0.0145	
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	
boron, dissolved	7440-42-8	E421	0.010	mg/L	<0.010	1.69	<0.010	1.16	<0.010	
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0000050	0.0000089	<0.0000050	0.0000166	<0.0000050	
calcium, dissolved	7440-70-2	E421	0.050	mg/L	8.39	165	16.2	104	13.6	
cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.000010	0.000260	<0.000010	0.000107	<0.000010	
chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L	0.00012	0.00096	<0.00010	0.00037	<0.00010	
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	0.00250	<0.00010	0.00123	<0.00010	
copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00064	<0.00020	0.00064	0.00189	0.00081	
iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	38.7	0.038	0.114	0.032	
lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	<0.0010	0.0020	<0.0010	<0.0010	<0.0010	
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	0.542	34.0	0.669	18.1	0.675	
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00065	4.00	0.00538	0.398	0.00387	
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000226	0.000356	0.000449	0.000553	0.000358	
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	0.00511	<0.00050	0.00299	<0.00050	
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	
potassium, dissolved	7440-09-7	E421	0.050	mg/L	0.549	64.3	0.694	32.8	0.818	
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00060	0.0455	0.00076	0.0208	0.00086	
selenium, dissolved	7782-49-2	E421	0.000050	mg/L	<0.000050	0.000126	0.000099	0.000148	0.000072	
silicon, dissolved	7440-21-3	E421	0.050	mg/L	2.22	10.8	2.64	5.38	2.95	
silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	
sodium, dissolved	7440-23-5	E421	0.050	mg/L	0.876	109	1.06	60.1	1.23	
strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.0307	1.15	0.0391	0.613	0.0424	
sulfur, dissolved	7704-34-9	E421	0.50	mg/L	<0.50	0.82	<0.50	2.70	<0.50	
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	
thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	
thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	



Analytical Results

Sub-Matrix: Water					Client sample ID	SW-1	SW-3	SW-6	SW-21	SW-17
(Matrix: Water)										
Client sampling date / time					30-Apr-2020 11:30	30-Apr-2020 13:00	30-Apr-2020 08:50	30-Apr-2020 12:05	30-Apr-2020 09:45	
Analyte	CAS Number	Method	LOR	Unit	VA20A5788-001	VA20A5788-002	VA20A5788-003	VA20A5788-004	VA20A5788-005	
					Result	Result	Result	Result	Result	
Dissolved Metals										
tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	0.00020	<0.00010	0.00017	<0.00010	
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	0.00063	0.00056	0.00033	0.00062	
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000012	0.000072	0.000057	0.000176	0.000041	
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	0.00068	<0.00050	<0.00050	<0.00050	
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	<0.00020	0.00036	<0.00020	<0.00020	<0.00020	
dissolved mercury filtration location	----	EP509	-	-	Field	Field	Field	Field	Field	
dissolved metals filtration location	----	EP421	-	-	Field	Field	Field	Field	Field	
Aggregate Organics										
biochemical oxygen demand [BOD]	----	E550	2.0	mg/L	<2.0	9.4	<2.0	4.6	<2.0	
chemical oxygen demand [COD]	----	E559	20	mg/L	<20	113	<20	54	<20	

Please refer to the General Comments section for an explanation of any qualifiers detected.



Analytical Results

Sub-Matrix: Water					Client sample ID	DUP	Field Blank	----	----	----
(Matrix: Water)					Client sampling date / time	30-Apr-2020 12:00	30-Apr-2020 12:00	---	---	---
Analyte	CAS Number	Method	LOR	Unit	VA20A5788-006	VA20A5788-007	-----	-----	-----	
					Result	Result	---	---	---	
Physical Tests										
alkalinity, total (as CaCO3)	---	E290	1.0	mg/L	950	<1.0	---	---	---	
conductivity	---	E100	2.0	µS/cm	1910	<2.0	---	---	---	
hardness (as CaCO3), from total Ca/Mg	---	EC100A	0.60	mg/L	604	<0.60	---	---	---	
pH	---	E108	0.10	pH units	7.01	5.84	---	---	---	
solids, total suspended [TSS]	---	E160-H	3.0	mg/L	65.6	<3.0	---	---	---	
hardness (as CaCO3), dissolved	---	EC100	0.60	mg/L	525	<0.60	---	---	---	
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	59.2	0.0064 ^{RRV}	---	---	---	
bromide	24959-67-9	E235.Br-L	0.050	mg/L	0.567	<0.050	---	---	---	
chloride	16887-00-6	E235.Cl	0.50	mg/L	79.9	<0.50	---	---	---	
fluoride	16984-48-8	E235.F	0.020	mg/L	<0.200 ^{DLDS}	<0.020	---	---	---	
Kjeldahl nitrogen, total [TKN]	---	E318	0.050	mg/L	59.3	<0.050	---	---	---	
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	<0.0500 ^{DLDS}	<0.0050	---	---	---	
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0100 ^{DLDS}	<0.0010	---	---	---	
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	---	---	---	
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.222	<0.0020	---	---	---	
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	<3.00 ^{DLDS}	<0.30	---	---	---	
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0394	<0.0030	---	---	---	
antimony, total	7440-36-0	E420	0.00010	mg/L	0.00012	<0.00010	---	---	---	
arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00882	<0.00010	---	---	---	
barium, total	7440-39-3	E420	0.00010	mg/L	0.797	<0.00010	---	---	---	
beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	---	---	---	
bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	---	---	---	
boron, total	7440-42-8	E420	0.010	mg/L	1.98	<0.010	---	---	---	
cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.0000160	<0.0000050	---	---	---	
calcium, total	7440-70-2	E420	0.050	mg/L	182	<0.050	---	---	---	
cesium, total	7440-46-2	E420	0.000010	mg/L	0.000233	<0.000010	---	---	---	
chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L	0.00113	<0.00010	---	---	---	
cobalt, total	7440-48-4	E420	0.00010	mg/L	0.00276	<0.00010	---	---	---	
copper, total	7440-50-8	E420	0.00050	mg/L	0.00066	<0.00050	---	---	---	



Analytical Results

Sub-Matrix: Water

Client sample ID

(Matrix: Water)

					DUP	Field Blank	----	----	----
					30-Apr-2020 12:00	30-Apr-2020 12:00	---	---	---
Analyte	CAS Number	Method	LOR	Unit	VA20A5788-006	VA20A5788-007	-----	-----	-----
					Result	Result	---	---	---
Total Metals									
iron, total	7439-89-6	E420	0.010	mg/L	42.6	<0.010	----	----	----
lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	----	----	----
lithium, total	7439-93-2	E420	0.0010	mg/L	0.0022	<0.0010	----	----	----
magnesium, total	7439-95-4	E420	0.0050	mg/L	36.5	<0.0050	----	----	----
manganese, total	7439-96-5	E420	0.00010	mg/L	4.24	<0.00010	----	----	----
mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	----	----	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000256	<0.000050	----	----	----
nickel, total	7440-02-0	E420	0.00050	mg/L	0.00533	<0.00050	----	----	----
phosphorus, total	7723-14-0	E420	0.050	mg/L	0.215	<0.050	----	----	----
potassium, total	7440-09-7	E420	0.050	mg/L	66.3	<0.050	----	----	----
rubidium, total	7440-17-7	E420	0.00020	mg/L	0.0454	<0.00020	----	----	----
selenium, total	7782-49-2	E420	0.000050	mg/L	0.000090	<0.000050	----	----	----
silicon, total	7440-21-3	E420	0.10	mg/L	11.6	<0.10	----	----	----
silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	----	----	----
sodium, total	7440-23-5	E420	0.050	mg/L	113	<0.050	----	----	----
strontium, total	7440-24-6	E420	0.00020	mg/L	1.15	<0.00020	----	----	----
sulfur, total	7704-34-9	E420	0.50	mg/L	0.92	<0.50	----	----	----
tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	----	----	----
thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	----	----	----
thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	----	----	----
tin, total	7440-31-5	E420	0.00010	mg/L	0.00014	<0.00010	----	----	----
titanium, total	7440-32-6	E420	0.00030	mg/L	0.00232	<0.00030	----	----	----
tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	----	----	----
uranium, total	7440-61-1	E420	0.000010	mg/L	0.000093	<0.000010	----	----	----
vanadium, total	7440-62-2	E420	0.00050	mg/L	0.00156	<0.00050	----	----	----
zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	----	----	----
zirconium, total	7440-67-7	E420	0.00020	mg/L	0.00041	<0.00020	----	----	----
Dissolved Metals									
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0058	<0.0010	----	----	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00010	<0.00010	----	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00868	<0.00010	----	----	----



Analytical Results

Sub-Matrix: Water					Client sample ID	DUP	Field Blank	----	----	----
(Matrix: Water)										
Client sampling date / time					30-Apr-2020 12:00	30-Apr-2020 12:00	---	---	---	---
Analyte	CAS Number	Method	LOR	Unit	VA20A5788-006	VA20A5788-007	-----	-----	-----	-----
					Result	Result	---	---	---	---
Dissolved Metals										
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.730	<0.00010	----	----	----	----
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<0.000100	----	----	----	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	----	----	----	----
boron, dissolved	7440-42-8	E421	0.010	mg/L	1.75	<0.010	----	----	----	----
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.0000077	<0.0000050	----	----	----	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L	158	<0.050	----	----	----	----
cesium, dissolved	7440-46-2	E421	0.000010	mg/L	0.000233	<0.000010	----	----	----	----
chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L	0.00083	<0.00010	----	----	----	----
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	0.00244	<0.00010	----	----	----	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00020	<0.00020	----	----	----	----
iron, dissolved	7439-89-6	E421	0.010	mg/L	36.2	<0.010	----	----	----	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	----	----	----	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0020	<0.0010	----	----	----	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	31.5	<0.0050	----	----	----	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	4.03	<0.00010	----	----	----	----
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	----	----	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000298	<0.000050	----	----	----	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00486	<0.00050	----	----	----	----
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	<0.050	----	----	----	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L	63.7	<0.050	----	----	----	----
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.0469	<0.00020	----	----	----	----
selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.000183	<0.000050	----	----	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L	11.0	<0.050	----	----	----	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	----	----	----	----
sodium, dissolved	7440-23-5	E421	0.050	mg/L	103	<0.050	----	----	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L	1.02	<0.00020	----	----	----	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L	0.87	<0.50	----	----	----	----
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<0.00020	----	----	----	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	----	----	----	----
thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	----	----	----	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L	0.00015	<0.00010	----	----	----	----



Analytical Results

Sub-Matrix: Water

(Matrix: Water)

					Client sample ID	DUP	Field Blank	----	----	----
					Client sampling date / time	30-Apr-2020 12:00	30-Apr-2020 12:00	---	---	---
Analyte	CAS Number	Method	LOR	Unit	VA20A5788-006	VA20A5788-007	-----	-----	-----	
					Result	Result	---	---	---	
Dissolved Metals										
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	0.00073	<0.00030	----	----	----	
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	<0.00010	----	----	----	
uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000059	<0.000010	----	----	----	
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	0.00072	<0.00050	----	----	----	
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	<0.0010	<0.0010	----	----	----	
zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	0.00033	<0.00020	----	----	----	
dissolved mercury filtration location	----	EP509	-	-	Field	Field	----	----	----	
dissolved metals filtration location	----	EP421	-	-	Field	Field	----	----	----	
Aggregate Organics										
biochemical oxygen demand [BOD]	----	E550	2.0	mg/L	8.0	<2.0	----	----	----	
chemical oxygen demand [COD]	----	E559	20	mg/L	105	<20	----	----	----	

Please refer to the General Comments section for an explanation of any qualifiers detected.



CERTIFICATE OF ANALYSIS

Work Order : **VA20B4492**
Client : **Regional District of Kitimat-Stikine**
Contact : **Mary Tress**
Address : **# 300 - 4545 Lazelle Avenue**
Terrace BC Canada V8G 4E1
Telephone : **----**
Project : **Thornhill Groundwater**
PO : **----**
C-O-C number : **----**
Sampler : **Mary Tress**
Site :
Quote number : **Q62338**
No. of samples received : **1**
No. of samples analysed : **1**

Page : **1 of 6**
Laboratory : **Vancouver - Environmental**
Account Manager : **Amber Springer**
Address : **8081 Lougheed Highway**
Burnaby BC Canada V5A 1W9
Telephone : **+1 604 253 4188**
Date Samples Received : **04-Sep-2020 12:20**
Date Analysis Commenced : **05-Sep-2020**
Issue Date : **14-Sep-2020 17:42**

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Annabelle Prasad	Analyst	Metals, Burnaby, British Columbia
Bruna Botti	Team Leader - Inorganics	Inorganics - Water Quality, Burnaby, British Columbia
Cristina Alexandre	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Dan Gebert	Laboratory Analyst	Metals, Burnaby, British Columbia
Dee Lee	Analyst	Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics - Water Quality, Burnaby, British Columbia
Owen Cheng		Metals, Burnaby, British Columbia



General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

<i>Unit</i>	<i>Description</i>
-	No Unit
µS/cm	Microsiemens per centimetre
mg/L	milligrams per litre
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in reports identified as "Preliminary Report" are considered authorized for use.



Analytical Results

Sub-Matrix: Water					Client sample ID	BH-96-2	---	---	---	---
(Matrix: Water)					Client sampling date / time	01-Sep-2020 08:50	---	---	---	---
Analyte	CAS Number	Method	LOR	Unit	VA20B4492-001	-----	-----	-----	-----	
					Result	---	---	---	---	
Physical Tests										
alkalinity, total (as CaCO3)	---	E290	1.0	mg/L	204	---	---	---	---	
conductivity	---	E100	2.0	µS/cm	390	---	---	---	---	
hardness (as CaCO3), from total Ca/Mg	---	EC100A	0.60	mg/L	105	---	---	---	---	
pH	---	E108	0.10	pH units	8.27	---	---	---	---	
solids, total dissolved [TDS]	---	E162	10	mg/L	274	---	---	---	---	
hardness (as CaCO3), dissolved	---	EC100	0.60	mg/L	96.1	---	---	---	---	
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0213	---	---	---	---	
bromide	24959-67-9	E235.Br-L	0.050	mg/L	<0.050	---	---	---	---	
chloride	16887-00-6	E235.Cl	0.50	mg/L	1.38	---	---	---	---	
fluoride	16984-48-8	E235.F	0.020	mg/L	0.145	---	---	---	---	
Kjeldahl nitrogen, total [TKN]	---	E318	0.050	mg/L	0.552	---	---	---	---	
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.629	---	---	---	---	
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	0.0022	---	---	---	---	
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.261	---	---	---	---	
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	5.09	---	---	---	---	
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L	5.47	---	---	---	---	
antimony, total	7440-36-0	E420	0.00010	mg/L	0.00047	---	---	---	---	
arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00560	---	---	---	---	
barium, total	7440-39-3	E420	0.00010	mg/L	0.0646	---	---	---	---	
beryllium, total	7440-41-7	E420	0.000100	mg/L	0.000155	---	---	---	---	
bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	---	---	---	---	
boron, total	7440-42-8	E420	0.010	mg/L	0.187	---	---	---	---	
cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.000578	---	---	---	---	
calcium, total	7440-70-2	E420	0.050	mg/L	17.9	---	---	---	---	
cesium, total	7440-46-2	E420	0.000010	mg/L	0.000488	---	---	---	---	
chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L	0.00600	---	---	---	---	
cobalt, total	7440-48-4	E420	0.00010	mg/L	0.00605	---	---	---	---	
copper, total	7440-50-8	E420	0.00050	mg/L	0.0151	---	---	---	---	



Analytical Results

Sub-Matrix: Water					Client sample ID				
(Matrix: Water)					BH-96-2	----	----	----	----
Client sampling date / time					01-Sep-2020 08:50	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA20B4492-001	-----	-----	-----	-----
					Result	---	---	---	---
Total Metals									
iron, total	7439-89-6	E420	0.010	mg/L	7.02	----	----	----	----
lead, total	7439-92-1	E420	0.000050	mg/L	0.00322	----	----	----	----
lithium, total	7439-93-2	E420	0.0010	mg/L	0.0067	----	----	----	----
magnesium, total	7439-95-4	E420	0.0050	mg/L	14.6	----	----	----	----
manganese, total	7439-96-5	E420	0.00010	mg/L	0.436	----	----	----	----
mercury, total	7439-97-6	E508	0.0000050	mg/L	0.0000253	----	----	----	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00282	----	----	----	----
nickel, total	7440-02-0	E420	0.00050	mg/L	0.00987	----	----	----	----
phosphorus, total	7723-14-0	E420	0.050	mg/L	0.288	----	----	----	----
potassium, total	7440-09-7	E420	0.050	mg/L	11.8	----	----	----	----
rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00295	----	----	----	----
selenium, total	7782-49-2	E420	0.000050	mg/L	0.000390	----	----	----	----
silicon, total	7440-21-3	E420	0.10	mg/L	12.5	----	----	----	----
silver, total	7440-22-4	E420	0.000010	mg/L	0.000060	----	----	----	----
sodium, total	7440-23-5	E420	0.050	mg/L	47.7	----	----	----	----
strontium, total	7440-24-6	E420	0.00020	mg/L	0.189	----	----	----	----
sulfur, total	7704-34-9	E420	0.50	mg/L	1.49	----	----	----	----
tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	----	----	----	----
thallium, total	7440-28-0	E420	0.000010	mg/L	0.000028	----	----	----	----
thorium, total	7440-29-1	E420	0.00010	mg/L	0.00033	----	----	----	----
tin, total	7440-31-5	E420	0.00010	mg/L	0.00032	----	----	----	----
titanium, total	7440-32-6	E420	0.00030	mg/L	0.123	----	----	----	----
tungsten, total	7440-33-7	E420	0.00010	mg/L	0.00011	----	----	----	----
uranium, total	7440-61-1	E420	0.000010	mg/L	0.00181	----	----	----	----
vanadium, total	7440-62-2	E420	0.00050	mg/L	0.0134	----	----	----	----
zinc, total	7440-66-6	E420	0.0030	mg/L	0.0327	----	----	----	----
zirconium, total	7440-67-7	E420	0.00020	mg/L	0.00024	----	----	----	----
Dissolved Metals									
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0432	----	----	----	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00028	----	----	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00326	----	----	----	----



Analytical Results

Sub-Matrix: Water					Client sample ID	BH-96-2	----	----	----	----
(Matrix: Water)					Client sampling date / time	01-Sep-2020 08:50	----	---	---	----
Analyte	CAS Number	Method	LOR	Unit	VA20B4492-001	-----	-----	-----	-----	-----
					Result	---	---	---	---	---
Dissolved Metals										
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0224	----	----	----	----	----
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	----	----	----	----	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	----	----	----	----	----
boron, dissolved	7440-42-8	E421	0.010	mg/L	0.168	----	----	----	----	----
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.0000556	----	----	----	----	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L	15.4	----	----	----	----	----
cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.000010	----	----	----	----	----
chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L	<0.00010	----	----	----	----	----
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	----	----	----	----	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00178	----	----	----	----	----
iron, dissolved	7439-89-6	E421	0.010	mg/L	0.040	----	----	----	----	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	----	----	----	----	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0020	----	----	----	----	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	14.0	----	----	----	----	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.0142	----	----	----	----	----
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	----	----	----	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00380	----	----	----	----	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	----	----	----	----	----
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	----	----	----	----	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L	11.3	----	----	----	----	----
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00043	----	----	----	----	----
selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.000268	----	----	----	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L	4.42	----	----	----	----	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	----	----	----	----	----
sodium, dissolved	7440-23-5	E421	0.050	mg/L	49.2	----	----	----	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.199	----	----	----	----	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L	1.52	----	----	----	----	----
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	----	----	----	----	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	----	----	----	----	----
thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	----	----	----	----	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	----	----	----	----	----



Analytical Results

Sub-Matrix: **Water**

Client sample ID

BH-96-2

(Matrix: **Water**)

Client sampling date / time

01-Sep-2020
08:50

Analyte	CAS Number	Method	LOR	Unit	VA20B4492-001	-----	-----	-----	-----
					Result	---	---	---	---
Dissolved Metals									
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	0.00079	----	----	----	----
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	----	----	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.00166	----	----	----	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	0.00128	----	----	----	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0017	----	----	----	----
zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	<0.00020	----	----	----	----
dissolved mercury filtration location	----	EP509	-	-	Field	----	----	----	----
dissolved metals filtration location	----	EP421	-	-	Field	----	----	----	----
Aggregate Organics									
chemical oxygen demand [COD]	----	E559	20	mg/L	<20	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: VA20B4492	Page	: 1 of 11
Client	: Regional District of Kitimat-Stikine	Laboratory	: Vancouver - Environmental
Contact	: Mary Tress	Account Manager	: Amber Springer
Address	: # 300 - 4545 Lazelle Avenue Terrace BC Canada V8G 4E1	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: Thornhill Groundwater	Date Samples Received	: 04-Sep-2020 12:20
PO	: ----	Issue Date	: 14-Sep-2020 17:42
C-O-C number	: ----		
Sampler	: Mary Tress		
Site	:		
Quote number	: Q62338		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

- Anonymous:** Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers occur - please see following pages for full details.

RIGHT SOLUTIONS | RIGHT PARTNER



Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 15:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 15:00 is used for calculation purposes.

Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid) BH-96-2	E559	01-Sep-2020	----	----	----		10-Sep-2020	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) BH-96-2	E298	01-Sep-2020	----	----	----		13-Sep-2020	28 days	12 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE BH-96-2	E235.Br-L	01-Sep-2020	----	----	----		05-Sep-2020	28 days	4 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE BH-96-2	E235.Cl	01-Sep-2020	----	----	----		05-Sep-2020	28 days	4 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE BH-96-2	E235.F	01-Sep-2020	----	----	----		05-Sep-2020	28 days	4 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE BH-96-2	E235.NO3-L	01-Sep-2020	----	----	----		05-Sep-2020	3 days	4 days	* EHTR
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE BH-96-2	E235.NO2-L	01-Sep-2020	----	----	----		05-Sep-2020	3 days	4 days	* EHTR



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec Actual		Eval	Analysis Date	Holding Times Rec Actual		Eval
Anions and Nutrients : Sulfate in Water by IC										
HDPE BH-96-2	E235.SO4	01-Sep-2020	----	----	----		05-Sep-2020	28 days	4 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) BH-96-2	E318	01-Sep-2020	11-Sep-2020	28 days	10 days	✓	13-Sep-2020	17 days	1 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) BH-96-2	E372-U	01-Sep-2020	11-Sep-2020	28 days	10 days	✓	12-Sep-2020	17 days	1 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE dissolved (nitric acid) BH-96-2	E421.Cr-L	01-Sep-2020	11-Sep-2020	180 days	10 days	✓	11-Sep-2020	169 days	0 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) BH-96-2	E509	01-Sep-2020	06-Sep-2020	28 days	5 days	✓	06-Sep-2020	22 days	0 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) BH-96-2	E421	01-Sep-2020	11-Sep-2020	180 days	10 days	✓	11-Sep-2020	169 days	0 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE BH-96-2	E290	01-Sep-2020	----	----	----		05-Sep-2020	14 days	4 days	✓
Physical Tests : Conductivity in Water										
HDPE BH-96-2	E100	01-Sep-2020	----	----	----		05-Sep-2020	28 days	4 days	✓
Physical Tests : pH by Meter										
HDPE BH-96-2	E108	01-Sep-2020	----	----	----		05-Sep-2020	0.25 hrs	99 hrs	* EHTR-FM



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : TDS by Gravimetry										
HDPE BH-96-2	E162	01-Sep-2020	----	----	----		08-Sep-2020	7 days	7 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid) BH-96-2	E420.Cr-L	01-Sep-2020	----	----	----		10-Sep-2020	180 days	9 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) BH-96-2	E508	01-Sep-2020	----	----	----		06-Sep-2020	28 days	5 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) BH-96-2	E420	01-Sep-2020	----	----	----		10-Sep-2020	180 days	9 days	✓

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.

Rec. HT: ALS recommended hold time (see units).



Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water** Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type	Method	QC Lot #	Count		Frequency (%)		Evaluation
			QC	Regular	Actual	Expected	
Analytical Methods							
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	82120	0	2	0.0	5.0	✖
Ammonia by Fluorescence	E298	84487	1	8	12.5	5.0	✔
Bromide in Water by IC (Low Level)	E235.Br-L	82109	1	14	7.1	5.0	✔
Chemical Oxygen Demand by Colourimetry	E559	83908	1	20	5.0	5.0	✔
Chloride in Water by IC	E235.Cl	82107	1	14	7.1	5.0	✔
Conductivity in Water	E100	82121	1	2	50.0	5.0	✔
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	84430	1	6	16.6	5.0	✔
Dissolved Mercury in Water by CVAAS	E509	82451	1	20	5.0	5.0	✔
Dissolved Metals in Water by CRC ICPMS	E421	84431	1	20	5.0	5.0	✔
Fluoride in Water by IC	E235.F	82108	1	14	7.1	5.0	✔
Nitrate in Water by IC (Low Level)	E235.NO3-L	82110	1	15	6.6	5.0	✔
Nitrite in Water by IC (Low Level)	E235.NO2-L	82111	1	15	6.6	5.0	✔
pH by Meter	E108	82119	1	3	33.3	5.0	✔
Sulfate in Water by IC	E235.SO4	82112	1	14	7.1	5.0	✔
TDS by Gravimetry	E162	82802	1	20	5.0	5.0	✔
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	83005	1	16	6.2	5.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	84486	1	9	11.1	5.0	✔
Total Mercury in Water by CVAAS	E508	82467	1	20	5.0	5.0	✔
Total Metals in Water by CRC ICPMS	E420	83006	1	16	6.2	5.0	✔
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	84488	1	9	11.1	5.0	✔
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	82120	1	2	50.0	5.0	✔
Ammonia by Fluorescence	E298	84487	1	8	12.5	5.0	✔
Bromide in Water by IC (Low Level)	E235.Br-L	82109	1	14	7.1	5.0	✔
Chemical Oxygen Demand by Colourimetry	E559	83908	1	20	5.0	5.0	✔
Chloride in Water by IC	E235.Cl	82107	1	14	7.1	5.0	✔
Conductivity in Water	E100	82121	1	2	50.0	5.0	✔
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	84430	1	6	16.6	5.0	✔
Dissolved Mercury in Water by CVAAS	E509	82451	1	20	5.0	5.0	✔
Dissolved Metals in Water by CRC ICPMS	E421	84431	1	20	5.0	5.0	✔
Fluoride in Water by IC	E235.F	82108	1	14	7.1	5.0	✔
Nitrate in Water by IC (Low Level)	E235.NO3-L	82110	1	15	6.6	5.0	✔
Nitrite in Water by IC (Low Level)	E235.NO2-L	82111	1	15	6.6	5.0	✔
pH by Meter	E108	82119	1	3	33.3	5.0	✔
Sulfate in Water by IC	E235.SO4	82112	1	14	7.1	5.0	✔
TDS by Gravimetry	E162	82802	1	20	5.0	5.0	✔
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	83005	1	16	6.2	5.0	✔



Matrix: **Water**

Evaluation: * = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type	Method	QC Lot #	Count		Frequency (%)		Evaluation
			QC	Regular	Actual	Expected	
Analytical Methods							
Laboratory Control Samples (LCS) - Continued							
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	84486	1	9	11.1	5.0	✓
Total Mercury in Water by CVAAS	E508	82467	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	83006	1	16	6.2	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	84488	1	9	11.1	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	82120	1	2	50.0	5.0	✓
Ammonia by Fluorescence	E298	84487	1	8	12.5	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	82109	1	14	7.1	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	83908	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	82107	1	14	7.1	5.0	✓
Conductivity in Water	E100	82121	1	2	50.0	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	84430	1	6	16.6	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	82451	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	84431	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	82108	1	14	7.1	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	82110	1	15	6.6	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	82111	1	15	6.6	5.0	✓
Sulfate in Water by IC	E235.SO4	82112	1	14	7.1	5.0	✓
TDS by Gravimetry	E162	82802	1	20	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	83005	1	16	6.2	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	84486	1	9	11.1	5.0	✓
Total Mercury in Water by CVAAS	E508	82467	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	83006	1	16	6.2	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	84488	1	9	11.1	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	84487	1	8	12.5	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	82109	1	14	7.1	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	83908	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	82107	1	14	7.1	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	84430	1	6	16.6	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	82451	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	84431	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	82108	1	14	7.1	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	82110	1	15	6.6	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	82111	1	15	6.6	5.0	✓
Sulfate in Water by IC	E235.SO4	82112	1	14	7.1	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	83005	1	16	6.2	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	84486	1	9	11.1	5.0	✓
Total Mercury in Water by CVAAS	E508	82467	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	83006	1	16	6.2	5.0	✓



Matrix: **Water** Evaluation: * = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type	Method	QC Lot #	Count		Frequency (%)		
			QC	Regular	Actual	Expected	Evaluation
<i>Analytical Methods</i>							
<i>Matrix Spikes (MS) - Continued</i>							
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	84488	1	9	11.1	5.0	✓



Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Conductivity in Water	E100 Vancouver - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108 Vancouver - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
TDS by Gravimetry	E162 Vancouver - Environmental	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Bromide in Water by IC (Low Level)	E235.Br-L Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Chloride in Water by IC	E235.Cl Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC (Low Level)	E235.NO2-L Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Alkalinity Species by Titration	E290 Vancouver - Environmental	Water	APHA 2320 B (mod)	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.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Ammonia by Fluorescence	E298 Vancouver - Environmental	Water	J. Environ. Monit., 2005, 7, 37-42 (mod)	Ammonia in water is analyzed by flow-injection analysis with fluorescence detection after reaction with orthophthaldialdehyde (OPA).
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318 Vancouver - Environmental	Water	APHA 4500-Norg D (mod)	Total Kjeldahl Nitrogen is determined using block digestion followed by flow-injection analysis with fluorescence detection.
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U Vancouver - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Total Metals in Water by CRC ICPMS	E420 Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS.
Dissolved Metals in Water by CRC ICPMS	E421 Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L Vancouver - Environmental	Water	APHA 3030 B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS
Total Mercury in Water by CVAAS	E508 Vancouver - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Dissolved Mercury in Water by CVAAS	E509 Vancouver - Environmental	Water	APHA 3030B/EPA 1631E (mod)	Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.
Chemical Oxygen Demand by Colourimetry	E559 Vancouver - Environmental	Water	APHA 5220 D (mod)	Samples are analyzed using the closed reflux colourimetric method.



<i>Analytical Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
Dissolved Hardness (Calculated)	EC100 Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO ₃), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO ₃ equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Hardness (Calculated) from Total Ca/Mg	EC100A Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO ₃), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in CaCO ₃ equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.
<i>Preparation Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
Digestion for TKN in water	EP318 Vancouver - Environmental	Water	APHA 4500-Norg D (mod)	Samples are digested using block digestion with Copper Sulfate Digestion Reagent.
Digestion for Total Phosphorus in water	EP372 Vancouver - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Dissolved Metals Water Filtration	EP421 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO ₃ .
Dissolved Mercury Water Filtration	EP509 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

QUALITY CONTROL REPORT

Work Order : **VA20B4492**

Page : 1 of 18

Client : Regional District of Kitimat-Stikine
Contact : Mary Tress
Address : # 300 - 4545 Lazelle Avenue
 Terrace BC Canada V8G 4E1
Telephone : ----
Project : Thornhill Groundwater
PO : ----
C-O-C number : ----
Sampler : Mary Tress
Site :
Quote number : Q62338
No. of samples received : 1
No. of samples analysed : 1

Laboratory : Vancouver - Environmental
Account Manager : Amber Springer
Address : 8081 Lougheed Highway
 Burnaby, British Columbia Canada V5A 1W9
Telephone : +1 604 253 4188
Date Samples Received : 04-Sep-2020 12:20
Date Analysis Commenced : 05-Sep-2020
Issue Date : 14-Sep-2020 17:42

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits
- Reference Material (RM) Report; Recovery and Acceptance Limits
- Method Blank (MB) Report; Recovery and Acceptance Limits
- Laboratory Control Sample (LCS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Annabelle Prasad	Analyst	Metals, Burnaby, British Columbia
Bruna Botti	Team Leader - Inorganics	Inorganics - Water Quality, Burnaby, British Columbia
Cristina Alexandre	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Dan Gebert	Laboratory Analyst	Metals, Burnaby, British Columbia
Dee Lee	Analyst	Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
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Owen Cheng		Metals, Burnaby, British Columbia

Page : 2 of 18
Work Order : VA20B4492
Client : Regional District of Kitimat-Stikine
Project : Thornhill Groundwater



General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include 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 predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number = Chemical Abstracts Services number is a unique identifier assigned to discrete substances.

DQO = Data Quality Objective.

LOR = Limit of Reporting (detection limit).

RPD = Relative Percentage Difference

= Indicates a QC result that did not meet the ALS DQO.



Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test specific).

Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 82119)											
VA20B4492-001	BH-96-2	pH	----	E108	0.10	pH units	8.27	8.28	0.121%	4%	----
Physical Tests (QC Lot: 82121)											
VA20B4492-001	BH-96-2	conductivity	----	E100	2.0	µS/cm	390	389	0.257%	10%	----
Physical Tests (QC Lot: 82802)											
VA20B4470-011	Anonymous	solids, total dissolved [TDS]	----	E162	20	mg/L	1760	1930	9.15%	20%	----
Anions and Nutrients (QC Lot: 82107)											
KS2001630-002	Anonymous	chloride	16887-00-6	E235.Cl	2.50	mg/L	46.8	47.1	0.696%	20%	----
Anions and Nutrients (QC Lot: 82108)											
KS2001630-002	Anonymous	fluoride	16984-48-8	E235.F	0.100	mg/L	0.202	0.197	0.006	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 82109)											
KS2001630-002	Anonymous	bromide	24959-67-9	E235.Br-L	0.250	mg/L	<0.250	<0.250	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 82110)											
KS2001630-002	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.0250	mg/L	<0.0250	<0.0250	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 82111)											
KS2001630-002	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 82112)											
KS2001630-002	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	1.50	mg/L	406	417	2.61%	20%	----
Anions and Nutrients (QC Lot: 84486)											
VA20B4450-001	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	0.250	mg/L	1.67	1.67	0.002	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 84487)											
KS2001668-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	2.50	mg/L	51.4	51.6	0.354%	20%	----
Anions and Nutrients (QC Lot: 84488)											
KS2001668-001	Anonymous	phosphorus, total	7723-14-0	E372-U	0.200	mg/L	8.48	8.29	2.26%	20%	----
Total Metals (QC Lot: 82467)											
VA20B4465-005	Anonymous	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Total Metals (QC Lot: 83005)											
VA20B4456-001	Anonymous	chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L	0.00046	0.00042	0.00004	Diff <2x LOR	----
Total Metals (QC Lot: 83006)											
VA20B4456-001	Anonymous	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.140	0.130	7.47%	20%	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	0.00279	0.00280	0.380%	20%	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00168	0.00172	1.99%	20%	----



Sub-Matrix: **Water**

Laboratory Duplicate (DUP) Report

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Total Metals (QC Lot: 83006) - continued											
VA20B4456-001	Anonymous	barium, total	7440-39-3	E420	0.00010	mg/L	0.0437	0.0435	0.422%	20%	----
		beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	0.063	0.062	0.0007	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.0000912	0.0000752	19.2%	20%	----
		calcium, total	7440-70-2	E420	0.050	mg/L	86.0	84.7	1.54%	20%	----
		cesium, total	7440-46-2	E420	0.000010	mg/L	0.000874	0.000880	0.700%	20%	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	0.00648	0.00648	0.143%	20%	----
		copper, total	7440-50-8	E420	0.00050	mg/L	0.00107	0.00109	0.00002	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	0.263	0.266	0.889%	20%	----
		lead, total	7439-92-1	E420	0.000050	mg/L	0.000234	0.000233	0.000001	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	0.0061	0.0059	0.0002	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	70.5	71.5	1.46%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.464	0.469	0.942%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00340	0.00338	0.582%	20%	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	0.0524	0.0530	1.13%	20%	----
		phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.050	mg/L	6.66	6.70	0.681%	20%	----
		rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00800	0.00830	3.71%	20%	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	0.000353	0.000400	0.000047	Diff <2x LOR	----
		silicon, total	7440-21-3	E420	0.10	mg/L	2.65	2.70	1.92%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.050	mg/L	7.86	7.80	0.723%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.398	0.400	0.670%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	147	144	1.79%	20%	----
		tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	0.000030	0.000030	0.0000008	Diff <2x LOR	----
		thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	0.00423	0.00422	0.329%	20%	----
		tungsten, total	7440-33-7	E420	0.00010	mg/L	0.00023	0.00022	0.00001	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	0.00478	0.00464	3.09%	20%	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	0.00053	0.00052	0.00001	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	0.0130	0.0126	0.0004	Diff <2x LOR	----
		zirconium, total	7440-67-7	E420	0.00020	mg/L	0.00022	0.00028	0.00006	Diff <2x LOR	----

Dissolved Metals (QC Lot: 82451)



Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Dissolved Metals (QC Lot: 82451) - continued											
VA20B4463-007	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 84430)											
VA20B4492-001	BH-96-2	chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L	<0.00010	0.00010	0.000003	Diff <2x LOR	----
Dissolved Metals (QC Lot: 84431)											
VA20B4492-001	BH-96-2	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0432	0.0406	6.31%	20%	----
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00028	0.00027	0.000009	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00326	0.00309	5.23%	20%	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0224	0.0203	9.92%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.010	mg/L	0.168	0.166	1.35%	20%	----
		cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.0000556	0.0000501	10.5%	20%	----
		calcium, dissolved	7440-70-2	E421	0.050	mg/L	15.4	15.2	1.72%	20%	----
		cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00178	0.00170	0.00008	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.010	mg/L	0.040	0.037	0.003	Diff <2x LOR	----
		lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0020	0.0019	0.00003	Diff <2x LOR	----
		magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	14.0	13.8	1.62%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.0142	0.0132	6.92%	20%	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00380	0.00371	2.47%	20%	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	0.050	mg/L	11.3	10.7	4.93%	20%	----
		rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00043	0.00037	0.00006	Diff <2x LOR	----
		selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.000268	0.000245	0.000022	Diff <2x LOR	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	4.42	4.15	6.44%	20%	----
		silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, dissolved	7440-23-5	E421	0.050	mg/L	49.2	47.3	4.00%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.199	0.196	1.94%	20%	----
		sulfur, dissolved	7704-34-9	E421	0.50	mg/L	1.52	1.56	0.03	Diff <2x LOR	----
		tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----



Sub-Matrix: Water					<i>Laboratory Duplicate (DUP) Report</i>						
<i>Laboratory sample ID</i>	<i>Client sample ID</i>	<i>Analyte</i>	<i>CAS Number</i>	<i>Method</i>	<i>LOR</i>	<i>Unit</i>	<i>Original Result</i>	<i>Duplicate Result</i>	<i>RPD(%) or Difference</i>	<i>Duplicate Limits</i>	<i>Qualifier</i>
Dissolved Metals (QC Lot: 84431) - continued											
VA20B4492-001	BH-96-2	titanium, dissolved	7440-32-6	E421	0.00030	mg/L	0.00079	0.00072	0.00007	Diff <2x LOR	----
		tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.00166	0.00161	2.83%	20%	----
		vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	0.00128	0.00123	0.00005	Diff <2x LOR	----
		zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0017	0.0026	0.0010	Diff <2x LOR	----
		zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
Aggregate Organics (QC Lot: 83908)											
VA20B4298-001	Anonymous	chemical oxygen demand [COD]	----	E559	20	mg/L	538	590	9.27%	20%	----



Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 82120)						
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 82121)						
conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 82802)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Anions and Nutrients (QCLot: 82107)						
chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 82108)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 82109)						
bromide	24959-67-9	E235.Br-L	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 82110)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 82111)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 82112)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 84486)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 84487)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 84488)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Total Metals (QCLot: 82467)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Total Metals (QCLot: 83005)						
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	<0.00010	----
Total Metals (QCLot: 83006)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----



Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 83006) - continued						
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	<0.00020	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	<0.00020	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
thorium, total	7440-29-1	E420	0.0001	mg/L	<0.00010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----
Dissolved Metals (QCLot: 82451)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 84430)						



Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 84430) - continued						
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	<0.00010	----
Dissolved Metals (QCLot: 84431)						
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	<0.000010	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	----



Sub-Matrix: **Water**

<i>Analyte</i>	<i>CAS Number</i>	<i>Method</i>	<i>LOR</i>	<i>Unit</i>	<i>Result</i>	<i>Qualifier</i>
Dissolved Metals (QCLot: 84431) - continued						
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
Aggregate Organics (QCLot: 83908)						
chemical oxygen demand [COD]	----	E559	20	mg/L	<20	----



Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
Analyte	CAS Number	Method	LOR	Unit	Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
Physical Tests (QCLot: 82119)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 82120)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	102	85.0	115	----
Physical Tests (QCLot: 82121)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	103	90.0	110	----
Physical Tests (QCLot: 82802)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	97.8	85.0	115	----
Anions and Nutrients (QCLot: 82107)									
chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 82108)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 82109)									
bromide	24959-67-9	E235.Br-L	0.05	mg/L	0.5 mg/L	94.4	85.0	115	----
Anions and Nutrients (QCLot: 82110)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 82111)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	99.6	90.0	110	----
Anions and Nutrients (QCLot: 82112)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 84486)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	98.0	75.0	125	----
Anions and Nutrients (QCLot: 84487)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.12 mg/L	95.2	85.0	115	----
Anions and Nutrients (QCLot: 84488)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	87.3	80.0	120	----
Total Metals (QCLot: 82467)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	99.4	80.0	120	----
Total Metals (QCLot: 83005)									
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	0.25 mg/L	110	80.0	120	----
Total Metals (QCLot: 83006)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	102	80.0	120	----



Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
Total Metals (QCLot: 83006) - continued									
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	101	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	109	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	114	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	89.8	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	99.1	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	109	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	98.9	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	98.4	80.0	120	----
cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	112	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	109	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	107	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	94.7	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	102	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	87.0	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	99.0	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	112	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	99.4	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	108	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	119	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	118	80.0	120	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	110	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	93.5	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	97.6	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	100	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	107	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	104	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	83.4	80.0	120	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	103	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	100	80.0	120	----
thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	99.3	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	102	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	103	80.0	120	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	101	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	102	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	112	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	111	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	97.5	80.0	120	----



Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 82451)									
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	101	80.0	120	----
Dissolved Metals (QCLot: 84430)									
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	0.25 mg/L	99.7	80.0	120	----
Dissolved Metals (QCLot: 84431)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	95.3	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	100	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	94.9	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	97.5	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	95.3	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	104	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	95.7	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	96.1	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	99.3	80.0	120	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	100	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	94.8	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	93.8	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	93.9	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	95.9	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	97.6	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	95.8	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	104	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	95.9	80.0	120	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	94.7	70.0	130	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	97.2	80.0	120	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	95.6	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	95.0	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	98.7	80.0	120	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	104	80.0	120	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	96.6	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	108	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	84.5	80.0	120	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	100	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	97.3	80.0	120	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	95.5	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	96.8	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	94.6	80.0	120	----



Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 84431) - continued									
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	96.6	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	94.7	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	95.2	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	93.7	80.0	120	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	100	80.0	120	----
Aggregate Organics (QCLot: 83908)									
chemical oxygen demand [COD]	----	E559	20	mg/L	750 mg/L	102	85.0	115	----



Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level $\geq 1x$ spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 82107)										
KS2001630-003	Anonymous	chloride	16887-00-6	E235.Cl	507 mg/L	500 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 82108)										
KS2001630-003	Anonymous	fluoride	16984-48-8	E235.F	5.04 mg/L	5 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 82109)										
KS2001630-003	Anonymous	bromide	24959-67-9	E235.Br-L	2.40 mg/L	2.5 mg/L	95.8	75.0	125	----
Anions and Nutrients (QCLot: 82110)										
KS2001630-003	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	12.6 mg/L	12.5 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 82111)										
KS2001630-003	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	2.50 mg/L	2.5 mg/L	100	75.0	125	----
Anions and Nutrients (QCLot: 82112)										
KS2001630-003	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	500 mg/L	500 mg/L	100	75.0	125	----
Anions and Nutrients (QCLot: 84486)										
VA20B4460-001	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	61.7 mg/L	2.5 mg/L	98.7	70.0	130	----
Anions and Nutrients (QCLot: 84487)										
VA20B4460-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	41.0 mg/L	40 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 84488)										
VA20B4450-001	Anonymous	phosphorus, total	7723-14-0	E372-U	ND mg/L	0.05 mg/L	ND	70.0	130	----
Total Metals (QCLot: 82467)										
VA20B4465-006	Anonymous	mercury, total	7439-97-6	E508	0.000102 mg/L	0.0001 mg/L	102	70.0	130	----
Total Metals (QCLot: 83005)										
VA20B4456-002	Anonymous	chromium, total	7440-47-3	E420.Cr-L	0.0409 mg/L	0.04 mg/L	102	70.0	130	----
Total Metals (QCLot: 83006)										
VA20B4456-002	Anonymous	aluminum, total	7429-90-5	E420	ND mg/L	0.2 mg/L	ND	70.0	130	----
		antimony, total	7440-36-0	E420	0.0211 mg/L	0.02 mg/L	105	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0207 mg/L	0.02 mg/L	104	70.0	130	----
		barium, total	7440-39-3	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0414 mg/L	0.04 mg/L	104	70.0	130	----
		bismuth, total	7440-69-9	E420	0.00903 mg/L	0.01 mg/L	90.3	70.0	130	----



Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 83006) - continued										
VA20B4456-002	Anonymous	boron, total	7440-42-8	E420	ND mg/L	0.1 mg/L	ND	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00378 mg/L	0.004 mg/L	94.6	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		cesium, total	7440-46-2	E420	0.0112 mg/L	0.01 mg/L	112	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0190 mg/L	0.02 mg/L	95.0	70.0	130	----
		copper, total	7440-50-8	E420	0.0182 mg/L	0.02 mg/L	90.9	70.0	130	----
		iron, total	7439-89-6	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		lead, total	7439-92-1	E420	0.0188 mg/L	0.02 mg/L	94.3	70.0	130	----
		lithium, total	7439-93-2	E420	0.103 mg/L	0.1 mg/L	103	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0218 mg/L	0.02 mg/L	109	70.0	130	----
		nickel, total	7440-02-0	E420	ND mg/L	0.04 mg/L	ND	70.0	130	----
		phosphorus, total	7723-14-0	E420	11.6 mg/L	10 mg/L	116	70.0	130	----
		potassium, total	7440-09-7	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		rubidium, total	7440-17-7	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		selenium, total	7782-49-2	E420	0.0470 mg/L	0.04 mg/L	117	70.0	130	----
		silicon, total	7440-21-3	E420	9.51 mg/L	10 mg/L	95.1	70.0	130	----
		silver, total	7440-22-4	E420	0.00396 mg/L	0.004 mg/L	99.0	70.0	130	----
		sodium, total	7440-23-5	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, total	7704-34-9	E420	ND mg/L	20 mg/L	ND	70.0	130	----
		tellurium, total	13494-80-9	E420	0.0400 mg/L	0.04 mg/L	99.9	70.0	130	----
		thallium, total	7440-28-0	E420	0.00376 mg/L	0.004 mg/L	94.0	70.0	130	----
		thorium, total	7440-29-1	E420	0.0205 mg/L	0.02 mg/L	102	70.0	130	----
		tin, total	7440-31-5	E420	0.0204 mg/L	0.02 mg/L	102	70.0	130	----
		titanium, total	7440-32-6	E420	ND mg/L	0.04 mg/L	ND	70.0	130	----
		tungsten, total	7440-33-7	E420	0.0204 mg/L	0.02 mg/L	102	70.0	130	----
		uranium, total	7440-61-1	E420	ND mg/L	0.004 mg/L	ND	70.0	130	----
		vanadium, total	7440-62-2	E420	0.107 mg/L	0.1 mg/L	107	70.0	130	----
		zinc, total	7440-66-6	E420	0.376 mg/L	0.4 mg/L	94.0	70.0	130	----
		zirconium, total	7440-67-7	E420	0.0435 mg/L	0.04 mg/L	109	70.0	130	----
Dissolved Metals (QCLot: 82451)										
VA20B4465-001	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000947 mg/L	0.0001 mg/L	94.7	70.0	130	----
Dissolved Metals (QCLot: 84430)										
VA20B4582-001	Anonymous	chromium, dissolved	7440-47-3	E421.Cr-L	0.0376 mg/L	0.04 mg/L	94.0	70.0	130	----



Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 84431)										
VA20B4582-001	Anonymous	aluminum, dissolved	7429-90-5	E421	0.178 mg/L	0.2 mg/L	88.9	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.0203 mg/L	0.02 mg/L	102	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.0199 mg/L	0.02 mg/L	99.3	70.0	130	----
		barium, dissolved	7440-39-3	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.0381 mg/L	0.04 mg/L	95.2	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.00891 mg/L	0.01 mg/L	89.1	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.094 mg/L	0.1 mg/L	94.3	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.00368 mg/L	0.004 mg/L	92.1	70.0	130	----
		calcium, dissolved	7440-70-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		cesium, dissolved	7440-46-2	E421	0.00983 mg/L	0.01 mg/L	98.3	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.0177 mg/L	0.02 mg/L	88.5	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.0175 mg/L	0.02 mg/L	87.5	70.0	130	----
		iron, dissolved	7439-89-6	E421	ND mg/L	2 mg/L	ND	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.0180 mg/L	0.02 mg/L	90.1	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.0982 mg/L	0.1 mg/L	98.2	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, dissolved	7439-96-5	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.0201 mg/L	0.02 mg/L	100	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.0358 mg/L	0.04 mg/L	89.6	70.0	130	----
		phosphorus, dissolved	7723-14-0	E421	9.98 mg/L	10 mg/L	99.8	70.0	130	----
		potassium, dissolved	7440-09-7	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		rubidium, dissolved	7440-17-7	E421	0.0185 mg/L	0.02 mg/L	92.6	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.0400 mg/L	0.04 mg/L	100	70.0	130	----
		silicon, dissolved	7440-21-3	E421	ND mg/L	10 mg/L	ND	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.00319 mg/L	0.004 mg/L	79.8	70.0	130	----
		sodium, dissolved	7440-23-5	E421	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, dissolved	7440-24-6	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, dissolved	7704-34-9	E421	18.6 mg/L	20 mg/L	92.9	70.0	130	----
		tellurium, dissolved	13494-80-9	E421	0.0412 mg/L	0.04 mg/L	103	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.00363 mg/L	0.004 mg/L	90.6	70.0	130	----
		thorium, dissolved	7440-29-1	E421	0.0203 mg/L	0.02 mg/L	101	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.0185 mg/L	0.02 mg/L	92.4	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.0379 mg/L	0.04 mg/L	94.8	70.0	130	----
		tungsten, dissolved	7440-33-7	E421	0.0191 mg/L	0.02 mg/L	95.7	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.00372 mg/L	0.004 mg/L	93.0	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.0934 mg/L	0.1 mg/L	93.4	70.0	130	----
		zinc, dissolved	7440-66-6	E421	0.361 mg/L	0.4 mg/L	90.2	70.0	130	----

Page : 18 of 18
 Work Order : VA20B4492
 Client : Regional District of Kitimat-Stikine
 Project : Thornhill Groundwater



Sub-Matrix: **Water**

					<i>Matrix Spike (MS) Report</i>					
					<i>Spike</i>		<i>Recovery (%)</i>	<i>Recovery Limits (%)</i>		
<i>Laboratory sample ID</i>	<i>Client sample ID</i>	<i>Analyte</i>	<i>CAS Number</i>	<i>Method</i>	<i>Concentration</i>	<i>Target</i>	<i>MS</i>	<i>Low</i>	<i>High</i>	<i>Qualifier</i>
Dissolved Metals (QCLot: 84431) - continued										
VA20B4582-001	Anonymous	zirconium, dissolved	7440-67-7	E421	0.0412 mg/L	0.04 mg/L	103	70.0	130	----
Aggregate Organics (QCLot: 83908)										
VA20B4298-002	Anonymous	chemical oxygen demand [COD]	----	E559	ND mg/L	500 mg/L	ND	75.0	125	----



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COC Number: 17 -

Page of

Report To Contact and company name below will appear on the final report			Report Format / Distribution			Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)																					
Company: Regional District of Kitimat-Stikine			Select Report Format: <input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> EXCEL <input type="checkbox"/> EDD (DIGITAL)			Regular [R] <input checked="" type="checkbox"/> Standard TAT if received by 3 pm - business days - no surcharges apply																					
Contact: Mary Tress			Quality Control (QC) Report with Report <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO			PRIORITY (Business Days)		4 day [P4-20%] <input type="checkbox"/>		EMERGENCY		1 Business day [E1 - 100%]		<input type="checkbox"/>													
Phone: 250-615-6100			<input checked="" type="checkbox"/> Compare Results to Criteria on Report - provide details below if box checked			3 day [P3-25%] <input type="checkbox"/>		2 day [P2-50%] <input type="checkbox"/>		Same Day, Weekend or Statutory holiday [E2 -200%		(Laboratory opening fees may apply)]		<input type="checkbox"/>													
Company address below will appear on the final report			Select Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX			Date and Time Required for all E&P TATs:																					
Street: 4545 Lazelle Avenue			Email 1 or Fax mtress@rdks.bc.ca; mhaley@rdks.bc.ca			For tests that can not be performed according to the service level selected, you will be contacted.																					
City/Province: Terrace/BC			Email 2 eblaney@rdks.bc.ca; sprouse@rdks.bc.ca			Analysis Request																					
Postal Code: V8G4E1			Email 3 mglover@rdks.bc.ca			Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below																					
Invoice To			Invoice Distribution			F/P	P		P																		
Same as Report To <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO			Select Invoice Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX																								
Copy of Invoice with Report <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO			Email 1 or Fax anne-maries@rdks.bc.ca																								
Company: Regional District of Kitimat-Stikine			Email 2 mhaley@rdks.bc.ca																								
Contact: Megan Haley			Project Information																								
			Oil and Gas Required Fields (client use)																								
ALS Account # / Quote #:			AFE/Cost Center:																								
Job #: Thornhill Groundwater			Major/Minor Code:																								
PO / AFE:			Requisitioner:																								
LSD:			Location:																								
ALS Lab Work Order # (lab use only): 4492			ALS Contact:																								
Sampler: Mary Tress																											
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	Disolved metals	Total Metals	dissolved hardness	Ammonia	Chloride	Fluoride	Nitrate	Nitrite	Total Kjeldahl Nitrogen	Total phosphorus	COD	Total Dissolved Solids	Sulphate	Alkalinity	pH Conductivity	SAMPLES ON HOLD	Sample is hazardous (please provide further detail)	NUMBER OF CONTAINERS					
BH-96-2		1-Sep-20	8:50	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R								
Environmental Division Vancouver Work Order Reference VA20B4492 Telephone : +1 604 253 4188																											



CERTIFICATE OF ANALYSIS

Work Order : **VA20B4463**
Client : **Regional District of Kitimat-Stikine**
Contact : **Mary Tress**
Address : **# 300 - 4545 Lazelle Avenue**
Terrace BC Canada V8G 4E1
Telephone : **----**
Project : **Thornhill Transfer Station Surface Water**
PO : **----**
C-O-C number : **----**
Sampler : **Mary Tress**
Site :
Quote number : **Q62338**
No. of samples received : **8**
No. of samples analysed : **8**

Page : **1 of 10**
Laboratory : **Vancouver - Environmental**
Account Manager : **Amber Springer**
Address : **8081 Lougheed Highway**
Burnaby BC Canada V5A 1W9
Telephone : **+1 604 253 4188**
Date Samples Received : **02-Sep-2020 14:30**
Date Analysis Commenced : **05-Sep-2020**
Issue Date : **15-Sep-2020 09:44**

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Angelo Salandanan	Lab Assistant	Metals, Burnaby, British Columbia
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General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

<i>Unit</i>	<i>Description</i>
-	No Unit
µS/cm	Microsiemens per centimetre
mg/L	milligrams per litre
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in reports identified as "Preliminary Report" are considered authorized for use.

Qualifiers

<i>Qualifier</i>	<i>Description</i>
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
RRV	Reported result verified by repeat analysis.



Analytical Results

Sub-Matrix: Water					Client sample ID				
(Matrix: Water)					SW-1	SW-3	SW-6	SW-21	SW-17
Client sampling date / time					01-Sep-2020 10:10	01-Sep-2020 09:10	01-Sep-2020 12:45	01-Sep-2020 10:30	01-Sep-2020 12:20
Analyte	CAS Number	Method	LOR	Unit	VA20B4463-001	VA20B4463-002	VA20B4463-003	VA20B4463-004	VA20B4463-005
					Result	Result	Result	Result	Result
Physical Tests									
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	26.7	852	51.6	368	38.4
conductivity	----	E100	2.0	µS/cm	54.9	1720	102	785	84.2
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L	25.2	498	47.9	268	36.9
pH	----	E108	0.10	pH units	7.45	7.13	7.82	8.17	7.63
solids, total suspended [TSS]	----	E160-H	3.0	mg/L	<3.0	66.4	3.2	<3.0	3.4
hardness (as CaCO3), dissolved	----	EC100	0.60	mg/L	25.4	494	50.6	284	37.0
Anions and Nutrients									
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	<0.0050	47.4	<0.0050	10.4	0.0193
bromide	24959-67-9	E235.Br-L	0.050	mg/L	<0.050	0.584	<0.050	<0.250 ^{DLDS}	<0.050
chloride	16887-00-6	E235.Cl	0.50	mg/L	<0.50	72.5	0.62	31.0	1.23
fluoride	16984-48-8	E235.F	0.020	mg/L	0.020	0.105	0.024	<0.100 ^{DLDS}	0.026
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	<0.050	51.0	0.115	13.1	0.193
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.0331	<0.0250 ^{DLDS}	0.0845	2.94	0.345
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0010	0.0056	0.0014	0.0959	0.0059
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	<0.0010	0.0030	<0.0010
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0028	0.231	0.0081	0.0424	0.0070
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	0.94	<1.50 ^{DLDS}	1.32	4.27	1.08
Total Metals									
aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0607	0.0666	0.147	0.120	0.111
antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	0.00013	<0.00010	0.00011	<0.00010
arsenic, total	7440-38-2	E420	0.00010	mg/L	<0.00010	0.0109	0.00015	0.00074	0.00015
barium, total	7440-39-3	E420	0.00010	mg/L	0.0191	0.661	0.0167	0.159	0.0222
beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
boron, total	7440-42-8	E420	0.010	mg/L	<0.010	1.79	<0.010	0.805	0.025
cadmium, total	7440-43-9	E420	0.0000050	mg/L	<0.0000050	0.0000100	0.0000170	0.0000171	0.0000069
calcium, total	7440-70-2	E420	0.050	mg/L	9.03	150	18.0	82.8	13.0
cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	0.000232	0.000015	0.000081	<0.000010
chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L	<0.00010	0.00126	0.00016	0.00042	0.00013
cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	0.00288	<0.00010	0.00083	<0.00010



Analytical Results

Sub-Matrix: Water					Client sample ID	SW-1	SW-3	SW-6	SW-21	SW-17
(Matrix: Water)										
Client sampling date / time					01-Sep-2020 10:10	01-Sep-2020 09:10	01-Sep-2020 12:45	01-Sep-2020 10:30	01-Sep-2020 12:20	
Analyte	CAS Number	Method	LOR	Unit	VA20B4463-001	VA20B4463-002	VA20B4463-003	VA20B4463-004	VA20B4463-005	
					Result	Result	Result	Result	Result	
Total Metals										
copper, total	7440-50-8	E420	0.00050	mg/L	0.00067	<0.00050	0.00128	0.00211	0.00117	
iron, total	7439-89-6	E420	0.010	mg/L	0.052	43.3	0.176	0.213	0.155	
lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	0.000057	<0.000050	<0.000050	
lithium, total	7439-93-2	E420	0.0010	mg/L	<0.0010	0.0022	<0.0010	<0.0010	<0.0010	
magnesium, total	7439-95-4	E420	0.0050	mg/L	0.650	29.6	0.742	14.8	1.06	
manganese, total	7439-96-5	E420	0.00010	mg/L	0.00405	3.84	0.0114	0.291	0.0115	
mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	
molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000194	0.000681	0.000400	0.000450	0.000320	
nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	0.00503	<0.00050	0.00220	<0.00050	
phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	0.255	<0.050	<0.050	<0.050	
potassium, total	7440-09-7	E420	0.050	mg/L	0.675	55.8	0.829	21.0	1.38	
rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00085	0.0404	0.00102	0.0136	0.00129	
selenium, total	7782-49-2	E420	0.000050	mg/L	<0.000050	0.000143	<0.000050	0.000116	0.000102	
silicon, total	7440-21-3	E420	0.10	mg/L	2.46	11.8	2.98	6.17	3.05	
silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	
sodium, total	7440-23-5	E420	0.050	mg/L	0.996	97.9	1.21	41.5	2.11	
strontium, total	7440-24-6	E420	0.00020	mg/L	0.0376	1.03	0.0433	0.500	0.0535	
sulfur, total	7704-34-9	E420	0.50	mg/L	<0.50	1.20	<0.50	2.16	<0.50	
tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	0.00025	<0.00020	<0.00020	<0.00020	
thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	
thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	0.00015	<0.00010	<0.00010	<0.00010	
titanium, total	7440-32-6	E420	0.00030	mg/L	0.00266	0.00324	0.00410	0.00431	0.00298	
tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
uranium, total	7440-61-1	E420	0.000010	mg/L	0.000017	0.000084	0.000070	0.000146	0.000031	
vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	0.00172	0.00073	<0.00050	0.00103	
zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	0.0033	<0.0030	<0.0030	<0.0030	
zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	0.00048	<0.00020	<0.00020	<0.00020	
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0306	0.0118	0.0522	0.0247	0.0636	
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00010	0.00012	<0.00010	<0.00010	<0.00010	



Analytical Results

Sub-Matrix: Water					Client sample ID	SW-1	SW-3	SW-6	SW-21	SW-17
(Matrix: Water)										
Client sampling date / time					01-Sep-2020 10:10	01-Sep-2020 09:10	01-Sep-2020 12:45	01-Sep-2020 10:30	01-Sep-2020 12:20	
Analyte	CAS Number	Method	LOR	Unit	VA20B4463-001	VA20B4463-002	VA20B4463-003	VA20B4463-004	VA20B4463-005	
					Result	Result	Result	Result	Result	
Dissolved Metals										
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	<0.00010	0.0101	0.00011	0.00071	<0.00010	
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0189	0.606	0.0151	0.156	0.0221	
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	
boron, dissolved	7440-42-8	E421	0.010	mg/L	<0.010	1.59	<0.010	0.719	0.024	
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.0000097	0.0000175	0.0000115	0.0000139	0.0000162	
calcium, dissolved	7440-70-2	E421	0.050	mg/L	9.11	151	19.1	89.8	13.0	
cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.000010	0.000213	<0.000010	0.000072	<0.000010	
chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L	<0.00010	0.00090	<0.00010	0.00030	<0.00010	
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	0.00268	<0.00010	0.00075	<0.00010	
copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00080	0.00027	0.00092	0.00180	0.00118	
iron, dissolved	7439-89-6	E421	0.010	mg/L	0.011	39.1	0.066	0.068	0.100	
lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	<0.0010	0.0021	<0.0010	<0.0010	<0.0010	
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	0.632	28.3	0.689	14.5	1.09	
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00238	3.71	0.00722	0.283	0.00688	
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000173	0.000522	0.000356	0.000393	0.000298	
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	0.00488	<0.00050	0.00208	<0.00050	
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	0.094	<0.050	<0.050	<0.050	
potassium, dissolved	7440-09-7	E421	0.050	mg/L	0.652	52.7	0.752	20.8	1.36	
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00082	0.0371	0.00092	0.0135	0.00128	
selenium, dissolved	7782-49-2	E421	0.000050	mg/L	<0.000050	0.000147	<0.000050	0.000097	<0.000050	
silicon, dissolved	7440-21-3	E421	0.050	mg/L	2.42	10.8	2.81	5.88	2.76	
silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	
sodium, dissolved	7440-23-5	E421	0.050	mg/L	1.00	91.1	1.19	40.9	2.26	
strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.0390	0.977	0.0447	0.501	0.0576	
sulfur, dissolved	7704-34-9	E421	0.50	mg/L	<0.50	1.04	<0.50	1.88	<0.50	
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	
thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	
thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	



Analytical Results

Sub-Matrix: Water					Client sample ID	SW-1	SW-3	SW-6	SW-21	SW-17
(Matrix: Water)										
Client sampling date / time					01-Sep-2020 10:10	01-Sep-2020 09:10	01-Sep-2020 12:45	01-Sep-2020 10:30	01-Sep-2020 12:20	
Analyte	CAS Number	Method	LOR	Unit	VA20B4463-001	VA20B4463-002	VA20B4463-003	VA20B4463-004	VA20B4463-005	
					Result	Result	Result	Result	Result	Result
Dissolved Metals										
tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	0.00013	<0.00010	<0.00010	<0.00010	<0.00010
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	0.00112	0.00139	0.00109	0.00156	
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000014	0.000088	0.000064	0.000142	0.000027	
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	0.00117	<0.00050	<0.00050	<0.00050	
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0028	0.0049	0.0019	0.0022	0.0039	
zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	<0.00020	0.00034	<0.00020	<0.00020	<0.00020	
dissolved mercury filtration location	----	EP509	-	-	Field	Field	Field	Field	Field	Field
dissolved metals filtration location	----	EP421	-	-	Field	Field	Field	Field	Field	Field
Aggregate Organics										
biochemical oxygen demand [BOD]	----	E550	2.0	mg/L	<2.0	4.3	<2.0	5.8	<2.0	
chemical oxygen demand [COD]	----	E559	20	mg/L	<20	120	<20	56	22	

Please refer to the General Comments section for an explanation of any qualifiers detected.



Analytical Results

Sub-Matrix: Water					Client sample ID	DUP	Field Blank	Travel Blank	----	----
(Matrix: Water)					Client sampling date / time	01-Sep-2020 12:00	01-Sep-2020 13:15	01-Sep-2020	----	----
Analyte	CAS Number	Method	LOR	Unit	VA20B4463-006	VA20B4463-007	VA20B4463-008	-----	-----	
					Result	Result	Result	---	---	
Physical Tests										
alkalinity, total (as CaCO3)	---	E290	1.0	mg/L	841	<1.0	---	---	---	
conductivity	---	E100	2.0	µS/cm	1690	<2.0	---	---	---	
hardness (as CaCO3), from total Ca/Mg	---	EC100A	0.60	mg/L	472	<0.60	<0.60	---	---	
pH	---	E108	0.10	pH units	7.07	5.66	---	---	---	
solids, total suspended [TSS]	---	E160-H	3.0	mg/L	88.8	<3.0	---	---	---	
hardness (as CaCO3), dissolved	---	EC100	0.60	mg/L	480	<0.60	---	---	---	
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	45.8	0.0062 ^{RRV}	<0.0050	---	---	
bromide	24959-67-9	E235.Br-L	0.050	mg/L	0.593	<0.050	---	---	---	
chloride	16887-00-6	E235.Cl	0.50	mg/L	70.4	<0.50	<0.50	---	---	
fluoride	16984-48-8	E235.F	0.020	mg/L	<0.100 ^{DLDS}	<0.020	<0.020	---	---	
Kjeldahl nitrogen, total [TKN]	---	E318	0.050	mg/L	49.6	<0.050	---	---	---	
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	<0.0250 ^{DLDS}	<0.0050	---	---	---	
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	0.0066	<0.0010	---	---	---	
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	---	---	---	
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.232	<0.0020	---	---	---	
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	<1.50 ^{DLDS}	<0.30	---	---	---	
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0577	<0.0030	<0.0030	---	---	
antimony, total	7440-36-0	E420	0.00010	mg/L	0.00014	<0.00010	<0.00010	---	---	
arsenic, total	7440-38-2	E420	0.00010	mg/L	0.0104	<0.00010	<0.00010	---	---	
barium, total	7440-39-3	E420	0.00010	mg/L	0.660	<0.00010	<0.00010	---	---	
beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	<0.000100	---	---	
bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	---	---	
boron, total	7440-42-8	E420	0.010	mg/L	1.80	<0.010	<0.010	---	---	
cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.0000097	<0.0000050	<0.0000050	---	---	
calcium, total	7440-70-2	E420	0.050	mg/L	148	<0.050	<0.050	---	---	
cesium, total	7440-46-2	E420	0.000010	mg/L	0.000222	<0.000010	<0.000010	---	---	
chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L	0.00111	<0.00010	<0.00010	---	---	
cobalt, total	7440-48-4	E420	0.00010	mg/L	0.00282	<0.00010	<0.00010	---	---	
copper, total	7440-50-8	E420	0.00050	mg/L	0.00061	<0.00050	<0.00050	---	---	



Analytical Results

Sub-Matrix: Water					Client sample ID	DUP	Field Blank	Travel Blank	----	----
(Matrix: Water)										
Client sampling date / time					01-Sep-2020 12:00	01-Sep-2020 13:15	01-Sep-2020	----	----	
Analyte	CAS Number	Method	LOR	Unit	VA20B4463-006	VA20B4463-007	VA20B4463-008	-----	-----	
					Result	Result	Result	---	---	
Total Metals										
iron, total	7439-89-6	E420	0.010	mg/L	41.5	<0.010	<0.010	----	----	
lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	----	----	
lithium, total	7439-93-2	E420	0.0010	mg/L	0.0027	<0.0010	<0.0010	----	----	
magnesium, total	7439-95-4	E420	0.0050	mg/L	25.1	<0.0050	<0.0050	----	----	
manganese, total	7439-96-5	E420	0.00010	mg/L	3.50	<0.00010	<0.00010	----	----	
mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	----	----	
molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000658	<0.000050	<0.000050	----	----	
nickel, total	7440-02-0	E420	0.00050	mg/L	0.00508	<0.00050	<0.00050	----	----	
phosphorus, total	7723-14-0	E420	0.050	mg/L	0.248	<0.050	<0.050	----	----	
potassium, total	7440-09-7	E420	0.050	mg/L	52.6	<0.050	<0.050	----	----	
rubidium, total	7440-17-7	E420	0.00020	mg/L	0.0384	<0.00020	<0.00020	----	----	
selenium, total	7782-49-2	E420	0.000050	mg/L	0.000180	<0.000050	<0.000050	----	----	
silicon, total	7440-21-3	E420	0.10	mg/L	12.0	<0.10	<0.10	----	----	
silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	----	----	
sodium, total	7440-23-5	E420	0.050	mg/L	86.3	<0.050	<0.050	----	----	
strontium, total	7440-24-6	E420	0.00020	mg/L	0.966	<0.00020	<0.00020	----	----	
sulfur, total	7704-34-9	E420	0.50	mg/L	1.03	<0.50	<0.50	----	----	
tellurium, total	13494-80-9	E420	0.00020	mg/L	0.00021	<0.00020	<0.00020	----	----	
thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	----	----	
thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	----	----	
tin, total	7440-31-5	E420	0.00010	mg/L	0.00015	<0.00010	<0.00010	----	----	
titanium, total	7440-32-6	E420	0.00030	mg/L	0.00254	<0.00030	<0.00030	----	----	
tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	----	----	
uranium, total	7440-61-1	E420	0.000010	mg/L	0.000084	<0.000010	<0.000010	----	----	
vanadium, total	7440-62-2	E420	0.00050	mg/L	0.00165	<0.00050	<0.00050	----	----	
zinc, total	7440-66-6	E420	0.0030	mg/L	0.0039	<0.0030	<0.0030	----	----	
zirconium, total	7440-67-7	E420	0.00020	mg/L	0.00043	<0.00020	<0.00020	----	----	
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0114	<0.0010	----	----	----	
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00011	<0.00010	----	----	----	
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00989	<0.00010	----	----	----	



Analytical Results

Sub-Matrix: Water					Client sample ID	DUP	Field Blank	Travel Blank	----	----
(Matrix: Water)					Client sampling date / time	01-Sep-2020 12:00	01-Sep-2020 13:15	01-Sep-2020	----	----
Analyte	CAS Number	Method	LOR	Unit	VA20B4463-006	VA20B4463-007	VA20B4463-008	-----	-----	
					Result	Result	Result	---	---	
Dissolved Metals										
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.585	<0.00010	----	----	----	
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<0.000100	----	----	----	
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	----	----	----	
boron, dissolved	7440-42-8	E421	0.010	mg/L	1.49	<0.010	----	----	----	
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.0000144	<0.0000050	----	----	----	
calcium, dissolved	7440-70-2	E421	0.050	mg/L	147	<0.050	----	----	----	
cesium, dissolved	7440-46-2	E421	0.000010	mg/L	0.000211	<0.000010	----	----	----	
chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L	0.00093	<0.00010	----	----	----	
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	0.00257	<0.00010	----	----	----	
copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00026	<0.00020	----	----	----	
iron, dissolved	7439-89-6	E421	0.010	mg/L	38.8	<0.010	----	----	----	
lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	----	----	----	
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0020	<0.0010	----	----	----	
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	27.2	<0.0050	----	----	----	
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	3.59	<0.00010	----	----	----	
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	----	----	----	
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000466	<0.000050	----	----	----	
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00486	<0.00050	----	----	----	
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	0.091	<0.050	----	----	----	
potassium, dissolved	7440-09-7	E421	0.050	mg/L	50.9	<0.050	----	----	----	
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.0371	<0.00020	----	----	----	
selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.000124	<0.000050	----	----	----	
silicon, dissolved	7440-21-3	E421	0.050	mg/L	10.9	<0.050	----	----	----	
silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	----	----	----	
sodium, dissolved	7440-23-5	E421	0.050	mg/L	89.6	<0.050	----	----	----	
strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.970	<0.00020	----	----	----	
sulfur, dissolved	7704-34-9	E421	0.50	mg/L	0.93	<0.50	----	----	----	
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<0.00020	----	----	----	
thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	----	----	----	
thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	----	----	----	
tin, dissolved	7440-31-5	E421	0.00010	mg/L	0.00013	<0.00010	----	----	----	



Analytical Results

Sub-Matrix: Water

Client sample ID

(Matrix: Water)

					DUP	Field Blank	Travel Blank	----	----
Client sampling date / time					01-Sep-2020 12:00	01-Sep-2020 13:15	01-Sep-2020	----	----
Analyte	CAS Number	Method	LOR	Unit	VA20B4463-006	VA20B4463-007	VA20B4463-008	-----	-----
					Result	Result	Result	---	---
Dissolved Metals									
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	0.00120	<0.00030	----	----	----
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	<0.00010	----	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000084	<0.000010	----	----	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	0.00113	<0.00050	----	----	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0019	<0.0010	----	----	----
zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	0.00036	<0.00020	----	----	----
dissolved mercury filtration location	----	EP509	-	-	Field	Field	----	----	----
dissolved metals filtration location	----	EP421	-	-	Field	Field	----	----	----
Aggregate Organics									
biochemical oxygen demand [BOD]	----	E550	2.0	mg/L	7.1	<2.0	<2.0	----	----
chemical oxygen demand [COD]	----	E559	20	mg/L	115	<20	<20	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.



QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: VA20B4463	Page	: 1 of 28
Client	: Regional District of Kitimat-Stikine	Laboratory	: Vancouver - Environmental
Contact	: Mary Tress	Account Manager	: Amber Springer
Address	: # 300 - 4545 Lazelle Avenue Terrace BC Canada V8G 4E1	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: Thornhill Transfer Station Surface Water	Date Samples Received	: 02-Sep-2020 14:30
PO	: ----	Issue Date	: 15-Sep-2020 09:44
C-O-C number	: ----		
Sampler	: Mary Tress		
Site	:		
Quote number	: Q62338		
No. of samples received	: 8		
No. of samples analysed	: 8		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.

DQO: Data Quality Objective.

LOR: Limit of Reporting (detection limit).

RPD: Relative Percent Difference.

Summary of Outliers

Outliers : Quality Control Samples

- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- Method Blank value outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers occur - please see following pages for full details.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Water**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Method Blank (MB) Values								
Total Metals	QC-MRG2-8300300 1	----	silver, total	7440-22-4	E420	0.000031 ^{MB-LOR} mg/L	0.00001 mg/L	Blank result exceeds permitted value

Result Qualifiers

Qualifier	Description
MB-LOR	Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.



Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 15:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 15:00 is used for calculation purposes.

Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Aggregate Organics : Biochemical Oxygen Demand - 5 day											
HDPE [BOD] DUP	E550	01-Sep-2020	----	----	----		05-Sep-2020	3 days	3 days	✓	
Aggregate Organics : Biochemical Oxygen Demand - 5 day											
HDPE [BOD] Field Blank	E550	01-Sep-2020	----	----	----		05-Sep-2020	3 days	3 days	✓	
Aggregate Organics : Biochemical Oxygen Demand - 5 day											
HDPE [BOD] SW-1	E550	01-Sep-2020	----	----	----		05-Sep-2020	3 days	3 days	✓	
Aggregate Organics : Biochemical Oxygen Demand - 5 day											
HDPE [BOD] SW-17	E550	01-Sep-2020	----	----	----		05-Sep-2020	3 days	3 days	✓	
Aggregate Organics : Biochemical Oxygen Demand - 5 day											
HDPE [BOD] SW-21	E550	01-Sep-2020	----	----	----		05-Sep-2020	3 days	3 days	✓	
Aggregate Organics : Biochemical Oxygen Demand - 5 day											
HDPE [BOD] SW-3	E550	01-Sep-2020	----	----	----		05-Sep-2020	3 days	3 days	✓	
Aggregate Organics : Biochemical Oxygen Demand - 5 day											
HDPE [BOD] SW-6	E550	01-Sep-2020	----	----	----		05-Sep-2020	3 days	3 days	✓	



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Aggregate Organics : Biochemical Oxygen Demand - 5 day											
HDPE [BOD] Travel Blank	E550	01-Sep-2020	----	----	----		05-Sep-2020	3 days	3 days	✔	
Aggregate Organics : Chemical Oxygen Demand by Colourimetry											
Amber glass total (sulfuric acid) DUP	E559	01-Sep-2020	----	----	----		10-Sep-2020	28 days	8 days	✔	
Aggregate Organics : Chemical Oxygen Demand by Colourimetry											
Amber glass total (sulfuric acid) Field Blank	E559	01-Sep-2020	----	----	----		10-Sep-2020	28 days	8 days	✔	
Aggregate Organics : Chemical Oxygen Demand by Colourimetry											
Amber glass total (sulfuric acid) SW-1	E559	01-Sep-2020	----	----	----		10-Sep-2020	28 days	8 days	✔	
Aggregate Organics : Chemical Oxygen Demand by Colourimetry											
Amber glass total (sulfuric acid) SW-17	E559	01-Sep-2020	----	----	----		10-Sep-2020	28 days	8 days	✔	
Aggregate Organics : Chemical Oxygen Demand by Colourimetry											
Amber glass total (sulfuric acid) SW-21	E559	01-Sep-2020	----	----	----		10-Sep-2020	28 days	8 days	✔	
Aggregate Organics : Chemical Oxygen Demand by Colourimetry											
Amber glass total (sulfuric acid) SW-3	E559	01-Sep-2020	----	----	----		10-Sep-2020	28 days	8 days	✔	
Aggregate Organics : Chemical Oxygen Demand by Colourimetry											
Amber glass total (sulfuric acid) SW-6	E559	01-Sep-2020	----	----	----		10-Sep-2020	28 days	8 days	✔	
Aggregate Organics : Chemical Oxygen Demand by Colourimetry											
Amber glass total (sulfuric acid) Travel Blank	E559	01-Sep-2020	----	----	----		10-Sep-2020	28 days	8 days	✔	



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Anions and Nutrients : Ammonia by Fluorescence											
Amber glass total (sulfuric acid) DUP	E298	01-Sep-2020	----	----	----		09-Sep-2020	28 days	7 days	✓	
Anions and Nutrients : Ammonia by Fluorescence											
Amber glass total (sulfuric acid) Field Blank	E298	01-Sep-2020	----	----	----		09-Sep-2020	28 days	7 days	✓	
Anions and Nutrients : Ammonia by Fluorescence											
Amber glass total (sulfuric acid) SW-17	E298	01-Sep-2020	----	----	----		09-Sep-2020	28 days	7 days	✓	
Anions and Nutrients : Ammonia by Fluorescence											
Amber glass total (sulfuric acid) SW-21	E298	01-Sep-2020	----	----	----		09-Sep-2020	28 days	7 days	✓	
Anions and Nutrients : Ammonia by Fluorescence											
Amber glass total (sulfuric acid) SW-6	E298	01-Sep-2020	----	----	----		09-Sep-2020	28 days	7 days	✓	
Anions and Nutrients : Ammonia by Fluorescence											
Amber glass total (sulfuric acid) Travel Blank	E298	01-Sep-2020	----	----	----		09-Sep-2020	28 days	7 days	✓	
Anions and Nutrients : Ammonia by Fluorescence											
Amber glass total (sulfuric acid) SW-1	E298	01-Sep-2020	----	----	----		09-Sep-2020	28 days	8 days	✓	
Anions and Nutrients : Ammonia by Fluorescence											
Amber glass total (sulfuric acid) SW-3	E298	01-Sep-2020	----	----	----		09-Sep-2020	28 days	8 days	✓	
Anions and Nutrients : Bromide in Water by IC (Low Level)											
HDPE DUP	E235.Br-L	01-Sep-2020	----	----	----		05-Sep-2020	28 days	3 days	✓	



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Anions and Nutrients : Bromide in Water by IC (Low Level)											
HDPE Field Blank	E235.Br-L	01-Sep-2020	----	----	----		05-Sep-2020	28 days	3 days	✓	
Anions and Nutrients : Bromide in Water by IC (Low Level)											
HDPE SW-17	E235.Br-L	01-Sep-2020	----	----	----		05-Sep-2020	28 days	3 days	✓	
Anions and Nutrients : Bromide in Water by IC (Low Level)											
HDPE SW-6	E235.Br-L	01-Sep-2020	----	----	----		05-Sep-2020	28 days	3 days	✓	
Anions and Nutrients : Bromide in Water by IC (Low Level)											
HDPE SW-1	E235.Br-L	01-Sep-2020	----	----	----		05-Sep-2020	28 days	4 days	✓	
Anions and Nutrients : Bromide in Water by IC (Low Level)											
HDPE SW-21	E235.Br-L	01-Sep-2020	----	----	----		05-Sep-2020	28 days	4 days	✓	
Anions and Nutrients : Bromide in Water by IC (Low Level)											
HDPE SW-3	E235.Br-L	01-Sep-2020	----	----	----		05-Sep-2020	28 days	4 days	✓	
Anions and Nutrients : Chloride in Water by IC											
HDPE DUP	E235.Cl	01-Sep-2020	----	----	----		05-Sep-2020	28 days	3 days	✓	
Anions and Nutrients : Chloride in Water by IC											
HDPE Field Blank	E235.Cl	01-Sep-2020	----	----	----		05-Sep-2020	28 days	3 days	✓	
Anions and Nutrients : Chloride in Water by IC											
HDPE SW-17	E235.Cl	01-Sep-2020	----	----	----		05-Sep-2020	28 days	3 days	✓	



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec Actual		Eval	Analysis Date	Holding Times Rec Actual		Eval
Anions and Nutrients : Chloride in Water by IC										
HDPE SW-6	E235.Cl	01-Sep-2020	----	----	----		05-Sep-2020	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE SW-1	E235.Cl	01-Sep-2020	----	----	----		05-Sep-2020	28 days	4 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE SW-21	E235.Cl	01-Sep-2020	----	----	----		05-Sep-2020	28 days	4 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE SW-3	E235.Cl	01-Sep-2020	----	----	----		05-Sep-2020	28 days	4 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE Travel Blank	E235.Cl	01-Sep-2020	----	----	----		07-Sep-2020	28 days	5 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE DUP	E378-U	01-Sep-2020	----	----	----		05-Sep-2020	3 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE Field Blank	E378-U	01-Sep-2020	----	----	----		05-Sep-2020	3 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE SW-1	E378-U	01-Sep-2020	----	----	----		05-Sep-2020	3 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE SW-17	E378-U	01-Sep-2020	----	----	----		05-Sep-2020	3 days	3 days	✓



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)											
HDPE SW-21	E378-U	01-Sep-2020	----	----	----		05-Sep-2020	3 days	3 days	✓	
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)											
HDPE SW-3	E378-U	01-Sep-2020	----	----	----		05-Sep-2020	3 days	3 days	✓	
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)											
HDPE SW-6	E378-U	01-Sep-2020	----	----	----		05-Sep-2020	3 days	3 days	✓	
Anions and Nutrients : Fluoride in Water by IC											
HDPE DUP	E235.F	01-Sep-2020	----	----	----		05-Sep-2020	28 days	3 days	✓	
Anions and Nutrients : Fluoride in Water by IC											
HDPE Field Blank	E235.F	01-Sep-2020	----	----	----		05-Sep-2020	28 days	3 days	✓	
Anions and Nutrients : Fluoride in Water by IC											
HDPE SW-17	E235.F	01-Sep-2020	----	----	----		05-Sep-2020	28 days	3 days	✓	
Anions and Nutrients : Fluoride in Water by IC											
HDPE SW-6	E235.F	01-Sep-2020	----	----	----		05-Sep-2020	28 days	3 days	✓	
Anions and Nutrients : Fluoride in Water by IC											
HDPE SW-1	E235.F	01-Sep-2020	----	----	----		05-Sep-2020	28 days	4 days	✓	
Anions and Nutrients : Fluoride in Water by IC											
HDPE SW-21	E235.F	01-Sep-2020	----	----	----		05-Sep-2020	28 days	4 days	✓	



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Fluoride in Water by IC										
HDPE SW-3	E235.F	01-Sep-2020	----	----	----		05-Sep-2020	28 days	4 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE Travel Blank	E235.F	01-Sep-2020	----	----	----		07-Sep-2020	28 days	5 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE DUP	E235.NO3-L	01-Sep-2020	----	----	----		05-Sep-2020	3 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE Field Blank	E235.NO3-L	01-Sep-2020	----	----	----		05-Sep-2020	3 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE SW-17	E235.NO3-L	01-Sep-2020	----	----	----		05-Sep-2020	3 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE SW-6	E235.NO3-L	01-Sep-2020	----	----	----		05-Sep-2020	3 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE SW-1	E235.NO3-L	01-Sep-2020	----	----	----		05-Sep-2020	3 days	4 days	* EHT
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE SW-21	E235.NO3-L	01-Sep-2020	----	----	----		05-Sep-2020	3 days	4 days	* EHT
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE SW-3	E235.NO3-L	01-Sep-2020	----	----	----		05-Sep-2020	3 days	4 days	* EHT



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Anions and Nutrients : Nitrite in Water by IC (Low Level)											
HDPE DUP	E235.NO2-L	01-Sep-2020	----	----	----		05-Sep-2020	3 days	3 days	✓	
Anions and Nutrients : Nitrite in Water by IC (Low Level)											
HDPE Field Blank	E235.NO2-L	01-Sep-2020	----	----	----		05-Sep-2020	3 days	3 days	✓	
Anions and Nutrients : Nitrite in Water by IC (Low Level)											
HDPE SW-17	E235.NO2-L	01-Sep-2020	----	----	----		05-Sep-2020	3 days	3 days	✓	
Anions and Nutrients : Nitrite in Water by IC (Low Level)											
HDPE SW-6	E235.NO2-L	01-Sep-2020	----	----	----		05-Sep-2020	3 days	3 days	✓	
Anions and Nutrients : Nitrite in Water by IC (Low Level)											
HDPE SW-1	E235.NO2-L	01-Sep-2020	----	----	----		05-Sep-2020	3 days	4 days	* EHT	
Anions and Nutrients : Nitrite in Water by IC (Low Level)											
HDPE SW-21	E235.NO2-L	01-Sep-2020	----	----	----		05-Sep-2020	3 days	4 days	* EHT	
Anions and Nutrients : Nitrite in Water by IC (Low Level)											
HDPE SW-3	E235.NO2-L	01-Sep-2020	----	----	----		05-Sep-2020	3 days	4 days	* EHT	
Anions and Nutrients : Sulfate in Water by IC											
HDPE DUP	E235.SO4	01-Sep-2020	----	----	----		05-Sep-2020	28 days	3 days	✓	
Anions and Nutrients : Sulfate in Water by IC											
HDPE Field Blank	E235.SO4	01-Sep-2020	----	----	----		05-Sep-2020	28 days	3 days	✓	



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Anions and Nutrients : Sulfate in Water by IC											
HDPE SW-17	E235.SO4	01-Sep-2020	----	----	----		05-Sep-2020	28 days	3 days	✓	
Anions and Nutrients : Sulfate in Water by IC											
HDPE SW-6	E235.SO4	01-Sep-2020	----	----	----		05-Sep-2020	28 days	3 days	✓	
Anions and Nutrients : Sulfate in Water by IC											
HDPE SW-1	E235.SO4	01-Sep-2020	----	----	----		05-Sep-2020	28 days	4 days	✓	
Anions and Nutrients : Sulfate in Water by IC											
HDPE SW-21	E235.SO4	01-Sep-2020	----	----	----		05-Sep-2020	28 days	4 days	✓	
Anions and Nutrients : Sulfate in Water by IC											
HDPE SW-3	E235.SO4	01-Sep-2020	----	----	----		05-Sep-2020	28 days	4 days	✓	
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)											
Amber glass total (sulfuric acid) DUP	E318	01-Sep-2020	09-Sep-2020	28 days	7 days	✓	10-Sep-2020	20 days	1 days	✓	
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)											
Amber glass total (sulfuric acid) Field Blank	E318	01-Sep-2020	09-Sep-2020	28 days	7 days	✓	10-Sep-2020	20 days	1 days	✓	
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)											
Amber glass total (sulfuric acid) SW-1	E318	01-Sep-2020	09-Sep-2020	28 days	7 days	✓	10-Sep-2020	20 days	1 days	✓	
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)											
Amber glass total (sulfuric acid) SW-17	E318	01-Sep-2020	09-Sep-2020	28 days	7 days	✓	10-Sep-2020	20 days	1 days	✓	



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)											
Amber glass total (sulfuric acid) SW-21	E318	01-Sep-2020	09-Sep-2020	28 days	7 days	✔	10-Sep-2020	20 days	1 days	✔	
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)											
Amber glass total (sulfuric acid) SW-6	E318	01-Sep-2020	09-Sep-2020	28 days	7 days	✔	10-Sep-2020	20 days	1 days	✔	
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)											
Amber glass total (sulfuric acid) SW-3	E318	01-Sep-2020	09-Sep-2020	28 days	8 days	✔	10-Sep-2020	19 days	1 days	✔	
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)											
Amber glass total (sulfuric acid) DUP	E372-U	01-Sep-2020	09-Sep-2020	28 days	7 days	✔	10-Sep-2020	20 days	1 days	✔	
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)											
Amber glass total (sulfuric acid) Field Blank	E372-U	01-Sep-2020	09-Sep-2020	28 days	7 days	✔	10-Sep-2020	20 days	1 days	✔	
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)											
Amber glass total (sulfuric acid) SW-1	E372-U	01-Sep-2020	09-Sep-2020	28 days	7 days	✔	10-Sep-2020	20 days	1 days	✔	
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)											
Amber glass total (sulfuric acid) SW-17	E372-U	01-Sep-2020	09-Sep-2020	28 days	7 days	✔	10-Sep-2020	20 days	1 days	✔	
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)											
Amber glass total (sulfuric acid) SW-21	E372-U	01-Sep-2020	09-Sep-2020	28 days	7 days	✔	10-Sep-2020	20 days	1 days	✔	
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)											
Amber glass total (sulfuric acid) SW-6	E372-U	01-Sep-2020	09-Sep-2020	28 days	7 days	✔	10-Sep-2020	20 days	1 days	✔	



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Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)											
Amber glass total (sulfuric acid) SW-3	E372-U	01-Sep-2020	09-Sep-2020	28 days	8 days	✔	10-Sep-2020	19 days	1 days	✔	
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)											
HDPE dissolved (nitric acid) DUP	E421.Cr-L	01-Sep-2020	10-Sep-2020	180 days	8 days	✔	10-Sep-2020	171 days	0 days	✔	
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)											
HDPE dissolved (nitric acid) Field Blank	E421.Cr-L	01-Sep-2020	10-Sep-2020	180 days	8 days	✔	10-Sep-2020	171 days	0 days	✔	
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)											
HDPE dissolved (nitric acid) SW-1	E421.Cr-L	01-Sep-2020	10-Sep-2020	180 days	8 days	✔	10-Sep-2020	171 days	0 days	✔	
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)											
HDPE dissolved (nitric acid) SW-17	E421.Cr-L	01-Sep-2020	10-Sep-2020	180 days	8 days	✔	10-Sep-2020	171 days	0 days	✔	
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)											
HDPE dissolved (nitric acid) SW-21	E421.Cr-L	01-Sep-2020	10-Sep-2020	180 days	8 days	✔	10-Sep-2020	171 days	0 days	✔	
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)											
HDPE dissolved (nitric acid) SW-3	E421.Cr-L	01-Sep-2020	10-Sep-2020	180 days	8 days	✔	10-Sep-2020	171 days	0 days	✔	
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)											
HDPE dissolved (nitric acid) SW-6	E421.Cr-L	01-Sep-2020	10-Sep-2020	180 days	8 days	✔	10-Sep-2020	171 days	0 days	✔	
Dissolved Metals : Dissolved Mercury in Water by CVAAS											
Glass vial dissolved (hydrochloric acid) DUP	E509	01-Sep-2020	06-Sep-2020	28 days	4 days	✔	06-Sep-2020	23 days	0 days	✔	



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Dissolved Metals : Dissolved Mercury in Water by CVAAS											
Glass vial dissolved (hydrochloric acid) Field Blank	E509	01-Sep-2020	06-Sep-2020	28 days	4 days	✔	06-Sep-2020	23 days	0 days	✔	
Dissolved Metals : Dissolved Mercury in Water by CVAAS											
Glass vial dissolved (hydrochloric acid) SW-17	E509	01-Sep-2020	06-Sep-2020	28 days	4 days	✔	06-Sep-2020	23 days	0 days	✔	
Dissolved Metals : Dissolved Mercury in Water by CVAAS											
Glass vial dissolved (hydrochloric acid) SW-6	E509	01-Sep-2020	06-Sep-2020	28 days	4 days	✔	06-Sep-2020	23 days	0 days	✔	
Dissolved Metals : Dissolved Mercury in Water by CVAAS											
Glass vial dissolved (hydrochloric acid) SW-1	E509	01-Sep-2020	06-Sep-2020	28 days	5 days	✔	06-Sep-2020	22 days	0 days	✔	
Dissolved Metals : Dissolved Mercury in Water by CVAAS											
Glass vial dissolved (hydrochloric acid) SW-21	E509	01-Sep-2020	06-Sep-2020	28 days	5 days	✔	06-Sep-2020	22 days	0 days	✔	
Dissolved Metals : Dissolved Mercury in Water by CVAAS											
Glass vial dissolved (hydrochloric acid) SW-3	E509	01-Sep-2020	06-Sep-2020	28 days	5 days	✔	06-Sep-2020	22 days	0 days	✔	
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS											
HDPE dissolved (nitric acid) DUP	E421	01-Sep-2020	10-Sep-2020	180 days	8 days	✔	10-Sep-2020	171 days	0 days	✔	
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS											
HDPE dissolved (nitric acid) Field Blank	E421	01-Sep-2020	10-Sep-2020	180 days	8 days	✔	10-Sep-2020	171 days	0 days	✔	
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS											
HDPE dissolved (nitric acid) SW-1	E421	01-Sep-2020	10-Sep-2020	180 days	8 days	✔	10-Sep-2020	171 days	0 days	✔	



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Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS											
HDPE dissolved (nitric acid) SW-17	E421	01-Sep-2020	10-Sep-2020	180 days	8 days	✓	10-Sep-2020	171 days	0 days	✓	
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS											
HDPE dissolved (nitric acid) SW-21	E421	01-Sep-2020	10-Sep-2020	180 days	8 days	✓	10-Sep-2020	171 days	0 days	✓	
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS											
HDPE dissolved (nitric acid) SW-3	E421	01-Sep-2020	10-Sep-2020	180 days	8 days	✓	10-Sep-2020	171 days	0 days	✓	
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS											
HDPE dissolved (nitric acid) SW-6	E421	01-Sep-2020	10-Sep-2020	180 days	8 days	✓	10-Sep-2020	171 days	0 days	✓	
Physical Tests : Alkalinity Species by Titration											
HDPE DUP	E290	01-Sep-2020	----	----	----		05-Sep-2020	14 days	3 days	✓	
Physical Tests : Alkalinity Species by Titration											
HDPE Field Blank	E290	01-Sep-2020	----	----	----		05-Sep-2020	14 days	3 days	✓	
Physical Tests : Alkalinity Species by Titration											
HDPE SW-17	E290	01-Sep-2020	----	----	----		05-Sep-2020	14 days	3 days	✓	
Physical Tests : Alkalinity Species by Titration											
HDPE SW-6	E290	01-Sep-2020	----	----	----		05-Sep-2020	14 days	3 days	✓	
Physical Tests : Alkalinity Species by Titration											
HDPE SW-1	E290	01-Sep-2020	----	----	----		05-Sep-2020	14 days	4 days	✓	



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Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Physical Tests : Alkalinity Species by Titration											
HDPE SW-21	E290	01-Sep-2020	----	----	----		05-Sep-2020	14 days	4 days	✓	
Physical Tests : Alkalinity Species by Titration											
HDPE SW-3	E290	01-Sep-2020	----	----	----		05-Sep-2020	14 days	4 days	✓	
Physical Tests : Conductivity in Water											
HDPE DUP	E100	01-Sep-2020	----	----	----		05-Sep-2020	28 days	3 days	✓	
Physical Tests : Conductivity in Water											
HDPE Field Blank	E100	01-Sep-2020	----	----	----		05-Sep-2020	28 days	3 days	✓	
Physical Tests : Conductivity in Water											
HDPE SW-17	E100	01-Sep-2020	----	----	----		05-Sep-2020	28 days	3 days	✓	
Physical Tests : Conductivity in Water											
HDPE SW-6	E100	01-Sep-2020	----	----	----		05-Sep-2020	28 days	3 days	✓	
Physical Tests : Conductivity in Water											
HDPE SW-1	E100	01-Sep-2020	----	----	----		05-Sep-2020	28 days	4 days	✓	
Physical Tests : Conductivity in Water											
HDPE SW-21	E100	01-Sep-2020	----	----	----		05-Sep-2020	28 days	4 days	✓	
Physical Tests : Conductivity in Water											
HDPE SW-3	E100	01-Sep-2020	----	----	----		05-Sep-2020	28 days	4 days	✓	



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Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Physical Tests : pH by Meter											
HDPE Field Blank	E108	01-Sep-2020	----	----	----		05-Sep-2020	0.25 hrs	93 hrs	*	EHTR-FM
Physical Tests : pH by Meter											
HDPE SW-6	E108	01-Sep-2020	----	----	----		05-Sep-2020	0.25 hrs	93 hrs	*	EHTR-FM
Physical Tests : pH by Meter											
HDPE DUP	E108	01-Sep-2020	----	----	----		05-Sep-2020	0.25 hrs	94 hrs	*	EHTR-FM
Physical Tests : pH by Meter											
HDPE SW-17	E108	01-Sep-2020	----	----	----		05-Sep-2020	0.25 hrs	94 hrs	*	EHTR-FM
Physical Tests : pH by Meter											
HDPE SW-1	E108	01-Sep-2020	----	----	----		05-Sep-2020	0.25 hrs	96 hrs	*	EHTR-FM
Physical Tests : pH by Meter											
HDPE SW-21	E108	01-Sep-2020	----	----	----		05-Sep-2020	0.25 hrs	96 hrs	*	EHTR-FM
Physical Tests : pH by Meter											
HDPE SW-3	E108	01-Sep-2020	----	----	----		05-Sep-2020	0.25 hrs	97 hrs	*	EHTR-FM
Physical Tests : TSS by Gravimetry											
HDPE DUP	E160-H	01-Sep-2020	----	----	----		06-Sep-2020	7 days	5 days	✓	
Physical Tests : TSS by Gravimetry											
HDPE Field Blank	E160-H	01-Sep-2020	----	----	----		06-Sep-2020	7 days	5 days	✓	



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Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Physical Tests : TSS by Gravimetry											
HDPE SW-1	E160-H	01-Sep-2020	----	----	----		06-Sep-2020	7 days	5 days	✓	
Physical Tests : TSS by Gravimetry											
HDPE SW-17	E160-H	01-Sep-2020	----	----	----		06-Sep-2020	7 days	5 days	✓	
Physical Tests : TSS by Gravimetry											
HDPE SW-21	E160-H	01-Sep-2020	----	----	----		06-Sep-2020	7 days	5 days	✓	
Physical Tests : TSS by Gravimetry											
HDPE SW-3	E160-H	01-Sep-2020	----	----	----		06-Sep-2020	7 days	5 days	✓	
Physical Tests : TSS by Gravimetry											
HDPE SW-6	E160-H	01-Sep-2020	----	----	----		06-Sep-2020	7 days	5 days	✓	
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)											
HDPE total (nitric acid) SW-1	E420.Cr-L	01-Sep-2020	----	----	----		09-Sep-2020	180 days	8 days	✓	
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)											
HDPE total (nitric acid) SW-21	E420.Cr-L	01-Sep-2020	----	----	----		09-Sep-2020	180 days	8 days	✓	
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)											
HDPE total (nitric acid) SW-3	E420.Cr-L	01-Sep-2020	----	----	----		09-Sep-2020	180 days	8 days	✓	
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)											
HDPE total (nitric acid) SW-6	E420.Cr-L	01-Sep-2020	----	----	----		09-Sep-2020	180 days	8 days	✓	



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Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid) DUP	E420.Cr-L	01-Sep-2020	----	----	----		10-Sep-2020	180 days	9 days	✔
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid) Field Blank	E420.Cr-L	01-Sep-2020	----	----	----		10-Sep-2020	180 days	9 days	✔
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid) SW-17	E420.Cr-L	01-Sep-2020	----	----	----		10-Sep-2020	180 days	9 days	✔
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE - total (lab preserved) Travel Blank	E420.Cr-L	01-Sep-2020	----	----	----		10-Sep-2020	180 days	9 days	✔
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) Field Blank	E508	01-Sep-2020	----	----	----		06-Sep-2020	28 days	4 days	✔
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) SW-17	E508	01-Sep-2020	----	----	----		06-Sep-2020	28 days	4 days	✔
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) SW-6	E508	01-Sep-2020	----	----	----		06-Sep-2020	28 days	4 days	✔
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved) Travel Blank	E508	01-Sep-2020	----	----	----		06-Sep-2020	28 days	4 days	✔
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) DUP	E508	01-Sep-2020	----	----	----		06-Sep-2020	28 days	5 days	✔



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Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Total Metals : Total Mercury in Water by CVAAS											
Glass vial total (hydrochloric acid) SW-1	E508	01-Sep-2020	----	----	----		06-Sep-2020	28 days	5 days	✓	
Total Metals : Total Mercury in Water by CVAAS											
Glass vial total (hydrochloric acid) SW-21	E508	01-Sep-2020	----	----	----		06-Sep-2020	28 days	5 days	✓	
Total Metals : Total Mercury in Water by CVAAS											
Glass vial total (hydrochloric acid) SW-3	E508	01-Sep-2020	----	----	----		06-Sep-2020	28 days	5 days	✓	
Total Metals : Total Metals in Water by CRC ICPMS											
HDPE total (nitric acid) SW-1	E420	01-Sep-2020	----	----	----		09-Sep-2020	180 days	8 days	✓	
Total Metals : Total Metals in Water by CRC ICPMS											
HDPE total (nitric acid) SW-21	E420	01-Sep-2020	----	----	----		09-Sep-2020	180 days	8 days	✓	
Total Metals : Total Metals in Water by CRC ICPMS											
HDPE total (nitric acid) SW-3	E420	01-Sep-2020	----	----	----		09-Sep-2020	180 days	8 days	✓	
Total Metals : Total Metals in Water by CRC ICPMS											
HDPE total (nitric acid) SW-6	E420	01-Sep-2020	----	----	----		09-Sep-2020	180 days	8 days	✓	
Total Metals : Total Metals in Water by CRC ICPMS											
HDPE total (nitric acid) DUP	E420	01-Sep-2020	----	----	----		10-Sep-2020	180 days	9 days	✓	
Total Metals : Total Metals in Water by CRC ICPMS											
HDPE total (nitric acid) Field Blank	E420	01-Sep-2020	----	----	----		10-Sep-2020	180 days	9 days	✓	



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Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) SW-17	E420	01-Sep-2020	----	----	----		10-Sep-2020	180 days	9 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) Travel Blank	E420	01-Sep-2020	----	----	----		10-Sep-2020	180 days	9 days	✓

Legend & Qualifier Definitions

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended

EHT: Exceeded ALS recommended hold time prior to analysis.

Rec. HT: ALS recommended hold time (see units).



Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water** Evaluation: * = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type	Method	QC Lot #	Count		Frequency (%)		Evaluation
			QC	Regular	Actual	Expected	
Analytical Methods							
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	82041	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	83253	1	19	5.2	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	82118	1	19	5.2	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	82046	1	10	10.0	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	83908	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	82043	2	37	5.4	5.0	✓
Conductivity in Water	E100	82039	1	20	5.0	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	83829	1	12	8.3	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	82450	2	40	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	83828	1	12	8.3	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	82042	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	82044	2	21	9.5	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	82048	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	82047	1	20	5.0	5.0	✓
pH by Meter	E108	82040	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	82045	1	20	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	83003	2	28	7.1	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	83255	1	7	14.2	5.0	✓
Total Mercury in Water by CVAAS	E508	82466	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	83004	2	35	5.7	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	83256	1	7	14.2	5.0	✓
TSS by Gravimetry	E160-H	82510	1	19	5.2	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	82041	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	83253	1	19	5.2	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	82118	1	19	5.2	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	82046	1	10	10.0	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	83908	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	82043	2	37	5.4	5.0	✓
Conductivity in Water	E100	82039	1	20	5.0	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	83829	1	12	8.3	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	82450	2	40	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	83828	1	12	8.3	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	82042	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	82044	2	21	9.5	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	82048	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	82047	1	20	5.0	5.0	✓



Matrix: **Water**

Evaluation: * = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type	Method	QC Lot #	Count		Frequency (%)		Evaluation
			QC	Regular	Actual	Expected	
Analytical Methods							
Laboratory Control Samples (LCS) - Continued							
pH by Meter	E108	82040	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	82045	1	20	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	83003	2	28	7.1	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	83255	1	7	14.2	5.0	✓
Total Mercury in Water by CVAAS	E508	82466	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	83004	2	35	5.7	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	83256	1	7	14.2	5.0	✓
TSS by Gravimetry	E160-H	82510	1	19	5.2	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	82041	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	83253	1	19	5.2	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	82118	1	19	5.2	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	82046	1	10	10.0	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	83908	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	82043	2	37	5.4	5.0	✓
Conductivity in Water	E100	82039	1	20	5.0	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	83829	1	12	8.3	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	82450	2	40	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	83828	1	12	8.3	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	82042	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	82044	2	21	9.5	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	82048	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	82047	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	82045	1	20	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	83003	2	28	7.1	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	83255	1	7	14.2	5.0	✓
Total Mercury in Water by CVAAS	E508	82466	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	83004	2	35	5.7	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	83256	1	7	14.2	5.0	✓
TSS by Gravimetry	E160-H	82510	1	19	5.2	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	83253	1	19	5.2	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	82046	1	10	10.0	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	83908	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	82043	2	37	5.4	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	83829	1	12	8.3	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	82450	2	40	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	83828	1	12	8.3	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	82042	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	82044	1	21	4.7	5.0	*



Matrix: **Water** Evaluation: * = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type	Method	QC Lot #	Count		Frequency (%)		
			QC	Regular	Actual	Expected	Evaluation
<i>Analytical Methods</i>							
Matrix Spikes (MS) - Continued							
Nitrate in Water by IC (Low Level)	E235.NO3-L	82048	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	82047	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	82045	1	20	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	83003	2	28	7.1	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	83255	1	7	14.2	5.0	✓
Total Mercury in Water by CVAAS	E508	82466	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	83004	2	35	5.7	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	83256	1	7	14.2	5.0	✓



Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Conductivity in Water	E100 Vancouver - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108 Vancouver - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
TSS by Gravimetry	E160-H Vancouver - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. 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.
Bromide in Water by IC (Low Level)	E235.Br-L Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Chloride in Water by IC	E235.Cl Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC (Low Level)	E235.NO2-L Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Alkalinity Species by Titration	E290 Vancouver - Environmental	Water	APHA 2320 B (mod)	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.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Ammonia by Fluorescence	E298 Vancouver - Environmental	Water	J. Environ. Monit., 2005, 7, 37-42 (mod)	Ammonia in water is analyzed by flow-injection analysis with fluorescence detection after reaction with orthophthaldialdehyde (OPA).
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318 Vancouver - Environmental	Water	APHA 4500-Norg D (mod)	Total Kjeldahl Nitrogen is determined using block digestion followed by flow-injection analysis with fluorescence detection.
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U Vancouver - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U Vancouver - Environmental	Water	APHA 4500-P E (mod)	Dissolved Orthophosphate is determined colourimetrically on a water sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
Total Metals in Water by CRC ICPMS	E420 Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS.
Dissolved Metals in Water by CRC ICPMS	E421 Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L Vancouver - Environmental	Water	APHA 3030 B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS
Total Mercury in Water by CVAAS	E508 Vancouver - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Dissolved Mercury in Water by CVAAS	E509 Vancouver - Environmental	Water	APHA 3030B/EPA 1631E (mod)	Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.
Biochemical Oxygen Demand - 5 day	E550 Vancouver - Environmental	Water	APHA 5210 B (mod)	Samples are diluted and incubated for a specified time period, after which the oxygen depletion is measured using a dissolved oxygen meter. Free chlorine is a negative interference in the BOD method; please advise ALS when free chlorine is present in samples.



<i>Analytical Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
Chemical Oxygen Demand by Colourimetry	E559 Vancouver - Environmental	Water	APHA 5220 D (mod)	Samples are analyzed using the closed reflux colourimetric method.
Dissolved Hardness (Calculated)	EC100 Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO ₃), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO ₃ equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Hardness (Calculated) from Total Ca/Mg	EC100A Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO ₃), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in CaCO ₃ equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.

<i>Preparation Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
Digestion for TKN in water	EP318 Vancouver - Environmental	Water	APHA 4500-Norg D (mod)	Samples are digested using block digestion with Copper Sulfate Digestion Reagent.
Digestion for Total Phosphorus in water	EP372 Vancouver - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Dissolved Metals Water Filtration	EP421 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO ₃ .
Dissolved Mercury Water Filtration	EP509 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

QUALITY CONTROL REPORT

Work Order : **VA20B4463**

Page : 1 of 22

Client : Regional District of Kitimat-Stikine
Contact : Mary Tress
Address : # 300 - 4545 Lazelle Avenue
 Terrace BC Canada V8G 4E1
Telephone : ----
Project : Thornhill Transfer Station Surface Water
PO : ----
C-O-C number : ----
Sampler : Mary Tress
Site :
Quote number : Q62338
No. of samples received : 8
No. of samples analysed : 8

Laboratory : Vancouver - Environmental
Account Manager : Amber Springer
Address : 8081 Lougheed Highway
 Burnaby, British Columbia Canada V5A 1W9
Telephone : +1 604 253 4188
Date Samples Received : 02-Sep-2020 14:30
Date Analysis Commenced : 05-Sep-2020
Issue Date : 15-Sep-2020 09:44

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits
- Reference Material (RM) Report; Recovery and Acceptance Limits
- Method Blank (MB) Report; Recovery and Acceptance Limits
- Laboratory Control Sample (LCS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Angelo Salandanan	Lab Assistant	Metals, Burnaby, British Columbia
Bruna Botti	Team Leader - Inorganics	Inorganics - Water Quality, Burnaby, British Columbia
Dan Gebert	Laboratory Analyst	Metals, Burnaby, British Columbia
Dee Lee	Analyst	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics - Water Quality, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	Inorganics - Water Quality, Burnaby, British Columbia
Monica Ko	Lab Assistant	Metals, Burnaby, British Columbia
Owen Cheng		Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia

Page : 2 of 22
Work Order : VA20B4463
Client : Regional District of Kitimat-Stikine
Project : Thornhill Transfer Station Surface Water



General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include 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 predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number = Chemical Abstracts Services number is a unique identifier assigned to discrete substances.

DQO = Data Quality Objective.

LOR = Limit of Reporting (detection limit).

RPD = Relative Percentage Difference

= Indicates a QC result that did not meet the ALS DQO.



Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 82039)											
VA20B4463-003	SW-6	conductivity	----	E100	2.0	µS/cm	102	102	0.00%	10%	----
Physical Tests (QC Lot: 82040)											
VA20B4463-003	SW-6	pH	----	E108	0.10	pH units	7.82	7.82	0.00%	4%	----
Physical Tests (QC Lot: 82041)											
VA20B4463-003	SW-6	alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	51.6	51.8	0.387%	20%	----
Physical Tests (QC Lot: 82510)											
VA20B4310-003	Anonymous	solids, total suspended [TSS]	----	E160-H	3.0	mg/L	<3.0	<3.0	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 82042)											
VA20B4463-001	SW-1	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 82043)											
VA20B4463-001	SW-1	chloride	16887-00-6	E235.Cl	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 82044)											
VA20B4463-001	SW-1	fluoride	16984-48-8	E235.F	0.020	mg/L	0.020	0.022	0.001	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 82045)											
VA20B4463-001	SW-1	sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	0.94	0.94	0.002	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 82046)											
VA20B4463-001	SW-1	bromide	24959-67-9	E235.Br-L	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 82047)											
VA20B4463-001	SW-1	nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 82048)											
VA20B4463-001	SW-1	nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.0331	0.0332	0.0001	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 82539)											
VA20B4419-001	Anonymous	chloride	16887-00-6	E235.Cl	0.50	mg/L	13.8	13.8	0.0462%	20%	----
Anions and Nutrients (QC Lot: 82542)											
VA20B4463-008	Travel Blank	fluoride	16984-48-8	E235.F	0.020	mg/L	<0.020	<0.020	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 83253)											
VA20B4255-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	2.50	mg/L	26.4	26.7	0.886%	20%	----
Anions and Nutrients (QC Lot: 83255)											
VA20B4463-001	SW-1	Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	<0.050	0.064	0.014	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 83256)											
VA20B4463-001	SW-1	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0028	0.0021	0.0007	Diff <2x LOR	----



Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Total Metals (QC Lot: 82466)											
VA20B4456-005	Anonymous	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Total Metals (QC Lot: 83003)											
VA20B4443-001	Anonymous	chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L	0.00012	<0.00010	0.00002	Diff <2x LOR	----
Total Metals (QC Lot: 83004)											
VA20B4443-001	Anonymous	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0141	0.0130	0.0011	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00075	0.00073	0.00001	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.00816	0.00821	0.549%	20%	----
		beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	0.050	mg/L	18.6	18.7	0.302%	20%	----
		cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	0.297	0.297	0.00208%	20%	----
		lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	0.100	mg/L	4.42	4.35	1.63%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.0288	0.0285	1.26%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000808	0.000833	3.01%	20%	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.100	mg/L	0.845	0.853	0.007	Diff <2x LOR	----
		rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00048	0.00045	0.00002	Diff <2x LOR	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	0.000070	0.000076	0.000006	Diff <2x LOR	----
		silicon, total	7440-21-3	E420	0.10	mg/L	4.60	4.56	0.679%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.050	mg/L	3.85	3.89	0.972%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.0963	0.0963	0.0338%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	1.06	1.04	0.02	Diff <2x LOR	----
		tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----



Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Total Metals (QC Lot: 83004) - continued											
VA20B4443-001	Anonymous	titanium, total	7440-32-6	E420	0.00030	mg/L	0.00067	0.00052	0.00015	Diff <2x LOR	----
		tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	0.000118	0.000123	4.14%	20%	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	0.00052	0.00051	0.000008	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
		zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
Total Metals (QC Lot: 83005)											
VA20B4456-001	Anonymous	chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L	0.00046	0.00042	0.00004	Diff <2x LOR	----
Total Metals (QC Lot: 83006)											
VA20B4456-001	Anonymous	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.140	0.130	7.47%	20%	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	0.00279	0.00280	0.380%	20%	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00168	0.00172	1.99%	20%	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.0437	0.0435	0.422%	20%	----
		beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	0.063	0.062	0.0007	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.0000912	0.0000752	19.2%	20%	----
		calcium, total	7440-70-2	E420	0.050	mg/L	86.0	84.7	1.54%	20%	----
		cesium, total	7440-46-2	E420	0.000010	mg/L	0.000874	0.000880	0.700%	20%	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	0.00648	0.00648	0.143%	20%	----
		copper, total	7440-50-8	E420	0.00050	mg/L	0.00107	0.00109	0.00002	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	0.263	0.266	0.889%	20%	----
		lead, total	7439-92-1	E420	0.000050	mg/L	0.000234	0.000233	0.000001	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	0.0061	0.0059	0.0002	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	70.5	71.5	1.46%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.464	0.469	0.942%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00340	0.00338	0.582%	20%	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	0.0524	0.0530	1.13%	20%	----
		phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.050	mg/L	6.66	6.70	0.681%	20%	----
		rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00800	0.00830	3.71%	20%	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	0.000353	0.000400	0.000047	Diff <2x LOR	----
		silicon, total	7440-21-3	E420	0.10	mg/L	2.65	2.70	1.92%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.050	mg/L	7.86	7.80	0.723%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.398	0.400	0.670%	20%	----



Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Total Metals (QC Lot: 83006) - continued											
VA20B4456-001	Anonymous	sulfur, total	7704-34-9	E420	0.50	mg/L	147	144	1.79%	20%	---
		tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	---
		thallium, total	7440-28-0	E420	0.000010	mg/L	0.000030	0.000030	0.0000008	Diff <2x LOR	---
		thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	---
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	---
		titanium, total	7440-32-6	E420	0.00030	mg/L	0.00423	0.00422	0.329%	20%	---
		tungsten, total	7440-33-7	E420	0.00010	mg/L	0.00023	0.00022	0.00001	Diff <2x LOR	---
		uranium, total	7440-61-1	E420	0.000010	mg/L	0.00478	0.00464	3.09%	20%	---
		vanadium, total	7440-62-2	E420	0.00050	mg/L	0.00053	0.00052	0.00001	Diff <2x LOR	---
		zinc, total	7440-66-6	E420	0.0030	mg/L	0.0130	0.0126	0.0004	Diff <2x LOR	---
		zirconium, total	7440-67-7	E420	0.00020	mg/L	0.00022	0.00028	0.00006	Diff <2x LOR	---
Dissolved Metals (QC Lot: 82450)											
VA20B4455-004	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	---
Dissolved Metals (QC Lot: 82451)											
VA20B4463-007	Field Blank	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	---
Dissolved Metals (QC Lot: 83828)											
VA20B4401-001	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0030	mg/L	0.0192	0.0183	0.0009	Diff <2x LOR	---
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	---
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00011	0.00011	0.000004	Diff <2x LOR	---
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.180	0.174	2.92%	20%	---
		beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	---
		bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	---
		boron, dissolved	7440-42-8	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	---
		cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.0000289	0.0000303	0.0000013	Diff <2x LOR	---
		calcium, dissolved	7440-70-2	E421	0.050	mg/L	85.3	86.8	1.66%	20%	---
		cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	---
		cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	---
		copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00037	0.00036	0.000005	Diff <2x LOR	---
		iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	---
		lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	---
		lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0056	0.0056	0.0000007	Diff <2x LOR	---
		magnesium, dissolved	7439-95-4	E421	0.100	mg/L	33.0	31.3	5.46%	20%	---
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	---
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000657	0.000640	2.62%	20%	---
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00059	0.00056	0.00003	Diff <2x LOR	---



Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Dissolved Metals (QC Lot: 83828) - continued											
VA20B4401-001	Anonymous	phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	0.050	mg/L	0.711	0.686	3.58%	20%	----
		rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00036	0.00039	0.00003	Diff <2x LOR	----
		selenium, dissolved	7782-49-2	E421	0.0500	mg/L	3.76 µg/L	0.00362	3.93%	20%	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	1.84	1.83	0.516%	20%	----
		silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, dissolved	7440-23-5	E421	0.050	mg/L	2.56	2.47	3.57%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.228	0.234	2.69%	20%	----
		sulfur, dissolved	7704-34-9	E421	0.50	mg/L	60.4	58.8	2.76%	20%	----
		tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, dissolved	7440-32-6	E421	0.0100	mg/L	<0.0100	<0.0100	0	Diff <2x LOR	----
		tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.00113	0.00112	0.843%	20%	----
		vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0030	0.0024	0.0006	Diff <2x LOR	----
		zirconium, dissolved	7440-67-7	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 83829)											
VA20B4401-001	Anonymous	chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
Aggregate Organics (QC Lot: 82118)											
VA20B4463-008	Travel Blank	biochemical oxygen demand [BOD]	----	E550	2.0	mg/L	<2.0	<2.0	0.00%	30%	----
Aggregate Organics (QC Lot: 83908)											
VA20B4298-001	Anonymous	chemical oxygen demand [COD]	----	E559	20	mg/L	538	590	9.27%	20%	----



Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 82039)						
conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 82041)						
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 82510)						
solids, total suspended [TSS]	----	E160-H	3	mg/L	<3.0	----
Anions and Nutrients (QCLot: 82042)						
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 82043)						
chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 82044)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 82045)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 82046)						
bromide	24959-67-9	E235.Br-L	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 82047)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 82048)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 82539)						
chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 82542)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 83253)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 83255)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 83256)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Total Metals (QCLot: 82466)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Total Metals (QCLot: 83003)						
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	<0.00010	----



Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 83004)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	---
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	---
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	---
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	---
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	---
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	---
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	---
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	---
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	---
cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	---
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	---
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	---
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	---
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	---
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	---
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	---
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	---
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	---
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	---
phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	---
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	---
rubidium, total	7440-17-7	E420	0.0002	mg/L	<0.00020	---
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	---
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	---
silver, total	7440-22-4	E420	0.00001	mg/L	# 0.000031	MB-LOR
sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	---
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	---
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	---
tellurium, total	13494-80-9	E420	0.0002	mg/L	<0.00020	---
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	---
thorium, total	7440-29-1	E420	0.0001	mg/L	<0.00010	---
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	---
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	---
tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	---
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	---
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	---



Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 83004) - continued						
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	---
zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	---
Total Metals (QCLot: 83005)						
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	<0.00010	---
Total Metals (QCLot: 83006)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	---
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	---
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	---
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	---
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	---
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	---
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	---
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	---
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	---
cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	---
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	---
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	---
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	---
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	---
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	---
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	---
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	---
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	---
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	---
phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	---
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	---
rubidium, total	7440-17-7	E420	0.0002	mg/L	<0.00020	---
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	---
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	---
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	---
sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	---
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	---
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	---
tellurium, total	13494-80-9	E420	0.0002	mg/L	<0.00020	---
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	---
thorium, total	7440-29-1	E420	0.0001	mg/L	<0.00010	---



Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 83006) - continued						
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	---
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	---
tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	---
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	---
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	---
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	---
zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	---
Dissolved Metals (QCLot: 82450)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	---
Dissolved Metals (QCLot: 82451)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	---
Dissolved Metals (QCLot: 83828)						
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	---
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	---
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	---
barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	---
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	---
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	---
boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	---
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	---
calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	---
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	<0.000010	---
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	---
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	---
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	---
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	---
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	---
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	---
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	---
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	---
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	---
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	---
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	---
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	---
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	---
silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	---



Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 83828) - continued						
silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
Dissolved Metals (QCLot: 83829)						
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	<0.00010	----
Aggregate Organics (QCLot: 82118)						
biochemical oxygen demand [BOD]	----	E550	2	mg/L	<2.0	----
Aggregate Organics (QCLot: 83908)						
chemical oxygen demand [COD]	----	E559	20	mg/L	<20	----

Qualifiers

Qualifier	Description
MB-LOR	Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.



Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
Analyte	CAS Number	Method	LOR	Unit	Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
Physical Tests (QCLot: 82039)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	103	90.0	110	----
Physical Tests (QCLot: 82040)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 82041)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	95.8	85.0	115	----
Physical Tests (QCLot: 82510)									
solids, total suspended [TSS]	----	E160-H	3	mg/L	150 mg/L	92.0	85.0	115	----
Anions and Nutrients (QCLot: 82042)									
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	99.1	80.0	120	----
Anions and Nutrients (QCLot: 82043)									
chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 82044)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	99.7	90.0	110	----
Anions and Nutrients (QCLot: 82045)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 82046)									
bromide	24959-67-9	E235.Br-L	0.05	mg/L	0.5 mg/L	104	85.0	115	----
Anions and Nutrients (QCLot: 82047)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	100.0	90.0	110	----
Anions and Nutrients (QCLot: 82048)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 82539)									
chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 82542)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	99.8	90.0	110	----
Anions and Nutrients (QCLot: 83253)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.12 mg/L	103	85.0	115	----
Anions and Nutrients (QCLot: 83255)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	97.8	75.0	125	----
Anions and Nutrients (QCLot: 83256)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	94.2	80.0	120	----



Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
Total Metals (QCLot: 82466)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	99.5	80.0	120	----
Total Metals (QCLot: 83003)									
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	0.25 mg/L	95.2	80.0	120	----
Total Metals (QCLot: 83004)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	92.6	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	105	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	99.0	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	100	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	88.0	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	96.3	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	102	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	98.0	80.0	120	----
cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	99.8	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	93.7	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	94.7	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	99.5	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	96.3	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	92.9	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	95.1	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	96.0	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	95.3	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	94.3	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	94.3	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	103	80.0	120	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	95.7	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	111	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	96.4	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	100	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	98.9	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	98.9	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	85.9	80.0	120	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	107	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	94.9	80.0	120	----
thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	87.0	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	97.4	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	94.9	80.0	120	----



Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
Total Metals (QCLot: 83004) - continued									
tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	92.7	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	95.5	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	97.0	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	108	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	94.9	80.0	120	----
Total Metals (QCLot: 83005)									
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	0.25 mg/L	110	80.0	120	----
Total Metals (QCLot: 83006)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	102	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	101	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	109	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	114	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	89.8	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	99.1	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	109	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	98.9	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	98.4	80.0	120	----
cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	112	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	109	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	107	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	94.7	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	102	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	87.0	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	99.0	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	112	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	99.4	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	108	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	119	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	118	80.0	120	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	110	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	93.5	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	97.6	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	100	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	107	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	104	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	83.4	80.0	120	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	103	80.0	120	----



Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
Total Metals (QCLot: 83006) - continued									
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	100	80.0	120	----
thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	99.3	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	102	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	103	80.0	120	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	101	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	102	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	112	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	111	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	97.5	80.0	120	----
Dissolved Metals (QCLot: 82450)									
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	99.6	80.0	120	----
Dissolved Metals (QCLot: 82451)									
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	101	80.0	120	----
Dissolved Metals (QCLot: 83828)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	99.5	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	99.0	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	96.4	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	99.6	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	101	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	107	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	97.4	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	96.6	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	105	80.0	120	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	109	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	96.0	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	93.3	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	98.9	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	104	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	102	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	96.6	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	97.9	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	102	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	97.2	80.0	120	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	103	70.0	130	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	99.2	80.0	120	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	99.0	80.0	120	----



Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report					
					Spike	Recovery (%)	Recovery Limits (%)		Qualifier	
					Concentration	LCS	Low	High		
Dissolved Metals (QCLot: 83828) - continued										
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	98.1	80.0	120	----	
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	106	80.0	120	----	
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	102	80.0	120	----	
sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	101	80.0	120	----	
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	108	80.0	120	----	
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	86.5	80.0	120	----	
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	101	80.0	120	----	
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	99.9	80.0	120	----	
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	99.1	80.0	120	----	
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	93.6	80.0	120	----	
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	90.6	80.0	120	----	
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	101	80.0	120	----	
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	104	80.0	120	----	
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	97.4	80.0	120	----	
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	93.1	80.0	120	----	
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	98.7	80.0	120	----	
Dissolved Metals (QCLot: 83829)										
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	0.25 mg/L	93.5	80.0	120	----	
Aggregate Organics (QCLot: 82118)										
biochemical oxygen demand [BOD]	----	E550	2	mg/L	198 mg/L	91.5	85.0	115	----	
Aggregate Organics (QCLot: 83908)										
chemical oxygen demand [COD]	----	E559	20	mg/L	750 mg/L	102	85.0	115	----	



Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level $\geq 1 \times$ spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 82042)										
VA20B4463-002	SW-3	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0263 mg/L	0.03 mg/L	87.7	70.0	130	----
Anions and Nutrients (QCLot: 82043)										
VA20B4463-002	SW-3	chloride	16887-00-6	E235.Cl	510 mg/L	500 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 82044)										
VA20B4463-002	SW-3	fluoride	16984-48-8	E235.F	5.15 mg/L	5 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 82045)										
VA20B4463-002	SW-3	sulfate (as SO4)	14808-79-8	E235.SO4	514 mg/L	500 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 82046)										
VA20B4463-002	SW-3	bromide	24959-67-9	E235.Br-L	2.59 mg/L	2.5 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 82047)										
VA20B4463-002	SW-3	nitrite (as N)	14797-65-0	E235.NO2-L	2.47 mg/L	2.5 mg/L	98.9	75.0	125	----
Anions and Nutrients (QCLot: 82048)										
VA20B4463-002	SW-3	nitrate (as N)	14797-55-8	E235.NO3-L	12.7 mg/L	12.5 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 82539)										
VA20B4378-001	Anonymous	chloride	16887-00-6	E235.Cl	497 mg/L	500 mg/L	99.5	75.0	125	----
Anions and Nutrients (QCLot: 83253)										
VA20B4255-002	Anonymous	ammonia, total (as N)	7664-41-7	E298	102 mg/L	100 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 83255)										
VA20B4463-002	SW-3	Kjeldahl nitrogen, total [TKN]	----	E318	ND mg/L	2.5 mg/L	ND	70.0	130	----
Anions and Nutrients (QCLot: 83256)										
VA20B4463-002	SW-3	phosphorus, total	7723-14-0	E372-U	ND mg/L	0.05 mg/L	ND	70.0	130	----
Total Metals (QCLot: 82466)										
VA20B4459-003	Anonymous	mercury, total	7439-97-6	E508	0.0000988 mg/L	0.0001 mg/L	98.8	70.0	130	----
Total Metals (QCLot: 83003)										
VA20B4443-002	Anonymous	chromium, total	7440-47-3	E420.Cr-L	0.0374 mg/L	0.04 mg/L	93.6	70.0	130	----
Total Metals (QCLot: 83004)										
VA20B4443-002	Anonymous	aluminum, total	7429-90-5	E420	0.177 mg/L	0.2 mg/L	88.7	70.0	130	----
		antimony, total	7440-36-0	E420	0.0196 mg/L	0.02 mg/L	97.8	70.0	130	----



Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 83004) - continued										
VA20B4443-002	Anonymous	arsenic, total	7440-38-2	E420	0.0185 mg/L	0.02 mg/L	92.6	70.0	130	----
		barium, total	7440-39-3	E420	0.0181 mg/L	0.02 mg/L	90.6	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0389 mg/L	0.04 mg/L	97.2	70.0	130	----
		bismuth, total	7440-69-9	E420	0.00943 mg/L	0.01 mg/L	94.3	70.0	130	----
		boron, total	7440-42-8	E420	0.096 mg/L	0.1 mg/L	95.5	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00375 mg/L	0.004 mg/L	93.7	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		cesium, total	7440-46-2	E420	0.00978 mg/L	0.01 mg/L	97.8	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0185 mg/L	0.02 mg/L	92.7	70.0	130	----
		copper, total	7440-50-8	E420	0.0184 mg/L	0.02 mg/L	91.8	70.0	130	----
		iron, total	7439-89-6	E420	1.86 mg/L	2 mg/L	93.3	70.0	130	----
		lead, total	7439-92-1	E420	0.0186 mg/L	0.02 mg/L	92.9	70.0	130	----
		lithium, total	7439-93-2	E420	0.0886 mg/L	0.1 mg/L	88.6	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0188 mg/L	0.02 mg/L	94.0	70.0	130	----
		nickel, total	7440-02-0	E420	0.0366 mg/L	0.04 mg/L	91.6	70.0	130	----
		phosphorus, total	7723-14-0	E420	9.23 mg/L	10 mg/L	92.3	70.0	130	----
		potassium, total	7440-09-7	E420	3.92 mg/L	4 mg/L	98.1	70.0	130	----
		rubidium, total	7440-17-7	E420	0.0181 mg/L	0.02 mg/L	90.6	70.0	130	----
		selenium, total	7782-49-2	E420	0.0402 mg/L	0.04 mg/L	101	70.0	130	----
		silicon, total	7440-21-3	E420	8.84 mg/L	10 mg/L	88.4	70.0	130	----
		silver, total	7440-22-4	E420	0.00387 mg/L	0.004 mg/L	96.8	70.0	130	----
		sodium, total	7440-23-5	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, total	7704-34-9	E420	19.2 mg/L	20 mg/L	96.1	70.0	130	----
		tellurium, total	13494-80-9	E420	0.0378 mg/L	0.04 mg/L	94.6	70.0	130	----
		thallium, total	7440-28-0	E420	0.00376 mg/L	0.004 mg/L	94.1	70.0	130	----
		thorium, total	7440-29-1	E420	0.0190 mg/L	0.02 mg/L	95.2	70.0	130	----
		tin, total	7440-31-5	E420	0.0186 mg/L	0.02 mg/L	92.9	70.0	130	----
		titanium, total	7440-32-6	E420	0.0376 mg/L	0.04 mg/L	94.1	70.0	130	----
		tungsten, total	7440-33-7	E420	0.0184 mg/L	0.02 mg/L	92.1	70.0	130	----
		uranium, total	7440-61-1	E420	0.00378 mg/L	0.004 mg/L	94.6	70.0	130	----
		vanadium, total	7440-62-2	E420	0.0951 mg/L	0.1 mg/L	95.1	70.0	130	----
		zinc, total	7440-66-6	E420	0.378 mg/L	0.4 mg/L	94.4	70.0	130	----
		zirconium, total	7440-67-7	E420	0.0377 mg/L	0.04 mg/L	94.3	70.0	130	----



Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 83005)										
VA20B4456-002	Anonymous	chromium, total	7440-47-3	E420.Cr-L	0.0409 mg/L	0.04 mg/L	102	70.0	130	----
Total Metals (QCLot: 83006)										
VA20B4456-002	Anonymous	aluminum, total	7429-90-5	E420	ND mg/L	0.2 mg/L	ND	70.0	130	----
		antimony, total	7440-36-0	E420	0.0211 mg/L	0.02 mg/L	105	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0207 mg/L	0.02 mg/L	104	70.0	130	----
		barium, total	7440-39-3	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0414 mg/L	0.04 mg/L	104	70.0	130	----
		bismuth, total	7440-69-9	E420	0.00903 mg/L	0.01 mg/L	90.3	70.0	130	----
		boron, total	7440-42-8	E420	ND mg/L	0.1 mg/L	ND	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00378 mg/L	0.004 mg/L	94.6	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		cesium, total	7440-46-2	E420	0.0112 mg/L	0.01 mg/L	112	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0190 mg/L	0.02 mg/L	95.0	70.0	130	----
		copper, total	7440-50-8	E420	0.0182 mg/L	0.02 mg/L	90.9	70.0	130	----
		iron, total	7439-89-6	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		lead, total	7439-92-1	E420	0.0188 mg/L	0.02 mg/L	94.3	70.0	130	----
		lithium, total	7439-93-2	E420	0.103 mg/L	0.1 mg/L	103	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0218 mg/L	0.02 mg/L	109	70.0	130	----
		nickel, total	7440-02-0	E420	ND mg/L	0.04 mg/L	ND	70.0	130	----
		phosphorus, total	7723-14-0	E420	11.6 mg/L	10 mg/L	116	70.0	130	----
		potassium, total	7440-09-7	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		rubidium, total	7440-17-7	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		selenium, total	7782-49-2	E420	0.0470 mg/L	0.04 mg/L	117	70.0	130	----
		silicon, total	7440-21-3	E420	9.51 mg/L	10 mg/L	95.1	70.0	130	----
		silver, total	7440-22-4	E420	0.00396 mg/L	0.004 mg/L	99.0	70.0	130	----
		sodium, total	7440-23-5	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, total	7704-34-9	E420	ND mg/L	20 mg/L	ND	70.0	130	----
		tellurium, total	13494-80-9	E420	0.0400 mg/L	0.04 mg/L	99.9	70.0	130	----
		thallium, total	7440-28-0	E420	0.00376 mg/L	0.004 mg/L	94.0	70.0	130	----
		thorium, total	7440-29-1	E420	0.0205 mg/L	0.02 mg/L	102	70.0	130	----
		tin, total	7440-31-5	E420	0.0204 mg/L	0.02 mg/L	102	70.0	130	----
		titanium, total	7440-32-6	E420	ND mg/L	0.04 mg/L	ND	70.0	130	----
		tungsten, total	7440-33-7	E420	0.0204 mg/L	0.02 mg/L	102	70.0	130	----



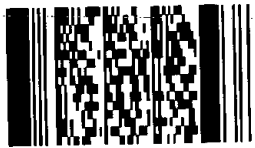
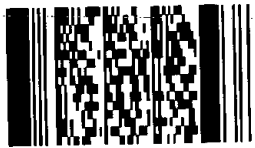
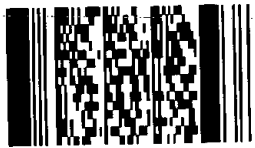
Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 83006) - continued										
VA20B4456-002	Anonymous	uranium, total	7440-61-1	E420	ND mg/L	0.004 mg/L	ND	70.0	130	----
		vanadium, total	7440-62-2	E420	0.107 mg/L	0.1 mg/L	107	70.0	130	----
		zinc, total	7440-66-6	E420	0.376 mg/L	0.4 mg/L	94.0	70.0	130	----
		zirconium, total	7440-67-7	E420	0.0435 mg/L	0.04 mg/L	109	70.0	130	----
Dissolved Metals (QCLot: 82450)										
VA20B4455-005	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000926 mg/L	0.0001 mg/L	92.6	70.0	130	----
Dissolved Metals (QCLot: 82451)										
VA20B4465-001	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000947 mg/L	0.0001 mg/L	94.7	70.0	130	----
Dissolved Metals (QCLot: 83828)										
VA20B4401-002	Anonymous	aluminum, dissolved	7429-90-5	E421	0.202 mg/L	0.2 mg/L	101	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.0206 mg/L	0.02 mg/L	103	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.0207 mg/L	0.02 mg/L	104	70.0	130	----
		barium, dissolved	7440-39-3	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.0416 mg/L	0.04 mg/L	104	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.0101 mg/L	0.01 mg/L	101	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.096 mg/L	0.1 mg/L	95.6	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.00396 mg/L	0.004 mg/L	99.0	70.0	130	----
		calcium, dissolved	7440-70-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		cesium, dissolved	7440-46-2	E421	0.0107 mg/L	0.01 mg/L	107	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.0198 mg/L	0.02 mg/L	98.8	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.0188 mg/L	0.02 mg/L	93.9	70.0	130	----
		iron, dissolved	7439-89-6	E421	1.99 mg/L	2 mg/L	99.4	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.0202 mg/L	0.02 mg/L	101	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.105 mg/L	0.1 mg/L	105	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, dissolved	7439-96-5	E421	0.0196 mg/L	0.02 mg/L	97.9	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.0206 mg/L	0.02 mg/L	103	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.0393 mg/L	0.04 mg/L	98.2	70.0	130	----
		phosphorus, dissolved	7723-14-0	E421	10.4 mg/L	10 mg/L	104	70.0	130	----
		potassium, dissolved	7440-09-7	E421	4.09 mg/L	4 mg/L	102	70.0	130	----
		rubidium, dissolved	7440-17-7	E421	0.0205 mg/L	0.02 mg/L	103	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.0415 mg/L	0.04 mg/L	104	70.0	130	----
		silicon, dissolved	7440-21-3	E421	9.44 mg/L	10 mg/L	94.4	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.00406 mg/L	0.004 mg/L	102	70.0	130	----
		sodium, dissolved	7440-23-5	E421	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, dissolved	7440-24-6	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----



Sub-Matrix: **Water**

					<i>Matrix Spike (MS) Report</i>					
					<i>Spike</i>		<i>Recovery (%)</i>	<i>Recovery Limits (%)</i>		
<i>Laboratory sample ID</i>	<i>Client sample ID</i>	<i>Analyte</i>	<i>CAS Number</i>	<i>Method</i>	<i>Concentration</i>	<i>Target</i>	<i>MS</i>	<i>Low</i>	<i>High</i>	<i>Qualifier</i>
Dissolved Metals (QCLot: 83828) - continued										
VA20B4401-002	Anonymous	sulfur, dissolved	7704-34-9	E421	20.2 mg/L	20 mg/L	101	70.0	130	----
		tellurium, dissolved	13494-80-9	E421	0.0410 mg/L	0.04 mg/L	102	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.00392 mg/L	0.004 mg/L	98.1	70.0	130	----
		thorium, dissolved	7440-29-1	E421	0.0206 mg/L	0.02 mg/L	103	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.0198 mg/L	0.02 mg/L	98.8	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.0381 mg/L	0.04 mg/L	95.2	70.0	130	----
		tungsten, dissolved	7440-33-7	E421	0.0201 mg/L	0.02 mg/L	100	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.00414 mg/L	0.004 mg/L	104	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.102 mg/L	0.1 mg/L	102	70.0	130	----
		zinc, dissolved	7440-66-6	E421	0.386 mg/L	0.4 mg/L	96.6	70.0	130	----
		zirconium, dissolved	7440-67-7	E421	0.0417 mg/L	0.04 mg/L	104	70.0	130	----
Dissolved Metals (QCLot: 83829)										
VA20B4401-002	Anonymous	chromium, dissolved	7440-47-3	E421.Cr-L	0.0395 mg/L	0.04 mg/L	98.8	70.0	130	----
Aggregate Organics (QCLot: 83908)										
VA20B4298-002	Anonymous	chemical oxygen demand [COD]	----	E559	ND mg/L	500 mg/L	ND	75.0	125	----

Report To <small>Contact and company name below will appear on the final report</small> Company: Regional District of Kitimat-Stikine Contact: Mary Tress Phone: 250-615-6100 <small>Company address below will appear on the final report</small> Street: 4545 Lazelle Avenue City/Province: Terrace/BC Postal Code: V8G4E1			Report Format / Distribution Select Report Format: <input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> EXCEL <input type="checkbox"/> EDD (DIGITAL) Quality Control (QC) Report with Report <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> Compare Results to Criteria on Report - provide details below if box checked Select Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX Email 1 or Fax: mtress@rdks.bc.ca; mhaley@rdks.bc.ca Email 2: eblaney@rdks.bc.ca; sprouse@rdks.bc.ca Email 3: mglover@rdks.bc.ca				Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply) Regular [R] <input checked="" type="checkbox"/> Standard TAT if received by 3 pm - business days - no surcharges apply PRIORITY (Business Days) 4 day [P4-20%] <input type="checkbox"/> 3 day [P3-25%] <input type="checkbox"/> 2 day [P2-50%] <input type="checkbox"/> EMERGENCY 1 Business day [E1 - 100%] <input type="checkbox"/> Same Day, Weekend or Statutory holiday [E2 -200% (Laboratory opening fees may apply)] <input type="checkbox"/> Date and Time Required for all E&P TATs: _____ <small>For tests that can not be performed according to the service level selected, you will be contacted.</small>																																																																																																																																																																																																																																																																																																												
Invoice To Same as Report To <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO Copy of Invoice with Report <input checked="" type="checkbox"/> YES <input checked="" type="checkbox"/> NO Company: Regional District of Kitimat-Stikine Contact: Megan Haley			Invoice Distribution Select Invoice Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX Email 1 or Fax: anne-maries@rdks.bc.ca Email 2: mhaley@rdks.bc.ca				Analysis Request <small>Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below</small> <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td>F/P</td><td>P</td><td></td><td></td><td></td><td></td><td></td><td></td><td>P</td><td></td><td>P</td><td></td><td></td><td></td><td></td><td>P</td><td></td><td>P</td><td>P</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> </table>													F/P	P							P		P					P		P	P																																																																																																																																																																																																																																																																													
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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: _____				Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below																																																																																																																																																																																																																																																																																																												
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Drinking Water (DW) Samples¹ (client use) Are samples taken from a Regulated DW System? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO Are samples for human consumption/ use? <input type="checkbox"/> YES <input checked="" type="checkbox"/> 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 <input type="checkbox"/> SIF Observations Yes <input type="checkbox"/> No <input type="checkbox"/> Ice Packs <input checked="" type="checkbox"/> Ice Cubes <input type="checkbox"/> Custody seal intact Yes <input type="checkbox"/> No <input type="checkbox"/> Cooling Initiated <input type="checkbox"/> INITIAL COOLER TEMPERATURES °C: 8.0 7.6 5.6 FINAL COOLER TEMPERATURES °C: 6																																																																																																																																																																																																																																																																																																												
SHIPMENT RELEASE (client use) Released by: <i>Mary Tress</i> Date: 02 Sep 2020 Time: 2:25			INITIAL SHIPMENT RECEPTION (lab use only) Received by: <i>Chris Allison</i> Date: Sept 2 Time: 2:30				FINAL SHIPMENT RECEPTION (lab use only) Received by: <i>em</i> Date: 04 Sept 2020 Time: 12:20 pm																																																																																																																																																																																																																																																																																																												

CERTIFICATE OF ANALYSIS

Work Order : **VA20B7660**
Client : **Regional District of Kitimat-Stikine**
Contact : **Mary Tress**
Address : **# 300 - 4545 Lazelle Avenue**
 Terrace BC Canada V8G 4E1
Telephone : **----**
Project : **Thornhill Groundwater**
PO : **----**
C-O-C number : **----**
Sampler : **Mary Tress**
Site :
Quote number : **Q62338**
No. of samples received : **2**
No. of samples analysed : **2**

Page : **1 of 6**
Laboratory : **Vancouver - Environmental**
Account Manager : **Amber Springer**
Address : **8081 Lougheed Highway**
 Burnaby BC Canada V5A 1W9
Telephone : **+1 604 253 4188**
Date Samples Received : **08-Oct-2020 20:10**
Date Analysis Commenced : **09-Oct-2020**
Issue Date : **23-Oct-2020 16:26**

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Bruna Botti	Team Leader - Inorganics	Inorganics - Water Quality, Burnaby, British Columbia
Katarzyna Glinka		Inorganics, Calgary, Alberta
Ken Chan	Supervisor - Metals Prep & Mercury	Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics - Water Quality, Burnaby, British Columbia
Omar Beydoun	Lab Assistant	Metals, Burnaby, British Columbia
Oscar Ruiz	Lab Assistant	Metals, Calgary, Alberta
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Ruth Morrison		Inorganics, Calgary, Alberta
Ruth Morrison		Metals, Calgary, Alberta



General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

<i>Unit</i>	<i>Description</i>
-	No Unit
µS/cm	Microsiemens per centimetre
mg/L	milligrams per litre
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in reports identified as "Preliminary Report" are considered authorized for use.

Qualifiers

<i>Qualifier</i>	<i>Description</i>
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DTMF	Dissolved concentration exceeds total for field-filtered metals sample. Metallic contaminants may have been introduced to dissolved sample during field filtration.



Analytical Results

Sub-Matrix: Water
 (Matrix: Water)

Client sample ID

					BH-96-2	Field Blank	----	----	----
					07-Oct-2020 08:15	07-Oct-2020 12:30	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA20B7660-001	VA20B7660-002	-----	-----	-----
					Result	Result	----	----	----
Physical Tests									
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	215	<1.0	----	----	----
conductivity	----	E100	2.0	µS/cm	392	<2.0	----	----	----
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L	165	<0.60	----	----	----
pH	----	E108	0.10	pH units	8.25	5.54	----	----	----
solids, total dissolved [TDS]	----	E162	10	mg/L	405	<10	----	----	----
hardness (as CaCO3), dissolved	----	EC100	0.60	mg/L	110	<0.60	----	----	----
Anions and Nutrients									
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.160	0.0081	----	----	----
chloride	16887-00-6	E235.Cl	0.50	mg/L	0.59	<0.50	----	----	----
fluoride	16984-48-8	E235.F	0.020	mg/L	0.148	<0.020	----	----	----
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	0.494	<0.050	----	----	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.182	<0.0050	----	----	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	0.0025	<0.0010	----	----	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.611 ^{DLHC}	<0.0020	----	----	----
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	2.22	<0.30	----	----	----
Total Metals									
aluminum, total	7429-90-5	E420	0.0030	mg/L	19.6	<0.0030	----	----	----
antimony, total	7440-36-0	E420	0.00010	mg/L	0.00053	<0.00010	----	----	----
arsenic, total	7440-38-2	E420	0.00010	mg/L	0.0129	<0.00010	----	----	----
barium, total	7440-39-3	E420	0.00010	mg/L	0.133	<0.00010	----	----	----
beryllium, total	7440-41-7	E420	0.000100	mg/L	0.000426	<0.000100	----	----	----
bismuth, total	7440-69-9	E420	0.000050	mg/L	0.000120	<0.000050	----	----	----
boron, total	7440-42-8	E420	0.010	mg/L	0.160	<0.010	----	----	----
cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.000433	<0.0000050	----	----	----
calcium, total	7440-70-2	E420	0.050	mg/L	25.2	<0.050	----	----	----
cesium, total	7440-46-2	E420	0.000010	mg/L	0.00180	<0.000010	----	----	----
chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L	0.0223	<0.00010	----	----	----
cobalt, total	7440-48-4	E420	0.00010	mg/L	0.0145	<0.00010	----	----	----
copper, total	7440-50-8	E420	0.00050	mg/L	0.0360	<0.00050	----	----	----
iron, total	7439-89-6	E420	0.010	mg/L	27.4	<0.010	----	----	----



Analytical Results

Sub-Matrix: Water					Client sample ID	BH-96-2	Field Blank	----	----	----
(Matrix: Water)										
Client sampling date / time					07-Oct-2020 08:15	07-Oct-2020 12:30	---	---	---	---
Analyte	CAS Number	Method	LOR	Unit	VA20B7660-001	VA20B7660-002	-----	-----	-----	-----
					Result	Result	---	---	---	---
Total Metals										
lead, total	7439-92-1	E420	0.000050	mg/L	0.00771	<0.000050	----	----	----	----
lithium, total	7439-93-2	E420	0.0010	mg/L	0.0176	<0.0010	----	----	----	----
magnesium, total	7439-95-4	E420	0.0050	mg/L	24.8	<0.0050	----	----	----	----
manganese, total	7439-96-5	E420	0.00010	mg/L	0.927	<0.00010	----	----	----	----
mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	----	----	----	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00290	<0.000050	----	----	----	----
nickel, total	7440-02-0	E420	0.00050	mg/L	0.0289	<0.00050	----	----	----	----
phosphorus, total	7723-14-0	E420	0.050	mg/L	0.664	<0.050	----	----	----	----
potassium, total	7440-09-7	E420	0.050	mg/L	12.8	<0.050	----	----	----	----
rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00825	<0.00020	----	----	----	----
selenium, total	7782-49-2	E420	0.000050	mg/L	0.000307	<0.000050	----	----	----	----
silicon, total	7440-21-3	E420	0.10	mg/L	31.8	<0.10	----	----	----	----
silver, total	7440-22-4	E420	0.000010	mg/L	0.000150	<0.000010	----	----	----	----
sodium, total	17341-25-2	E420	0.050	mg/L	45.1	<0.050	----	----	----	----
strontium, total	7440-24-6	E420	0.00020	mg/L	0.263	<0.00020	----	----	----	----
sulfur, total	7704-34-9	E420	0.50	mg/L	0.94	<0.50	----	----	----	----
tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	----	----	----	----
thallium, total	7440-28-0	E420	0.000010	mg/L	0.000074	<0.000010	----	----	----	----
thorium, total	7440-29-1	E420	0.00010	mg/L	0.00117	<0.00010	----	----	----	----
tin, total	7440-31-5	E420	0.00010	mg/L	0.00029	<0.00010	----	----	----	----
titanium, total	7440-32-6	E420	0.00030	mg/L	0.352	<0.00030	----	----	----	----
tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	----	----	----	----
uranium, total	7440-61-1	E420	0.000010	mg/L	0.00234	<0.000010	----	----	----	----
vanadium, total	7440-62-2	E420	0.00050	mg/L	0.0442	<0.00050	----	----	----	----
zinc, total	7440-66-6	E420	0.0030	mg/L	0.0883	<0.0030	----	----	----	----
zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	----	----	----	----
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0082	<0.0010	----	----	----	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00019	<0.00010	----	----	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00437	<0.00010	----	----	----	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0222	<0.00010	----	----	----	----



Analytical Results

Sub-Matrix: Water					Client sample ID	BH-96-2	Field Blank	----	----	----
(Matrix: Water)										
Client sampling date / time					07-Oct-2020 08:15	07-Oct-2020 12:30	---	---	---	---
Analyte	CAS Number	Method	LOR	Unit	VA20B7660-001	VA20B7660-002	-----	-----	-----	-----
					Result	Result	---	---	---	---
Dissolved Metals										
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<0.000100	---	---	---	---
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	---	---	---	---
boron, dissolved	7440-42-8	E421	0.010	mg/L	0.130	<0.010	---	---	---	---
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.0000247	<0.0000050	---	---	---	---
calcium, dissolved	7440-70-2	E421	0.050	mg/L	15.8	<0.050	---	---	---	---
cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.000010	<0.000010	---	---	---	---
chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L	<0.00010	<0.00010	---	---	---	---
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	<0.00010	---	---	---	---
copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00116	<0.00020	---	---	---	---
iron, dissolved	7439-89-6	E421	0.010	mg/L	0.011	<0.010	---	---	---	---
lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	---	---	---	---
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0017	<0.0010	---	---	---	---
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	17.2	<0.0050	---	---	---	---
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.0447	<0.00010	---	---	---	---
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	---	---	---	---
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00420 ^{DTMF}	<0.000050	---	---	---	---
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	---	---	---	---
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	<0.050	---	---	---	---
potassium, dissolved	7440-09-7	E421	0.050	mg/L	12.3	<0.050	---	---	---	---
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00042	<0.00020	---	---	---	---
selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.000110	<0.000050	---	---	---	---
silicon, dissolved	7440-21-3	E421	0.050	mg/L	4.07	<0.050	---	---	---	---
silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	---	---	---	---
sodium, dissolved	17341-25-2	E421	0.050	mg/L	50.8	<0.050	---	---	---	---
strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.214	<0.00020	---	---	---	---
sulfur, dissolved	7704-34-9	E421	0.50	mg/L	0.94	<0.50	---	---	---	---
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<0.00020	---	---	---	---
thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	---	---	---	---
thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	---	---	---	---
tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	---	---	---	---
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	---	---	---	---



Analytical Results

Sub-Matrix: Water

Client sample ID

(Matrix: Water)

					BH-96-2	Field Blank	----	----	----
Client sampling date / time					07-Oct-2020 08:15	07-Oct-2020 12:30	---	---	---
Analyte	CAS Number	Method	LOR	Unit	VA20B7660-001	VA20B7660-002	-----	-----	-----
					Result	Result	---	---	---
Dissolved Metals									
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	<0.00010	----	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.00168	<0.000010	----	----	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	0.00066	<0.00050	----	----	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0021	<0.0010	----	----	----
zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	<0.00020	<0.00020	----	----	----
dissolved mercury filtration location	----	EP509	-	-	Field	Field	----	----	----
dissolved metals filtration location	----	EP421	-	-	Field	Field	----	----	----
Aggregate Organics									
chemical oxygen demand [COD]	----	E559	20	mg/L	53	<20	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: VA20B7660	Page	: 1 of 12
Client	: Regional District of Kitimat-Stikine	Laboratory	: Vancouver - Environmental
Contact	: Mary Tress	Account Manager	: Amber Springer
Address	: # 300 - 4545 Lazelle Avenue Terrace BC Canada V8G 4E1	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: Thornhill Groundwater	Date Samples Received	: 08-Oct-2020 20:10
PO	: ----	Issue Date	: 23-Oct-2020 16:26
C-O-C number	: ----		
Sampler	: Mary Tress		
Site	:		
Quote number	: Q62338		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.

DQO: Data Quality Objective.

LOR: Limit of Reporting (detection limit).

RPD: Relative Percent Difference.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

RIGHT SOLUTIONS | RIGHT PARTNER



Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 15:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 15:00 is used for calculation purposes.

Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid) Field Blank	E559	07-Oct-2020	----	----	----		19-Oct-2020	28 days	11 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid) BH-96-2	E559	07-Oct-2020	----	----	----		19-Oct-2020	28 days	12 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) BH-96-2	E298	07-Oct-2020	----	----	----		22-Oct-2020	28 days	15 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) Field Blank	E298	07-Oct-2020	----	----	----		22-Oct-2020	28 days	15 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE BH-96-2	E235.Cl	07-Oct-2020	----	----	----		09-Oct-2020	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE Field Blank	E235.Cl	07-Oct-2020	----	----	----		09-Oct-2020	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE BH-96-2	E235.F	07-Oct-2020	----	----	----		09-Oct-2020	28 days	2 days	✓



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Anions and Nutrients : Fluoride in Water by IC											
HDPE Field Blank	E235.F	07-Oct-2020	----	----	----		09-Oct-2020	28 days	2 days	✓	
Anions and Nutrients : Nitrate in Water by IC (Low Level)											
HDPE BH-96-2	E235.NO3-L	07-Oct-2020	----	----	----		09-Oct-2020	3 days	2 days	✓	
Anions and Nutrients : Nitrate in Water by IC (Low Level)											
HDPE Field Blank	E235.NO3-L	07-Oct-2020	----	----	----		09-Oct-2020	3 days	2 days	✓	
Anions and Nutrients : Nitrite in Water by IC (Low Level)											
HDPE BH-96-2	E235.NO2-L	07-Oct-2020	----	----	----		09-Oct-2020	3 days	2 days	✓	
Anions and Nutrients : Nitrite in Water by IC (Low Level)											
HDPE Field Blank	E235.NO2-L	07-Oct-2020	----	----	----		09-Oct-2020	3 days	2 days	✓	
Anions and Nutrients : Sulfate in Water by IC											
HDPE BH-96-2	E235.SO4	07-Oct-2020	----	----	----		09-Oct-2020	28 days	2 days	✓	
Anions and Nutrients : Sulfate in Water by IC											
HDPE Field Blank	E235.SO4	07-Oct-2020	----	----	----		09-Oct-2020	28 days	2 days	✓	
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)											
Amber glass total (sulfuric acid) BH-96-2	E318	07-Oct-2020	18-Oct-2020	28 days	10 days	✓	18-Oct-2020	17 days	0 days	✓	
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)											
Amber glass total (sulfuric acid) Field Blank	E318	07-Oct-2020	18-Oct-2020	28 days	10 days	✓	18-Oct-2020	17 days	0 days	✓	



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)											
Amber glass total (sulfuric acid) BH-96-2	E372-U	07-Oct-2020	18-Oct-2020	28 days	11 days	✔	18-Oct-2020	16 days	0 days	✔	
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)											
Amber glass total (sulfuric acid) Field Blank	E372-U	07-Oct-2020	18-Oct-2020	28 days	11 days	✔	18-Oct-2020	16 days	0 days	✔	
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)											
HDPE dissolved (nitric acid) BH-96-2	E421.Cr-L	07-Oct-2020	16-Oct-2020	180 days	9 days	✔	17-Oct-2020	170 days	1 days	✔	
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)											
HDPE dissolved (nitric acid) Field Blank	E421.Cr-L	07-Oct-2020	16-Oct-2020	180 days	9 days	✔	17-Oct-2020	170 days	1 days	✔	
Dissolved Metals : Dissolved Mercury in Water by CVAAS											
Glass vial dissolved (hydrochloric acid) BH-96-2	E509	07-Oct-2020	16-Oct-2020	28 days	8 days	✔	16-Oct-2020	19 days	0 days	✔	
Dissolved Metals : Dissolved Mercury in Water by CVAAS											
Glass vial dissolved (hydrochloric acid) Field Blank	E509	07-Oct-2020	16-Oct-2020	28 days	8 days	✔	16-Oct-2020	19 days	0 days	✔	
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS											
HDPE dissolved (nitric acid) BH-96-2	E421	07-Oct-2020	16-Oct-2020	180 days	9 days	✔	17-Oct-2020	170 days	1 days	✔	
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS											
HDPE dissolved (nitric acid) Field Blank	E421	07-Oct-2020	16-Oct-2020	180 days	9 days	✔	17-Oct-2020	170 days	1 days	✔	
Physical Tests : Alkalinity Species by Titration											
HDPE BH-96-2	E290	07-Oct-2020	----	----	----		09-Oct-2020	14 days	2 days	✔	



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
Rec	Actual	Rec		Actual							
Physical Tests : Alkalinity Species by Titration											
HDPE Field Blank	E290	07-Oct-2020	----	----	----		09-Oct-2020	14 days	2 days	✓	
Physical Tests : Conductivity in Water											
HDPE BH-96-2	E100	07-Oct-2020	----	----	----		09-Oct-2020	28 days	2 days	✓	
Physical Tests : Conductivity in Water											
HDPE Field Blank	E100	07-Oct-2020	----	----	----		09-Oct-2020	28 days	2 days	✓	
Physical Tests : pH by Meter											
HDPE Field Blank	E108	07-Oct-2020	----	----	----		09-Oct-2020	0.25 hrs	50 hrs	* EHTR-FM	
Physical Tests : pH by Meter											
HDPE BH-96-2	E108	07-Oct-2020	----	----	----		09-Oct-2020	0.25 hrs	54 hrs	* EHTR-FM	
Physical Tests : TDS by Gravimetry											
HDPE BH-96-2	E162	07-Oct-2020	----	----	----		10-Oct-2020	7 days	3 days	✓	
Physical Tests : TDS by Gravimetry											
HDPE Field Blank	E162	07-Oct-2020	----	----	----		13-Oct-2020	7 days	6 days	✓	
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)											
HDPE total (nitric acid) BH-96-2	E420.Cr-L	07-Oct-2020	----	----	----		16-Oct-2020	180 days	9 days	✓	
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)											
HDPE total (nitric acid) Field Blank	E420.Cr-L	07-Oct-2020	----	----	----		16-Oct-2020	180 days	9 days	✓	



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) BH-96-2	E508	07-Oct-2020	----	----	----		16-Oct-2020	28 days	8 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) Field Blank	E508	07-Oct-2020	----	----	----		16-Oct-2020	28 days	8 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) BH-96-2	E420	07-Oct-2020	----	----	----		16-Oct-2020	180 days	9 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) Field Blank	E420	07-Oct-2020	----	----	----		16-Oct-2020	180 days	9 days	✓

Legend & Qualifier Definitions

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended
 Rec. HT: ALS recommended hold time (see units).



Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water** Evaluation: * = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type	Method	QC Lot #	Count		Frequency (%)		Evaluation
			QC	Regular	Actual	Expected	
Analytical Methods							
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	100330	1	16	6.2	5.0	✓
Ammonia by Fluorescence	E298	106659	1	20	5.0	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	104685	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	100323	1	16	6.2	5.0	✓
Conductivity in Water	E100	100329	1	16	6.2	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	103681	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	103518	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	103682	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	100322	1	16	6.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	100325	1	16	6.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	100326	1	16	6.2	5.0	✓
pH by Meter	E108	100328	1	16	6.2	5.0	✓
Sulfate in Water by IC	E235.SO4	100327	1	16	6.2	5.0	✓
TDS by Gravimetry	E162	100888	2	40	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	102534	1	13	7.6	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	104423	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	103525	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	102533	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	104634	1	18	5.5	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	100330	1	16	6.2	5.0	✓
Ammonia by Fluorescence	E298	106659	1	20	5.0	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	104685	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	100323	1	16	6.2	5.0	✓
Conductivity in Water	E100	100329	1	16	6.2	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	103681	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	103518	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	103682	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	100322	1	16	6.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	100325	1	16	6.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	100326	1	16	6.2	5.0	✓
pH by Meter	E108	100328	1	16	6.2	5.0	✓
Sulfate in Water by IC	E235.SO4	100327	1	16	6.2	5.0	✓
TDS by Gravimetry	E162	100888	2	40	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	102534	1	13	7.6	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	104423	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	103525	1	20	5.0	5.0	✓



Matrix: **Water**

Evaluation: * = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type	Method	QC Lot #	Count		Frequency (%)		
			QC	Regular	Actual	Expected	Evaluation
Analytical Methods							
Laboratory Control Samples (LCS) - Continued							
Total Metals in Water by CRC ICPMS	E420	102533	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	104634	1	18	5.5	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	100330	1	16	6.2	5.0	✓
Ammonia by Fluorescence	E298	106659	1	20	5.0	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	104685	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	100323	1	16	6.2	5.0	✓
Conductivity in Water	E100	100329	1	16	6.2	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	103681	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	103518	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	103682	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	100322	1	16	6.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	100325	1	16	6.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	100326	1	16	6.2	5.0	✓
Sulfate in Water by IC	E235.SO4	100327	1	16	6.2	5.0	✓
TDS by Gravimetry	E162	100888	2	40	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	102534	1	13	7.6	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	104423	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	103525	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	102533	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	104634	1	18	5.5	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	106659	1	20	5.0	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	104685	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	100323	1	16	6.2	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	103681	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	103518	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	103682	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	100322	1	16	6.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	100325	1	16	6.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	100326	1	16	6.2	5.0	✓
Sulfate in Water by IC	E235.SO4	100327	1	16	6.2	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	102534	1	13	7.6	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	104423	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	103525	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	102533	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	104634	1	18	5.5	5.0	✓



Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Conductivity in Water	E100 Vancouver - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108 Vancouver - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
TDS by Gravimetry	E162 Vancouver - Environmental	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Chloride in Water by IC	E235.Cl Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC (Low Level)	E235.NO2-L Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Alkalinity Species by Titration	E290 Vancouver - Environmental	Water	APHA 2320 B (mod)	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.
Ammonia by Fluorescence	E298 Calgary - Environmental	Water	J. Environ. Monit., 2005, 7, 37-42 (mod)	Ammonia in water is analyzed by flow-injection analysis with fluorescence detection after reaction with orthophthaldialdehyde (OPA).



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318 Calgary - Environmental	Water	APHA 4500-Norg D (mod)	Total Kjeldahl Nitrogen is determined using block digestion followed by flow-injection analysis with fluorescence detection.
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U Calgary - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Total Metals in Water by CRC ICPMS	E420 Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS.
Dissolved Metals in Water by CRC ICPMS	E421 Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L Vancouver - Environmental	Water	APHA 3030 B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS
Total Mercury in Water by CVAAS	E508 Calgary - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Dissolved Mercury in Water by CVAAS	E509 Calgary - Environmental	Water	APHA 3030B/EPA 1631E (mod)	Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.
Chemical Oxygen Demand by Colourimetry	E559 Calgary - Environmental	Water	APHA 5220 D (mod)	Samples are analyzed using the closed reflux colourimetric method.
Dissolved Hardness (Calculated)	EC100 Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO ₃), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO ₃ equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Hardness (Calculated) from Total Ca/Mg	EC100A Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO ₃), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in CaCO ₃ equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
---------------------	--------------	--------	------------------	---------------------



<i>Preparation Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
Digestion for TKN in water	EP318 Calgary - Environmental	Water	APHA 4500-Norg D (mod)	Samples are digested using block digestion with Copper Sulfate Digestion Reagent.
Digestion for Total Phosphorus in water	EP372 Calgary - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Dissolved Metals Water Filtration	EP421 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO ₃ .
Dissolved Mercury Water Filtration	EP509 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

QUALITY CONTROL REPORT

Work Order : **VA20B7660**

Page : 1 of 18

Client : Regional District of Kitimat-Stikine
Contact : Mary Tress
Address : # 300 - 4545 Lazelle Avenue
 Terrace BC Canada V8G 4E1
Telephone : ----
Project : Thornhill Groundwater
PO : ----
C-O-C number : ----
Sampler : Mary Tress
Site :
Quote number : Q62338
No. of samples received : 2
No. of samples analysed : 2

Laboratory : Vancouver - Environmental
Account Manager : Amber Springer
Address : 8081 Lougheed Highway
 Burnaby, British Columbia Canada V5A 1W9
Telephone : +1 604 253 4188
Date Samples Received : 08-Oct-2020 20:10
Date Analysis Commenced : 09-Oct-2020
Issue Date : 23-Oct-2020 16:26

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits
- Reference Material (RM) Report; Recovery and Acceptance Limits
- Method Blank (MB) Report; Recovery and Acceptance Limits
- Laboratory Control Sample (LCS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Bruna Botti	Team Leader - Inorganics	Inorganics - Water Quality, Burnaby, British Columbia
Katarzyna Glinka		Inorganics, Calgary, Alberta
Ken Chan	Supervisor - Metals Prep & Mercury	Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics - Water Quality, Burnaby, British Columbia
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Ruth Morrison		Inorganics, Calgary, Alberta
Ruth Morrison		Metals, Calgary, Alberta

Page : 2 of 18
Work Order : VA20B7660
Client : Regional District of Kitimat-Stikine
Project : Thornhill Groundwater



General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include 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 predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number = Chemical Abstracts Services number is a unique identifier assigned to discrete substances.

DQO = Data Quality Objective.

LOR = Limit of Reporting (detection limit).

RPD = Relative Percentage Difference

= Indicates a QC result that did not meet the ALS DQO.



Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test specific).

Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 100328)											
VA20B7635-003	Anonymous	pH	----	E108	0.10	pH units	8.27	8.27	0.00%	4%	----
Physical Tests (QC Lot: 100329)											
VA20B7635-003	Anonymous	conductivity	----	E100	2.0	µS/cm	364	368	1.09%	10%	----
Physical Tests (QC Lot: 100330)											
VA20B7635-003	Anonymous	alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	207	210	1.78%	20%	----
Physical Tests (QC Lot: 100888)											
VA20B7514-003	Anonymous	solids, total dissolved [TDS]	----	E162	13	mg/L	56	63	7	Diff <2x LOR	----
Physical Tests (QC Lot: 102030)											
KS2002130-001	Anonymous	solids, total dissolved [TDS]	----	E162	20	mg/L	1020	1090	7.14%	20%	----
Anions and Nutrients (QC Lot: 100322)											
VA20B7635-001	Anonymous	fluoride	16984-48-8	E235.F	0.100	mg/L	0.171	0.204	0.032	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 100323)											
VA20B7635-001	Anonymous	chloride	16887-00-6	E235.Cl	2.50	mg/L	<2.50	<2.50	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 100325)											
VA20B7635-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.0250	mg/L	0.180	0.182	0.0017	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 100326)											
VA20B7635-001	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 100327)											
VA20B7635-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	1.50	mg/L	176	176	0.0548%	20%	----
Anions and Nutrients (QC Lot: 104423)											
VA20B7558-001	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 104634)											
VA20B7558-001	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	<0.0020	<0.0020	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 106659)											
VA20B7660-002	Field Blank	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0081	0.0114	0.0033	Diff <2x LOR	----
Total Metals (QC Lot: 102533)											
VA20B7670-001	Anonymous	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0156	0.0140	0.0016	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00068	0.00068	0.0000009	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.0597	0.0562	6.00%	20%	----
		beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----



Sub-Matrix: **Water** *Laboratory Duplicate (DUP) Report*

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Total Metals (QC Lot: 102533) - continued											
VA20B7670-001	Anonymous	bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.0000097	0.0000105	0.0000008	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	0.050	mg/L	77.6	77.3	0.320%	20%	----
		cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	0.023	0.022	0.001	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	0.0052	0.0051	0.00004	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	19.3	18.6	3.43%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.00209	0.00208	0.409%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00344	0.00334	3.04%	20%	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.050	mg/L	3.66	3.55	3.11%	20%	----
		rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00079	0.00073	0.00006	Diff <2x LOR	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	0.00519	0.00488	6.13%	20%	----
		silicon, total	7440-21-3	E420	0.10	mg/L	8.85	8.65	2.24%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, total	17341-25-2	E420	0.050	mg/L	8.36	8.13	2.73%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.862	0.846	1.87%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	25.8	24.9	3.54%	20%	----
		tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	0.00047	0.00050	0.00003	Diff <2x LOR	----
		tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	0.00198	0.00194	2.09%	20%	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	0.00055	0.00056	0.00002	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
		zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----

Total Metals (QC Lot: 102534)

VA20B7670-001	Anonymous	chromium, total	7440-47-3	E420-Cr-L	0.00010	mg/L	0.00016	0.00019	0.00002	Diff <2x LOR	----
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Total Metals (QC Lot: 103525)



Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Total Metals (QC Lot: 103525) - continued											
VA20B7568-006	Anonymous	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 103518)											
VA20B7568-004	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 103681)											
VA20B7614-002	Anonymous	chromium, dissolved	7440-47-3	E421.Cr-L	0.00050	mg/L	0.0163	0.0165	1.65%	20%	----
Dissolved Metals (QC Lot: 103682)											
VA20B7614-002	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0050	mg/L	0.0421	0.0380	0.0041	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00050	mg/L	0.00185	0.00185	0.000007	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00050	mg/L	0.00746	0.00719	3.77%	20%	----
		barium, dissolved	7440-39-3	E421	0.00050	mg/L	0.317	0.325	2.60%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.000500	mg/L	<0.000500	<0.000500	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.00250	mg/L	<0.00250	<0.00250	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.050	mg/L	3.40	3.60	5.44%	20%	----
		cadmium, dissolved	7440-43-9	E421	0.0000500	mg/L	<0.0000500	<0.0000500	0	Diff <2x LOR	----
		calcium, dissolved	7440-70-2	E421	0.250	mg/L	171	182	6.29%	20%	----
		cesium, dissolved	7440-46-2	E421	0.000050	mg/L	0.000584	0.000588	0.702%	20%	----
		cobalt, dissolved	7440-48-4	E421	0.00050	mg/L	0.0103	0.0107	3.54%	20%	----
		copper, dissolved	7440-50-8	E421	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.050	mg/L	8.19	8.92	8.49%	20%	----
		lead, dissolved	7439-92-1	E421	0.000250	mg/L	<0.000250	<0.000250	0	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0050	mg/L	0.0194	0.0207	0.0012	Diff <2x LOR	----
		magnesium, dissolved	7439-95-4	E421	0.0250	mg/L	50.4	54.1	6.96%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00050	mg/L	0.925	0.978	5.56%	20%	----
		molybdenum, dissolved	7439-98-7	E421	0.000250	mg/L	0.00113	0.00119	0.000056	Diff <2x LOR	----
		nickel, dissolved	7440-02-0	E421	0.00250	mg/L	0.0216	0.0230	0.00138	Diff <2x LOR	----
		phosphorus, dissolved	7723-14-0	E421	1.50	mg/L	<1.50	<1.50	0	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	0.250	mg/L	151	153	1.43%	20%	----
		rubidium, dissolved	7440-17-7	E421	0.00100	mg/L	0.0880	0.0925	5.04%	20%	----
		selenium, dissolved	7782-49-2	E421	0.000500	mg/L	<0.000500	<0.000500	0	Diff <2x LOR	----
		silicon, dissolved	7440-21-3	E421	0.250	mg/L	15.6	16.7	6.31%	20%	----
		silver, dissolved	7440-22-4	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		sodium, dissolved	17341-25-2	E421	0.250	mg/L	361	369	2.25%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00100	mg/L	1.20	1.20	0.0238%	20%	----
		sulfur, dissolved	7704-34-9	E421	2.50	mg/L	6.82	6.86	0.04	Diff <2x LOR	----
		tellurium, dissolved	13494-80-9	E421	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----



Sub-Matrix: Water					<i>Laboratory Duplicate (DUP) Report</i>						
<i>Laboratory sample ID</i>	<i>Client sample ID</i>	<i>Analyte</i>	<i>CAS Number</i>	<i>Method</i>	<i>LOR</i>	<i>Unit</i>	<i>Original Result</i>	<i>Duplicate Result</i>	<i>RPD(%) or Difference</i>	<i>Duplicate Limits</i>	<i>Qualifier</i>
Dissolved Metals (QC Lot: 103682) - continued											
VA20B7614-002	Anonymous	thallium, dissolved	7440-28-0	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		thorium, dissolved	7440-29-1	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		tin, dissolved	7440-31-5	E421	0.00050	mg/L	0.00122	0.00122	0.000006	Diff <2x LOR	----
		titanium, dissolved	7440-32-6	E421	0.0500	mg/L	<0.0500	<0.0500	0	Diff <2x LOR	----
		tungsten, dissolved	7440-33-7	E421	0.00050	mg/L	0.00162	0.00181	0.00019	Diff <2x LOR	----
		uranium, dissolved	7440-61-1	E421	0.000050	mg/L	0.000134	0.000159	0.000024	Diff <2x LOR	----
		vanadium, dissolved	7440-62-2	E421	0.00500	mg/L	<0.00500	<0.00500	0	Diff <2x LOR	----
		zinc, dissolved	7440-66-6	E421	0.0050	mg/L	0.0052	<0.0050	0.0002	Diff <2x LOR	----
		zirconium, dissolved	7440-67-7	E421	0.00150	mg/L	0.00342	0.00339	0.00003	Diff <2x LOR	----
Aggregate Organics (QC Lot: 104685)											
VA20B7656-001	Anonymous	chemical oxygen demand [COD]	----	E559	20	mg/L	<20	<20	0	Diff <2x LOR	----



Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 100329)						
conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 100330)						
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 100888)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Physical Tests (QCLot: 102030)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Anions and Nutrients (QCLot: 100322)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 100323)						
chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 100325)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 100326)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 100327)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 104423)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 104634)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 106659)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Total Metals (QCLot: 102533)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----



Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 102533) - continued						
cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	<0.00020	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	17341-25-2	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	<0.00020	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
thorium, total	7440-29-1	E420	0.0001	mg/L	<0.00010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----
Total Metals (QCLot: 102534)						
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	<0.00010	----
Total Metals (QCLot: 103525)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 103518)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 103681)						



Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 103681) - continued						
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	<0.00010	----
Dissolved Metals (QCLot: 103682)						
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	<0.000010	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
sodium, dissolved	17341-25-2	E421	0.05	mg/L	<0.050	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	----



Sub-Matrix: **Water**

<i>Analyte</i>	<i>CAS Number</i>	<i>Method</i>	<i>LOR</i>	<i>Unit</i>	<i>Result</i>	<i>Qualifier</i>
Dissolved Metals (QCLot: 103682) - continued						
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
Aggregate Organics (QCLot: 104685)						
chemical oxygen demand [COD]	----	E559	20	mg/L	<20	----



Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: Water					Laboratory Control Sample (LCS) Report				
					Spike Concentration	Recovery (%) LCS	Recovery Limits (%)		Qualifier
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 100328)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 100329)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	99.7	90.0	110	----
Physical Tests (QCLot: 100330)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	97.5	85.0	115	----
Physical Tests (QCLot: 100888)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	95.4	85.0	115	----
Physical Tests (QCLot: 102030)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	98.8	85.0	115	----
Anions and Nutrients (QCLot: 100322)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	97.5	90.0	110	----
Anions and Nutrients (QCLot: 100323)									
chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 100325)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	104	90.0	110	----
Anions and Nutrients (QCLot: 100326)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 100327)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	103	90.0	110	----
Anions and Nutrients (QCLot: 104423)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	88.2	75.0	125	----
Anions and Nutrients (QCLot: 104634)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	8.32 mg/L	97.2	80.0	120	----
Anions and Nutrients (QCLot: 106659)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.1 mg/L	106	85.0	115	----
Total Metals (QCLot: 102533)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	101	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	105	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	97.5	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	99.6	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	102	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	108	80.0	120	----



Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
Total Metals (QCLot: 102533) - continued									
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	97.4	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	100	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	102	80.0	120	----
cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	97.9	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	100	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	98.3	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	98.7	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	104	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	102	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	99.3	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	101	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	100	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	104	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	101	80.0	120	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	102	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	105	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	103	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	98.7	80.0	120	----
sodium, total	17341-25-2	E420	0.05	mg/L	50 mg/L	97.9	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	103	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	91.2	80.0	120	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	105	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	106	80.0	120	----
thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	101	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	101	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	99.3	80.0	120	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	107	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	103	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	102	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	102	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	98.0	80.0	120	----
Total Metals (QCLot: 102534)									
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	0.25 mg/L	99.8	80.0	120	----
Total Metals (QCLot: 103525)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	102	80.0	120	----



Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 103518)									
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	105	80.0	120	----
Dissolved Metals (QCLot: 103681)									
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	0.25 mg/L	97.2	80.0	120	----
Dissolved Metals (QCLot: 103682)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	105	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	91.4	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	92.0	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	98.0	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	94.6	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	101	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	87.4	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	99.4	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	101	80.0	120	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	102	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	99.8	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	97.9	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	90.9	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	93.3	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	98.5	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	105	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	99.5	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	96.2	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	99.4	80.0	120	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	101	70.0	130	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	102	80.0	120	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	100	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	87.7	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	93.6	80.0	120	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	101	80.0	120	----
sodium, dissolved	17341-25-2	E421	0.05	mg/L	50 mg/L	102	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	103	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	91.1	80.0	120	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	99.1	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	94.5	80.0	120	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	92.4	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	93.5	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	94.9	80.0	120	----



Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 103682) - continued									
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	90.0	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	94.9	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	103	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	101	80.0	120	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	91.5	80.0	120	----
Aggregate Organics (QCLot: 104685)									
chemical oxygen demand [COD]	----	E559	20	mg/L	500 mg/L	95.6	85.0	115	----



Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 100322)										
VA20B7635-002	Anonymous	fluoride	16984-48-8	E235.F	4.99 mg/L	5 mg/L	99.8	75.0	125	----
Anions and Nutrients (QCLot: 100323)										
VA20B7635-002	Anonymous	chloride	16887-00-6	E235.Cl	510 mg/L	500 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 100325)										
VA20B7635-002	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	12.8 mg/L	12.5 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 100326)										
VA20B7635-002	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	2.36 mg/L	2.5 mg/L	94.6	75.0	125	----
Anions and Nutrients (QCLot: 100327)										
VA20B7635-002	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	502 mg/L	500 mg/L	100	75.0	125	----
Anions and Nutrients (QCLot: 104423)										
VA20B7558-001	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	3.12 mg/L	2.5 mg/L	125	70.0	130	----
Anions and Nutrients (QCLot: 104634)										
VA20B7558-001	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0643 mg/L	0.05 mg/L	129	70.0	130	----
Anions and Nutrients (QCLot: 106659)										
VA20B7660-002	Field Blank	ammonia, total (as N)	7664-41-7	E298	0.118 mg/L	0.1 mg/L	118	75.0	125	----
Total Metals (QCLot: 102533)										
VA20B7680-001	Anonymous	aluminum, total	7429-90-5	E420	0.196 mg/L	0.2 mg/L	98.2	70.0	130	----
		antimony, total	7440-36-0	E420	0.0210 mg/L	0.02 mg/L	105	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0177 mg/L	0.02 mg/L	88.6	70.0	130	----
		barium, total	7440-39-3	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0389 mg/L	0.04 mg/L	97.2	70.0	130	----
		bismuth, total	7440-69-9	E420	0.00967 mg/L	0.01 mg/L	96.7	70.0	130	----
		boron, total	7440-42-8	E420	0.090 mg/L	0.1 mg/L	90.3	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00369 mg/L	0.004 mg/L	92.2	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		cesium, total	7440-46-2	E420	0.00968 mg/L	0.01 mg/L	96.8	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0179 mg/L	0.02 mg/L	89.6	70.0	130	----
		copper, total	7440-50-8	E420	0.0173 mg/L	0.02 mg/L	86.6	70.0	130	----
		iron, total	7439-89-6	E420	1.83 mg/L	2 mg/L	91.4	70.0	130	----



Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 102533) - continued										
VA20B7680-001	Anonymous	lead, total	7439-92-1	E420	0.0188 mg/L	0.02 mg/L	94.3	70.0	130	----
		lithium, total	7439-93-2	E420	0.0984 mg/L	0.1 mg/L	98.4	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0202 mg/L	0.02 mg/L	101	70.0	130	----
		nickel, total	7440-02-0	E420	0.0354 mg/L	0.04 mg/L	88.6	70.0	130	----
		phosphorus, total	7723-14-0	E420	9.52 mg/L	10 mg/L	95.2	70.0	130	----
		potassium, total	7440-09-7	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		rubidium, total	7440-17-7	E420	0.0181 mg/L	0.02 mg/L	90.5	70.0	130	----
		selenium, total	7782-49-2	E420	0.0402 mg/L	0.04 mg/L	100	70.0	130	----
		silicon, total	7440-21-3	E420	ND mg/L	10 mg/L	ND	70.0	130	----
		silver, total	7440-22-4	E420	0.00388 mg/L	0.004 mg/L	97.0	70.0	130	----
		sodium, total	17341-25-2	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, total	7704-34-9	E420	ND mg/L	20 mg/L	ND	70.0	130	----
		tellurium, total	13494-80-9	E420	0.0417 mg/L	0.04 mg/L	104	70.0	130	----
		thallium, total	7440-28-0	E420	0.00385 mg/L	0.004 mg/L	96.2	70.0	130	----
		thorium, total	7440-29-1	E420	0.0207 mg/L	0.02 mg/L	103	70.0	130	----
		tin, total	7440-31-5	E420	0.0188 mg/L	0.02 mg/L	93.9	70.0	130	----
		titanium, total	7440-32-6	E420	0.0364 mg/L	0.04 mg/L	90.9	70.0	130	----
		tungsten, total	7440-33-7	E420	0.0201 mg/L	0.02 mg/L	100	70.0	130	----
		uranium, total	7440-61-1	E420	0.00380 mg/L	0.004 mg/L	95.1	70.0	130	----
		vanadium, total	7440-62-2	E420	0.0952 mg/L	0.1 mg/L	95.2	70.0	130	----
		zinc, total	7440-66-6	E420	0.357 mg/L	0.4 mg/L	89.3	70.0	130	----
		zirconium, total	7440-67-7	E420	0.0409 mg/L	0.04 mg/L	102	70.0	130	----
Total Metals (QCLot: 102534)										
VA20B7680-001	Anonymous	chromium, total	7440-47-3	E420.Cr-L	0.0370 mg/L	0.04 mg/L	92.5	70.0	130	----
Total Metals (QCLot: 103525)										
VA20B7568-007	Anonymous	mercury, total	7439-97-6	E508	0.000102 mg/L	0.0001 mg/L	102	70.0	130	----
Dissolved Metals (QCLot: 103518)										
VA20B7568-005	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000991 mg/L	0.0001 mg/L	99.1	70.0	130	----
Dissolved Metals (QCLot: 103681)										
VA20B7631-001	Anonymous	chromium, dissolved	7440-47-3	E421.Cr-L	0.0390 mg/L	0.04 mg/L	97.6	70.0	130	----
Dissolved Metals (QCLot: 103682)										
VA20B7631-001	Anonymous	aluminum, dissolved	7429-90-5	E421	0.203 mg/L	0.2 mg/L	102	70.0	130	----



Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 103682) - continued										
VA20B7631-001	Anonymous	antimony, dissolved	7440-36-0	E421	0.0204 mg/L	0.02 mg/L	102	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.0194 mg/L	0.02 mg/L	97.1	70.0	130	----
		barium, dissolved	7440-39-3	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.0387 mg/L	0.04 mg/L	96.8	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.00908 mg/L	0.01 mg/L	90.8	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.080 mg/L	0.1 mg/L	79.5	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.00401 mg/L	0.004 mg/L	100	70.0	130	----
		calcium, dissolved	7440-70-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		cesium, dissolved	7440-46-2	E421	0.0102 mg/L	0.01 mg/L	102	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.0199 mg/L	0.02 mg/L	99.4	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.0197 mg/L	0.02 mg/L	98.5	70.0	130	----
		iron, dissolved	7439-89-6	E421	1.94 mg/L	2 mg/L	96.9	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.0186 mg/L	0.02 mg/L	93.0	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.0997 mg/L	0.1 mg/L	99.7	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	0.990 mg/L	1 mg/L	99.0	70.0	130	----
		manganese, dissolved	7439-96-5	E421	0.0195 mg/L	0.02 mg/L	97.3	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.0204 mg/L	0.02 mg/L	102	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.0393 mg/L	0.04 mg/L	98.2	70.0	130	----
		phosphorus, dissolved	7723-14-0	E421	10.2 mg/L	10 mg/L	102	70.0	130	----
		potassium, dissolved	7440-09-7	E421	3.81 mg/L	4 mg/L	95.2	70.0	130	----
		rubidium, dissolved	7440-17-7	E421	0.0196 mg/L	0.02 mg/L	98.2	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.0413 mg/L	0.04 mg/L	103	70.0	130	----
		silicon, dissolved	7440-21-3	E421	9.49 mg/L	10 mg/L	94.9	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.00407 mg/L	0.004 mg/L	102	70.0	130	----
		sodium, dissolved	17341-25-2	E421	1.93 mg/L	2 mg/L	96.6	70.0	130	----
		strontium, dissolved	7440-24-6	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, dissolved	7704-34-9	E421	19.6 mg/L	20 mg/L	97.8	70.0	130	----
		tellurium, dissolved	13494-80-9	E421	0.0420 mg/L	0.04 mg/L	105	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.00376 mg/L	0.004 mg/L	94.0	70.0	130	----
		thorium, dissolved	7440-29-1	E421	0.0211 mg/L	0.02 mg/L	106	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.0199 mg/L	0.02 mg/L	99.4	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.0396 mg/L	0.04 mg/L	99.0	70.0	130	----
		tungsten, dissolved	7440-33-7	E421	0.0192 mg/L	0.02 mg/L	96.0	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.00375 mg/L	0.004 mg/L	93.8	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.101 mg/L	0.1 mg/L	101	70.0	130	----
		zinc, dissolved	7440-66-6	E421	0.422 mg/L	0.4 mg/L	106	70.0	130	----
		zirconium, dissolved	7440-67-7	E421	0.0392 mg/L	0.04 mg/L	97.9	70.0	130	----

Page : 18 of 18
 Work Order : VA20B7660
 Client : Regional District of Kitimat-Stikine
 Project : Thornhill Groundwater



Sub-Matrix: **Water**

					<i>Matrix Spike (MS) Report</i>					
					<i>Spike</i>		<i>Recovery (%)</i>	<i>Recovery Limits (%)</i>		
<i>Laboratory sample ID</i>	<i>Client sample ID</i>	<i>Analyte</i>	<i>CAS Number</i>	<i>Method</i>	<i>Concentration</i>	<i>Target</i>	<i>MS</i>	<i>Low</i>	<i>High</i>	<i>Qualifier</i>
Aggregate Organics (QCLot: 104685)										
VA20B7656-002	Anonymous	chemical oxygen demand [COD]	----	E559	133 mg/L	139.5 mg/L	95.4	75.0	125	----



**Chain of Custody (COC) / Analytical
Request Form**

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here
(lab use only)

COC Number: 17 -

Page of

www.alsglobal.com

Report To Contact and company name below will appear on the final report			Report Format / Distribution			Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)																								
Company: Regional District of Kitimat-Stikine			Select Report Format: <input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> EXCEL <input type="checkbox"/> EDD (DIGITAL)			Regular [R] <input checked="" type="checkbox"/> Standard TAT if received by 3 pm - business days - no surcharges apply																								
Contact: Mary Tress			Quality Control (QC) Report with Report <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO			PRIORITY (Business Days)	4 day [P4-20%] <input type="checkbox"/>						EMERGENCY	1 Business day [E1 - 100%] <input type="checkbox"/>																
Phone: 250-615-6100			<input checked="" type="checkbox"/> Compare Results to Criteria on Report - provide details below if box checked				3 day [P3-25%] <input type="checkbox"/>							Same Day, Weekend or Statutory holiday [E2 -200% (Laboratory opening fees may apply)] <input type="checkbox"/>																
Company address below will appear on the final report			Select Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX				2 day [P2-50%] <input type="checkbox"/>																							
Street: 4545 Lazelle Avenue			Email 1 or Fax: mtress@rdks.bc.ca; mhaley@rdks.bc.ca			Date and Time Required for all E&P TATs:																								
City/Province: Terrace/BC			Email 2: eblaney@rdks.bc.ca; sprouse@rdks.bc.ca			For tests that can not be performed according to the service level selected, you will be contacted.																								
Postal Code: V8G4E1			Email 3: mglover@rdks.bc.ca			Analysis Request																								
Invoice To: Same as Report To <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO			Invoice Distribution			Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below																								
Copy of Invoice with Report <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO			Select Invoice Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX			F	P																							
Company: Regional District of Kitimat-Stikine			Email 1 or Fax: anne-maries@rdks.bc.ca																											
Contact: Megan Haley			Email 2: mhaley@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:			Mary Tress																					
ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)				Date (dd-mm-yy)	Time (hh:mm)	Sample Type	Dissolved metals	Total Metals	dissolved hardness	Ammonia	Chloride	Fluoride	Nitrate	Nitrite	Total Kjeldahl Nitrogen	Total phosphorus	COD	Total Dissolved Solids	Sulphate	Alkalinity	pH	Conductivity	SAMPLES ON HOLD	Sample is hazardous (please provide further detail)	NUMBER OF CONTAINERS				
	BH-96-2				7-Oct-20	09:15	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			
	Field Blank				7-Oct-20	12:30	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R		

Environmental Division
Vancouver
Work Order Reference
VA20B7660

Drinking Water (DW) Samples YES NO
 Are samples taken from a Regulated DW Sys... YES NO
 Are samples for human consumption/ use? YES NO

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)

Telephone: +1 604 253 4188

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: H07 | FINAL COOLER TEMPERATURES °C: 4

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Mary Tress	Date: 8-Oct-20	Time: 10:35	Received by: Chris	Date: 8 Oct 2020	Time: 1035	Received by: WA	Date: 10/8	Time: 8:10p



CERTIFICATE OF ANALYSIS

Work Order : **VA20B7656**
Amendment : **1**
Client : **Regional District of Kitimat-Stikine**
Contact : M Haley
Address : # 300 - 4545 Lazelle Avenue
Terrace BC Canada V8G 4E1
Telephone : ----
Project : Thornhill Transfer Station Surface Water
PO : ----
C-O-C number : ----
Sampler : Mary Tress
Site :
Quote number : Q62338
No. of samples received : 7
No. of samples analysed : 7

Page : 1 of 11
Laboratory : Vancouver - Environmental
Account Manager : Amber Springer
Address : 8081 Lougheed Highway
Burnaby BC Canada V5A 1W9
Telephone : +1 604 253 4188
Date Samples Received : 08-Oct-2020 20:10
Date Analysis Commenced : 09-Oct-2020
Issue Date : 28-Oct-2020 10:34

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Bruna Botti	Team Leader - Inorganics	Inorganics - Water Quality, Burnaby, British Columbia
Katarzyna Glinka		Inorganics, Calgary, Alberta
Ken Chan	Supervisor - Metals Prep & Mercury	Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics - Water Quality, Burnaby, British Columbia
Omar Beydoun	Lab Assistant	Metals, Burnaby, British Columbia
Oscar Ruiz	Lab Assistant	Metals, Calgary, Alberta
Rebecca Baker		Inorganics, Calgary, Alberta
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Ruth Morrison		Inorganics, Calgary, Alberta
Ruth Morrison		Metals, Calgary, Alberta



General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

<i>Unit</i>	<i>Description</i>
-	No Unit
µS/cm	Microsiemens per centimetre
mg/L	milligrams per litre
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in reports identified as "Preliminary Report" are considered authorized for use.

Workorder Comments

Amendment (28/10/2020): This report has been amended following changes to the analytical data reported. The quality system is being utilised to resolve this issue. The specific data affected includes TKN reported for VA20B7656-002.

Qualifiers

<i>Qualifier</i>	<i>Description</i>
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
RRV	Reported result verified by repeat analysis.
TKNI	TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.



Analytical Results

Sub-Matrix: Water					Client sample ID				
(Matrix: Water)					SW-1	SW-3	SW-6	SW-21	SW-17
Client sampling date / time					07-Oct-2020 10:00	07-Oct-2020 09:10	07-Oct-2020 11:45	07-Oct-2020 10:30	07-Oct-2020 11:15
Analyte	CAS Number	Method	LOR	Unit	VA20B7656-001	VA20B7656-002	VA20B7656-003	VA20B7656-004	VA20B7656-005
					Result	Result	Result	Result	Result
Physical Tests									
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	29.2	877	49.1	306	38.9
conductivity	----	E100	2.0	µS/cm	61.1	1760	99.4	660	83.1
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L	29.4	498	48.3	218	36.6
pH	----	E108	0.10	pH units	7.48	7.31	7.71	7.82	7.55
solids, total suspended [TSS]	----	E160-H	3.0	mg/L	58.4	75.8	<3.0	5.5	3.7
hardness (as CaCO3), dissolved	----	EC100	0.60	mg/L	29.5	543	49.5	240	37.9
Anions and Nutrients									
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0136	46.6 ^{DLHC, RRV, TKN}	0.0131	0.0955	0.0168
chloride	16887-00-6	E235.Cl	0.50	mg/L	<0.50	58.2	0.66	22.1	0.97
fluoride	16984-48-8	E235.F	0.020	mg/L	<0.020	<0.200 ^{DLDS}	0.020	0.126	0.022
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	0.138	41.9 ^{DLHC}	0.353	10.8 ^{DLHC}	0.278
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.0483	<0.0500 ^{DLDS}	0.120	3.28	0.341
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0010	<0.0100 ^{DLDS}	<0.0010	0.0932	<0.0010
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	0.0012	<0.0010	0.0029	0.0027	0.0023
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	<0.0020	0.257 ^{DLHC}	<0.0020	0.0499	0.0030
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	0.96	<3.00 ^{DLDS}	1.21	2.88	1.00
Total Metals									
aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0988	0.0522	0.179	0.285	0.149
antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	0.00013	<0.00010	0.00012	<0.00010
arsenic, total	7440-38-2	E420	0.00010	mg/L	<0.00010	0.00911	0.00020	0.00066	0.00015
barium, total	7440-39-3	E420	0.00010	mg/L	0.0190	0.641	0.0171	0.120	0.0226
beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
boron, total	7440-42-8	E420	0.010	mg/L	<0.010	1.83	<0.010	0.578	0.022
cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.0000053	0.0000110	0.0000054	0.0000262	0.0000058
calcium, total	7440-70-2	E420	0.050	mg/L	10.6	153	18.0	68.0	12.8
cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	0.000229	0.000015	0.000065	0.000010
chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L	0.00011	0.00092	0.00017	0.00046	0.00018
cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	0.00238	<0.00010	0.00061	<0.00010
copper, total	7440-50-8	E420	0.00050	mg/L	0.00089	<0.00050	0.00100	0.00275	0.00106



Analytical Results

Sub-Matrix: Water					Client sample ID	SW-1	SW-3	SW-6	SW-21	SW-17
(Matrix: Water)										
Client sampling date / time					07-Oct-2020 10:00	07-Oct-2020 09:10	07-Oct-2020 11:45	07-Oct-2020 10:30	07-Oct-2020 11:15	
Analyte	CAS Number	Method	LOR	Unit	VA20B7656-001	VA20B7656-002	VA20B7656-003	VA20B7656-004	VA20B7656-005	
					Result	Result	Result	Result	Result	
Total Metals										
iron, total	7439-89-6	E420	0.010	mg/L	0.084	44.6	0.201	0.394	0.187	
lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	0.000095	<0.000050	
lithium, total	7439-93-2	E420	0.0010	mg/L	<0.0010	0.0024	<0.0010	<0.0010	<0.0010	
magnesium, total	7439-95-4	E420	0.0050	mg/L	0.693	28.3	0.819	11.6	1.16	
manganese, total	7439-96-5	E420	0.00010	mg/L	0.00492	3.80	0.0140	0.348	0.0137	
mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	
molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000414	0.000506	0.000472	0.000352	0.000361	
nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	0.00461	<0.00050	0.00180	<0.00050	
phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	0.288	<0.050	0.055	<0.050	
potassium, total	7440-09-7	E420	0.050	mg/L	0.720	54.7	0.860	16.3	1.32	
rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00095	0.0382	0.00107	0.0104	0.00115	
selenium, total	7782-49-2	E420	0.000050	mg/L	<0.000050	0.000105	<0.000050	0.000108	0.000066	
silicon, total	7440-21-3	E420	0.10	mg/L	2.90	12.1	3.51	5.65	3.34	
silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	
sodium, total	17341-25-2	E420	0.050	mg/L	1.03	80.7	1.30	28.3	2.03	
strontium, total	7440-24-6	E420	0.00020	mg/L	0.0419	1.02	0.0462	0.400	0.0538	
sulfur, total	7704-34-9	E420	0.50	mg/L	<0.50	2.07	<0.50	1.45	<0.50	
tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	
thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	
thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	0.00013	<0.00010	<0.00010	<0.00010	
titanium, total	7440-32-6	E420	0.00030	mg/L	0.00364	0.00235	0.00535	0.00897	0.00498	
tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
uranium, total	7440-61-1	E420	0.000010	mg/L	0.000022	0.000066	0.000064	0.000100	0.000027	
vanadium, total	7440-62-2	E420	0.00050	mg/L	0.00063	0.00156	0.00081	0.00071	0.00073	
zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	<0.0030	0.0053	<0.0030	
zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	0.00043	0.00031	0.00033	<0.00020	
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0382	0.0355	0.0594	0.0324	0.0643	
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00010	0.00011	<0.00010	<0.00010	<0.00010	
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	<0.00010	0.0117	0.00012	0.00050	0.00012	



Analytical Results

Sub-Matrix: Water					Client sample ID	SW-1	SW-3	SW-6	SW-21	SW-17
(Matrix: Water)										
Client sampling date / time					07-Oct-2020 10:00	07-Oct-2020 09:10	07-Oct-2020 11:45	07-Oct-2020 10:30	07-Oct-2020 11:15	
Analyte	CAS Number	Method	LOR	Unit	VA20B7656-001	VA20B7656-002	VA20B7656-003	VA20B7656-004	VA20B7656-005	
					Result	Result	Result	Result	Result	
Dissolved Metals										
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0190	0.663	0.0168	0.126	0.0238	
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	
boron, dissolved	7440-42-8	E421	0.010	mg/L	<0.010	1.52	<0.010	0.521	0.019	
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	0.0000214	<0.0000050	
calcium, dissolved	7440-70-2	E421	0.050	mg/L	10.6	163	18.4	73.9	13.2	
cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.000010	0.000239	<0.000010	0.000058	<0.000010	
chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L	<0.00010	0.00088	<0.00010	0.00030	<0.00010	
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	0.00243	<0.00010	0.00058	<0.00010	
copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00074	0.00021	0.00124	0.00232	0.00094	
iron, dissolved	7439-89-6	E421	0.010	mg/L	0.015	44.8	0.081	0.088	0.096	
lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	<0.0010	0.0020	<0.0010	<0.0010	<0.0010	
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	0.749	32.8	0.881	13.5	1.24	
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00214	3.93	0.00996	0.337	0.00923	
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000427	0.000401	0.000433	0.000325	0.000338	
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	0.00471	<0.00050	0.00150	<0.00050	
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	0.244	<0.050	<0.050	<0.050	
potassium, dissolved	7440-09-7	E421	0.050	mg/L	0.798	56.9	0.922	18.5	1.41	
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00079	0.0402	0.00106	0.0113	0.00122	
selenium, dissolved	7782-49-2	E421	0.000050	mg/L	<0.000050	0.000162	0.000064	0.000146	0.000078	
silicon, dissolved	7440-21-3	E421	0.050	mg/L	2.65	11.5	3.17	5.11	3.04	
silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	
sodium, dissolved	17341-25-2	E421	0.050	mg/L	1.14	91.8	1.40	32.7	2.09	
strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.0449	1.08	0.0498	0.461	0.0624	
sulfur, dissolved	7704-34-9	E421	0.50	mg/L	<0.50	1.85	<0.50	1.44	<0.50	
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	
thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	
thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	0.00012	<0.00010	<0.00010	<0.00010	



Analytical Results

Sub-Matrix: Water					Client sample ID	SW-1	SW-3	SW-6	SW-21	SW-17
(Matrix: Water)										
Client sampling date / time					07-Oct-2020 10:00	07-Oct-2020 09:10	07-Oct-2020 11:45	07-Oct-2020 10:30	07-Oct-2020 11:15	
Analyte	CAS Number	Method	LOR	Unit	VA20B7656-001	VA20B7656-002	VA20B7656-003	VA20B7656-004	VA20B7656-005	
					Result	Result	Result	Result	Result	
Dissolved Metals										
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	0.00042	0.00160	0.00144	0.00167	0.00175	
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000021	0.000068	0.000063	0.000094	0.000027	
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	0.00160	<0.00050	<0.00050	<0.00050	
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0019	0.0031	0.0011	0.0024	<0.0010	
zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	<0.00020	0.00037	<0.00020	<0.00020	<0.00020	
dissolved mercury filtration location	----	EP509	-	-	Field	Field	Field	Field	Field	
dissolved metals filtration location	----	EP421	-	-	Field	Field	Field	Field	Field	
Aggregate Organics										
biochemical oxygen demand [BOD]	----	E550	2.0	mg/L	<2.0	<6.0	<2.0	4.7	<2.0	
chemical oxygen demand [COD]	----	E559	20	mg/L	<20	101	<20	48	<20	

Please refer to the General Comments section for an explanation of any qualifiers detected.



Analytical Results

Sub-Matrix: Water					Client sample ID	DUP	Travel Blank	----	----	----
(Matrix: Water)					Client sampling date / time	07-Oct-2020 12:00	07-Oct-2020	---	---	---
Analyte	CAS Number	Method	LOR	Unit	VA20B7656-006	VA20B7656-007	-----	-----	-----	
					Result	Result	---	---	---	
Physical Tests										
alkalinity, total (as CaCO3)	---	E290	1.0	mg/L	30.6	---	---	---	---	---
conductivity	---	E100	2.0	µS/cm	61.7	---	---	---	---	---
hardness (as CaCO3), from total Ca/Mg	---	EC100A	0.60	mg/L	28.4	<0.60	---	---	---	---
pH	---	E108	0.10	pH units	7.46	---	---	---	---	---
solids, total suspended [TSS]	---	E160-H	3.0	mg/L	<3.0	---	---	---	---	---
hardness (as CaCO3), dissolved	---	EC100	0.60	mg/L	29.3	---	---	---	---	---
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0079	0.0052	---	---	---	---
chloride	16887-00-6	E235.Cl	0.50	mg/L	<0.50	<0.50	---	---	---	---
fluoride	16984-48-8	E235.F	0.020	mg/L	0.023	<0.020	---	---	---	---
Kjeldahl nitrogen, total [TKN]	---	E318	0.050	mg/L	<0.050	---	---	---	---	---
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.0380	---	---	---	---	---
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0010	---	---	---	---	---
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	---	---	---	---	---
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0021	---	---	---	---	---
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	0.96	---	---	---	---	---
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0917	<0.0030	---	---	---	---
antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	<0.00010	---	---	---	---
arsenic, total	7440-38-2	E420	0.00010	mg/L	<0.00010	<0.00010	---	---	---	---
barium, total	7440-39-3	E420	0.00010	mg/L	0.0195	<0.00010	---	---	---	---
beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	---	---	---	---
bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	---	---	---	---
boron, total	7440-42-8	E420	0.010	mg/L	<0.010	<0.010	---	---	---	---
cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.0000094	<0.0000050	---	---	---	---
calcium, total	7440-70-2	E420	0.050	mg/L	10.2	<0.050	---	---	---	---
cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	<0.000010	---	---	---	---
chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L	<0.00010	<0.00010	---	---	---	---
cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	---	---	---	---
copper, total	7440-50-8	E420	0.00050	mg/L	0.00089	<0.00050	---	---	---	---
iron, total	7439-89-6	E420	0.010	mg/L	0.070	<0.010	---	---	---	---



Analytical Results

Sub-Matrix: Water					Client sample ID	DUP	Travel Blank	----	----	----
(Matrix: Water)					Client sampling date / time	07-Oct-2020 12:00	07-Oct-2020	---	---	---
Analyte	CAS Number	Method	LOR	Unit	VA20B7656-006	VA20B7656-007	-----	-----	-----	
					Result	Result	---	---	---	
Total Metals										
lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	---	---	---	
lithium, total	7439-93-2	E420	0.0010	mg/L	<0.0010	<0.0010	---	---	---	
magnesium, total	7439-95-4	E420	0.0050	mg/L	0.702	<0.0050	---	---	---	
manganese, total	7439-96-5	E420	0.00010	mg/L	0.00462	<0.00010	---	---	---	
mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	---	---	---	
molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000404	<0.000050	---	---	---	
nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	<0.00050	---	---	---	
phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	<0.050	---	---	---	
potassium, total	7440-09-7	E420	0.050	mg/L	0.736	<0.050	---	---	---	
rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00080	<0.00020	---	---	---	
selenium, total	7782-49-2	E420	0.000050	mg/L	0.000074	<0.000050	---	---	---	
silicon, total	7440-21-3	E420	0.10	mg/L	2.87	<0.10	---	---	---	
silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	---	---	---	
sodium, total	17341-25-2	E420	0.050	mg/L	1.06	<0.050	---	---	---	
strontium, total	7440-24-6	E420	0.00020	mg/L	0.0415	<0.00020	---	---	---	
sulfur, total	7704-34-9	E420	0.50	mg/L	<0.50	<0.50	---	---	---	
tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	---	---	---	
thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	---	---	---	
thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	---	---	---	
tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	---	---	---	
titanium, total	7440-32-6	E420	0.00030	mg/L	0.00280	<0.00030	---	---	---	
tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	---	---	---	
uranium, total	7440-61-1	E420	0.000010	mg/L	0.000021	<0.000010	---	---	---	
vanadium, total	7440-62-2	E420	0.00050	mg/L	0.00057	<0.00050	---	---	---	
zinc, total	7440-66-6	E420	0.0030	mg/L	0.0031	<0.0030	---	---	---	
zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	---	---	---	
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0378	---	---	---	---	
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00010	---	---	---	---	
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	<0.00010	---	---	---	---	
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0200	---	---	---	---	



Analytical Results

Sub-Matrix: Water					Client sample ID	DUP	Travel Blank	----	----	----
(Matrix: Water)					Client sampling date / time	07-Oct-2020 12:00	07-Oct-2020	---	---	---
Analyte	CAS Number	Method	LOR	Unit	VA20B7656-006	VA20B7656-007	-----	-----	-----	
					Result	Result	---	---	---	
Dissolved Metals										
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	----	----	----	----	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	----	----	----	----	----
boron, dissolved	7440-42-8	E421	0.010	mg/L	<0.010	----	----	----	----	----
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0000050	----	----	----	----	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L	10.5	----	----	----	----	----
cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.000010	----	----	----	----	----
chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L	0.00020	----	----	----	----	----
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	----	----	----	----	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00080	----	----	----	----	----
iron, dissolved	7439-89-6	E421	0.010	mg/L	0.016	----	----	----	----	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	----	----	----	----	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	<0.0010	----	----	----	----	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	0.750	----	----	----	----	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00214	----	----	----	----	----
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	----	----	----	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000398	----	----	----	----	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	----	----	----	----	----
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	----	----	----	----	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L	0.812	----	----	----	----	----
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00093	----	----	----	----	----
selenium, dissolved	7782-49-2	E421	0.000050	mg/L	<0.000050	----	----	----	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L	2.58	----	----	----	----	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	----	----	----	----	----
sodium, dissolved	17341-25-2	E421	0.050	mg/L	1.12	----	----	----	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.0466	----	----	----	----	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L	<0.50	----	----	----	----	----
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	----	----	----	----	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	----	----	----	----	----
thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	----	----	----	----	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	----	----	----	----	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	0.00032	----	----	----	----	----



Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

					Client sample ID	DUP	Travel Blank	----	----	----
					Client sampling date / time	07-Oct-2020 12:00	07-Oct-2020	---	---	---
Analyte	CAS Number	Method	LOR	Unit	VA20B7656-006	VA20B7656-007	-----	-----	-----	
					Result	Result	---	---	---	
Dissolved Metals										
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	----	----	----	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000020	----	----	----	----	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	----	----	----	----	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	<0.0010	----	----	----	----	----
zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	<0.00020	----	----	----	----	----
dissolved mercury filtration location	----	EP509	-	-	Field	----	----	----	----	----
dissolved metals filtration location	----	EP421	-	-	Field	----	----	----	----	----
Aggregate Organics										
biochemical oxygen demand [BOD]	----	E550	2.0	mg/L	<2.0	<2.0	----	----	----	----
chemical oxygen demand [COD]	----	E559	20	mg/L	<20	<20	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: VA20B7656	Page	: 1 of 24
Amendment	: 1		
Client	: Regional District of Kitimat-Stikine	Laboratory	: Vancouver - Environmental
Contact	: M Haley	Account Manager	: Amber Springer
Address	: # 300 - 4545 Lazelle Avenue Terrace BC Canada V8G 4E1	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: Thornhill Transfer Station Surface Water	Date Samples Received	: 08-Oct-2020 20:10
PO	: ----	Issue Date	: 28-Oct-2020 10:34
C-O-C number	: ----		
Sampler	: Mary Tress		
Site	:		
Quote number	: Q62338		
No. of samples received	: 7		
No. of samples analysed	: 7		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.

DQO: Data Quality Objective.

LOR: Limit of Reporting (detection limit).

RPD: Relative Percent Difference.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.



Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 15:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 15:00 is used for calculation purposes.

Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD] DUP	E550	07-Oct-2020	----	----	----		10-Oct-2020	3 days	2 days	✓
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD] SW-17	E550	07-Oct-2020	----	----	----		10-Oct-2020	3 days	2 days	✓
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD] SW-6	E550	07-Oct-2020	----	----	----		10-Oct-2020	3 days	2 days	✓
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD] Travel Blank	E550	07-Oct-2020	----	----	----		10-Oct-2020	3 days	2 days	✓
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD] SW-1	E550	07-Oct-2020	----	----	----		10-Oct-2020	3 days	3 days	✓
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD] SW-21	E550	07-Oct-2020	----	----	----		10-Oct-2020	3 days	3 days	✓
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD] SW-3	E550	07-Oct-2020	----	----	----		10-Oct-2020	3 days	3 days	✓



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid) DUP	E559	07-Oct-2020	----	----	----		19-Oct-2020	28 days	11 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid) SW-1	E559	07-Oct-2020	----	----	----		19-Oct-2020	28 days	11 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid) SW-17	E559	07-Oct-2020	----	----	----		19-Oct-2020	28 days	11 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid) SW-21	E559	07-Oct-2020	----	----	----		19-Oct-2020	28 days	11 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid) SW-3	E559	07-Oct-2020	----	----	----		19-Oct-2020	28 days	11 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid) SW-6	E559	07-Oct-2020	----	----	----		19-Oct-2020	28 days	11 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid) Travel Blank	E559	07-Oct-2020	----	----	----		19-Oct-2020	28 days	11 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) Travel Blank	E298	07-Oct-2020	----	----	----		22-Oct-2020	28 days	14 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) DUP	E298	07-Oct-2020	----	----	----		22-Oct-2020	28 days	15 days	✓



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Anions and Nutrients : Ammonia by Fluorescence											
Amber glass total (sulfuric acid) SW-1	E298	07-Oct-2020	----	----	----		22-Oct-2020	28 days	15 days	✓	
Anions and Nutrients : Ammonia by Fluorescence											
Amber glass total (sulfuric acid) SW-17	E298	07-Oct-2020	----	----	----		22-Oct-2020	28 days	15 days	✓	
Anions and Nutrients : Ammonia by Fluorescence											
Amber glass total (sulfuric acid) SW-21	E298	07-Oct-2020	----	----	----		22-Oct-2020	28 days	15 days	✓	
Anions and Nutrients : Ammonia by Fluorescence											
Amber glass total (sulfuric acid) SW-3	E298	07-Oct-2020	----	----	----		22-Oct-2020	28 days	15 days	✓	
Anions and Nutrients : Ammonia by Fluorescence											
Amber glass total (sulfuric acid) SW-6	E298	07-Oct-2020	----	----	----		22-Oct-2020	28 days	15 days	✓	
Anions and Nutrients : Chloride in Water by IC											
HDPE DUP	E235.Cl	07-Oct-2020	----	----	----		09-Oct-2020	28 days	2 days	✓	
Anions and Nutrients : Chloride in Water by IC											
HDPE SW-1	E235.Cl	07-Oct-2020	----	----	----		09-Oct-2020	28 days	2 days	✓	
Anions and Nutrients : Chloride in Water by IC											
HDPE SW-17	E235.Cl	07-Oct-2020	----	----	----		09-Oct-2020	28 days	2 days	✓	
Anions and Nutrients : Chloride in Water by IC											
HDPE SW-21	E235.Cl	07-Oct-2020	----	----	----		09-Oct-2020	28 days	2 days	✓	



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Anions and Nutrients : Chloride in Water by IC											
HDPE SW-3	E235.Cl	07-Oct-2020	----	----	----		09-Oct-2020	28 days	2 days	✓	
Anions and Nutrients : Chloride in Water by IC											
HDPE SW-6	E235.Cl	07-Oct-2020	----	----	----		09-Oct-2020	28 days	2 days	✓	
Anions and Nutrients : Chloride in Water by IC											
HDPE Travel Blank	E235.Cl	07-Oct-2020	----	----	----		13-Oct-2020	28 days	6 days	✓	
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)											
HDPE DUP	E378-U	07-Oct-2020	----	----	----		09-Oct-2020	3 days	2 days	✓	
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)											
HDPE SW-1	E378-U	07-Oct-2020	----	----	----		09-Oct-2020	3 days	2 days	✓	
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)											
HDPE SW-17	E378-U	07-Oct-2020	----	----	----		09-Oct-2020	3 days	2 days	✓	
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)											
HDPE SW-21	E378-U	07-Oct-2020	----	----	----		09-Oct-2020	3 days	2 days	✓	
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)											
HDPE SW-3	E378-U	07-Oct-2020	----	----	----		09-Oct-2020	3 days	2 days	✓	
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)											
HDPE SW-6	E378-U	07-Oct-2020	----	----	----		09-Oct-2020	3 days	2 days	✓	



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Anions and Nutrients : Fluoride in Water by IC											
HDPE DUP	E235.F	07-Oct-2020	----	----	----		09-Oct-2020	28 days	2 days	✓	
Anions and Nutrients : Fluoride in Water by IC											
HDPE SW-1	E235.F	07-Oct-2020	----	----	----		09-Oct-2020	28 days	2 days	✓	
Anions and Nutrients : Fluoride in Water by IC											
HDPE SW-17	E235.F	07-Oct-2020	----	----	----		09-Oct-2020	28 days	2 days	✓	
Anions and Nutrients : Fluoride in Water by IC											
HDPE SW-21	E235.F	07-Oct-2020	----	----	----		09-Oct-2020	28 days	2 days	✓	
Anions and Nutrients : Fluoride in Water by IC											
HDPE SW-3	E235.F	07-Oct-2020	----	----	----		09-Oct-2020	28 days	2 days	✓	
Anions and Nutrients : Fluoride in Water by IC											
HDPE SW-6	E235.F	07-Oct-2020	----	----	----		09-Oct-2020	28 days	2 days	✓	
Anions and Nutrients : Fluoride in Water by IC											
HDPE Travel Blank	E235.F	07-Oct-2020	----	----	----		13-Oct-2020	28 days	6 days	✓	
Anions and Nutrients : Nitrate in Water by IC (Low Level)											
HDPE DUP	E235.NO3-L	07-Oct-2020	----	----	----		09-Oct-2020	3 days	2 days	✓	
Anions and Nutrients : Nitrate in Water by IC (Low Level)											
HDPE SW-1	E235.NO3-L	07-Oct-2020	----	----	----		09-Oct-2020	3 days	2 days	✓	



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Anions and Nutrients : Nitrate in Water by IC (Low Level)											
HDPE SW-17	E235.NO3-L	07-Oct-2020	----	----	----		09-Oct-2020	3 days	2 days	✓	
Anions and Nutrients : Nitrate in Water by IC (Low Level)											
HDPE SW-21	E235.NO3-L	07-Oct-2020	----	----	----		09-Oct-2020	3 days	2 days	✓	
Anions and Nutrients : Nitrate in Water by IC (Low Level)											
HDPE SW-3	E235.NO3-L	07-Oct-2020	----	----	----		09-Oct-2020	3 days	2 days	✓	
Anions and Nutrients : Nitrate in Water by IC (Low Level)											
HDPE SW-6	E235.NO3-L	07-Oct-2020	----	----	----		09-Oct-2020	3 days	2 days	✓	
Anions and Nutrients : Nitrite in Water by IC (Low Level)											
HDPE DUP	E235.NO2-L	07-Oct-2020	----	----	----		09-Oct-2020	3 days	2 days	✓	
Anions and Nutrients : Nitrite in Water by IC (Low Level)											
HDPE SW-1	E235.NO2-L	07-Oct-2020	----	----	----		09-Oct-2020	3 days	2 days	✓	
Anions and Nutrients : Nitrite in Water by IC (Low Level)											
HDPE SW-17	E235.NO2-L	07-Oct-2020	----	----	----		09-Oct-2020	3 days	2 days	✓	
Anions and Nutrients : Nitrite in Water by IC (Low Level)											
HDPE SW-21	E235.NO2-L	07-Oct-2020	----	----	----		09-Oct-2020	3 days	2 days	✓	
Anions and Nutrients : Nitrite in Water by IC (Low Level)											
HDPE SW-3	E235.NO2-L	07-Oct-2020	----	----	----		09-Oct-2020	3 days	2 days	✓	



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Anions and Nutrients : Nitrite in Water by IC (Low Level)											
HDPE SW-6	E235.NO2-L	07-Oct-2020	----	----	----		09-Oct-2020	3 days	2 days	✓	
Anions and Nutrients : Sulfate in Water by IC											
HDPE DUP	E235.SO4	07-Oct-2020	----	----	----		09-Oct-2020	28 days	2 days	✓	
Anions and Nutrients : Sulfate in Water by IC											
HDPE SW-1	E235.SO4	07-Oct-2020	----	----	----		09-Oct-2020	28 days	2 days	✓	
Anions and Nutrients : Sulfate in Water by IC											
HDPE SW-17	E235.SO4	07-Oct-2020	----	----	----		09-Oct-2020	28 days	2 days	✓	
Anions and Nutrients : Sulfate in Water by IC											
HDPE SW-21	E235.SO4	07-Oct-2020	----	----	----		09-Oct-2020	28 days	2 days	✓	
Anions and Nutrients : Sulfate in Water by IC											
HDPE SW-3	E235.SO4	07-Oct-2020	----	----	----		09-Oct-2020	28 days	2 days	✓	
Anions and Nutrients : Sulfate in Water by IC											
HDPE SW-6	E235.SO4	07-Oct-2020	----	----	----		09-Oct-2020	28 days	2 days	✓	
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)											
Amber glass total (sulfuric acid) DUP	E318	07-Oct-2020	18-Oct-2020	28 days	10 days	✓	18-Oct-2020	17 days	0 days	✓	
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)											
Amber glass total (sulfuric acid) SW-1	E318	07-Oct-2020	18-Oct-2020	28 days	10 days	✓	18-Oct-2020	17 days	0 days	✓	



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)											
Amber glass total (sulfuric acid) SW-17	E318	07-Oct-2020	18-Oct-2020	28 days	10 days	✔	18-Oct-2020	17 days	0 days	✔	
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)											
Amber glass total (sulfuric acid) SW-21	E318	07-Oct-2020	18-Oct-2020	28 days	10 days	✔	18-Oct-2020	17 days	0 days	✔	
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)											
Amber glass total (sulfuric acid) SW-3	E318	07-Oct-2020	18-Oct-2020	28 days	10 days	✔	18-Oct-2020	17 days	0 days	✔	
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)											
Amber glass total (sulfuric acid) SW-6	E318	07-Oct-2020	18-Oct-2020	28 days	10 days	✔	18-Oct-2020	17 days	0 days	✔	
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)											
Amber glass total (sulfuric acid) DUP	E372-U	07-Oct-2020	18-Oct-2020	28 days	11 days	✔	18-Oct-2020	16 days	0 days	✔	
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)											
Amber glass total (sulfuric acid) SW-1	E372-U	07-Oct-2020	18-Oct-2020	28 days	11 days	✔	18-Oct-2020	16 days	0 days	✔	
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)											
Amber glass total (sulfuric acid) SW-17	E372-U	07-Oct-2020	18-Oct-2020	28 days	11 days	✔	18-Oct-2020	16 days	0 days	✔	
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)											
Amber glass total (sulfuric acid) SW-21	E372-U	07-Oct-2020	18-Oct-2020	28 days	11 days	✔	18-Oct-2020	16 days	0 days	✔	
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)											
Amber glass total (sulfuric acid) SW-3	E372-U	07-Oct-2020	18-Oct-2020	28 days	11 days	✔	18-Oct-2020	16 days	0 days	✔	



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)											
Amber glass total (sulfuric acid) SW-6	E372-U	07-Oct-2020	18-Oct-2020	28 days	11 days	✔	18-Oct-2020	16 days	0 days	✔	
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)											
HDPE dissolved (nitric acid) DUP	E421.Cr-L	07-Oct-2020	16-Oct-2020	180 days	9 days	✔	17-Oct-2020	170 days	1 days	✔	
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)											
HDPE dissolved (nitric acid) SW-1	E421.Cr-L	07-Oct-2020	16-Oct-2020	180 days	9 days	✔	17-Oct-2020	170 days	1 days	✔	
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)											
HDPE dissolved (nitric acid) SW-17	E421.Cr-L	07-Oct-2020	16-Oct-2020	180 days	9 days	✔	17-Oct-2020	170 days	1 days	✔	
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)											
HDPE dissolved (nitric acid) SW-21	E421.Cr-L	07-Oct-2020	16-Oct-2020	180 days	9 days	✔	17-Oct-2020	170 days	1 days	✔	
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)											
HDPE dissolved (nitric acid) SW-3	E421.Cr-L	07-Oct-2020	16-Oct-2020	180 days	9 days	✔	17-Oct-2020	170 days	1 days	✔	
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)											
HDPE dissolved (nitric acid) SW-6	E421.Cr-L	07-Oct-2020	16-Oct-2020	180 days	9 days	✔	17-Oct-2020	170 days	1 days	✔	
Dissolved Metals : Dissolved Mercury in Water by CVAAS											
Glass vial dissolved (hydrochloric acid) DUP	E509	07-Oct-2020	16-Oct-2020	28 days	8 days	✔	16-Oct-2020	19 days	0 days	✔	
Dissolved Metals : Dissolved Mercury in Water by CVAAS											
Glass vial dissolved (hydrochloric acid) SW-1	E509	07-Oct-2020	16-Oct-2020	28 days	8 days	✔	16-Oct-2020	19 days	0 days	✔	



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Dissolved Metals : Dissolved Mercury in Water by CVAAS											
Glass vial dissolved (hydrochloric acid) SW-17	E509	07-Oct-2020	16-Oct-2020	28 days	8 days	✔	16-Oct-2020	19 days	0 days	✔	
Dissolved Metals : Dissolved Mercury in Water by CVAAS											
Glass vial dissolved (hydrochloric acid) SW-21	E509	07-Oct-2020	16-Oct-2020	28 days	8 days	✔	16-Oct-2020	19 days	0 days	✔	
Dissolved Metals : Dissolved Mercury in Water by CVAAS											
Glass vial dissolved (hydrochloric acid) SW-3	E509	07-Oct-2020	16-Oct-2020	28 days	8 days	✔	16-Oct-2020	19 days	0 days	✔	
Dissolved Metals : Dissolved Mercury in Water by CVAAS											
Glass vial dissolved (hydrochloric acid) SW-6	E509	07-Oct-2020	16-Oct-2020	28 days	8 days	✔	16-Oct-2020	19 days	0 days	✔	
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS											
HDPE dissolved (nitric acid) DUP	E421	07-Oct-2020	16-Oct-2020	180 days	9 days	✔	17-Oct-2020	170 days	1 days	✔	
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS											
HDPE dissolved (nitric acid) SW-1	E421	07-Oct-2020	16-Oct-2020	180 days	9 days	✔	17-Oct-2020	170 days	1 days	✔	
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS											
HDPE dissolved (nitric acid) SW-17	E421	07-Oct-2020	16-Oct-2020	180 days	9 days	✔	17-Oct-2020	170 days	1 days	✔	
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS											
HDPE dissolved (nitric acid) SW-21	E421	07-Oct-2020	16-Oct-2020	180 days	9 days	✔	17-Oct-2020	170 days	1 days	✔	
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS											
HDPE dissolved (nitric acid) SW-3	E421	07-Oct-2020	16-Oct-2020	180 days	9 days	✔	17-Oct-2020	170 days	1 days	✔	



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS											
HDPE dissolved (nitric acid) SW-6	E421	07-Oct-2020	16-Oct-2020	180 days	9 days	✓	17-Oct-2020	170 days	1 days	✓	
Physical Tests : Alkalinity Species by Titration											
HDPE DUP	E290	07-Oct-2020	----	----	----		09-Oct-2020	14 days	2 days	✓	
Physical Tests : Alkalinity Species by Titration											
HDPE SW-1	E290	07-Oct-2020	----	----	----		09-Oct-2020	14 days	2 days	✓	
Physical Tests : Alkalinity Species by Titration											
HDPE SW-17	E290	07-Oct-2020	----	----	----		09-Oct-2020	14 days	2 days	✓	
Physical Tests : Alkalinity Species by Titration											
HDPE SW-21	E290	07-Oct-2020	----	----	----		09-Oct-2020	14 days	2 days	✓	
Physical Tests : Alkalinity Species by Titration											
HDPE SW-3	E290	07-Oct-2020	----	----	----		09-Oct-2020	14 days	2 days	✓	
Physical Tests : Alkalinity Species by Titration											
HDPE SW-6	E290	07-Oct-2020	----	----	----		09-Oct-2020	14 days	2 days	✓	
Physical Tests : Conductivity in Water											
HDPE DUP	E100	07-Oct-2020	----	----	----		09-Oct-2020	28 days	2 days	✓	
Physical Tests : Conductivity in Water											
HDPE SW-1	E100	07-Oct-2020	----	----	----		09-Oct-2020	28 days	2 days	✓	



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Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Physical Tests : Conductivity in Water											
HDPE SW-17	E100	07-Oct-2020	----	----	----		09-Oct-2020	28 days	2 days	✓	
Physical Tests : Conductivity in Water											
HDPE SW-21	E100	07-Oct-2020	----	----	----		09-Oct-2020	28 days	2 days	✓	
Physical Tests : Conductivity in Water											
HDPE SW-3	E100	07-Oct-2020	----	----	----		09-Oct-2020	28 days	2 days	✓	
Physical Tests : Conductivity in Water											
HDPE SW-6	E100	07-Oct-2020	----	----	----		09-Oct-2020	28 days	2 days	✓	
Physical Tests : pH by Meter											
HDPE DUP	E108	07-Oct-2020	----	----	----		09-Oct-2020	0.25 hrs	51 hrs	* EHTR-FM	
Physical Tests : pH by Meter											
HDPE SW-17	E108	07-Oct-2020	----	----	----		09-Oct-2020	0.25 hrs	51 hrs	* EHTR-FM	
Physical Tests : pH by Meter											
HDPE SW-6	E108	07-Oct-2020	----	----	----		09-Oct-2020	0.25 hrs	51 hrs	* EHTR-FM	
Physical Tests : pH by Meter											
HDPE SW-21	E108	07-Oct-2020	----	----	----		09-Oct-2020	0.25 hrs	52 hrs	* EHTR-FM	
Physical Tests : pH by Meter											
HDPE SW-1	E108	07-Oct-2020	----	----	----		09-Oct-2020	0.25 hrs	53 hrs	* EHTR-FM	



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Physical Tests : pH by Meter											
HDPE SW-3	E108	07-Oct-2020	----	----	----		09-Oct-2020	0.25 hrs	54 hrs	*	EHTR-FM
Physical Tests : TSS by Gravimetry											
HDPE SW-1	E160-H	07-Oct-2020	----	----	----		12-Oct-2020	7 days	4 days	✓	
Physical Tests : TSS by Gravimetry											
HDPE SW-3	E160-H	07-Oct-2020	----	----	----		12-Oct-2020	7 days	5 days	✓	
Physical Tests : TSS by Gravimetry											
HDPE DUP	E160-H	07-Oct-2020	----	----	----		13-Oct-2020	7 days	6 days	✓	
Physical Tests : TSS by Gravimetry											
HDPE SW-17	E160-H	07-Oct-2020	----	----	----		13-Oct-2020	7 days	6 days	✓	
Physical Tests : TSS by Gravimetry											
HDPE SW-21	E160-H	07-Oct-2020	----	----	----		13-Oct-2020	7 days	6 days	✓	
Physical Tests : TSS by Gravimetry											
HDPE SW-6	E160-H	07-Oct-2020	----	----	----		13-Oct-2020	7 days	6 days	✓	
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)											
HDPE total (nitric acid) Travel Blank	E420.Cr-L	07-Oct-2020	----	----	----		15-Oct-2020	180 days	7 days	✓	
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)											
HDPE total (nitric acid) DUP	E420.Cr-L	07-Oct-2020	----	----	----		16-Oct-2020	180 days	9 days	✓	



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid) SW-1	E420.Cr-L	07-Oct-2020	----	----	----		16-Oct-2020	180 days	9 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid) SW-17	E420.Cr-L	07-Oct-2020	----	----	----		16-Oct-2020	180 days	9 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid) SW-21	E420.Cr-L	07-Oct-2020	----	----	----		16-Oct-2020	180 days	9 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid) SW-3	E420.Cr-L	07-Oct-2020	----	----	----		16-Oct-2020	180 days	9 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid) SW-6	E420.Cr-L	07-Oct-2020	----	----	----		16-Oct-2020	180 days	9 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) DUP	E508	07-Oct-2020	----	----	----		16-Oct-2020	28 days	8 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) SW-1	E508	07-Oct-2020	----	----	----		16-Oct-2020	28 days	8 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) SW-17	E508	07-Oct-2020	----	----	----		16-Oct-2020	28 days	8 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) SW-21	E508	07-Oct-2020	----	----	----		16-Oct-2020	28 days	8 days	✓



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Total Metals : Total Mercury in Water by CVAAS											
Glass vial total (hydrochloric acid) SW-3	E508	07-Oct-2020	----	----	----		16-Oct-2020	28 days	8 days	✓	
Total Metals : Total Mercury in Water by CVAAS											
Glass vial total (hydrochloric acid) SW-6	E508	07-Oct-2020	----	----	----		16-Oct-2020	28 days	8 days	✓	
Total Metals : Total Mercury in Water by CVAAS											
Glass vial total (hydrochloric acid) Travel Blank	E508	07-Oct-2020	----	----	----		16-Oct-2020	28 days	8 days	✓	
Total Metals : Total Metals in Water by CRC ICPMS											
HDPE total (nitric acid) Travel Blank	E420	07-Oct-2020	----	----	----		15-Oct-2020	180 days	7 days	✓	
Total Metals : Total Metals in Water by CRC ICPMS											
HDPE total (nitric acid) DUP	E420	07-Oct-2020	----	----	----		16-Oct-2020	180 days	9 days	✓	
Total Metals : Total Metals in Water by CRC ICPMS											
HDPE total (nitric acid) SW-1	E420	07-Oct-2020	----	----	----		16-Oct-2020	180 days	9 days	✓	
Total Metals : Total Metals in Water by CRC ICPMS											
HDPE total (nitric acid) SW-17	E420	07-Oct-2020	----	----	----		16-Oct-2020	180 days	9 days	✓	
Total Metals : Total Metals in Water by CRC ICPMS											
HDPE total (nitric acid) SW-21	E420	07-Oct-2020	----	----	----		16-Oct-2020	180 days	9 days	✓	
Total Metals : Total Metals in Water by CRC ICPMS											
HDPE total (nitric acid) SW-3	E420	07-Oct-2020	----	----	----		16-Oct-2020	180 days	9 days	✓	



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) SW-6	E420	07-Oct-2020	----	----	----		16-Oct-2020	180 days	9 days	✔

Legend & Qualifier Definitions

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended

Rec. HT: ALS recommended hold time (see units).



Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water** Evaluation: * = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type	Method	QC Lot #	Count		Frequency (%)		Evaluation
			QC	Regular	Actual	Expected	
Analytical Methods							
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	100330	1	16	6.2	5.0	✓
Ammonia by Fluorescence	E298	106659	1	20	5.0	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	100872	2	29	6.9	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	104685	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	100323	2	26	7.6	5.0	✓
Conductivity in Water	E100	100329	1	16	6.2	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	103681	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	103518	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	103682	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	100332	1	14	7.1	5.0	✓
Fluoride in Water by IC	E235.F	100322	2	24	8.3	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	100325	1	16	6.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	100326	1	16	6.2	5.0	✓
pH by Meter	E108	100328	1	16	6.2	5.0	✓
Sulfate in Water by IC	E235.SO4	100327	1	16	6.2	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	102518	2	30	6.6	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	104423	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	103525	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	102517	2	40	5.0	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	104634	1	18	5.5	5.0	✓
TSS by Gravimetry	E160-H	101459	2	40	5.0	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	100330	1	16	6.2	5.0	✓
Ammonia by Fluorescence	E298	106659	1	20	5.0	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	100872	2	29	6.9	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	104685	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	100323	2	26	7.6	5.0	✓
Conductivity in Water	E100	100329	1	16	6.2	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	103681	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	103518	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	103682	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	100332	1	14	7.1	5.0	✓
Fluoride in Water by IC	E235.F	100322	2	24	8.3	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	100325	1	16	6.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	100326	1	16	6.2	5.0	✓
pH by Meter	E108	100328	1	16	6.2	5.0	✓
Sulfate in Water by IC	E235.SO4	100327	1	16	6.2	5.0	✓



Matrix: **Water**

Evaluation: * = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type	Method	QC Lot #	Count		Frequency (%)		Evaluation
			QC	Regular	Actual	Expected	
Analytical Methods							
Laboratory Control Samples (LCS) - Continued							
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	102518	2	30	6.6	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	104423	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	103525	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	102517	2	40	5.0	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	104634	1	18	5.5	5.0	✓
TSS by Gravimetry	E160-H	101459	2	40	5.0	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	100330	1	16	6.2	5.0	✓
Ammonia by Fluorescence	E298	106659	1	20	5.0	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	100872	2	29	6.9	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	104685	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	100323	2	26	7.6	5.0	✓
Conductivity in Water	E100	100329	1	16	6.2	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	103681	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	103518	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	103682	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	100332	1	14	7.1	5.0	✓
Fluoride in Water by IC	E235.F	100322	2	24	8.3	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	100325	1	16	6.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	100326	1	16	6.2	5.0	✓
Sulfate in Water by IC	E235.SO4	100327	1	16	6.2	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	102518	2	30	6.6	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	104423	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	103525	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	102517	2	40	5.0	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	104634	1	18	5.5	5.0	✓
TSS by Gravimetry	E160-H	101459	2	40	5.0	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	106659	1	20	5.0	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	104685	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	100323	2	26	7.6	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	103681	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	103518	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	103682	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	100332	1	14	7.1	5.0	✓
Fluoride in Water by IC	E235.F	100322	2	24	8.3	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	100325	1	16	6.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	100326	1	16	6.2	5.0	✓
Sulfate in Water by IC	E235.SO4	100327	1	16	6.2	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	102518	2	30	6.6	5.0	✓



Matrix: **Water** Evaluation: * = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type	Method	QC Lot #	Count		Frequency (%)		
			QC	Regular	Actual	Expected	Evaluation
<i>Analytical Methods</i>							
Matrix Spikes (MS) - Continued							
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	104423	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	103525	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	102517	2	40	5.0	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	104634	1	18	5.5	5.0	✓



Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Conductivity in Water	E100 Vancouver - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108 Vancouver - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
TSS by Gravimetry	E160-H Vancouver - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. 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.
Chloride in Water by IC	E235.Cl Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC (Low Level)	E235.NO2-L Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Alkalinity Species by Titration	E290 Vancouver - Environmental	Water	APHA 2320 B (mod)	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.
Ammonia by Fluorescence	E298 Calgary - Environmental	Water	J. Environ. Monit., 2005, 7, 37-42 (mod)	Ammonia in water is analyzed by flow-injection analysis with fluorescence detection after reaction with orthophthaldialdehyde (OPA).



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318 Calgary - Environmental	Water	APHA 4500-Norg D (mod)	Total Kjeldahl Nitrogen is determined using block digestion followed by flow-injection analysis with fluorescence detection.
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U Calgary - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U Vancouver - Environmental	Water	APHA 4500-P E (mod)	Dissolved Orthophosphate is determined colourimetrically on a water sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
Total Metals in Water by CRC ICPMS	E420 Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS.
Dissolved Metals in Water by CRC ICPMS	E421 Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L Vancouver - Environmental	Water	APHA 3030 B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS
Total Mercury in Water by CVAAS	E508 Calgary - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Dissolved Mercury in Water by CVAAS	E509 Calgary - Environmental	Water	APHA 3030B/EPA 1631E (mod)	Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.
Biochemical Oxygen Demand - 5 day	E550 Vancouver - Environmental	Water	APHA 5210 B (mod)	Samples are diluted and incubated for a specified time period, after which the oxygen depletion is measured using a dissolved oxygen meter. Free chlorine is a negative interference in the BOD method; please advise ALS when free chlorine is present in samples.
Chemical Oxygen Demand by Colourimetry	E559 Calgary - Environmental	Water	APHA 5220 D (mod)	Samples are analyzed using the closed reflux colourimetric method.
Dissolved Hardness (Calculated)	EC100 Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO ₃), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO ₃ equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.



<i>Analytical Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
Hardness (Calculated) from Total Ca/Mg	EC100A Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO ₃), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in CaCO ₃ equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.
<i>Preparation Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
Digestion for TKN in water	EP318 Calgary - Environmental	Water	APHA 4500-Norg D (mod)	Samples are digested using block digestion with Copper Sulfate Digestion Reagent.
Digestion for Total Phosphorus in water	EP372 Calgary - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Dissolved Metals Water Filtration	EP421 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO ₃ .
Dissolved Mercury Water Filtration	EP509 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

QUALITY CONTROL REPORT

Work Order : **VA20B7656**
Amendment : **1**

Page : 1 of 22

Client : Regional District of Kitimat-Stikine
Contact : M Haley
Address : # 300 - 4545 Lazelle Avenue
Terrace BC Canada V8G 4E1
Telephone : ----
Project : Thornhill Transfer Station Surface Water
PO : ----
C-O-C number : ----
Sampler : Mary Tress
Site :
Quote number : Q62338
No. of samples received : 7
No. of samples analysed : 7

Laboratory : Vancouver - Environmental
Account Manager : Amber Springer
Address : 8081 Lougheed Highway
Burnaby, British Columbia Canada V5A 1W9
Telephone : +1 604 253 4188
Date Samples Received : 08-Oct-2020 20:10
Date Analysis Commenced : 09-Oct-2020
Issue Date : 28-Oct-2020 10:34

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits
- Reference Material (RM) Report; Recovery and Acceptance Limits
- Method Blank (MB) Report; Recovery and Acceptance Limits
- Laboratory Control Sample (LCS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Bruna Botti	Team Leader - Inorganics	Inorganics - Water Quality, Burnaby, British Columbia
Katarzyna Glinka		Inorganics, Calgary, Alberta
Ken Chan	Supervisor - Metals Prep & Mercury	Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics - Water Quality, Burnaby, British Columbia
Omar Beydoun	Lab Assistant	Metals, Burnaby, British Columbia
Oscar Ruiz	Lab Assistant	Metals, Calgary, Alberta
Rebecca Baker		Inorganics, Calgary, Alberta
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Ruth Morrison		Inorganics, Calgary, Alberta
Ruth Morrison		Metals, Calgary, Alberta



General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include 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 predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number = Chemical Abstracts Services number is a unique identifier assigned to discrete substances.

DQO = Data Quality Objective.

LOR = Limit of Reporting (detection limit).

RPD = Relative Percentage Difference

= Indicates a QC result that did not meet the ALS DQO.



Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test specific).

Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 100328)											
VA20B7635-003	Anonymous	pH	----	E108	0.10	pH units	8.27	8.27	0.00%	4%	----
Physical Tests (QC Lot: 100329)											
VA20B7635-003	Anonymous	conductivity	----	E100	2.0	µS/cm	364	368	1.09%	10%	----
Physical Tests (QC Lot: 100330)											
VA20B7635-003	Anonymous	alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	207	210	1.78%	20%	----
Physical Tests (QC Lot: 101459)											
VA20B7428-001	Anonymous	solids, total suspended [TSS]	----	E160-H	3.0	mg/L	5.6	6.0	0.4	Diff <2x LOR	----
Physical Tests (QC Lot: 102034)											
VA20B7545-001	Anonymous	solids, total suspended [TSS]	----	E160-H	3.0	mg/L	5.3	4.5	0.8	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 100322)											
VA20B7635-001	Anonymous	fluoride	16984-48-8	E235.F	0.100	mg/L	0.171	0.204	0.032	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 100323)											
VA20B7635-001	Anonymous	chloride	16887-00-6	E235.Cl	2.50	mg/L	<2.50	<2.50	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 100325)											
VA20B7635-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.0250	mg/L	0.180	0.182	0.0017	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 100326)											
VA20B7635-001	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 100327)											
VA20B7635-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	1.50	mg/L	176	176	0.0548%	20%	----
Anions and Nutrients (QC Lot: 100332)											
VA20B7635-001	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	0.0015	0.0011	0.0004	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 101957)											
VA20B7894-001	Anonymous	chloride	16887-00-6	E235.Cl	0.50	mg/L	0.62	0.62	0.005	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 101958)											
VA20B7894-001	Anonymous	fluoride	16984-48-8	E235.F	0.020	mg/L	0.072	0.072	0.00004	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 104423)											
VA20B7558-001	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 104634)											
VA20B7558-001	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	<0.0020	<0.0020	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 106659)											
VA20B7660-002	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0081	0.0114	0.0033	Diff <2x LOR	----



Sub-Matrix: **Water**

Laboratory Duplicate (DUP) Report

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Total Metals (QC Lot: 102517)											
VA20B7567-008	Anonymous	aluminum, total	7429-90-5	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		rubidium, total	7440-17-7	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		silicon, total	7440-21-3	E420	0.10	mg/L	<0.10	<0.10	0	Diff <2x LOR	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, total	17341-25-2	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
		tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----



Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Total Metals (QC Lot: 102517) - continued											
VA20B7567-008	Anonymous	zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
		zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
Total Metals (QC Lot: 102518)											
VA20B7567-008	Anonymous	chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
Total Metals (QC Lot: 102533)											
VA20B7670-001	Anonymous	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0156	0.0140	0.0016	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00068	0.00068	0.0000009	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.0597	0.0562	6.00%	20%	----
		beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.0000097	0.0000105	0.0000008	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	0.050	mg/L	77.6	77.3	0.320%	20%	----
		cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	0.023	0.022	0.001	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	0.0052	0.0051	0.000004	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	19.3	18.6	3.43%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.00209	0.00208	0.409%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00344	0.00334	3.04%	20%	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.050	mg/L	3.66	3.55	3.11%	20%	----
		rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00079	0.00073	0.00006	Diff <2x LOR	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	0.00519	0.00488	6.13%	20%	----
		silicon, total	7440-21-3	E420	0.10	mg/L	8.85	8.65	2.24%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, total	17341-25-2	E420	0.050	mg/L	8.36	8.13	2.73%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.862	0.846	1.87%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	25.8	24.9	3.54%	20%	----
		tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----



Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Total Metals (QC Lot: 102533) - continued											
VA20B7670-001	Anonymous	tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	0.00047	0.00050	0.00003	Diff <2x LOR	----
		tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	0.00198	0.00194	2.09%	20%	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	0.00055	0.00056	0.00002	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
		zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
Total Metals (QC Lot: 102534)											
VA20B7670-001	Anonymous	chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L	0.00016	0.00019	0.00002	Diff <2x LOR	----
Total Metals (QC Lot: 103525)											
VA20B7568-006	Anonymous	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 103518)											
VA20B7568-004	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 103681)											
VA20B7614-002	Anonymous	chromium, dissolved	7440-47-3	E421.Cr-L	0.00050	mg/L	0.0163	0.0165	1.65%	20%	----
Dissolved Metals (QC Lot: 103682)											
VA20B7614-002	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0050	mg/L	0.0421	0.0380	0.0041	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00050	mg/L	0.00185	0.00185	0.000007	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00050	mg/L	0.00746	0.00719	3.77%	20%	----
		barium, dissolved	7440-39-3	E421	0.00050	mg/L	0.317	0.325	2.60%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.000500	mg/L	<0.000500	<0.000500	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.00250	mg/L	<0.00250	<0.00250	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.050	mg/L	3.40	3.60	5.44%	20%	----
		cadmium, dissolved	7440-43-9	E421	0.0000500	mg/L	<0.0000500	<0.0000500	0	Diff <2x LOR	----
		calcium, dissolved	7440-70-2	E421	0.250	mg/L	171	182	6.29%	20%	----
		cesium, dissolved	7440-46-2	E421	0.000050	mg/L	0.000584	0.000588	0.702%	20%	----
		cobalt, dissolved	7440-48-4	E421	0.00050	mg/L	0.0103	0.0107	3.54%	20%	----
		copper, dissolved	7440-50-8	E421	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.050	mg/L	8.19	8.92	8.49%	20%	----
		lead, dissolved	7439-92-1	E421	0.000250	mg/L	<0.000250	<0.000250	0	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0050	mg/L	0.0194	0.0207	0.0012	Diff <2x LOR	----
		magnesium, dissolved	7439-95-4	E421	0.0250	mg/L	50.4	54.1	6.96%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00050	mg/L	0.925	0.978	5.56%	20%	----
		molybdenum, dissolved	7439-98-7	E421	0.000250	mg/L	0.00113	0.00119	0.000056	Diff <2x LOR	----
		nickel, dissolved	7440-02-0	E421	0.00250	mg/L	0.0216	0.0230	0.00138	Diff <2x LOR	----



Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Dissolved Metals (QC Lot: 103682) - continued											
VA20B7614-002	Anonymous	phosphorus, dissolved	7723-14-0	E421	1.50	mg/L	<1.50	<1.50	0	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	0.250	mg/L	151	153	1.43%	20%	----
		rubidium, dissolved	7440-17-7	E421	0.00100	mg/L	0.0880	0.0925	5.04%	20%	----
		selenium, dissolved	7782-49-2	E421	0.000500	mg/L	<0.000500	<0.000500	0	Diff <2x LOR	----
		silicon, dissolved	7440-21-3	E421	0.250	mg/L	15.6	16.7	6.31%	20%	----
		silver, dissolved	7440-22-4	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		sodium, dissolved	17341-25-2	E421	0.250	mg/L	361	369	2.25%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00100	mg/L	1.20	1.20	0.0238%	20%	----
		sulfur, dissolved	7704-34-9	E421	2.50	mg/L	6.82	6.86	0.04	Diff <2x LOR	----
		tellurium, dissolved	13494-80-9	E421	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		thallium, dissolved	7440-28-0	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		thorium, dissolved	7440-29-1	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		tin, dissolved	7440-31-5	E421	0.00050	mg/L	0.00122	0.00122	0.000006	Diff <2x LOR	----
		titanium, dissolved	7440-32-6	E421	0.0500	mg/L	<0.0500	<0.0500	0	Diff <2x LOR	----
		tungsten, dissolved	7440-33-7	E421	0.00050	mg/L	0.00162	0.00181	0.00019	Diff <2x LOR	----
		uranium, dissolved	7440-61-1	E421	0.000050	mg/L	0.000134	0.000159	0.000024	Diff <2x LOR	----
		vanadium, dissolved	7440-62-2	E421	0.00500	mg/L	<0.00500	<0.00500	0	Diff <2x LOR	----
		zinc, dissolved	7440-66-6	E421	0.0050	mg/L	0.0052	<0.0050	0.0002	Diff <2x LOR	----
		zirconium, dissolved	7440-67-7	E421	0.00150	mg/L	0.00342	0.00339	0.00003	Diff <2x LOR	----
Aggregate Organics (QC Lot: 100872)											
VA20B7656-005	SW-17	biochemical oxygen demand [BOD]	----	E550	2.0	mg/L	<2.0	<2.0	0.00%	30%	----
Aggregate Organics (QC Lot: 100967)											
VA20B7756-007	Anonymous	biochemical oxygen demand [BOD]	----	E550	2.0	mg/L	<2.0	<2.0	0.00%	30%	----
Aggregate Organics (QC Lot: 104685)											
VA20B7656-001	SW-1	chemical oxygen demand [COD]	----	E559	20	mg/L	<20	<20	0	Diff <2x LOR	----



Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 100329)						
conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 100330)						
alkalinity, total (as CaCO ₃)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 101459)						
solids, total suspended [TSS]	----	E160-H	3	mg/L	<3.0	----
Physical Tests (QCLot: 102034)						
solids, total suspended [TSS]	----	E160-H	3	mg/L	<3.0	----
Anions and Nutrients (QCLot: 100322)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 100323)						
chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 100325)						
nitrate (as N)	14797-55-8	E235.NO ₃ -L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 100326)						
nitrite (as N)	14797-65-0	E235.NO ₂ -L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 100327)						
sulfate (as SO ₄)	14808-79-8	E235.SO ₄	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 100332)						
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 101957)						
chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 101958)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 104423)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 104634)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 106659)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Total Metals (QCLot: 102517)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----



Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 102517) - continued						
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	<0.00020	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	17341-25-2	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	<0.00020	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
thorium, total	7440-29-1	E420	0.0001	mg/L	<0.00010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----
Total Metals (QCLot: 102518)						



Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 102518) - continued						
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	<0.00010	---
Total Metals (QCLot: 102533)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	---
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	---
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	---
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	---
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	---
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	---
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	---
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	---
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	---
cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	---
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	---
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	---
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	---
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	---
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	---
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	---
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	---
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	---
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	---
phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	---
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	---
rubidium, total	7440-17-7	E420	0.0002	mg/L	<0.00020	---
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	---
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	---
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	---
sodium, total	17341-25-2	E420	0.05	mg/L	<0.050	---
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	---
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	---
tellurium, total	13494-80-9	E420	0.0002	mg/L	<0.00020	---
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	---
thorium, total	7440-29-1	E420	0.0001	mg/L	<0.00010	---
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	---
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	---
tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	---



Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 102533) - continued						
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----
Total Metals (QCLot: 102534)						
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	<0.00010	----
Total Metals (QCLot: 103525)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 103518)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 103681)						
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	<0.00010	----
Dissolved Metals (QCLot: 103682)						
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	<0.000010	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----



Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 103682) - continued						
silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
sodium, dissolved	17341-25-2	E421	0.05	mg/L	<0.050	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
Aggregate Organics (QCLot: 100872)						
biochemical oxygen demand [BOD]	----	E550	2	mg/L	<2.0	----
Aggregate Organics (QCLot: 100967)						
biochemical oxygen demand [BOD]	----	E550	2	mg/L	<2.0	----
Aggregate Organics (QCLot: 104685)						
chemical oxygen demand [COD]	----	E559	20	mg/L	<20	----



Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: Water					Laboratory Control Sample (LCS) Report				
					Spike Concentration	Recovery (%) LCS	Recovery Limits (%)		Qualifier
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 100328)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 100329)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	99.7	90.0	110	----
Physical Tests (QCLot: 100330)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	97.5	85.0	115	----
Physical Tests (QCLot: 101459)									
solids, total suspended [TSS]	----	E160-H	3	mg/L	150 mg/L	89.7	85.0	115	----
Physical Tests (QCLot: 102034)									
solids, total suspended [TSS]	----	E160-H	3	mg/L	150 mg/L	104	85.0	115	----
Anions and Nutrients (QCLot: 100322)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	97.5	90.0	110	----
Anions and Nutrients (QCLot: 100323)									
chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 100325)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	104	90.0	110	----
Anions and Nutrients (QCLot: 100326)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 100327)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	103	90.0	110	----
Anions and Nutrients (QCLot: 100332)									
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	105	80.0	120	----
Anions and Nutrients (QCLot: 101957)									
chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	98.4	90.0	110	----
Anions and Nutrients (QCLot: 101958)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	97.0	90.0	110	----
Anions and Nutrients (QCLot: 104423)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	88.2	75.0	125	----
Anions and Nutrients (QCLot: 104634)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	8.32 mg/L	97.2	80.0	120	----
Anions and Nutrients (QCLot: 106659)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.1 mg/L	106	85.0	115	----



Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
Total Metals (QCLot: 102517)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	106	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	103	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	103	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	103	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	99.5	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	111	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	99.8	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	103	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	100	80.0	120	----
cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	100	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	104	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	102	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	93.5	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	95.6	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	99.5	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	100	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	98.4	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	106	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	107	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	106	80.0	120	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	115	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	107	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	100	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	98.4	80.0	120	----
sodium, total	17341-25-2	E420	0.05	mg/L	50 mg/L	110	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	100	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	83.8	80.0	120	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	96.9	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	94.7	80.0	120	----
thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	101	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	100	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	108	80.0	120	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	96.4	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	99.9	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	105	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	104	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	95.9	80.0	120	----



Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
Total Metals (QCLot: 102518)									
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	0.25 mg/L	105	80.0	120	----
Total Metals (QCLot: 102533)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	101	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	105	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	97.5	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	99.6	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	102	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	108	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	97.4	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	100	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	102	80.0	120	----
cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	97.9	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	100	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	98.3	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	98.7	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	104	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	102	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	99.3	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	101	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	100	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	104	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	101	80.0	120	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	102	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	105	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	103	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	98.7	80.0	120	----
sodium, total	17341-25-2	E420	0.05	mg/L	50 mg/L	97.9	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	103	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	91.2	80.0	120	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	105	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	106	80.0	120	----
thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	101	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	101	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	99.3	80.0	120	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	107	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	103	80.0	120	----



Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
Total Metals (QCLot: 102533) - continued									
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	102	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	102	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	98.0	80.0	120	----
Total Metals (QCLot: 102534)									
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	0.25 mg/L	99.8	80.0	120	----
Total Metals (QCLot: 103525)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	102	80.0	120	----
Dissolved Metals (QCLot: 103518)									
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	105	80.0	120	----
Dissolved Metals (QCLot: 103681)									
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	0.25 mg/L	97.2	80.0	120	----
Dissolved Metals (QCLot: 103682)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	105	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	91.4	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	92.0	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	98.0	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	94.6	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	101	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	87.4	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	99.4	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	101	80.0	120	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	102	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	99.8	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	97.9	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	90.9	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	93.3	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	98.5	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	105	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	99.5	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	96.2	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	99.4	80.0	120	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	101	70.0	130	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	102	80.0	120	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	100	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	87.7	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	93.6	80.0	120	----



Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
Dissolved Metals (QCLot: 103682) - continued									
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	101	80.0	120	----
sodium, dissolved	17341-25-2	E421	0.05	mg/L	50 mg/L	102	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	103	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	91.1	80.0	120	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	99.1	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	94.5	80.0	120	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	92.4	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	93.5	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	94.9	80.0	120	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	90.0	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	94.9	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	103	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	101	80.0	120	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	91.5	80.0	120	----
Aggregate Organics (QCLot: 100872)									
biochemical oxygen demand [BOD]	----	E550	2	mg/L	198 mg/L	86.1	85.0	115	----
Aggregate Organics (QCLot: 100967)									
biochemical oxygen demand [BOD]	----	E550	2	mg/L	198 mg/L	85.1	85.0	115	----
Aggregate Organics (QCLot: 104685)									
chemical oxygen demand [COD]	----	E559	20	mg/L	500 mg/L	95.6	85.0	115	----



Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level $\geq 1 \times$ spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 100322)										
VA20B7635-002	Anonymous	fluoride	16984-48-8	E235.F	4.99 mg/L	5 mg/L	99.8	75.0	125	----
Anions and Nutrients (QCLot: 100323)										
VA20B7635-002	Anonymous	chloride	16887-00-6	E235.Cl	510 mg/L	500 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 100325)										
VA20B7635-002	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	12.8 mg/L	12.5 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 100326)										
VA20B7635-002	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	2.36 mg/L	2.5 mg/L	94.6	75.0	125	----
Anions and Nutrients (QCLot: 100327)										
VA20B7635-002	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	502 mg/L	500 mg/L	100	75.0	125	----
Anions and Nutrients (QCLot: 100332)										
VA20B7635-002	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0297 mg/L	0.03 mg/L	99.0	70.0	130	----
Anions and Nutrients (QCLot: 101957)										
VA20B7894-002	Anonymous	chloride	16887-00-6	E235.Cl	97.2 mg/L	100 mg/L	97.2	75.0	125	----
Anions and Nutrients (QCLot: 101958)										
VA20B7894-002	Anonymous	fluoride	16984-48-8	E235.F	0.969 mg/L	1 mg/L	96.9	75.0	125	----
Anions and Nutrients (QCLot: 104423)										
VA20B7558-001	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	3.12 mg/L	2.5 mg/L	125	70.0	130	----
Anions and Nutrients (QCLot: 104634)										
VA20B7558-001	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0643 mg/L	0.05 mg/L	129	70.0	130	----
Anions and Nutrients (QCLot: 106659)										
VA20B7660-002	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.118 mg/L	0.1 mg/L	118	75.0	125	----
Total Metals (QCLot: 102517)										
VA20B7567-009	Anonymous	aluminum, total	7429-90-5	E420	0.200 mg/L	0.2 mg/L	99.8	70.0	130	----
		antimony, total	7440-36-0	E420	0.0194 mg/L	0.02 mg/L	97.0	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0182 mg/L	0.02 mg/L	90.9	70.0	130	----
		barium, total	7440-39-3	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0384 mg/L	0.04 mg/L	96.0	70.0	130	----
		bismuth, total	7440-69-9	E420	0.0105 mg/L	0.01 mg/L	105	70.0	130	----



Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 102517) - continued										
VA20B7567-009	Anonymous	boron, total	7440-42-8	E420	0.096 mg/L	0.1 mg/L	96.5	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00380 mg/L	0.004 mg/L	95.1	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		cesium, total	7440-46-2	E420	0.00963 mg/L	0.01 mg/L	96.3	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0192 mg/L	0.02 mg/L	95.8	70.0	130	----
		copper, total	7440-50-8	E420	0.0184 mg/L	0.02 mg/L	91.8	70.0	130	----
		iron, total	7439-89-6	E420	1.96 mg/L	2 mg/L	97.8	70.0	130	----
		lead, total	7439-92-1	E420	0.0195 mg/L	0.02 mg/L	97.6	70.0	130	----
		lithium, total	7439-93-2	E420	0.0973 mg/L	0.1 mg/L	97.3	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	0.0183 mg/L	0.02 mg/L	91.6	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0188 mg/L	0.02 mg/L	93.8	70.0	130	----
		nickel, total	7440-02-0	E420	0.0391 mg/L	0.04 mg/L	97.7	70.0	130	----
		phosphorus, total	7723-14-0	E420	10.1 mg/L	10 mg/L	101	70.0	130	----
		potassium, total	7440-09-7	E420	3.86 mg/L	4 mg/L	96.6	70.0	130	----
		rubidium, total	7440-17-7	E420	0.0195 mg/L	0.02 mg/L	97.5	70.0	130	----
		selenium, total	7782-49-2	E420	0.0409 mg/L	0.04 mg/L	102	70.0	130	----
		silicon, total	7440-21-3	E420	8.78 mg/L	10 mg/L	87.8	70.0	130	----
		silver, total	7440-22-4	E420	0.00382 mg/L	0.004 mg/L	95.6	70.0	130	----
		sodium, total	17341-25-2	E420	2.01 mg/L	2 mg/L	100	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, total	7704-34-9	E420	19.0 mg/L	20 mg/L	95.2	70.0	130	----
		tellurium, total	13494-80-9	E420	0.0368 mg/L	0.04 mg/L	92.0	70.0	130	----
		thallium, total	7440-28-0	E420	0.00389 mg/L	0.004 mg/L	97.2	70.0	130	----
		thorium, total	7440-29-1	E420	0.0237 mg/L	0.02 mg/L	118	70.0	130	----
		tin, total	7440-31-5	E420	0.0193 mg/L	0.02 mg/L	96.4	70.0	130	----
		titanium, total	7440-32-6	E420	0.0371 mg/L	0.04 mg/L	92.8	70.0	130	----
		tungsten, total	7440-33-7	E420	0.0190 mg/L	0.02 mg/L	94.9	70.0	130	----
		uranium, total	7440-61-1	E420	0.00411 mg/L	0.004 mg/L	103	70.0	130	----
		vanadium, total	7440-62-2	E420	0.0952 mg/L	0.1 mg/L	95.2	70.0	130	----
		zinc, total	7440-66-6	E420	0.386 mg/L	0.4 mg/L	96.5	70.0	130	----
		zirconium, total	7440-67-7	E420	0.0388 mg/L	0.04 mg/L	96.9	70.0	130	----
Total Metals (QCLot: 102518)										
VA20B7567-009	Anonymous	chromium, total	7440-47-3	E420.Cr-L	0.0385 mg/L	0.04 mg/L	96.3	70.0	130	----
Total Metals (QCLot: 102533)										
VA20B7680-001	Anonymous	aluminum, total	7429-90-5	E420	0.196 mg/L	0.2 mg/L	98.2	70.0	130	----



Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 102533) - continued										
VA20B7680-001	Anonymous	antimony, total	7440-36-0	E420	0.0210 mg/L	0.02 mg/L	105	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0177 mg/L	0.02 mg/L	88.6	70.0	130	----
		barium, total	7440-39-3	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0389 mg/L	0.04 mg/L	97.2	70.0	130	----
		bismuth, total	7440-69-9	E420	0.00967 mg/L	0.01 mg/L	96.7	70.0	130	----
		boron, total	7440-42-8	E420	0.090 mg/L	0.1 mg/L	90.3	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00369 mg/L	0.004 mg/L	92.2	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		cesium, total	7440-46-2	E420	0.00968 mg/L	0.01 mg/L	96.8	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0179 mg/L	0.02 mg/L	89.6	70.0	130	----
		copper, total	7440-50-8	E420	0.0173 mg/L	0.02 mg/L	86.6	70.0	130	----
		iron, total	7439-89-6	E420	1.83 mg/L	2 mg/L	91.4	70.0	130	----
		lead, total	7439-92-1	E420	0.0188 mg/L	0.02 mg/L	94.3	70.0	130	----
		lithium, total	7439-93-2	E420	0.0984 mg/L	0.1 mg/L	98.4	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0202 mg/L	0.02 mg/L	101	70.0	130	----
		nickel, total	7440-02-0	E420	0.0354 mg/L	0.04 mg/L	88.6	70.0	130	----
		phosphorus, total	7723-14-0	E420	9.52 mg/L	10 mg/L	95.2	70.0	130	----
		potassium, total	7440-09-7	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		rubidium, total	7440-17-7	E420	0.0181 mg/L	0.02 mg/L	90.5	70.0	130	----
		selenium, total	7782-49-2	E420	0.0402 mg/L	0.04 mg/L	100	70.0	130	----
		silicon, total	7440-21-3	E420	ND mg/L	10 mg/L	ND	70.0	130	----
		silver, total	7440-22-4	E420	0.00388 mg/L	0.004 mg/L	97.0	70.0	130	----
		sodium, total	17341-25-2	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, total	7704-34-9	E420	ND mg/L	20 mg/L	ND	70.0	130	----
		tellurium, total	13494-80-9	E420	0.0417 mg/L	0.04 mg/L	104	70.0	130	----
		thallium, total	7440-28-0	E420	0.00385 mg/L	0.004 mg/L	96.2	70.0	130	----
		thorium, total	7440-29-1	E420	0.0207 mg/L	0.02 mg/L	103	70.0	130	----
		tin, total	7440-31-5	E420	0.0188 mg/L	0.02 mg/L	93.9	70.0	130	----
		titanium, total	7440-32-6	E420	0.0364 mg/L	0.04 mg/L	90.9	70.0	130	----
		tungsten, total	7440-33-7	E420	0.0201 mg/L	0.02 mg/L	100	70.0	130	----
		uranium, total	7440-61-1	E420	0.00380 mg/L	0.004 mg/L	95.1	70.0	130	----
		vanadium, total	7440-62-2	E420	0.0952 mg/L	0.1 mg/L	95.2	70.0	130	----
		zinc, total	7440-66-6	E420	0.357 mg/L	0.4 mg/L	89.3	70.0	130	----
		zirconium, total	7440-67-7	E420	0.0409 mg/L	0.04 mg/L	102	70.0	130	----



Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 102534)										
VA20B7680-001	Anonymous	chromium, total	7440-47-3	E420.Cr-L	0.0370 mg/L	0.04 mg/L	92.5	70.0	130	----
Total Metals (QCLot: 103525)										
VA20B7568-007	Anonymous	mercury, total	7439-97-6	E508	0.000102 mg/L	0.0001 mg/L	102	70.0	130	----
Dissolved Metals (QCLot: 103518)										
VA20B7568-005	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000991 mg/L	0.0001 mg/L	99.1	70.0	130	----
Dissolved Metals (QCLot: 103681)										
VA20B7631-001	Anonymous	chromium, dissolved	7440-47-3	E421.Cr-L	0.0390 mg/L	0.04 mg/L	97.6	70.0	130	----
Dissolved Metals (QCLot: 103682)										
VA20B7631-001	Anonymous	aluminum, dissolved	7429-90-5	E421	0.203 mg/L	0.2 mg/L	102	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.0204 mg/L	0.02 mg/L	102	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.0194 mg/L	0.02 mg/L	97.1	70.0	130	----
		barium, dissolved	7440-39-3	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.0387 mg/L	0.04 mg/L	96.8	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.00908 mg/L	0.01 mg/L	90.8	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.080 mg/L	0.1 mg/L	79.5	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.00401 mg/L	0.004 mg/L	100	70.0	130	----
		calcium, dissolved	7440-70-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		cesium, dissolved	7440-46-2	E421	0.0102 mg/L	0.01 mg/L	102	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.0199 mg/L	0.02 mg/L	99.4	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.0197 mg/L	0.02 mg/L	98.5	70.0	130	----
		iron, dissolved	7439-89-6	E421	1.94 mg/L	2 mg/L	96.9	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.0186 mg/L	0.02 mg/L	93.0	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.0997 mg/L	0.1 mg/L	99.7	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	0.990 mg/L	1 mg/L	99.0	70.0	130	----
		manganese, dissolved	7439-96-5	E421	0.0195 mg/L	0.02 mg/L	97.3	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.0204 mg/L	0.02 mg/L	102	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.0393 mg/L	0.04 mg/L	98.2	70.0	130	----
		phosphorus, dissolved	7723-14-0	E421	10.2 mg/L	10 mg/L	102	70.0	130	----
		potassium, dissolved	7440-09-7	E421	3.81 mg/L	4 mg/L	95.2	70.0	130	----
		rubidium, dissolved	7440-17-7	E421	0.0196 mg/L	0.02 mg/L	98.2	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.0413 mg/L	0.04 mg/L	103	70.0	130	----
		silicon, dissolved	7440-21-3	E421	9.49 mg/L	10 mg/L	94.9	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.00407 mg/L	0.004 mg/L	102	70.0	130	----
		sodium, dissolved	17341-25-2	E421	1.93 mg/L	2 mg/L	96.6	70.0	130	----
		strontium, dissolved	7440-24-6	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----



Sub-Matrix: **Water**

					<i>Matrix Spike (MS) Report</i>					
					<i>Spike</i>		<i>Recovery (%)</i>	<i>Recovery Limits (%)</i>		
<i>Laboratory sample ID</i>	<i>Client sample ID</i>	<i>Analyte</i>	<i>CAS Number</i>	<i>Method</i>	<i>Concentration</i>	<i>Target</i>	<i>MS</i>	<i>Low</i>	<i>High</i>	<i>Qualifier</i>
Dissolved Metals (QCLot: 103682) - continued										
VA20B7631-001	Anonymous	sulfur, dissolved	7704-34-9	E421	19.6 mg/L	20 mg/L	97.8	70.0	130	----
		tellurium, dissolved	13494-80-9	E421	0.0420 mg/L	0.04 mg/L	105	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.00376 mg/L	0.004 mg/L	94.0	70.0	130	----
		thorium, dissolved	7440-29-1	E421	0.0211 mg/L	0.02 mg/L	106	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.0199 mg/L	0.02 mg/L	99.4	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.0396 mg/L	0.04 mg/L	99.0	70.0	130	----
		tungsten, dissolved	7440-33-7	E421	0.0192 mg/L	0.02 mg/L	96.0	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.00375 mg/L	0.004 mg/L	93.8	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.101 mg/L	0.1 mg/L	101	70.0	130	----
		zinc, dissolved	7440-66-6	E421	0.422 mg/L	0.4 mg/L	106	70.0	130	----
		zirconium, dissolved	7440-67-7	E421	0.0392 mg/L	0.04 mg/L	97.9	70.0	130	----
Aggregate Organics (QCLot: 104685)										
VA20B7656-002	SW-3	chemical oxygen demand [COD]	----	E559	133 mg/L	139.5 mg/L	95.4	75.0	125	----

APPENDIX F

Historic Analytical Results

**Table F-1: Historic Groundwater Analytical Results
2020 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	Thornhill Landfill																													
				BH96-3																													
				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	3-Aug-03	1-Dec-03	14-May-04	18-Oct-04	1-Jun-05	1-Nov-05						
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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	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	<0.02	<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	<0.001	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	<0.001	<0.00002	<0.001	<0.001	<0.001	<0.00002	<0.00002	<0.00002	
				Bismuth	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.00002	<0.00002	<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	0.00002	0.00002	<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	<0.001	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	<0.001	<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	<																

Table F-1: Historic Groundwater Analytical Results
2020 Thornhill Transfer Station Annual Monitoring Program
Regional District of Kitimat-Stikine

Table with columns for Location Monitoring Well, Standards (CSR Aquatic Life, CSR Drinking Water), Units, and 20 sampling dates from 2006 to 2015. Rows are categorized into Conventional Parameters (e.g., Conductivity, Hardness, pH), Dissolved Metals (e.g., Aluminum, Arsenic, Barium), and various other analytes. Values are provided in mg/L or uS/cm, with some cells containing ranges or detection limits.

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 M271/2004, as updated [includes amendments up to BC Reg. 131/2020 and BC Reg. 161/2020, updated to 1 February 2021])

QAQC = quality assurance/quality control; FD = field duplicate;

**Table F-2: Historic Groundwater Analytical Results
2020 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	Thornhill Landfill																	
								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	Goodwin Well	Goodwin Well	Goodwin Well			
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													
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)	-	-	-	-	<i>1.3 - 18.5</i>	-	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)	-	-	-	-	<i>1500</i>	-	mg/L	27	28.2	31.8	28.9	28.7	28.8	8	-	-	24	-	32.7	31.1					
Fluoride (F)	-	-	-	-	<i>2.0-3.0 (e)</i>	-	mg/L	-	-	0.6	0.6	0.69	0.79	0.56	-	-	0.73	-	0.63	0.59					
Nitrate (as N)	-	-	-	-	<i>400</i>	<i>10</i>	mg/L	-	0.007	<0.05	<0.05	<0.05	<0.1	<0.1	-	-	<0.1	-	<0.01	0.034					
Nitrite (as N)	-	-	-	-	<i>0.2 - 0.8</i>	<i>1</i>	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)	-	-	-	-	<i>128 - 429</i>	<i>500</i>	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	-	-	-	-	-	<i>9.5</i>	mg/L	0.2	0.111	0.025	0.02	0.059	0.014	0.024	-	-	0.014	-	<0.005	0.0074					
Antimony	-	-	-	-	<i>0.09</i>	<i>0.006</i>	mg/L	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.0006	ND	-	-	<0.0005	-	<0.0001	<0.00020					
Arsenic	-	-	-	-	<i>0.05</i>	<i>0.01</i>	mg/L	<0.001	0.0027	0.002	0.002	0.002	0.0024	0.0023	-	-	0.002	-	0.002	0.00211					
Barium	-	-	-	-	<i>10</i>	<i>1</i>	mg/L	<0.1	0.03	0.016	0.02	0.023	0.016	0.073	-	-	0.028	-	0.025	0.0229					
Beryllium	-	-	-	-	<i>0.0015</i>	<i>0.008</i>	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	-	-	-	-	<i>12</i>	<i>5</i>	mg/L	-	-	0.17	0.17	0.1	0.227	0.146	-	-	-	-	0.155	0.121					
Cadmium	-	-	-	-	<i>0.0005 - 0.004</i>	<i>0.005</i>	mg/L	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	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	-	-	-	-	<i>0.01</i>	<i>0.05</i>	mg/L	<0.02	<0.001	<0.001	<0.001	<0.001	0.001	ND	-	-	<0.001	-	<0.0005	<0.00050					
Cobalt	-	-	-	-	<i>0.04</i>	<i>0.001</i>	mg/L	<0.02	<0.01	<0.01	<0.01	<0.001	<0.0001	ND	-	-	<0.0005	-	<0.0005	<0.00010					
Copper	-	-	-	-	<i>0.02 - 0.09</i>	<i>1.5</i>	mg/L	<0.01	0.004	0.004	0.002	0.004	0.006	0.0189	0.0053	-	-	0.0015	-	0.002	0.0194				
Iron	-	-	-	-	-	<i>6.5</i>	mg/L	<0.1	0.06	<0.05	<0.05	0.14	<0.04	ND	-	-	0.01	-	<0.010	<0.010					
Lead	-	-	-	-	<i>0.04 - 0.16</i>	<i>0.01</i>	mg/L	0.002	<0.001	<0.001	<0.001	<0.001	0.0007	ND	-	-	0.0003	-	<0.0001	<0.00020					
Lithium	-	-	-	-	-	<i>0.008</i>	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	-	-	-	-	-	<i>1.5</i>	mg/L	0.05	0.04	0.04	0.043	0.008	0.0156	0.102	-	-	0.132	-	0.0412	0.00178					
Mercury	-	-	-	-	<i>0.00025</i>	<i>0.001</i>	mg/L	-	<0.00001	<0.00002	<0.00003	<0.00002	<0.00006	ND	-	-	<0.00002	-	<0.00002	<0.000010					
Molybdenum	-	-	-	-	<i>10</i>	<i>0.25</i>	mg/L	0.02	<0.03	0.019	0.016	0.014	0.0206	0.017	-	-	0.023	-	0.0192	0.0161					
Nickel	-	-	-	-	<i>0.25 - 1.5</i>	<i>0.08</i>	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	-	-	-	-	<i>0.02</i>	<i>0.01</i>	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	-	-	-	-	<i>0.0005 - 0.015</i>	<i>0.02</i>	mg/L	<0.01	<0.0001	<0.0001	<0.0002	<0.0001	<0.00008	ND	-	-	<0.00002	-	<0.00005	<0.000050					
Sodium	-	-	-	-	-	<i>200</i>	mg/L	91	-	48.1	75.9	61.5	69.4	71.9	-	-	86	-	87.2	72.6					
Strontium	-	-	-	-	-	<i>2.5</i>	mg/L	-	-	0.088	0.095	0.084	-	0.116	-	-	0.116	-	0.122	0.12					
Sulfur	-	-	-	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-	-	12	11.2					
Tellurium	-	-	-	-	-	-	mg/L	-	-	<0.001	<0.001	<0.001	-	-	-	-	-	-	<0.00050	<0.00050					
Thallium	-	-	-	-	<i>0.003</i>	-	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	<0.00010					
Tin	-	-	-	-	-	<i>2.5</i>	mg/L	-	-	<0.001	<0.001	<0.001	-	ND	-	<0.005	-	<0.0002	0.00032						
Titanium	-	-	-	-	<i>1</i>	-	mg/L	<0.01	<0.01	<0.001	<0.001	<0.001	-	ND	-	<0.005	-	<0.005	<0.0050	<0.0050					
Tungsten	-	-	-	-	-	<i>0.003</i>	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-					
Uranium	-	-	-	-	<i>0.085</i>	<i>0.02</i>	mg/L	-	0.00009	0.0007	0.0009	0.0008	0.0006	0.0011</											

**Table F-3: Historic Groundwater Analytical Results
2020 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	CSR Drinking Water Standard (DW)	Units	Thornhill Landfill												
								Reinhardt Well												
								Reinhardt Well 1-Jun-96	Reinhardt Well 1-May-98	Reinhardt Well 15-Aug-00	Reinhardt Well 1-Dec-03	Reinhardt Well 27-May-08	Reinhardt Well 26-Aug-09	Reinhardt Well 15-Jun-10	Reinhardt Well 25-Oct-10	Reinhardt Well 24-May-12	Reinhardt Well 25-Jul-16	Reinhardt Well 24-Aug-17		
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	-	-	<25	<25	<30	ND	-	-	<20	<20			
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			
Tellurium	-	-	-	-	-	-	mg/L	-	-	<0.001	<0.001	-	-	-	-	-	<0.00050			
Thallium	0.003	-	-	-	-	-	mg/L	-	<0.0001	<0.001	<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	-	-	-	-	mg/L	-	-	-	-	-	-	-	-	-	-			
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 AWF 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 M271/2004, as updated [includes amendments up to BC Reg. 131/2020 and BC Reg. 161/2020, updated to 1 February 2021])

QAQC = quality assurance/quality control; FD = field duplicate;

Table F-4: Historic Surface Water Analytical Results
2020 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-16			
								SW-16 22-Mar-16	SW-16 25-Jul-16	SW-16 13-Oct-16	SW-16 28-Mar-17
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
BCWQG calculation Long Term	-	-	-	-	-	-	-	0.002292	0.002668	0.002	0.002
BCWQG calculation Max	-	-	-	-	-	-	-	0.0073862	0.0082698	0.002	0.002
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 WQG), updated
 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 F-5: Historic Surface Water Analytical Results
2020 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) (i)		-		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
 2020 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 - 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
2020 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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 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



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*Appendix B. Thornhill Landfill 2020 Greenhouse Gas Emissions Reduction
Quantification (Sperling Hansen Associates, 2021)*



May 31st, 2021

PRJ21032

Ms. Erin Blaney, BSc.
Zero Waste Coordinator
Regional District of Kitimat-Stikine
Suite 300 - 4545 Lazelle Avenue
Terrace, B.C., V8G 4E1

Dear Ms. Blaney,

Re: Thornhill Landfill 2020 Greenhouse Gas (GHG) Emissions Reduction Quantification

Sperling Hansen Associates (SHA) is pleased to submit this letter report for the *Thornhill Landfill Flare 2020 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 and Climate Change Strategy (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 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 in 2020.

2 OPEN FLARE SYSTEM AT 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 a 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 a 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 continuous 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 GEM5000 gas analyser allows for monitoring of the LFG flow rate and the gas composition (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.



Photos 1&2 - QED Precision Wellhead (left) and Solar Spark Flare at the Thornhill Landfill (right)

3 FLARE MONITORING DATA FOR 2020

3.1 Flare Temperature Data

The flare temperature data was measured continuously and logged every 5 minutes during 2020. 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 2020 flare thermocouple recorded data at the Landfill.

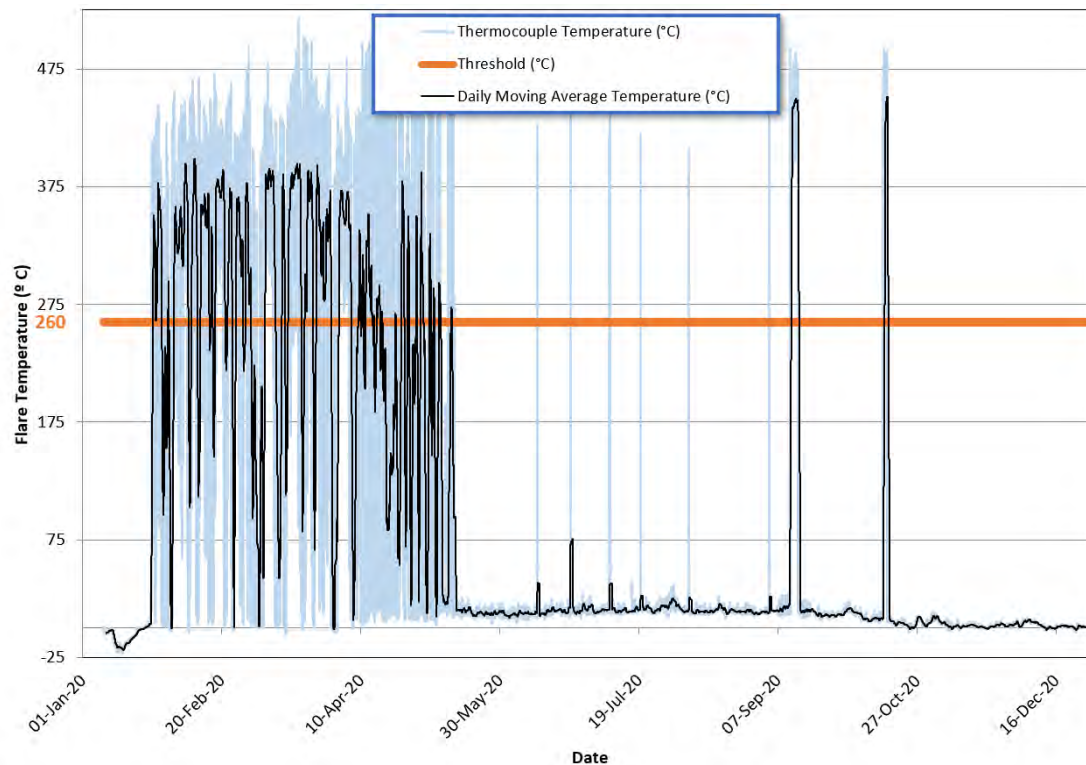


Figure 1 - Thornhill Landfill Flare Thermocouple Recorded Temperature Data (2020)

Based on the recorded flare temperature data, the Thornhill Landfill flare has operated for approximately 1,730 hours of the total 8,600 hours in 2020. This is equivalent to a 20.1% operational status and 79.9% down time in this period. As it appears and indicated in Figure 1, the flare operation was interrupted in May of 2020 after which the system has not been back up and operating. Our assessment of the causing issue is presented in Section 5. The flare run time calculations are summarized in Table 1.

Table 1 – Summary of the Thornhill Landfill Flare Run Time for 2020

	number of 5-minute records	hours/year	Days/year	% of 2020
Total	103,204	8,600	358.3	98.2%
Temp. > 260 °C	20,763	1,730	72.1	20.1%
Temp. < 260 °C (Down time)	82,441	6,870	286.3	79.9%

3.2 Landfill Gas Quality and Flow Rate Data

The composition and flow rate of the LFG collected and combusted at the Thornhill Landfill were measured using a Landtec GEM5000 LFG analyzer. During SHA’s visit for data collection and flare service in May 2021, the flare was not operational. We realized that diluted gas (CH₄ content of approximately 12%) was the primary reason for the flare not to operate. Inspecting the gas collection system, we realized one of the Fernco caps of one of the gas vents was removed. This was a source of air entering into the subgrade gas collection system and diluting the LFG.

As mentioned before, the solar flare requires a minimum methane content of approximately 30% to sustain a flame at the flare tip. The solar fan, on the other hand, sustains a gas flow rate of 10 to 12 scfm when operational. Therefore, to estimate total methane combusted in 2020 and the GHG offsets for this year we assumed a methane content of 30% for the period that flare had been operating in 2020. We also used an average flow rate of 11 scfm as the solar fan had been continuously operating throughout 2020. Adopting this conservative approach, we used this information to quantify the total methane captured and flared at the Thornhill Landfill in 2020. Table 2 below shows the assumed data for methane content and LFG flow rate for 2020.

Table 2 – LFG Flow Rate and Composition at the Thornhill Landfill

Date/Time	Methane Content (%)	Solar Fan min. Flow Rate (scfm)
Required for the Flare to operate	30.0	10-12 (Avg. 11)

4 GHG EMISSION REDUCTION QUANTIFICATION

The total methane that was combusted at the Thornhill Landfill flare during 2020 was calculated based on the following parameters:

1. LFG flow rate of 11 scfm
2. Methane content of 30%
3. Methane density at standard temperature and pressure (i.e. 15 °C and 1 atm (CRA, 2013))
4. Flare run time of 1,730 hrs (~ 72 days)
5. Flare methane destruction efficiency of 96%

Based on the collected data and the total run time during 2020, SHA estimates that a total of 6.3 tonnes of methane was combusted at the Thornhill Landfill this year. Therefore, the total GHG emissions reduction achieved by the Thornhill flare in 2020 is 158 tonnes of carbon dioxide equivalent (CO₂-e). The GHG offset calculation is based on the methane global warming potential (GWP) of 25 (ENV, 2014).

A summary of the aforementioned parameters and the calculated values are presented below:

Open Flare Destruction Efficiency:	96	%
Thornhill Flare Down Time in 2020:	79.9	%
Methane GWP:	25	tonne/tonne
Methane Density:	0.678	kg/m ³
Standard Pressure:	1	atm
Standard Temperature:	15	°C
Average LFG Flow Rate:	11	scfm
Average Methane Content:	30.0	% by volume
Average LFG Flow Rate:	18.7	m ³ /hr
Total Methane Collected in 2020:	48,219	m ³
Total Methane Collected in 2020:	32.7	tonnes/year
Total Methane Destroyed in 2020:	6.3	tonnes/year
Total GHG Emissions Reduction in 2020:	158	tonnes CO₂-e in 2020

5 OTHER SITE OBSERVATIONS

During the recent site visit, SHA completed a full inspection of flare major components. As per the manufacturer's recommendations, we inspected the following:

- Solar fan (in good condition)
- Solar fan rechargeable battery (in good conditions)
- Spark pilot (not operating, replaced)
- Spark pilot's rechargeable battery (in good conditions)
- Flame arrestor (replaced as per manufacturer recommendations)
- Data logger (data downloaded)
- Data logger battery (in good conditions)
- Wellhead (orifice plate replaced, condensate accumulation was observed)
- LFG vents (one cap was off, replaced and fixed)

The presence of vacuum at the wellhead was an indication of the fan being in good conditions, therefore, the fan was not replaced at this time. However, observing the significant head loss through the wellhead, we decided to replace the 1.25" orifice plate (O.P.) (shown in Photo 2) with a bigger size (1.4") O.P.

Additionally, observing the condensate accumulation in the O.P. housing we believe that condensate freezing may result in a full blockage of the gas flow during sub-zero conditions. To avoid this issue, trace heating, or at the minimum installation of an insulation wrap around the wellhead may increase the flare's operational status in coming winters. Photos 1 to 3 below illustrates some of our observations during the site visit.



Photo 1 - Negative Pressure Maintained at the Wellhead by the Solar Powered Fan



Photo 2 - Orifice plate Replaced from 1.25 to 1.4 Allowing Lower Head Loss Through the Wellhead



Photo 3 - Source of Air Intrusion into the Gas Collection System Identified and Fixed

6 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. The 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. However, the flare efficiency was significantly reduced during 2020.

- Based on our observations we believe that a loose Fernco cap on one of the LFG vents was responsible for the air intrusion into the gas piping system, hence dilution of the LFG at the flare location.
- Based on conservative assumptions about gas composition data, we estimated that a total GHG emissions reduction of 158 tonnes CO₂-e was achieved in 2020. We believe that proper maintenance of the LFG system will increase the achieved GHG reduction at this facility.
- We recommend insulation or heat tracing of the LFG wellhead at the flare station to prevent condensate freezing during winter.
- SHA encourages the RDKS to initiate placement of a fabricated biocover system over the Landfill closure system. The Fabricated biocover system will achieve more than 75% oxidation of the fugitive methane from the cover soil through the application of methanotrophic bacteria. SHA estimated that this initiative will result in a significant (approximately 1,000 tonnes of CO₂-e/year) additional GHG emissions reduction.
- The RDKS will continue to log and collect the flare temperature data which are essential for the quantification of the annual GHG offsets. SHA recommends this data acquisition process take place regularly so that in case the flare operation is interrupted, the issues are detected and addressed promptly.
- We recommend that the LFG flow rate and composition data also be collected more regularly (e.g. quarterly). The gas quality and flow rate may be affected by a rapid barometric pressure change during SHA's annual field visit. Therefore, having more monitoring data points throughout the year allows for completing more reliable quantification of the annual GHG emission reductions.

We have enjoyed working with you on this project and we trust you will find this letter report informative and meeting expectations. 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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