THORNHILL LANDFILL & TRANSFER STATION

2021 Annual Report

Prepared for:
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Environment & Climate Change Strategy
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Regional District of
Kitimat-Stikine

Executive Summary

The Thornhill Landfill closed in 2016 with the opening of the Forceman Ridge Waste Management Facility (FRWMF). Following the closure of the Thornhill Landfill, the Thornhill Transfer Station was constructed to accept waste from the greater Terrace area, including waste from curbside collection programs, commercial haulers, and the public. The transfer station operates as a scaled facility, and accepts waste for transfer to the FRWMF, and metal waste for recycling.

The closed landfill is authorised under Operational Certificate MR-4057, which includes an environmental effects monitoring program, and the requirement to report on non-compliance events. The landfill is in the final stages of closure with expected completion in 2023. In 2021 the closed landfill received an amendment to the OC, following the construction and commissioning of additional groundwater monitoring wells, which were added to the environmental effects monitoring program.

In 2021 the site received 23,970 visits from commercial, public and curbside haulers, depositing a total of 11,489 tonnes of waste at the site for transfer to FRWMF and scrap metal recyclers. Of this waste, the majority was received from the commercial haulers, but the greatest volume of transactions is received on public access days over three days of the week.

Two wildlife interactions were reported for 2021, from a grizzly bear cub and a moose. The facility experienced minimal vector activity from birds, including raptor species (bald eagles), and corvid species (crows and ravens). No non-compliance reports were submitted for the site in 2021.

Projects of note include the application of grass seed to north and northeast facing section of the landfill, and the installation of two groundwater monitoring wells at the facility, including the application for a water license to request permission to use water for cleaning the transfer station tip floor. The Facility water quality monitoring program, including results of groundwater, surface water, and treated leachate discharge monitoring are discussed in the Environmental Effects Monitoring Report, prepared by WSP Golder.

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1 Introduction

This annual report for the closed Thornhill Landfill and Transfer Station (TTS) and covers the period from January to December 2021. It has been prepared to fulfill the requirements of the facility's Operational Certificate (OC) MR-4057, issued by the Ministry of Environment and Climate Change Strategy (ENV) and most recently amended in November 2021. Waste is no longer discharged to the Thornhill Landfill and septage is no longer accepted at the facility. Refuse and compostable organics are collected, consolidated, and hauled to the Forceman Ridge Waste Management Facility (FRWMF). 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 FRWMF. Metal collected at the Transfer Station is sold as scrap.

The 2021 Annual Report summarizes the following topics presented in Table 1.

Table 1: Report Objectives

Waste Tracking
- Summary of Visits to the TTS
- Quantity of Waste Received and Recycled

Facility Updates and Maintenance
- Operational Certificate Amendments
- Landfill Closure
- Landfill Gas Capture
- Environmental Monitoring Program Updates
- Non-Compliance Reports
- Scale Maintenance

Wildlife Observations

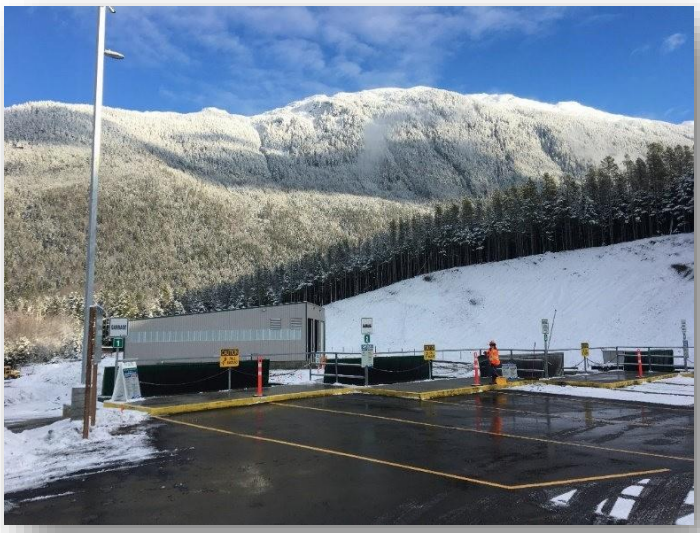
Environmental Monitoring

Environmental monitoring was conducted in accordance with the OC. The results of the water quality monitoring program, which includes groundwater, surface water, and leachate monitoring, are discussed in the Environmental Effects Monitoring Report prepared by WSP Golder and contained in Appendix A of this report.

2 Background

The TTS opened in November 2016 on the site of the closed Landfill and is owned and operated by the RDKS. The TTS is located about 10 km southeast of the City of Terrace; access is from Old Lakelse Lake

Drive. 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. The final stages of closure are anticipated to be completed in 2023.



Most waste generated in the greater Terrace area is hauled to the TTS, consolidated, and then hauled to FRWMF for final disposal. Waste is no longer discharged at the Thornhill landfill. Waste is currently managed in accordance with the Regional District Kitimat-Stikine Solid Waste Management Plan (1995).

3 Waste Accepted at Transfer Station

The TTS operates a residential drop off area for refuse, yard and garden materials, metal (including large appliances and propane tanks), and clean wood. The TTS consists of two scales, a 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. Several U-bays for metal, yard and garden waste, and clean wood are available for public and commercial use.

The public have access to the facility on Saturday, Sunday and Monday, and commercial account holders have access to the facility Monday through Saturday. Table 2 provides a breakdown of scale transactions at the facility by day and user type for 2021.

Table 2: Count of Users and Tonnes Tipped by Day of the Week at Thornhill Transfer Station in 2021

Day & User Type	Count of Transactions	Tonnes
Monday	**5,241**	**2,263**
Commercial	754	1,649
Curbside	67	89
Public	4,419	524
Tuesday	**777**	**1,040**
Commercial	573	463
Curbside	204	577
Wednesday	**1,133**	**2,263**
Commercial	757	1,450
Curbside	376	813
Thursday	**799**	**1.846**
Commercial	576	1,189
Curbside	223	657
Friday	**1,024**	**2,081**
Commercial	732	1,269
Curbside	292	813
Saturday	**7,209**	**1,081**
Commercial	185	96
Public	7,020	985
Sunday	**7,787**	**914**
Public	7,787	914
Total	**23,970**	**11,489**

In 2021 There was a total of 23,970 transactions across the scale and 11,489 tonnes of waste accepted for disposal, or recycling. Figure 2 provides the breakdown of tonnes tipped and total transactions by each user type.

In 2021 commercial account holders hauled 53% of all waste received at the Transfer Station and represented 15% of transactions across the scale with an average tip of 1.7 tonnes per transaction. Public users hauled 21% of all waste received at the Transfer Station and represented 80% of transactions across the scale with an average tip of 125 kilograms per transaction. Curbside hauling represents 26% percent of all waste received and 10% of transactions with an average tip of 2.5 tonnes per transaction.

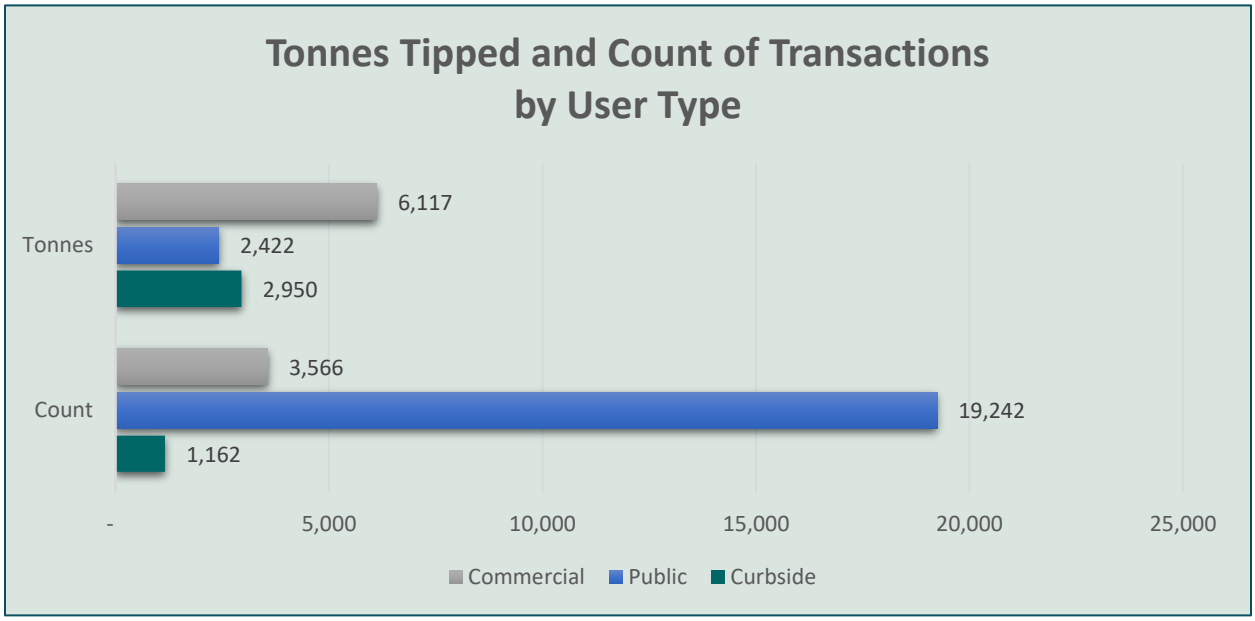


Figure 2: Tonnes of Waste and Count of Transactions by User Type

Table 3 provides a summary of tonnes per waste type accepted at the facility by the public and commercial account holders.

Table 3: Landfilled and Diverted Waste Tonnages by In Service-Area and Out of Service-Area Users

Waste Type	Tonnes Public	Tonnes Commercial	Total Tonnes
Landfilled Waste	**2,062**	**5,638**	**7,699**
C&D	721	904	1,624
Carcass	1	-	1
Refuse	1,340	4,734	6,074
Diverted Waste	**370**	**471**	**840**
Clean Wood	15	27	42
Concrete	55	-	55
Metal	85	-	85
Organics	187	444	631
White Goods	11	-	11
Ozone Depleting	17	-	17
Curbside	**-**	**-**	**2,950**
Curbside Organics	-	-	962
Curbside Refuse	-	-	1,988
Total	**2,422**	**6,109**	**11,489**

Of all waste accepted at the TTS, 84% was transferred for landfilling at FRWMF, and 16% was diverted to the FRWMF organics compost facility, the scrap metal pile, or the clean wood pile. All wastes accepted at the TTS are transferred to the FRWMF for final disposal, except for metals, which are sold at market value to local scrap yard.

Animal carcasses, C&D, and refuse are consolidated for transport to the FRWMF where they are tipped at the active face of the landfill. A description of each of these wastes is provided below.

Carcass

Carcasses that are delivered in a load of less than 50 kg are accepted for disposal at the TTS, where they are consolidated with refuse. In 2021, **1 tonne** of carcasses were accepted for disposal.

Construction and Demolition

C&D waste accepted at TTS includes painted and treated wood waste, and demolition waste, in loads less than 5 m^3 from within the service aera. In 2021, **1,624 tonnes** of construction and demolition waste were accepted for disposal.

Refuse

Refuse includes general municipal solid waste from curbside, commercial account holders, and self hauled refuse. In 2021 **6,074 tonnes** of refuse was collected for disposal.

3.1 Diverted Wastes

Diverted waste includes materials that are recycled such as concrete, metal, organics, white goods, and yard and garden waste. Metal and white goods are collected for recycling through a local metal scrapyard. Broken concrete, organics and yard and garden waste are transferred to the FRWMF for recycling.

Clean Wood Waste

Clean Wood means wood that is free of glue, laminate, paint, treatment, and may include small metal fasteners but does not include plywood or OSB. Clean wood is segregated, and either burned as prescribed in the Operational Certificate or chipped and used as hog fuel in the compost facility. In 2021, **42 tonnes** of clean wood waste were accepted for disposal.

Broken Concrete

Concrete includes concrete with or without rebar, in pieces less than 300mm at their widest width. Broken concrete is used as alternative daily cover for waste at FRWMF. In 2021, **55** tonnes were accepted for disposal.

Metals

Metals are segregated onsite and sold at market value to scrap yards with the Terrace area. Metals are also accepted for free at several scrapyards within the Terrace area. A total of **213.7 tonnes** of scrap metal was collected and sold to scrap markets.

Organics

Organics includes food scraps that are received from commercial sources, local farms, and from the curbside programs for the City of Terrace, Electoral Area E, and parts of Electoral Area C. Organics are composted through the compost facility and used for landfill closure projects. In 2021, **1,593 tonnes** of organics were accepted for composting.

White Goods and Ozone Depleting Appliances

White goods and ozone depleting appliances are accepted for disposal at the TTS under the Major Appliance Recycling Roundtable steward. Freon gas is removed from ozone depleting appliances, and all appliances are included in the metal recycling. In 2021, 38 tonnes of white goods and ozone depleting appliances were segregated for recycling.

4 Operations

4.1 OC Amendments and Authorisations

In 2021 the RDKS received one Operational Certificate amendment to update the groundwater monitoring program, and leachate reporting requirements. The amendments are summarised in Table 4.

Table 4 Description Temporary Authorisations, and OC Amendments in 2021

Amendment Date and Section of the OC	Description
Operational Certificate Amendment November 18, 2021	
Section 5.2 Groundwater Monitoring	Addition of MW21-01, MW21-02 and MW21-03 to the groundwater monitoring program.
Section 6.1D Annual Reporting	Removal of the quantity of leachate collected from the list of reportable items.

4.2 Landfill Closure

In 2021 landfill closure work included application of cover material along the North and Northeast slopes of the closed landfill. Approximately a third of this area was seeded with some *Poa pratensis*

(Kentucky Bluegrass) to prevent erosion of the cover material before it could be seeded with the custom grass mix used on the closed Southwest portion of the landfill. The custom native grass seed mix will be applied to sections with cover material in 2022. Roughly a third of the landfill remains uncovered and unseeded.

4.3 Landfill Gas Collection

Thornhill Landfill includes a methane gas collection system and flare. Sperling Hansen Associates performed maintenance on the landfill gas flair in 2021. Maintenance performed included:

- Replacing the pilot ignitor
- Replacing the flame arrestor
- Replacing the orifice plate
- Troubleshooting the cause of diluted gas flow

4.4 Monitoring Well Installation

In 2021 two monitoring wells were installed, and one historical shallow groundwater well was recommissioned. These three wells, MW21-01, MW21-02 and MW21-03 were installed by Stantec Consulting and added to the OC with the 2021 OC amendment.

A Water Act application was submitted to Front Counter BC to use water from MW21-01 for cleaning the tip floor at the transfer station. Further details of these wells are included in Monitoring Well Installation Report (Appendix B), completed by Stantec Consulting.

4.5 Methods of Leachate Collection, Treatment and Disposal

Leachate from the landfill is collected through a series of toe ditches along the north and west boundaries of the landfill. Leachate passively flows through the ditches and is conveyed to two facultative treatment lagoons. Leachate flows into the upper treatment lagoon, which passively flows through a sand and gravel berm into the lower treatment lagoon. Storm water from the sites is also conveyed through a stormwater ditch into the lower treatment lagoon. Treated leachate from the lower lagoon passively flows into an exfiltration ditch that connects with Thornhill Creek one kilometre downstream.

4.6 Non-Compliance Reports

There were no non-compliance reports submitted by the RDKS or ENV in 2021 for the Thornhill Landfill.

4.7 Scale Maintenance

Scale maintenance and calibration was performed on the inbound and outbound scales at the Thornhill Transfer Station by a qualified contractor on the following dates:

- April 30, 2021
- September 23, 2021

4.8 Unauthorised tipping

There was no unauthorised tipping reported at the Thornhill Transfer Station or Thornhill Landfill in 2021.

5 Wildlife Occurrences and Observations

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

Facility operators are required to inspect the fence line weekly, testing for proper voltage, proper tension on fence stands, overall condition of the fence, and signs of wildlife activity. The results of the inspections are recorded on the Daily Operation Inspection Form. There was minimal vector activity from birds, including raptor species (bald eagles), and corvid species (crows and ravens). Wildlife observations from 2021 are presented in Table 5.

Table 5: Wildlife Sightings at the Thornhill Landfill and Transfer Station

Observation Date	Description
January 2, 2021	Grizzly bear cub had climbed the entrance gate. The sighting was reported to the BC Conservation Officer, and a trap was set for the bear.
November 26, 2021	A moose damaged the fence entering the site. Moose tracks were observed, and signs of digging. The incident was reported to the BC Conservation Officer who requested the RDKS monitor the situation.

6 Environmental Monitoring

The RDKS performs regular monitoring and sampling of surface water, groundwater, and leachate at the Thornhill Landfill in accordance with the OC. The details of the Facility water quality monitoring program, including results of groundwater, surface water, and treated leachate discharge monitoring are discussed in *Thornhill Landfill 2021 Annual Water Quality Monitoring Report*, prepared by WSP Golder, and contained in Appendix A of this report.

Groundwater

There are four groundwater monitoring wells located around the facility. One is a background well, and three are down gradient wells. Three of the wells were installed in 2021, including a shallow groundwater well which was recommissioned and added to the program. The wells are sampled and monitored three times per year. In-Situ parameters are monitored using a YSI and TLC Depth Tape. Lab samples are collected in sample bottles and shipped to ALS for analysis.

Surface Water

There are four surface water sampling and monitoring locations for this facility located downgradient to the North of the landfill. They are located on or connected to the Thornhill Creek drainage network. One of the four sites is a facility sample of the leachate prior to treatment. The sites are sampled and monitoring three timers per year. In-Situ parameters are monitoring using a YSI and TLC Depth Tape. Lab samples are collected in sample bottles and shipped to ALS for analysis.

7 Summary

In 2021 a total of 11,489 tonnes of waste was transferred through the Thornhill Transfer Station, with 9,687 tonnes of this waste transferred to FRWMF landfill for final disposal. 1,802 tonnes of waste were diverted from being landfilled, including 1,593 tonnes of compost which was transferred to the FRWMF compost facility.

OC amendments updated the monitoring program to include three additional groundwater monitoring sites and removed the requirement to measure the quantity of leachate produced and discharged through the facultative lagoons. Landfill gas collection activities included maintenance of the gas flair. There were no non-compliance reports for 2021, and no unauthorised tipping events. Wildlife sightings included a grizzly bear cub, and moose activity. Environmental monitoring was completed by the RDKS, and the results are included in Appendix A.

Regional District of
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Appendix A Environmental Effects Monitoring Report

REPORT

Closed Thornhill Landfill

2021 Annual Environmental Effects Monitoring Report

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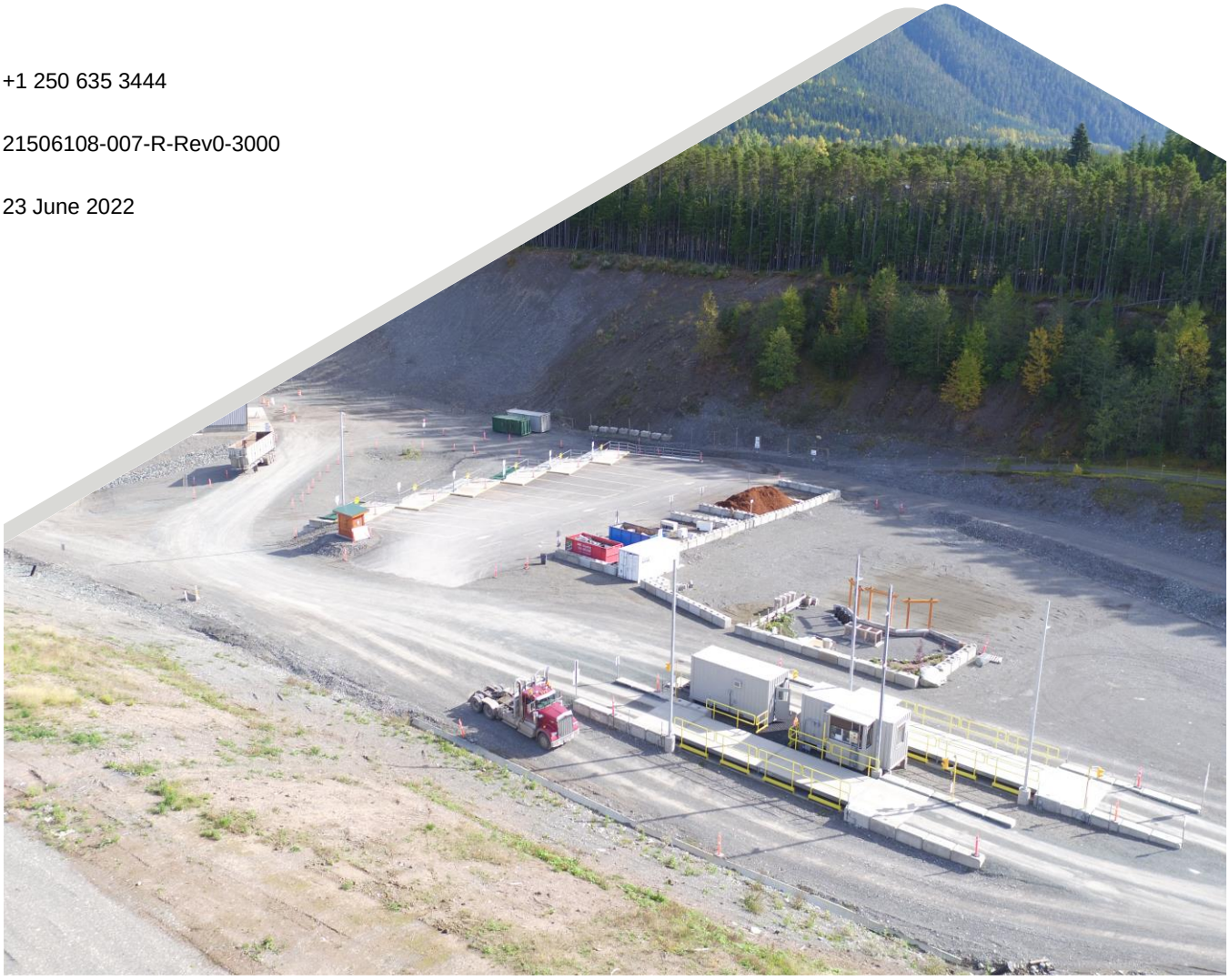
21506108-007-R-Rev0-3000

23 June 2022



Distribution List

e-Copy: Regional District of Kitimat-Stikine

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Executive Summary

Golder Associates Ltd., member of WSP (Golder) was retained by the Regional District of Kitimat-Stikine (RDKS) to prepare the 2021 Annual Environmental Effects Monitoring (EEM) Report for the closed Thornhill Landfill (the "Site", also referred to as the landfill). 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 reporting, as specified in Operational Certificate No. 4057, first issued on 2 February 1976, amended 18 November 2021 (the "OC", Appendix A). The Site is no longer an active landfill since 2016.

As outlined in the OC, the objective of the EEM Program is to determine the potential effects of the Closed Thornhill Landfill on the receiving environment. The scope of work for the EEM Program includes the following:

- **Surface Water Monitoring**: Sampling of four surface water stations collected upstream and downstream of the Site, and from the leachate collection system, conducted three times per year in the spring, summer and fall.
- **Groundwater Monitoring**: Sampling of four groundwater monitoring wells at the Site, 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 ENV no later than 30 June of the following year.

The 2021 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.

No impacts to downgradient groundwater quality were observed, which is expected given the low permeable nature of the clay material underlying the majority of the Site.

The numerous exceedances of dissolved and total metals observed at standpipe MW21-3, installed in a test pit northwest of the Site, are not considered representative of downgradient groundwater quality. Monitoring wells installed in test pits are not industry standard and water sampled from such installations is likely perched within the upper clay material and/or surface water that has infiltrated the pit.

Golder presents the following recommendations for future work at the closed Thornhill Landfill:

- Replace monitoring well MW21-03 with a conventional drilled monitoring well.
- Total metals analysis in groundwater should be discontinued because the results are commonly influenced by particulate entrained within the samples and it is not used in groundwater screening to CSR standards which are applied to dissolved metals.
- Add dissolved organic carbon to surface water analyses to allow for a more accurate comparison to the BC WQG for dissolved copper. The guideline is based on the Copper Biotic Ligand Model (BLM) which is dependant on sample pH, hardness, and dissolved organic carbon. For results without DOC, the BLM is run with the conservative assumption of DOC equal to the laboratory detection limit (0.05 mg/L).

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., member of WSP (Golder) in March 2022. 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 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 2022, our present understanding of the Site conditions, and our professional judgment in light of such information available at the time of this report. This report provides a professional opinion, and therefore no warranty is either expressed, implied or made as to the conclusions, advice and recommendations offered in this report. This report does not provide a legal opinion regarding compliance with applicable laws. With respect to regulatory compliance issues, it should be noted that regulatory statutes and the interpretation of regulatory statutes are subject to change.

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

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1.0 INTRODUCTION

Golder Associates Ltd., Member of WSP (Golder) was retained by the Regional District of Kitimat-Stikine (RDKS) to prepare the 2021 Annual Environmental Effects Monitoring (EEM) Report for the Thornhill Landfill (the “Site”, also referred to as the landfill). 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 reporting, as specified in Operational Certificate No. 4057, first issued on 2 February 1976, amended 18 November 2021 (the “OC”, Appendix A).

1.1 Objective and Scope of Work

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 2023.

As outlined in the OC, the objective of the EEM Program is to determine the potential effects of the Closed Thornhill Landfill on the receiving environment. The scope of work for the EEM Program includes the following:

- **Surface Water Monitoring**: Sampling of four surface water stations collected upstream and downstream of the Site and from the leachate collection system, conducted three times per year in the spring, summer and fall.
- **Groundwater Monitoring**: Sampling of four groundwater monitoring wells at the Site, 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 ENV no later than 30 June of the following year.

The purpose of this report is to present the following 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).
- Figures showing EEM monitoring stations as well as groundwater elevation data.
- Chemistry plots of key water quality parameters at the Site (Appendix B)
- Tabulated chemistry results and comparison of these to applicable standards and guideline (Appendix C)
- Discussion of chemistry results and temporal evolution of water quality at the Site.
- Discussion of the QAQC program.
- Conclusions and recommendations for the current EEM program.
- Record of laboratory analytical reports over the 2021 reporting period (Appendix D)

1.2 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 2020 (Golder 2021). A hydrogeological and geotechnical investigation was carried out by SHA in 1997 prior to the expansion of the landfill (SHA 1997). Two new monitoring wells were installed at the Site in 2021 by Stantec Consulting Ltd. as described in their 2021 memo (Appendix E).

1.3 Site Description

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

- GeoBC's web-based mapping tool iMapBC (accessed May 2022)
- The Surficial Geology Map of the Skeena River and Bulkley River Area (Clague 1983)
- Google Earth (accessed May 2022)
- The 1997 Thornhill Landfill hydro geotechnical investigation (SHA 1997)
- Stantec's 2021 memo on the installation of two new monitoring wells

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 $4.2x10^{-10}$ m/s based on grain size and proctor permeability laboratory testing of four silt and clay samples.

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

reportedly develops a downward gradient along the contact and enters the glacial till layer that underlies the entire Site.

SHA (1997) inferred that silt and clay lenses extend into the gravel unit to the south along the entire length of the contact zone. Perched aquifers on these clay lenses were observed during drilling activities in 1997. Two monitoring wells that were installed by SHA 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 was 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 at a depth of 16 m below ground surface.

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.

Two new monitoring wells were installed at the Site in 2021 by Stantec Consulting Ltd. Monitoring well MW21-1 was installed east and cross-gradient of the Site and screened within the sand and gravel outwash materials at a depth of 21 m below ground surface. Monitoring well MW21-1 was installed north and downgradient of the Site within the glacial marine silt and clay at a depth of 12 m below ground surface. An existing standpipe was discovered in 2021 and installed as monitoring well MW21-3 during test pitting activities at the Site in 2021. MW21-1, MW21-2, and MW21-3 were added to the OC in 2021.

1.4 Sampling Locations

A summary of the Site's EEM monitoring locations per the OC is provided in Table 1 below. Discontinued stations are also provided for historical context with the tabulated results and report figures.

Table 1: EEM Monitoring Locations

Location	OC Station ID	Sample Type	Easting *UTM*	Northing *UTM*	Inferred Groundwater Gradient
BH96-2	E231889	Monitoring Well	533240	6038425	Downgradient
MW21-01	-	Monitoring Well	533440	6038299	Side-gradient
MW21-02	-	Monitoring Well	533200	6038533	Downgradient
MW21-03	-	Standpipe in Test Pit	533028	6038349	Downgradient/ Side Gradient
SW-1	E231882	Surface Water	533702	6038575	Cross-Gradient
SW-3	E231883	Surface Water	533198	6038389	Downgradient
SW-6	E231884	Surface Water	532615	6039310	Downgradient
SW-21	E231886	Surface Water	533182	6038522	Downgradient

Location	OC Station ID	Sample Type	Easting *UTM*	Northing *UTM*	Inferred Groundwater Gradient
Discontinued from the EEM					
BH96-3	-	Monitoring Well	533314	6038203	Upgradient
SW-16	-	Surface Water	533122	6038801	Downgradient
SW-17	-	Surface Water	533031	6038804	Downgradient
SW-18	-	Surface Water	533006	6038901	Downgradient
SW-22	-	Surface Water	533152	6038586	Downgradient
SW-23	-	Surface Water	531755	6039631	Downgradient
Goodwin Well (Well Tag 51068)	-	Domestic Water Well	532315	6037760	Upgradient
Reinhart Well (Well Tag 38440)	-	Domestic Water Well	533558	6038095	Upgradient

Notes:
Coordinates are approximate.

1.5 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 (ENV 2003). Regulations and guidelines supporting EMA consist of the BC Contaminated Sites Regulation (ENV 1996) and the BC Water Quality Guidelines (ENV 2021a, 2021b), each of which is summarized in this section with respects to evaluating environmental media at the Site.

It should be noted that regulatory standards and guidelines are subject to change over time. Golder has screened Site chemistry data as provided by RDKS, including historical results, to the standards and guidelines applicable at the time of preparing this report. Golder has not reviewed the screening of historical data, nor compared screening results of previous EEM reports but rather has provided the historical data for completeness. The screening of current (2021) chemistry data to the standards and guidelines outlined below is the focus of this report.

- ***BC Contaminated Sites Regulation*** (CSR): Schedule 3.2 water standards for drinking water (DW) standards are considered applicable for groundwater quality.

  For the groundwater screening criteria above, CSR DW was considered appliable to the Site based on ENV Protocol 21 *Water Use Determination* (ENV 2017). Section 3.1 of Protocol 21 outlines that if the site boundary or contamination plume is within 500 m of nearby water well sources then DW applies. As shown on Figure 2, Reinhart Well (Well Tag 38440) is a domestic water well within 500 m of the Site boundary. In addition, Section 3.2 of Protocol 21 outlines how DW applies regardless of whether drinking water wells currently exist near the Site to protect aquifers that could support future drinking water wells. For these reasons, protection of drinking water has been applied to screening criteria at the Site.

- ***BC Water Quality Guidelines*** (WQGs): The WQGs are considered applicable for surface waters at the Site for the protection freshwater aquatic life (AW-F). The WQGs are comprised of working and approved guidelines with both 30-day mean (chronic) and maximum (acute) applied to the screening.

For surface water screening criteria above, WQG for the protection of DW was considered not appliable to the Site based on the understanding that surface water emanating from the Site is not used for drinking water consumption. This was supported by a recent search of the online BC Water Resource Atlas (accessed June 2022) which did not find any surface water leases at or within 1 km of the Site registered for human consumption.

2.0 MONITORING METHODOLOGY

2.1 Sampling Methods

RDKS completed the field sampling and field QA/QC during the 2021 monitoring year. Water samples were collected by RDKS field staff following established sampling procedures as outlined in the *British Columbia Field Sampling Manual* (ENV 2013). The YSI water quality meter was calibrated before each sampling event following manufactures instructions. Samples were collected in clean, laboratory-supplied sample bottles, and transported to an accredited laboratory for analyses of the parameters outlined in the OC.

2.2 Surface Water Sampling

The 2021 surface water monitoring program consisted of surface water sampling at up to four locations at the Site (Figure 2). Per the OC, surface water samples were collected in March April (Spring), July (Summer) and October (Fall) 2021. A description of each surface water sampling location (historical to present) is provided in Table 2 below.

Table 2: Surface Water Locations

Location	Description
SW-1	Cross-gradient to the landfill. Background location.
SW-3	Historically sampled from landfill leachate seep. Since 2017, seepage from the leachate seep is collected in a leachate pond.
SW-6	Located on Thornhill Creek by Ziegler Bridge.
SW-16	Located on Thornhill Creek, downstream of the Thornhill Creek and leachate outfall originating from SW-21 confluence and 100 m upstream of SW-17.
SW-17	Located on Thornhill Creek, 100 m downstream of the confluence of Thornhill Creek and leachate outfall originating from SW-21.
SW-18	Located 100 m downstream from SW-17.
SW-21	Monitoring weir located 200 m downstream of the leachate and stormwater retention pond.
SW-22	Located 60 m downstream of SW-21.
SW-23	Located on Thornhill Creek near the Old Lakelse Rd and Miller Rd intersection.

Samples were collected as per the requirements of OC 17227.

2.3 Groundwater Sampling

The 2021 groundwater monitoring program consisted of groundwater sampling at four locations at the Site (Figure 2). Per the OC, groundwater samples were collected in April (Spring), July (Summer) and October (Fall) 2021. A description of each groundwater sampling location (historical to present) is provided in Table 3 below.

Table 3: Groundwater Locations

Location	Description
BH96-2	Installed in the silt and clay unit at the northern edge (downgradient) of the Site.
MW21-01	Installed in sand and gravel at the eastern edge (upgradient) of the Site adjacent to the transfer station building.
MW21-02	Installed in clay approximately 100 m north (downgradient) of the edge of the Site.
MW21-03	Re-installed at the western (downgradient/side gradient) edge of the Site during test pitting activities.

Samples from the July and October 2021 events were analysed for total metals, in addition to the parameters specified by the OC. There are no CSR criteria applied to total metals results as standards are applied to dissolved metals. Locations MW21-01, MW21-02 and MW21-03 were proactively sampled in October as the amended OC which included these wells came into effect 18 November 2021.

2.4 Quality Assurance and Control

To assess and document that the program's sampling and analytical data are interpretable, meaningful, and reproducible, conformance to the QA/QC program per the OC was followed. Standard industry field procedures were used in both the collection (field program) and analysis (laboratory) of the samples.

The following data quality objectives (DQO) was considered acceptable for field QA/QC program:

- Submission of field duplicate for approximately 10% of the total sampling locations per sampling event. The results of the field duplicates are used to assess relative percent difference (RPD) or difference factor (DF) if concentrations are less than five times the reported detection limit (RDL), per targets below.
  - Water: RPD less than 20% for inorganics and 30% for organics.
  - All media: DF less than two.
- Submission of field duplicate for approximately 10% of the total sampling locations per sampling event.
- Submission of a field blank sample per sampling event.
  - Field blanks less than five times the laboratory RDL.

The following DQOs were considered acceptable for laboratory QA/QC program:

- Analyses performed by the accredited laboratory ALS Environmental Ltd (ALS). ALS is certified by the Canadian Association for Laboratory Accreditation (CALA) for the analyses of this program.
- Analytical blanks should be below the detection limits used for the specific analysis.
- Laboratory duplicates should fall within the targets set by the laboratory.

Reference materials or spiked standards should be within the targets specified by the laboratory.

3.0 RESULTS AND DISCUSSION

3.1 Groundwater Elevations

Groundwater was found at depths of 21 m below ground surface upgradient of the landfill at MW21-1 and 9 m below ground surface downgradient of the landfill at BH96-2 and MW21-2. Water-level monitoring at BH96-2 shows that there is little variation in groundwater levels in the silt and clay unit over a seasonal basis (less than 10 cm variation).

A map of groundwater flow based on the October 2021 water-level measurements is presented in Figure 3. As shown in the figure, groundwater is inferred to flow towards the northwest at the Site. SHA (1997) estimated the hydraulic conductivity of the clay material in which the downgradient wells are screened to be 1E-9 m/s to 2E-10 m/s. The low permeability of the clay materials present at these locations would serve to limit groundwater flow.

The groundwater level at monitoring well MW21-3, placed in a former test pit, was 1.7 m below ground surface. Water measured at this location is inferred to be related to perched water within the upper clay material and/or surface water that has infiltrated the pit.

3.2 Groundwater Quality

Analytical results for the EEM groundwater monitoring locations were compared to the applicable BC CSR DW standards (Appendix C). In 2021, groundwater concentrations were less than the CSR DW standards, with the exception of the following parameters:

- Dissolved arsenic, dissolved cobalt, dissolved iron and dissolved manganese (MW21-03)

3.3 Surface Water Quality

Analytical results for the surface water locations were compared to the applicable BC approved and working WQGs for AW-F (Appendix C). In 2021, surface water concentrations were less than the BC WQGs for AW-F, with the exception of the following parameters:

- Dissolved oxygen and total ammonia (SW-3 and SW-21)
- Nitrate (SW-21)

- Total arsenic and total cobalt (SW-3)
- Total boron, total barium, total iron, total manganese, and dissolved iron (SW-3)
- Dissolved aluminum (SW-6)
- Dissolved copper (SW-3, SW-6, and SW-21)

For the screening of dissolved copper, note that the guideline is based on the Copper Biotic Ligand Model (BLM) which is dependant on sample pH, hardness, and dissolved organic carbon. For results without DOC, the BLM is run with the conservative assumption of DOC equal to the laboratory detection limit (0.05 mg/L).

3.4 QA/QC Program

Results of the field QA/QC program are presented with the screened chemistry data in Appendix C, whereas the laboratory QA/QC program is documented within the laboratory reports in Appendix D. Note that the laboratory reports document the chemistry results of 2021 field QA/QC program, whereas the QA/QC tables in Appendix C document the compiled data Golder received from RDKS. Where the QA/QC DQO did not meet the program objectives, further examination was conducted on a case-by-case basis as summarized in Table 4 below.

Table 4: Field QA/QC Results

Media	Location	Parameters Above RPD DQO	Parameters Above DF DQO
Surface Water	SW-21	T. Molybdenum (36%)	-
Surface Water	SW-6	Nitrate (as N) (50%), D. Zinc (115%)	-

In general, the RPDs/DFs greater than the DQO targets outlined above demonstrates the natural sample variability and reflects the nature of the chemistry distribution within the tested media. None of the parameters that exceeded the DQO targets were found above applicable criteria.

The results of the laboratory quality control program met the laboratory's internal criteria for acceptable results with the exception of holding times for some samples. Generally, many analyses hold time outliers that were reported by the laboratory were a result of delayed sample submission by RDKS. There were few analyses hold time outliers which were a result of the laboratory analyzing the samples late (nitrate in BH96-2, MW21-01, MW21-02, MW21-03 in 06 October 2021; nitrite in BH96-2, MW21-01, MW21-02, MW21-03 in 06 October 2021; total dissolved solids in BH96-2, MW21-01, MW21-02, MW21-03 in 06 October 2021).

From the QA/QC information provided, the precision and accuracy of the laboratory data is considered acceptable.

4.0 DISCUSSION

The EEM data was examined graphically (Appendix B) to evaluate temporal water quality variations over time. The data set considered covers 1996 through 2021.

The following leachate indicator parameters were chosen to evaluate the potential environmental impact of landfill activities at the Site:

- Ammonia
- Electrical Conductivity
- Chloride
- Sulphate
- Iron (dissolved for groundwater, total for surface water)

For groundwater, temporal plots over the period of record through 2021 are only available for downgradient monitoring well BH96-2. No variations in leachate indicator parameters are apparent.

While some total metals were observed above the CSR in monitoring wells MW21-1 and MW21-2, the presence of these metals both upgradient and downgradient of the Site and the absence of these metals in the dissolved phase indicates they are naturally occurring and likely associated with particulate entrained within the samples. No exceedances to the applicable regulations were observed for dissolved metals/other constituents upgradient groundwater at MW21-1, nor in downgradient groundwater at MW21-2 and BH96-2. Several exceedances of dissolved metals were observed at standpipe MW21-3, re-installed during test pitting activities northwest of the Site. Water sampled at this location is not considered representative of local groundwater but rather perched water within the upper clay material and/or surface water that has infiltrated the pit.

A review of the temporal plots for surface water shows a slight decline in chloride concentrations and associated electrical conductivity at surface water monitoring locations SW-3 and SW-21 over time. Sulphate remains low at SW-3 and SW-21 after an increase in 2015 and 2016. Total iron appears to be increasing at SW-3.

Surface water sampling location SW-3, a seep located immediately adjacent to the landfill, is characterized by elevated concentrations of ammonia, dissolved iron and copper, total arsenic, barium, boron, chromium, iron and manganese and low dissolved oxygen, which are inferred to be as a result of the landfill. These elevated concentrations are quickly attenuated downstream, with SW-21 characterized by elevated ammonia and dissolved copper and low dissolved oxygen, and no exceedances observed at further downstream locations except at SW-6. At SW-6, dissolved aluminum and copper were observed above the BC WQG for AW-F. The dissolved aluminum is not attributed to the landfill because surface water closer to the landfill is not characterized by similar exceedances. Similarly, specific conductivity is observed to be highest at SW-3, declining at SW-21 and reaching background concentrations at other downstream locations.

In summary, no impacts to groundwater from the landfill were observed and impacts to surface water are quickly attenuated downstream. 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.

5.0 CONCLUSIONS AND RECOMMENDATIONS

The 2021 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.

No impacts to downgradient groundwater quality were observed, which is expected given the low permeable nature of the clay material underlying the majority of the Site.

The numerous exceedances of dissolved and total metals observed at standpipe MW21-3, installed in a test pit northwest of the Site, are not considered representative of downgradient groundwater quality. Monitoring wells installed in test pits are not industry standard and water sampled from such installations is likely perched within the upper clay material and/or surface water that has infiltrated the pit.

Golder presents the following recommendations for future work at the closed Thornhill Landfill:

- Replace monitoring well MW21-03 with a conventional drilled monitoring well.
- Groundwater samples should continue to be analysed for dissolved metals. Total metals analysis in groundwater should be discontinued because the results are commonly influenced by particulate entrained within the samples and it is not used in groundwater screening to CSR standards which are applied to dissolved metals.
- Add dissolved organic carbon to surface water analyses to allow for a more accurate comparison to the BC WQG (AW-F) for dissolved copper. The guideline is based on the Copper Biotic Ligand Model (BLM) which is dependant on sample pH, hardness, and dissolved organic carbon. For results without DOC, the BLM is run with the conservative assumption of DOC equal to the laboratory detection limit (0.05 mg/L).

6.0 CLOSURE

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.

Lindsay Carson, EIT
Environmental Engineer

Jillian Sacré, MSc, PGeo
Principal, Senior Hydrogeologist

PROFESSIONAL GEOSCIENTIST
PROVINCE OF BRITISH COLUMBIA
J. P. SACRE
23/06/22

LC/JS/asd

https://golderassociates.sharepoint.com/sites/156582/project files/6 deliverables/3.0_issued/21506108-007-r-rev0/21506108-007-r-rev0-3000-thornhill 2021 eem_23jun_22.docx

PERMIT TO PRACTICE #1003064
Engineers & Geoscientists BC

7.0 REFERENCES

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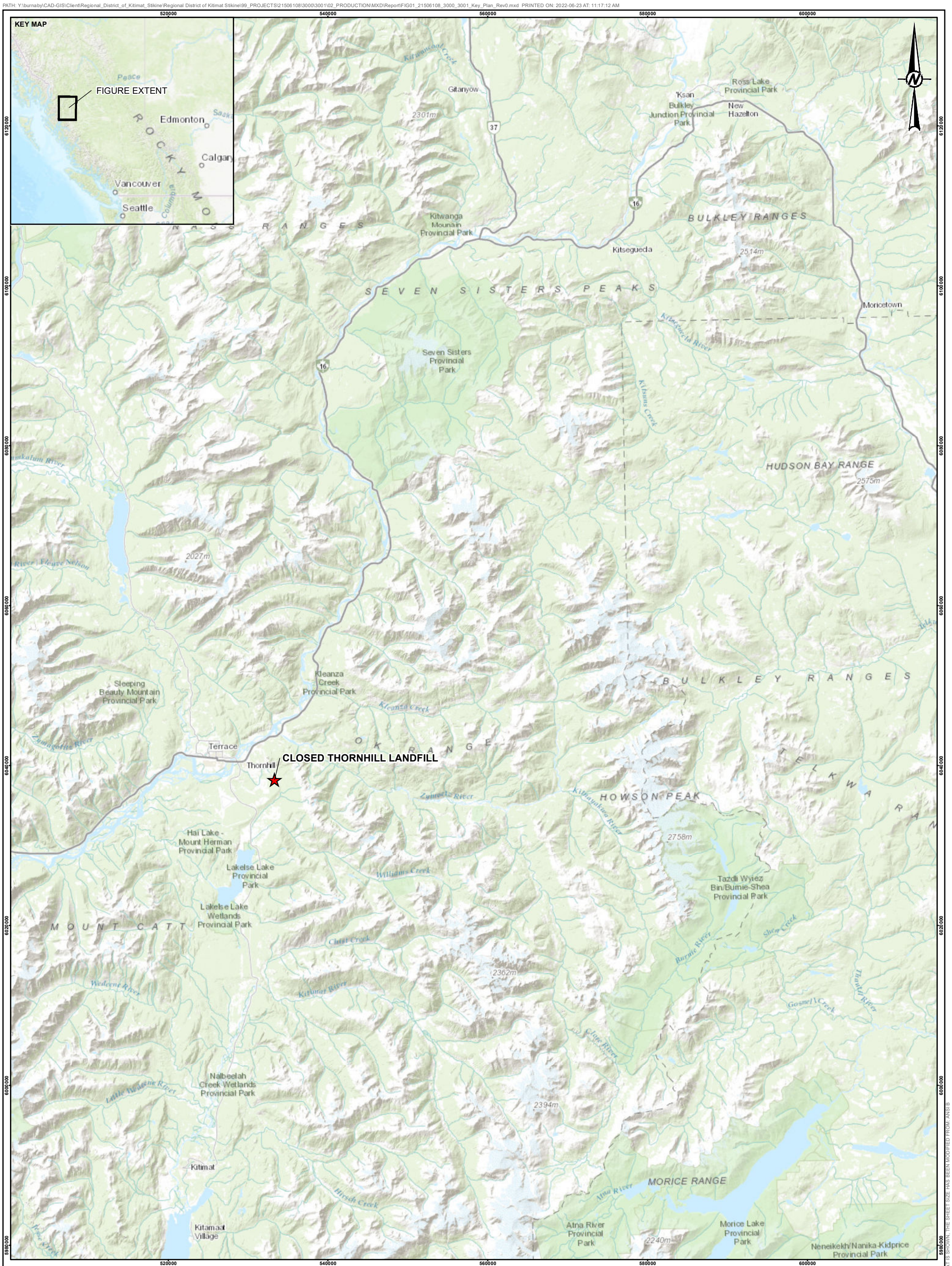


LEGEND

★ SITE LOCATION

REFERENCE(S)

1. TOPOGRAPHIC MAP © ESRI AND ITS LICENSORS. USED UNDER LICENSE, ALL RIGHTS RESERVED.

NOT FOR CONSTRUCTION

0 9 18

1:450,000 KILOMETRES

CLIENT
REGIONAL DISTRICT OF KITIMAT-STIKINE

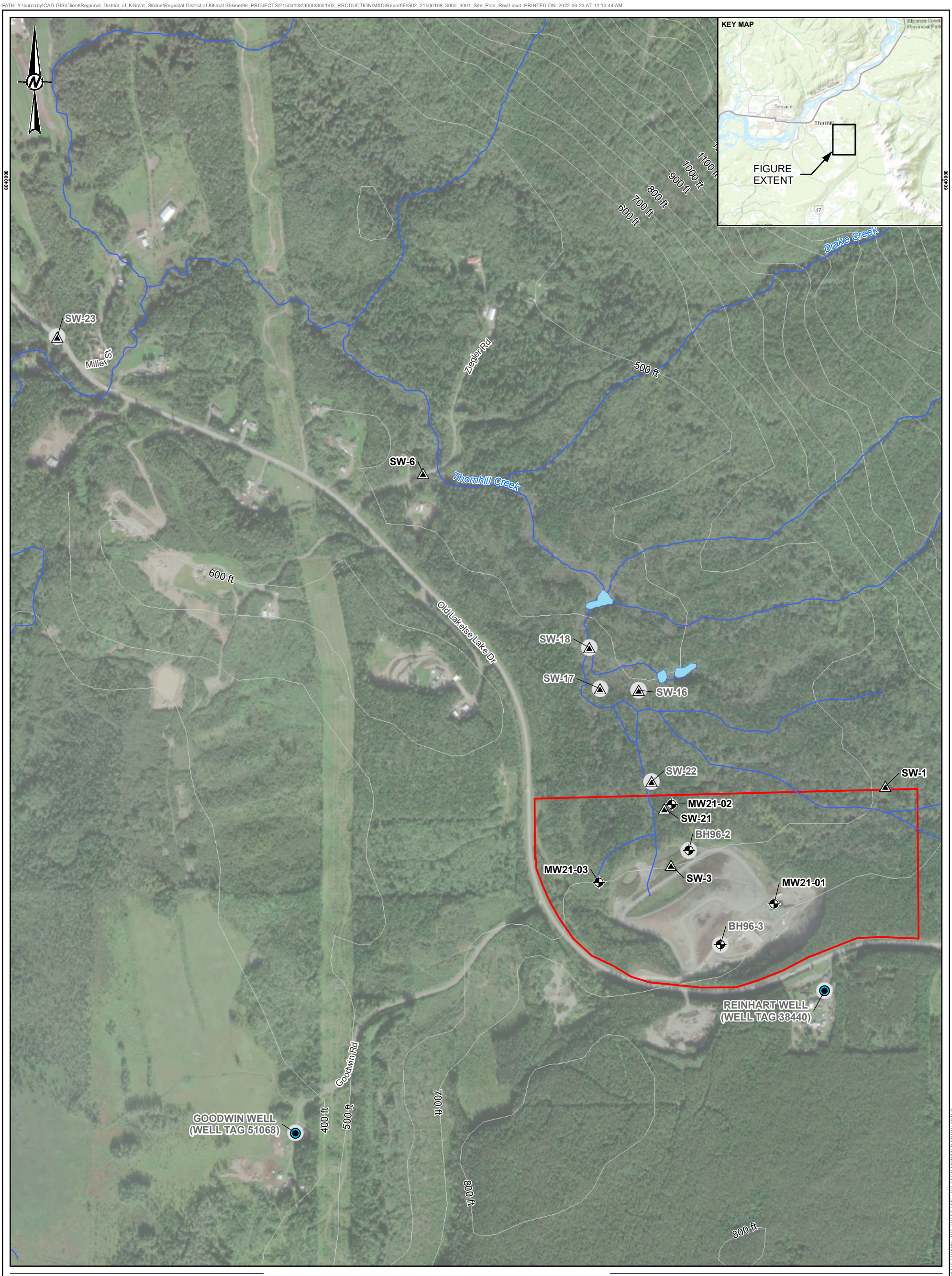
PROJECT
CLOSED THORNHILL LANDFILL
ENVIRONMENTAL EFFECTS MONITORING PROGRAM

CONSULTANT
WSP GOLDER

YYYY-MM-DD	2022-06-23
DESIGNED	LC
PREPARED	LH
REVIEWED	LC
APPROVED	JS

TITLE
KEY PLAN

PROJECT NO.	CONTROL	REV.	FIGURE
21506108	3000/3001	0	1



LEGEND

PROJECT DATA

SAMPLE LOCATIONS

- MONITORING WELL
- SURFACE WATER
- DOMESTIC WATER WELL
- HISTORICAL (DISCONTINUED FROM EEM)
- WATERCOURSE
- SITE BOUNDARY

BASE DATA

- CONTOUR
- WATERBODY

NOT FOR CONSTRUCTION

0 170 340

1:8,500 METRES

NOTE(S)

1. SITE FEATURES ARE APPROXIMATE.

REFERENCE(S)

1. IMAGERY COPYRIGHT © 20200907 ESRI AND ITS LICENSORS. SOURCE: MAXAR. USED UNDER LICENSE, ALL RIGHTS RESERVED.
2. WATERBODY DATA CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENSE – BRITISH COLUMBIA.
3. CONTOUR DATA CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENSE – CANADA.
4. SITE BOUNDARY DATA OBTAINED FROM THE REGIONAL DISTRICT OF KITIMAT-STIKINE ON 2022/05/25 (LEASE_LICENSE_RDKS.SHP).

COORDINATE SYSTEM: NAD 1983 UTM ZONE 9N

CLIENT
REGIONAL DISTRICT OF KITIMAT-STIKINE

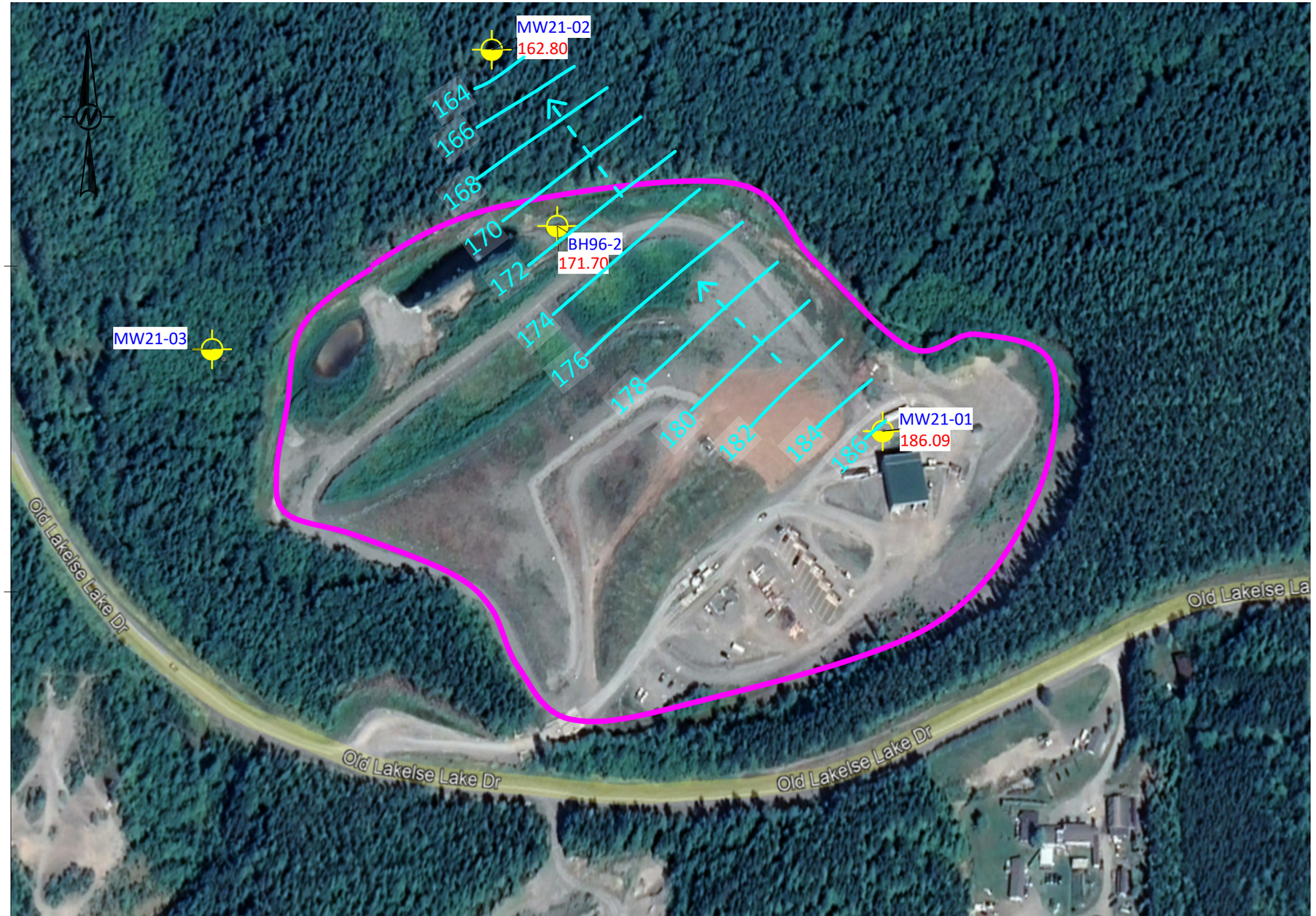
PROJECT
CLOSED THORNHILL LANDFILL
ENVIRONMENTAL EFFECTS MONITORING PROGRAM

CONSULTANT
WSP GOLDER

YYYY-MM-DD	2022-06-23
DESIGNED	LC
PREPARED	LH
REVIEWED	LC
APPROVED	JS

TITLE
SITE PLAN

PROJECT NO.	CONTROL	REV.	FIGURE
21506108	3000/3001	0	2



LEGEND

- MW21-01 — Groundwater Monitoring Well
- 165.51 — Water Level - Monitoring Well (masl)
- 160 — Inferred Water Table Elevation Contours (OCTOBER 2021)
- Approximate Groundwater Flow Direction
- Landfill Area

NOTE(S)

REFERENCE(S)

Base Map: Google Earth (2021).

NOT FOR CONSTRUCTION

0m 100m 200m

CLIENT

Reginal District of Kitimat-Stickie

CONSULTANT

WSP GOLDER

YYYY-MM-DD	2022-06-14
DESIGNED	KQ
PREPARED	KQ
REVIEWED	LC
APPROVED	JS

PROJECT

Closed Thornhill Landfill
Environmental Effects Monitoring Program

TITLE

GROUNDWATER ELEVATIONS OCTOBER 2021

PROJECT NO.	CONTROL	REV.	FIGURE
21506108	3001	0	3

APPENDIX A

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

Ministry of Environment and Climate Change Strategy
Environmental Protection Division
Suite 325 - 1011 4th Avenue
Prince George BC V2L 3H9
Authorizations - North Region
Telephone: (250) 565-6135
Facsimile: (250) 565-6629

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

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

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

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.

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Date amended: December 15, 2020
(most recent)

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for Director, *Environmental Management Act*
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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	Inorganics Total metals, alkalinity (as $CaCO_3$), total and dissolved hardness (as $CaCO_3$), ammonia, fluoride, chloride, conductivity, nitrate, nitrite, total kjeldahl nitrogen, pH, total phosphorus, ortho-phosphorus, total suspended solids, sulphate. Organics	Once per Season: Spring (March- April) Summer (July –Aug.) Fall (October – Nov.)

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	Biological oxygen demand (BOD_5), chemical oxygen demand (COD) Field Parameters 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	Inorganics 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. Organics Chemical oxygen demand (COD), Field Parameters 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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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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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:

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);

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

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)

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

November 18, 2021

Tracking Number: 408661
Authorization Number: 4057

KITIMAT-STIKINE REGIONAL DISTRICT
#300-4545 LAZELLE AVE
TERRACE, BC
V8G 4E1

Dear KITIMAT-STIKINE REGIONAL DISTRICT,

Your application for an Authorization amendment under the Environmental Management Act

In response to your emails dated October 6, 2021 and November 15, 2021, to include addition monitoring wells and to remove the reference to amount of leachate given it is not designed for flow measurement. Pursuant to Section 16(4) of the *Environmental Management Act*, I as Director approve the following changes of Section 5.2 and 6.1D.

From: Section 5.2:

Locations	Parameters	Frequency
BH 96-2 E231889	Inorganics 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. Organics Chemical oxygen demand (COD), Field Parameters Conductivity, pH, water elevation, temperature, dissolved oxygen	Once per Season: Spring (March- April) Summer (July –Aug.) Fall (October – Nov.)

To: Section 5.2:

Locations	Parameters	Frequency
BH 96-2 E231889 MW21-01 MW21-02 MW21-03	Inorganics 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. Organics Chemical oxygen demand (COD), Field Parameters Conductivity, pH, water elevation, temperature, dissolved oxygen	Once per Season: Spring (March- April) Summer (July –Aug.) Fall (October – Nov.)

From: Section 6.1D:
The methods and amounts of leachate collection, treatment and disposal, if applicable

To: Section 6.1D:
The methods of leachate collection, treatment and disposal, if applicable

Please note that although a revised Authorization Document has not been produced at this time a copy of this letter is being placed on the Authorization file, as an addendum to the Authorization, to formally reflect the change.

This Authorization 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 permittee. This Authorization 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 permittee to ensure that all activities conducted under this authorization are carried out with regard to the rights of third parties, and comply with other applicable legislation that may be in force.

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

Yours truly,

Karen Moores, P.Ag.
Section Head, North Authorizations, Municipal and Smelter Sectors
Environmental Protection Division
Ministry of Environment and Climate Change Strategy
email: Karen.Moores@gov.bc.ca

ENCL: None

APPENDIX B

Chemistry Plots

1.0 SURFACE WATER

The following notes apply to Surface Water Figure B-1 to B-5:

- BC WQG = British Columbia Water Quality Guidelines, the most conservative values were used.
- Non-detectable results were plotted at the detection limit without fill.

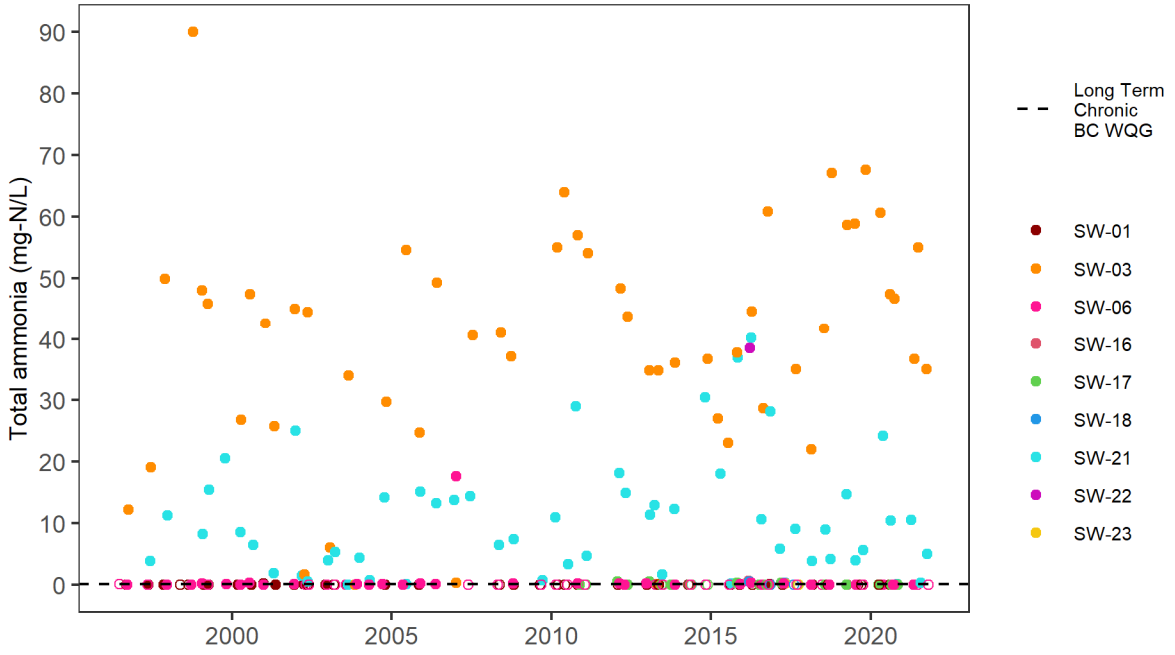

Figure B-1: Temporal plot of total ammonia ground water concentrations, 1996 to 2021.

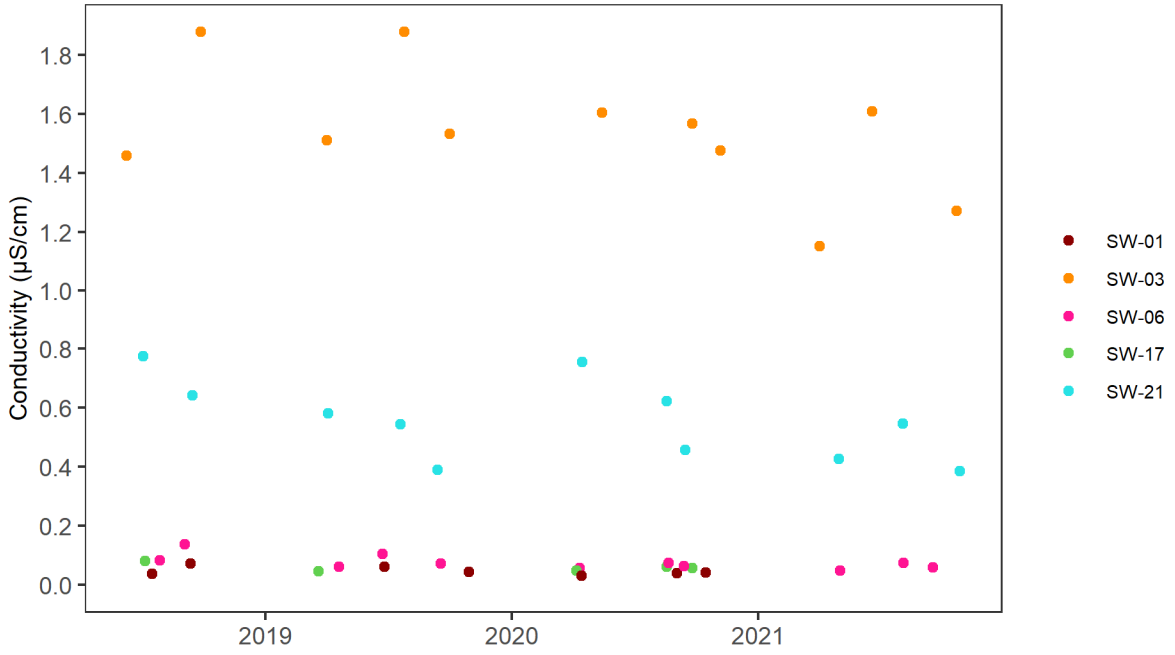

Figure B-2: Temporal plot of conductivity ground water concentrations, 2018 to 2021.

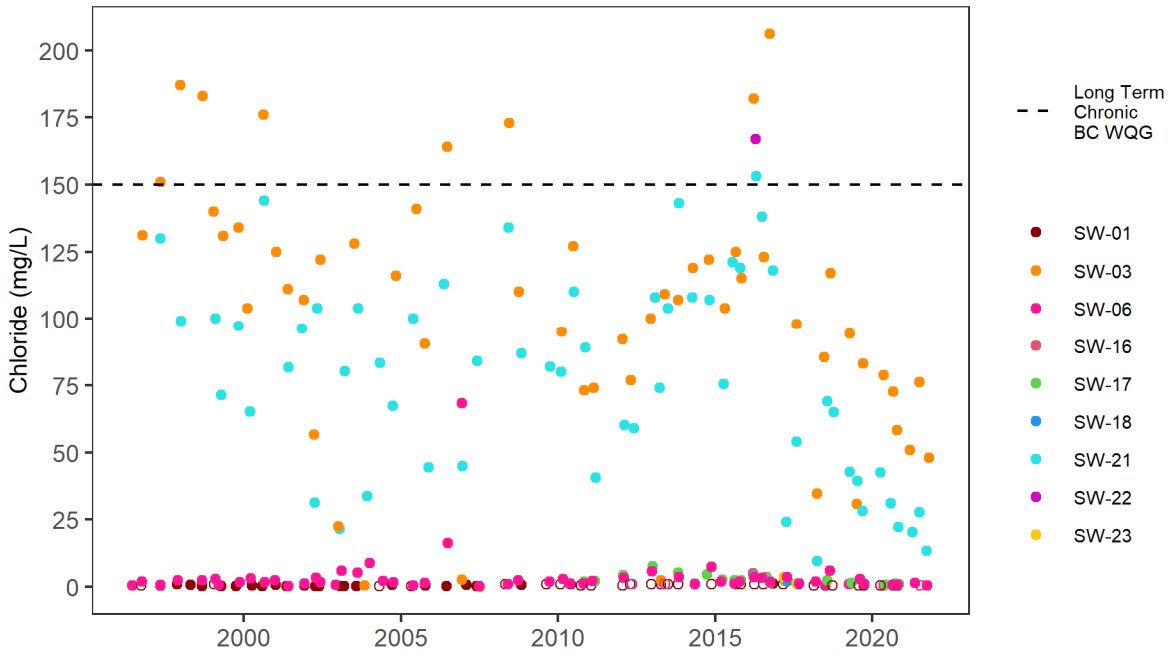

Figure B-3: Temporal plot of chloride ground water concentrations, 1996 to 2021.

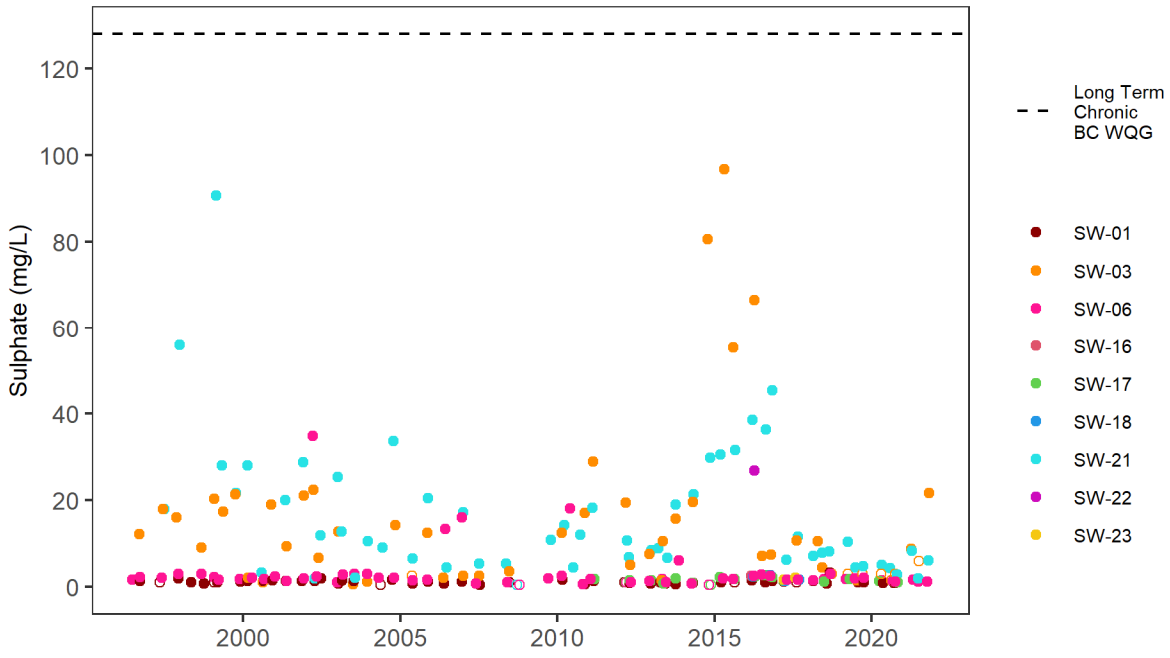

Figure B-4: Temporal plot of sulphate ground water concentrations, 1996 to 2021.

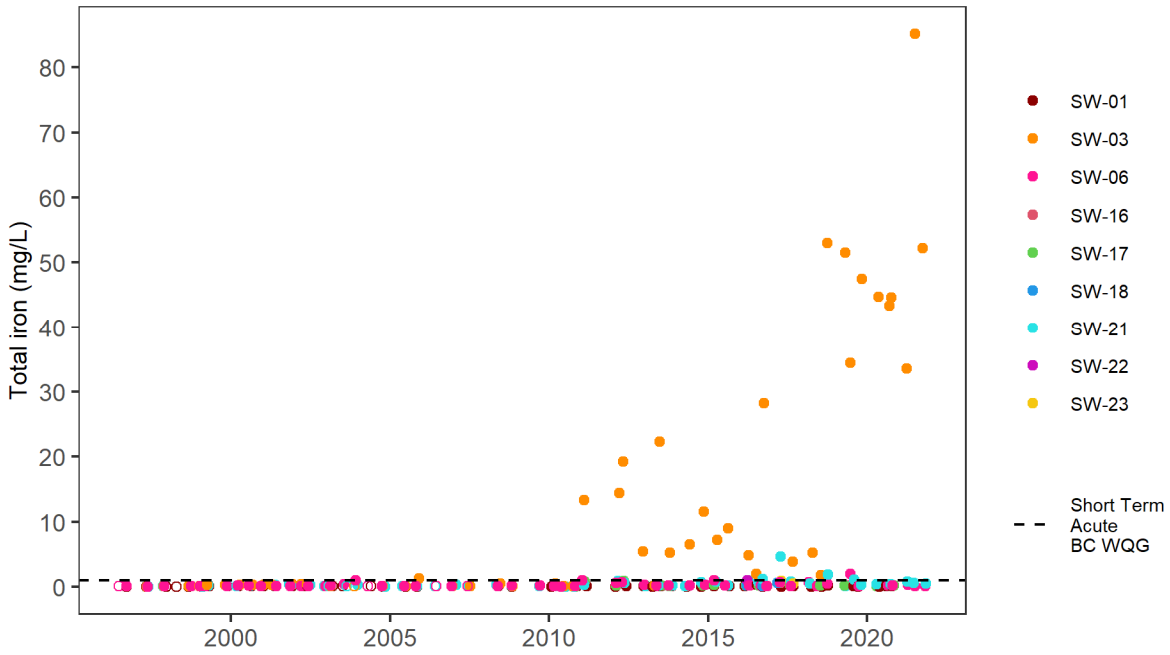

Figure B-5: Temporal plot of total iron ground water concentrations, 1996 to 2021.

2.0 GROUNDWATER

The following notes apply to Ground water Figures B-6 to B-10:

- BC CSR = British Columbia Contaminated Sites Regulation, the most conservative values were used.
- Non-detectable results were plotted at the detection limit without fill.

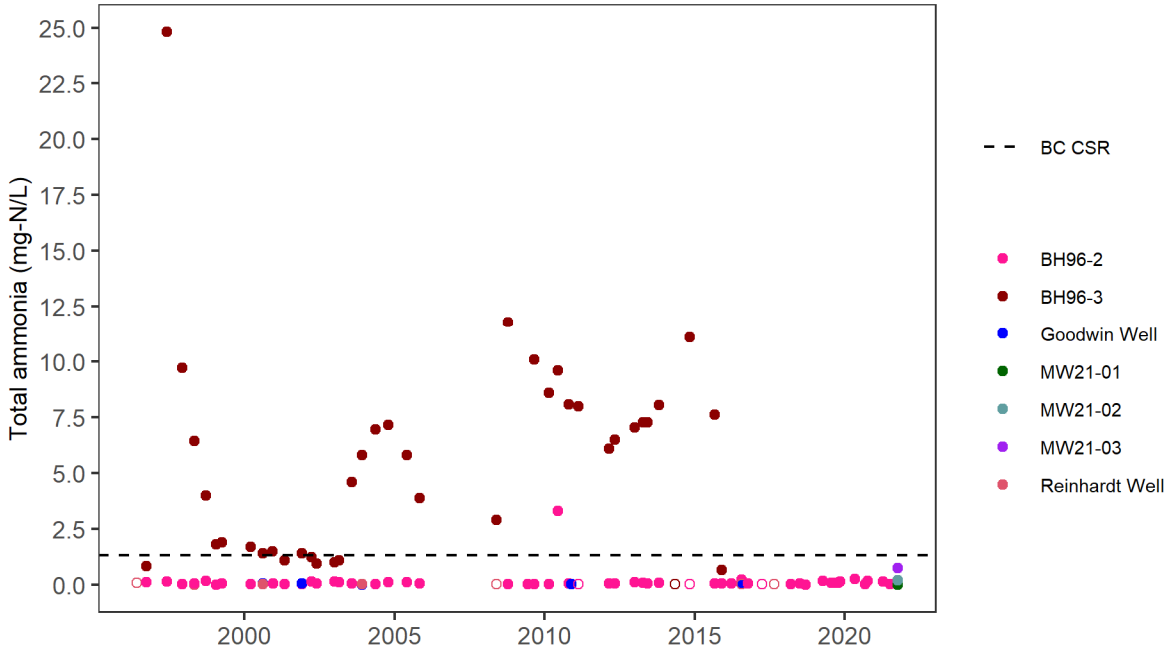

Figure B-6: Temporal plot of total ammonia ground water concentrations, 1996 to 2021.

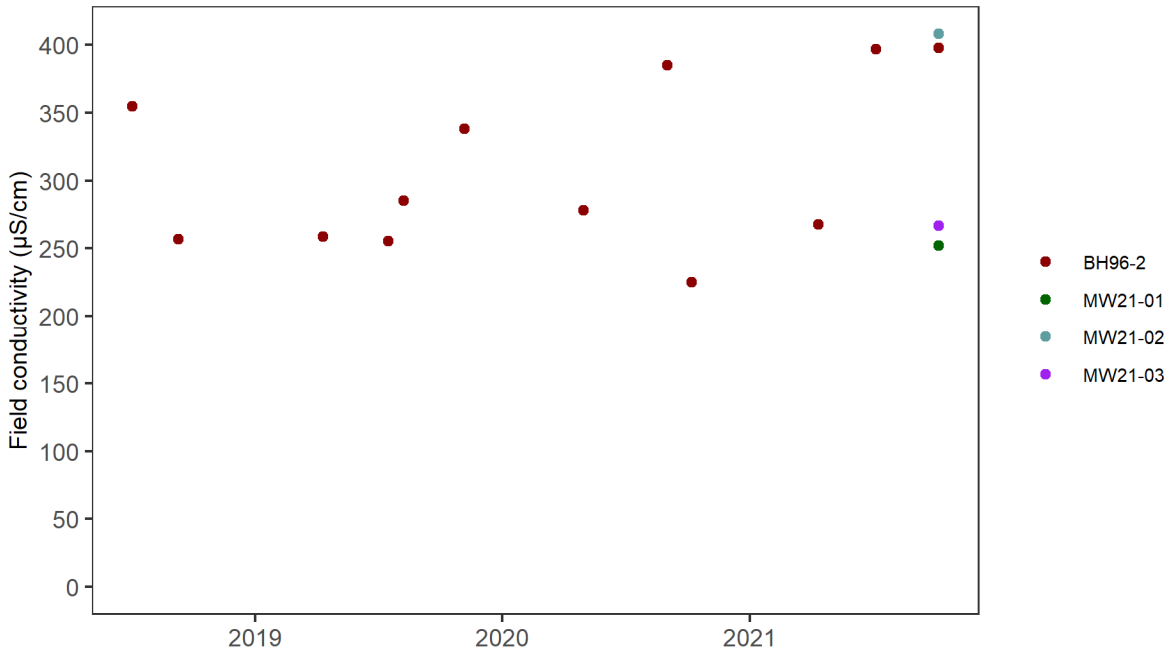

Figure B-7: Temporal plot of field conductivity ground water concentrations, 2018 to 2021.

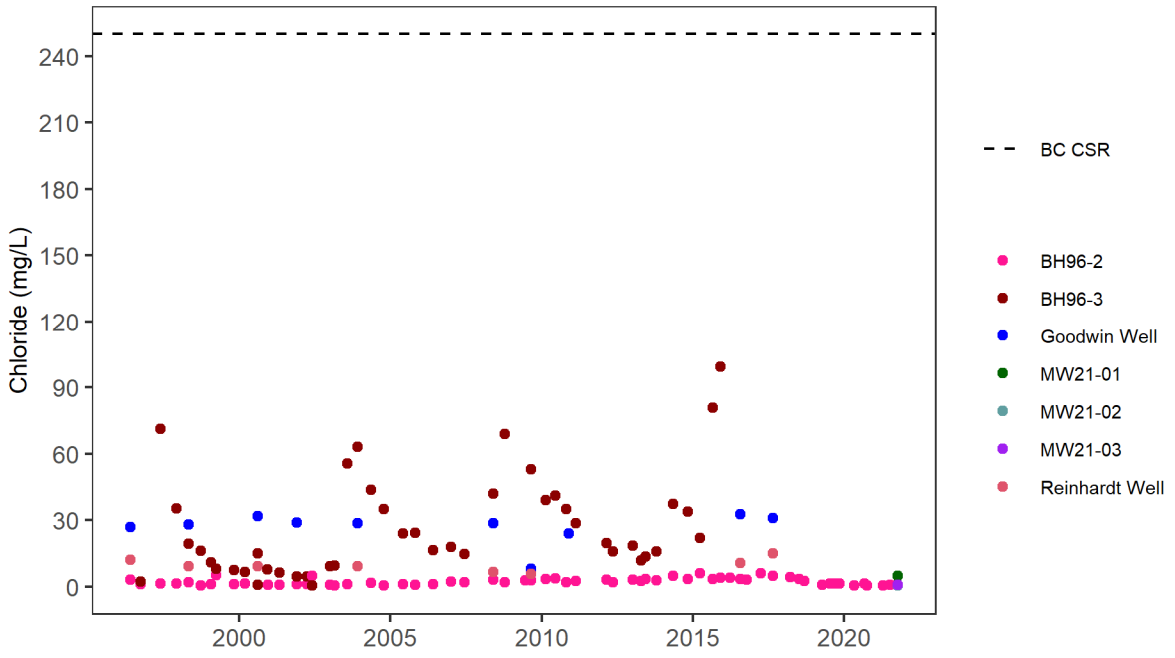

Figure B-8: Temporal plot of chloride ground water concentrations, 1996 to 2021.

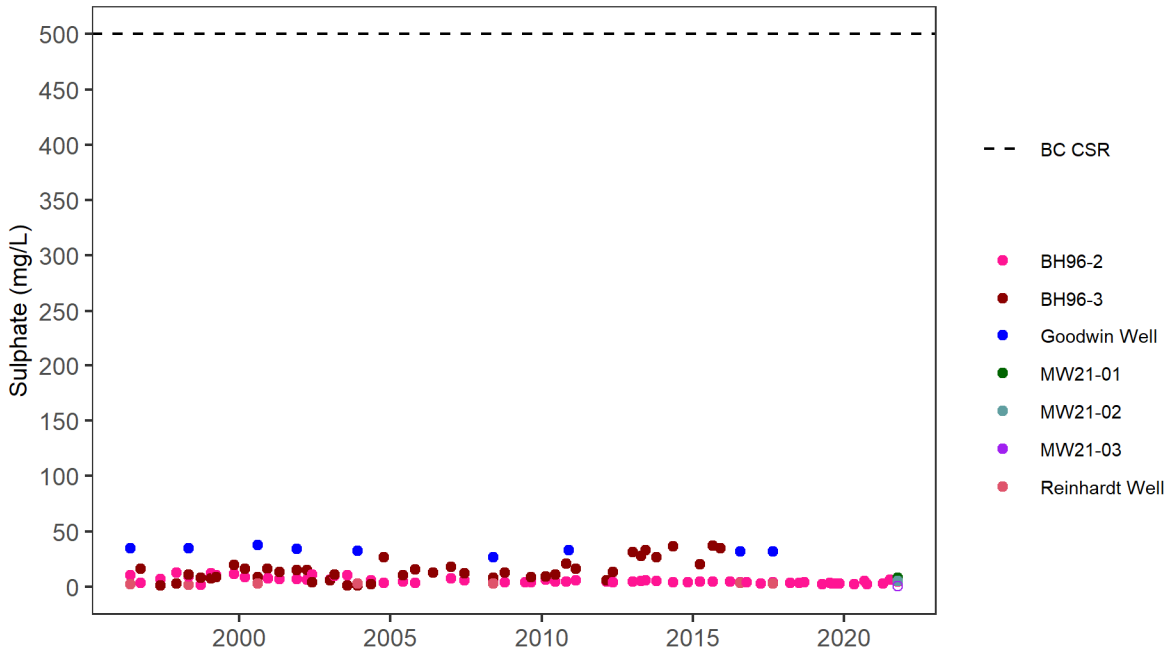

Figure B-9: Temporal plot of sulphate ground water concentrations, 1996 to 2021.

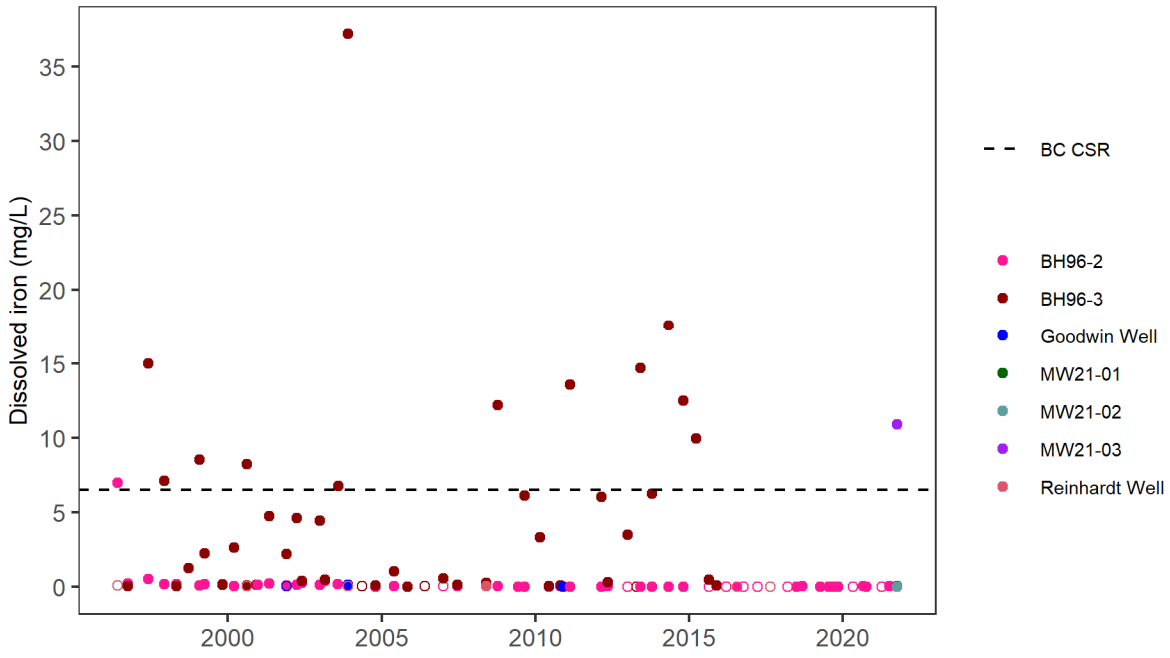

Figure B-10: Temporal plot of dissolved iron ground water concentrations, 1996 to 2021.

APPENDIX C

Analytical Data

1 - Surface Water Data

Appendix C
Results of Surface Water Analyses
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name		SW-1	SW-1B	SW-1	SW-1B	SW-1	SW-1B	SW-1	SW-1B	SW-1	SW-1B	SW-1C	SW-1D
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	1996-10-01	1996-10-01	1997-06-01	1997-06-01	1997-12-04	1997-12-04	1998-05-04	1998-05-04	1998-09-24	1998-09-24	1998-09-24	1998-09-24
Field Measured															
pH	-	6.5 - 9.0	6.5 - 9.0	-	-	-	-	-	-	-	-	-	-	-	-
Temperature	°C	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved oxygen	mg/L	8[a]	5[a]	-	-	-	-	-	-	-	-	-	-	-	-
Conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation reduction potential	mV	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conventional Parameters															
pH, lab	-	6.5 - 9.0	6.5 - 9.0	7.5	-	6.8	-	7.0	-	7.1	-	7.5	7.0	-	-
Specific conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hardness, as $CaCO_3$	mg/L	-	-	26	-	16	-	29	-	15	-	15	34	-	-
Total alkalinity, as $CaCO_3$	mg/L	20[a]	-	-	-	-	-	-	-	-	-	-	-	-	-
Total suspended solids	mg/L	-	-	7.0	-	2.0	-	13	-	3.0	-	<1.0	-	-	-
Conductivity	µS/cm	-	-	60.3	-	42	-	64	-	31	-	28	67	-	-
Hardness, as $CaCO_3$ (Dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Major Ions															
Bromide	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride	mg/L	150	600	<0.5	<0.5	<0.5	<0.5	0.90	0.90	0.80	0.80	0.17	0.17	1.0	1.0
Fluoride	mg/L	-	0.40 - 2.2[b]	-	-	-	-	-	-	-	-	-	-	-	-
Magnesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate	mg/L	128 - 429[b, c]	-	1.4	1.4	<1.0	<1.0	2.0	2.0	1.0	1.0	0.79	0.79	3.0	3.0
Nutrients and Biological Indicators															
Nitrate	mg-N/L	3.0	33	0.029	0.029	0.011	0.011	0.38	0.38	0.018	0.018	0.017	0.017	0.025	0.025
Nitrite	mg-N/L	0.020 - 0.20[d]	0.060 - 0.60[d]	0.0010	0.0010	<0.001	<0.001	0.0050	0.0050	0.0010	0.0010	<0.005	<0.005	0.0010	0.0010
Total ammonia	mg-N/L	0.11 - 2.0[e]	0.74 - 26[f]	0.020	-	0.0090	-	0.040	-	<0.005	-	<0.005	0.0050	-	-
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	-	-
Chemical oxygen demand	mg/L	-	-	<20	-	24	-	<20	-	<10	-	<25	-	-	-
Total Metals															
Aluminum	mg/L	-	-	0.026	-	<0.05	-	0.024	-	0.059	-	0.070	0.016	-	-
Antimony	mg/L	0.0090	-	-	-	<0.2[(DL>Mn)]	<0.2[(DL>Mn)]	<0.0001	<0.0001	<0.0001	<0.0001	<0.05[(DL>Mn)]	<0.05[(DL>Mn)]	<0.0001	<0.0001
Arsenic	mg/L	-	0.005	<0.0001	<0.0001	<0.2[(DL>Mx)]	<0.2[(DL>Mx)]	<0.0001	<0.0001	<0.0001	<0.0001	0.00050	0.00050	<0.0001	<0.0001
Barium	mg/L	1.0	-	0.020	0.020	0.010	0.010	0.020	0.020	0.010	0.010	0.0090	0.0090	0.030	0.030
Beryllium	mg/L	0.00013	-	<0.005[(DL>Mn)]	<0.005[(DL>Mn)]	<0.005[(DL>Mn)]	<0.005[(DL>Mn)]	<0.005[(DL>Mn)]	<0.005[(DL>Mn)]	<0.005[(DL>Mn)]	<0.005[(DL>Mn)]	<0.001[(DL>Mn)]	<0.001[(DL>Mn)]	<0.005[(DL>Mn)]	<0.005[(DL>Mn)]
Bismuth	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	1.2	-	<0.1	<0.1	-	-	-	-	-	-	<0.01	<0.01	-	-
Cadmium	mg/L	-	-	<0.0002	<0.0002	<0.002	<0.002	0.00070	0.00070	<0.0002	<0.0002	<0.005	<0.005	<0.0002	<0.0002
Calcium	mg/L	-	-	9.3	-	5.7	-	10	-	5.3	-	5.3	12	-	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	0.0010[g]	-	<0.001	<0.001	<0.01	<0.01	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.0005	<0.001	<0.001
Cobalt	mg/L	0.0040	0.11	<0.02[(DL>Mn)]	<0.02[(DL>Mn)]	<0.01[(DL>Mn)]	<0.01[(DL>Mn)]	<0.01[(DL>Mn)]	<0.01[(DL>Mn)]	<0.01[(DL>Mn)]	<0.01[(DL>Mn)]	<0.005[(DL>Mn)]	<0.005[(DL>Mn)]	**0.010[(Mn)]**	**0.010[(Mn)]**
Copper	mg/L	-	-	<0.001	<0.001	<0.01	<0.01	<0.001	<0.001	0.0010	0.0010	0.0012	0.0012	0.0010	0.0010
Iron	mg/L	-	1.0	<0.03	-	<0.03	-	<0.03	-	<0.03	-	0.018	<0.03	-	-
Lead	mg/L	0.020[b]	0.0030 - 0.42[b]	<0.001	<0.001	<0.01[(DL>Mn, DL>Mx)]	<0.01[(DL>Mn)]	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.0005	<0.001	<0.001
Lithium	mg/L	-	-	<0.02	-	-	-	-	-	-	-	-	-	-	-
Magnesium	mg/L	-	-	0.64	-	0.39	-	0.79	-	0.40	-	0.40	0.90	-	-
Manganese	mg/L	0.77 - 2.6[b]	0.82 - 3.4[b]	<0.005	-	<0.005	-	0.0060	-	<0.005	-	0.0020	<0.005	-	-
Mercury	mg/L	0.000010	-	<0.00005[(DL>Mn)]	<0.00005[(DL>Mn)]	<0.00005[(DL>Mn)]	<0.00005[(DL>Mn)]	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	-	-
Molybdenum	mg/L	7.6	46	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.01	<0.01	<0.03	<0.03
Nickel	mg/L	0.025 - 0.15[b]	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05
Potassium	mg/L	-	-	-	-	-	-	-	-	-	-	0.50	-	-	-
Rubidium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/L	0.0020	-	<0.0005	<0.0005	<0.01[(DL>Mn)]	<0.01[(DL>Mn)]	<0.0005	<0.0005	<0.0005	<0.0005	<0.05[(DL>Mn)]	<0.05[(DL>Mn)]	<0.0005	<0.0005
Silicon	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver	mg/L	0.000050 - 0.0015[b]	0.00010 - 0.0030[b]	<0.0001[(DL>Mn)]	<0.0001[(DL>Mn)]	<0.001[(DL>Mn, DL>Mx)]	<0.001[(DL>Mn, DL>Mx)]	<0.0001[(DL>Mn)]	<0.0001[(DL>Mn)]	<0.0001[(DL>Mn)]	<0.0001[(DL>Mn)]	<0.01[(DL>Mn, DL>Mx)]	<0.01[(DL>Mn, DL>Mx)]	<0.0001[(DL>Mn)]	<0.0001[(DL>Mn)]
Sodium	mg/L	-	-	<2.0	-	-	-	-	-	-	-	0.80	-	-	-
Strontium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	-	-	0.33	-	0.55	-	-	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	0.00080	-	<0.0001	<0.0001	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.001[(DL>Mn)]	<0.001[(DL>Mn)]	<0.001[(DL>Mn)]	<0.001[(DL>Mn)]
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	mg/L	-	-	<0.01	-	<0.002	-	<0.01	-	<0.003	-	<0.001	<0.001	-	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	0.0085	-	0.000020	0.000020	-	-	0.000010	0.000010	-	-	<0.0005	<0.0005	<0.001	<0.001
Vanadium	mg/L	-	-	<0.03	-	<0.01	-	<0.03	-	<0.003	-	<0.001	<0.001	-	-
Zinc	mg/L	0.0075 - 0.19[b]	0.033 - 0.34[b]	<0.005	<0.005	0.0020	0.0020	<0.005	<0.005	0.0060	0.0060	<0.005	<0.005	<0.012[(DL>Mn)]	<0.012[(DL>Mn)]
Zirconium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Metals															
Aluminum	mg/L	0.0074 - 0.050[h]	0.024 - 0.10[h]	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bismuth	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/L	0.000018 - 0.00046[b]	0.000038 - 0.0028[b]	-	-	-	-	-	-	-	-	-	-	-	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	mg/L	0.002[i]	0.00020 - 0.00046[i]	-	-	-	-	-	-	-	-	-	-	-	-
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	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zirconium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table Notes:
BC WQG = British Columbia Approved (updated December 2021) and Working (updated February 2021) Water Quality Guidelines for the protection of freshwater aquatic life (AW-F)
[a] = guideline is a minimum value.
[b] = guideline is hardness dependent.
[c] = for some samples, water hardness was greater than 250 mg/L.
[d] = guideline is chloride dependent.
[e] & [f] = the ammonia guideline is pH and temperature dependent.
[g] = guideline is for chromium VI.
[h] = guideline is pH dependent.
[i] = guideline for dissolved copper is pH, hardness, and dissolved organic carbon dependent.
[(Mn)] = Exceeds BC WQG long-term chronic (30-day mean)
[(Mx)] = Exceeds BC WQG short-term acute (maximum)
[(DL>Mn)] = Detection Limit exceeds BC WQG 30-day mean
[(DL>Mx)] = Detection Limit exceeds BC WQG maximum
< Indicates parameter was below laboratory equipment detection limit.
- Chemical not analyzed or criteria not defined

Appendix C
Results of Surface Water Analyses
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name		SW-1	SW-1B	SW-1	SW-1B	SW-1	SW-1B	SW-1	SW-1B	SW-1	SW-1B	SW-1	SW-1B
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	1999-01-27	1999-01-27	1999-04-01	1999-04-01	1999-11-01	1999-11-01	2000-03-17	2000-03-17	2000-08-15	2000-08-15	2000-12-20	2000-12-20
Field Measured															
pH	-	6.5 - 9.0	6.5 - 9.0	-	-	-	-	-	-	-	-	-	-	-	-
Temperature	°C	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved oxygen	mg/L	8[a]	5[a]	-	-	-	-	-	-	-	-	-	-	-	-
Conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation reduction potential	mV	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conventional Parameters															
pH, lab	-	6.5 - 9.0	6.5 - 9.0	-	-	-	-	-	-	7.2	-	7.5	-	7.5	-
Specific conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hardness, as $CaCO_3$	mg/L	-	-	29	-	22	-	27	-	29	-	26	-	27	-
Total alkalinity, as $CaCO_3$	mg/L	20[a]	-	-	-	-	-	-	-	-	-	-	-	-	-
Total suspended solids	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conductivity	µS/cm	-	-	-	-	40.8	-	-	-	55	-	-	-	-	-
Hardness, as $CaCO_3$ (Dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Major Ions															
Bromide	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride	mg/L	150	600	<1.0	<1.0	0.30	0.30	0.30	0.30	0.40	0.40	0.30	0.30	0.60	0.60
Fluoride	mg/L	-	0.40 - 2.2[b]	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Magnesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate	mg/L	128 - 429[b, c]	-	<1.0	<1.0	1.0	1.0	1.2	1.2	1.4	1.4	1.3	1.3	1.5	1.5
Nutrients and Biological Indicators															
Nitrate	mg-N/L	3.0	33	0.080	0.080	<0.05	<0.05	0.10	0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Nitrite	mg-N/L	0.020 - 0.20[d]	0.060 - 0.60[d]	<0.005	<0.005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Total ammonia	mg-N/L	0.11 - 2.0[e]	0.74 - 26[f]	<0.005	-	0.020	-	-	-	0.040	-	0.050	-	0.20	-
Total Kjeldahl Nitrogen	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total phosphorus	mg-P/L	-	-	-	-	-	-	-	-	<0.01	-	<0.01	-	0.060	-
Dissolved phosphorus	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Orthophosphate	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Biochemical oxygen demand	mg/L	-	-	<10	-	<10	-	<10	-	<10	-	<10	-	<10	-
Chemical oxygen demand	mg/L	-	-	<25	-	<25	-	<25	-	-	-	<25	-	<25	-
Total Metals															
Aluminum	mg/L	-	-	<0.02	-	0.028	-	0.029	-	2.3	-	0.017	-	0.023	-
Antimony	mg/L	0.0090	-	<0.015[(DL>Mn)]	<0.015[(DL>Mn)]	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Arsenic	mg/L	-	0.005	<0.04[(DL>Mx)]	<0.04[(DL>Mx)]	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Barium	mg/L	1.0	-	0.018	0.018	0.013	0.013	0.017	0.017	0.15	0.15	0.015	0.015	0.017	0.017
Beryllium	mg/L	0.00013	-	<0.001[(DL>Mn)]	<0.001[(DL>Mn)]	<0.001[(DL>Mn)]	<0.001[(DL>Mn)]	<0.001[(DL>Mn)]	<0.001[(DL>Mn)]	<0.001[(DL>Mn)]	<0.001[(DL>Mn)]	<0.001[(DL>Mn)]	<0.001[(DL>Mn)]	<0.001[(DL>Mn)]	<0.001[(DL>Mn)]
Bismuth	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	1.2	-	<0.008	<0.008	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Cadmium	mg/L	-	-	<0.0001	<0.0001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Calcium	mg/L	-	-	10	-	7.8	-	9.5	-	10	-	9.4	-	9.4	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	0.0010[g]	-	<0.002[(DL>Mn)]	<0.002[(DL>Mn)]	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cobalt	mg/L	0.0040	0.11	0.0040	0.0040	<0.001	<0.001	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	mg/L	-	-	0.0020	0.0020	0.0010	0.0010	0.0010	0.0010	0.019	0.019	0.0010	0.0010	0.0010	0.0010
Iron	mg/L	-	1.0	0.021	-	<0.05	-	<0.05	-	0.060	-	<0.05	-	<0.05	-
Lead	mg/L	0.020[b]	0.0030 - 0.42[b]	<0.02[(DL>Mn, DL>Mx)]	<0.02[(DL>Mn)]	<0.001	<0.001	<0.001	<0.001	**0.015[(Mn)]**	**0.015[(Mn)]**	<0.001	<0.001	<0.001	<0.001
Lithium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Magnesium	mg/L	-	-	0.77	-	0.59	-	0.75	-	0.081	-	0.59	-	0.75	-
Manganese	mg/L	0.77 - 2.6[b]	0.82 - 3.4[b]	0.0070	-	0.0010	-	0.0040	-	0.0050	-	0.014	-	0.0010	-
Mercury	mg/L	0.000010	-	<0.00005[(DL>Mn)]	<0.00005[(DL>Mn)]	<0.00005[(DL>Mn)]	<0.00005[(DL>Mn)]	<0.00005[(DL>Mn)]	<0.00005[(DL>Mn)]	<0.00005[(DL>Mn)]	<0.00005[(DL>Mn)]	<0.00005[(DL>Mn)]	<0.00005[(DL>Mn)]	<0.00005[(DL>Mn)]	<0.00005[(DL>Mn)]
Molybdenum	mg/L	7.6	46	<0.004	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Nickel	mg/L	0.025 - 0.15[b]	-	<0.008	<0.008	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	**0.060[(Mn)]**	**0.060[(Mn)]**
Potassium	mg/L	-	-	0.80	-	0.54	-	0.67	-	0.071	-	0.56	-	0.68	-
Rubidium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/L	0.0020	-	<0.001	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Silicon	mg/L	-	-	-	-	-	-	-	-	4.0	-	5.5	-	5.4	-
Silver	mg/L	0.000050 - 0.0015[b]	0.00010 - 0.0030[b]	<0.0001[(DL>Mn)]	<0.0001[(DL>Mn)]	<0.0001[(DL>Mn)]	<0.0001[(DL>Mn)]	<0.0001[(DL>Mn)]	<0.0001	<0.0001[(DL>Mn)]	<0.0001[(DL>Mn)]	<0.0001[(DL>Mn)]	<0.0001[(DL>Mn)]	<0.0001[(DL>Mn)]	<0.0001[(DL>Mn)]
Sodium	mg/L	-	-	1.2	-	0.91	-	0.96	-	1.2	-	1.0	-	0.57	-
Strontium	mg/L	-	-	-	-	-	-	-	-	0.042	-	0.042	-	0.036	-
Sulphur	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	0.00080	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
Titanium	mg/L	-	-	0.0010	-	0.0010	-	0.0010	-	0.0010	-	<0.001	-	<0.001	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	0.0085	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Vanadium	mg/L	-	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
Zinc	mg/L	0.0075 - 0.19[b]	0.033 - 0.34[b]	**0.012[(Mn)]**	**0.012[(Mn)]**	0.0060	0.0060	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	**0.0080[(Mn)]**	**0.0080[(Mn)]**
Zirconium	mg/L	-	-	<0.01	-	<0.01	-	<0.01	-	<0.01	-	<0.01	-	<0.01	-
Dissolved Metals															
Aluminum	mg/L	0.0074 - 0.050[(h)]	0.024 - 0.10[(h)]	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bismuth	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/L	0.000018 - 0.00046[b]	0.000038 - 0.0028[b]	-	-	-	-	-	-	-	-	-	-	-	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	mg/L	0.002[(i)]	0.00020 - 0.00046[(i)]	-	-	-	-	-	-	-	-	-	-	-	-
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	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zirconium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table Notes:
BC WQG = British Columbia Approved (updated December 2021) and Working (updated February 2021) Water Quality Guidelines for the protection of freshwater aquatic life (AW-F)
[a] = guideline is a minimum value.
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[c] = for some samples, water hardness was greater than 250 mg/L.
[d] = guideline is chloride dependent.
[e] & [f] = the ammonia guideline is pH and temperature dependent.
[g] = guideline is for chromium VI.
[h] = guideline is pH dependent.
[i] = guideline for dissolved copper is pH, hardness, and dissolved organic carbon dependent.
[Mn] = Exceeds BC WQG long-term chronic (30-day mean)
[Mx] = Exceeds BC WQG short-term acute (maximum)
[DL>Mn] = Detection Limit exceeds BC WQG 30-day mean
[DL>Mx] = Detection Limit exceeds BC WQG maximum
< Indicates parameter was below laboratory equipment detection limit.
- Chemical not analyzed or criteria not defined

Appendix C
Results of Surface Water Analyses
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name		SW-1	SW-1B	SW-1	SW-1B	SW-1	SW-1B	SW-1	SW-1B	SW-1	SW-1B	SW-1	SW-1B
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	2001-05-07	2001-05-07	2001-12-01	2001-12-01	2002-04-01	2002-04-01	2002-06-01	2002-06-01	2003-01-01	2003-01-01	2003-03-01	2003-03-01
Field Measured															
pH	-	6.5 - 9.0	6.5 - 9.0	-	-	-	-	-	-	-	-	-	-	-	-
Temperature	°C	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved oxygen	mg/L	8[a]	5[a]	-	-	-	-	-	-	-	-	-	-	-	-
Conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation reduction potential	mV	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conventional Parameters															
pH, lab	-	6.5 - 9.0	6.5 - 9.0	**6.4 (Mn, Mx)**	-	6.7	-	7.5	-	**5.1 (Mn, Mx)**	-	6.8	-	7.0	7.1
Specific conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hardness, as $CaCO_3$	mg/L	-	-	25	-	22	-	25	-	14	-	14	-	24	-
Total alkalinity, as $CaCO_3$	mg/L	20[a]	-	-	-	-	-	-	-	-	-	-	-	-	-
Total suspended solids	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	<4.0	-
Conductivity	µS/cm	-	-	59	-	53	-	1100	-	35	-	31	-	58	65
Hardness, as $CaCO_3$ (Dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Major Ions															
Bromide	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride	mg/L	150	600	0.30	0.30	0.40	0.40	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Fluoride	mg/L	-	0.40 - 2.2[b]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Magnesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate	mg/L	128 - 429[b, c]	-	1.3	1.3	1.3	1.3	1.3	1.3	1.9	1.9	0.70	0.70	1.5	1.5
Nutrients and Biological Indicators															
Nitrate	mg-N/L	3.0	33	<0.05	<0.05	0.060	0.060	0.23	0.23	<0.05	<0.05	0.14	0.14	0.080	0.080
Nitrite	mg-N/L	0.020 - 0.20[d]	0.060 - 0.60[d]	0.0040	0.0040	<0.002	<0.002	**0.23 (Mn, Mx)**	**0.23 (Mn, Mx)**	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Total ammonia	mg-N/L	0.11 - 2.0[e]	0.74 - 26[f]	0.030	-	0.030	-	0.087	-	<0.005	-	0.030	-	<0.01	<0.005
Total Kjeldahl Nitrogen	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total phosphorus	mg-P/L	-	-	0.040	-	0.020	-	0.050	-	0.10	-	0.030	-	0.060	-
Dissolved phosphorus	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Orthophosphate	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Biochemical oxygen demand	mg/L	-	-	<10	-	<10	-	<10	-	<6.0	-	<10	-	<10	<10
Chemical oxygen demand	mg/L	-	-	<25	-	<25	-	<25	-	<10	-	<25	-	<25	11
Total Metals															
Aluminum	mg/L	-	-	0.026	-	0.019	-	0.040	-	0.041	-	0.068	-	0.022	0.024
Antimony	mg/L	0.0090	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Arsenic	mg/L	-	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
Barium	mg/L	1.0	-	0.017	0.017	0.013	0.013	0.015	0.015	0.010	0.010	0.010	0.010	0.015	0.015
Beryllium	mg/L	0.00013	-	<0.001 (DL>Mn)	<0.001 (DL>Mn)	<0.001 (DL>Mn)	<0.001 (DL>Mn)	<0.001 (DL>Mn)	<0.001 (DL>Mn)	<0.001 (DL>Mn)	<0.001 (DL>Mn)	<0.001 (DL>Mn)	<0.001 (DL>Mn)	<0.001 (DL>Mn)	<0.001 (DL>Mn)
Bismuth	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	1.2	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.080	0.080	<0.05	<0.05	<0.005	<0.005
Cadmium	mg/L	-	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0014	0.0014	<0.0002	<0.0002	<0.0002	<0.0002
Calcium	mg/L	-	-	8.8	-	7.7	-	8.7	-	4.9	-	4.8	-	8.5	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	0.0010[g]	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cobalt	mg/L	0.0040	0.11	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	mg/L	-	-	<0.001	<0.001	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	-	-	0.008	0.008
Iron	mg/L	-	1.0	<0.05	-	<0.05	-	0.060	-	0.070	-	<0.05	-	<0.05	-
Lead	mg/L	0.020[b]	0.0030 - 0.42[b]	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Lithium	mg/L	-	-	-	-	-	-	-	-	<0.001	-	<0.001	-	<0.001	0.00032
Magnesium	mg/L	-	-	0.73	-	0.64	-	0.83	-	0.40	-	0.45	-	0.81	-
Manganese	mg/L	0.77 - 2.6[b]	0.82 - 3.4[b]	<0.001	-	0.0040	-	0.0030	-	0.0030	-	0.018	-	0.0030	0.0028
Mercury	mg/L	0.000010	-	<0.00005 (DL>Mn)	<0.00005 (DL>Mn)	<0.00002 (DL>Mn)	<0.00002 (DL>Mn)	<0.00002 (DL>Mn)	<0.00002 (DL>Mn)	<0.00002 (DL>Mn)	<0.00002 (DL>Mn)	<0.00002 (DL>Mn)	<0.00002 (DL>Mn)	<0.00002 (DL>Mn)	<0.00002 (DL>Mn)
Molybdenum	mg/L	7.6	46	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.0014	0.0014
Nickel	mg/L	0.025 - 0.15[b]	-	0.0020	0.0020	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Potassium	mg/L	-	-	1.5	-	0.59	-	0.76	-	0.51	-	0.54	-	0.80	-
Rubidium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/L	0.0020	-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Silicon	mg/L	-	-	13	-	5.4	-	5.1	-	2.4	-	0.35	-	4.6	-
Silver	mg/L	0.000050 - 0.0015[b]	0.00010 - 0.0030[b]	<0.0001 (DL>Mn)	<0.0001 (DL>Mn)	<0.0001 (DL>Mn)	<0.0001 (DL>Mn)	<0.0001 (DL>Mn)	<0.0001 (DL>Mn)	<0.0001 (DL>Mn)	<0.0001 (DL>Mn)	<0.0001 (DL>Mn)	<0.0001 (DL>Mn)	<0.0001 (DL>Mn)	<0.0001 (DL>Mn)
Sodium	mg/L	-	-	1.0	-	0.86	-	1.1	-	0.73	-	0.62	-	1.3	-
Strontium	mg/L	-	-	0.17	-	0.031	-	0.033	-	0.20	-	0.020	-	0.032	0.041
Sulphur	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	0.00080	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.000002	<0.000002	<0.0001	<0.0001	<0.0001	<0.0001
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	<0.001	-	<0.001	-	<0.001	-	0.000010	-	<0.001	-	<0.001	0.000030
Titanium	mg/L	-	-	<0.001	-	<0.001	-	<0.001	-	-	-	<0.001	-	<0.001	0.0030
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	0.0085	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.000016	0.000016	<0.0005	<0.0005	<0.0005	<0.0005
Vanadium	mg/L	-	-	<0.001	-	<0.001	-	<0.001	-	0.00030	-	<0.001	-	<0.001	0.00029
Zinc	mg/L	0.0075 - 0.19[b]	0.033 - 0.34[b]	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.0046	0.0046	<0.005	<0.005	<0.005	<0.005
Zirconium	mg/L	-	-	0.0080	-	<0.01	-	<0.01	-	-	-	<0.01	-	<0.01	0.0050
Dissolved Metals															
Aluminum	mg/L	0.0074 - 0.050[h]	0.024 - 0.10[h]	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bismuth	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/L	0.000018 - 0.00046[b]	0.000038 - 0.0028[b]	-	-	-	-	-	-	-	-	-	-	-	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	mg/L	0.002[i]	0.00020 - 0.00046[i]	-	-	-	-	-	-	-	-	-	-	-	-
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	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zirconium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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[g] = guideline is for chromium VI.
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- Chemical not analyzed or criteria not defined

Appendix C
Results of Surface Water Analyses
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name		SW-1C	SW-1D	SW-1	SW-1B	SW-1	SW-1B	SW-1	SW-1B	SW-1	SW-1B	SW-1	SW-1B
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	2003-03-01	2003-03-01	2003-08-03	2003-08-03	2004-05-14	2004-05-14	2004-10-18	2004-10-18	2005-06-01	2005-06-01	2005-11-01	2005-11-01
Field Measured															
pH	-	6.5 - 9.0	6.5 - 9.0	-	-	-	-	-	-	-	-	-	-	-	-
Temperature	°C	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved oxygen	mg/L	8[a]	5[a]	-	-	-	-	-	-	-	-	-	-	-	-
Conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation reduction potential	mV	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conventional Parameters															
pH, lab	-	6.5 - 9.0	6.5 - 9.0	-	-	7.5	-	6.9	-	6.3[Mn, Mx]	-	7.3	-	6.6	-
Specific conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hardness, as $CaCO_3$	mg/L	-	-	-	-	30	-	16	-	29	-	18	-	28	-
Total alkalinity, as $CaCO_3$	mg/L	20[a]	-	-	-	-	-	-	-	-	-	-	-	-	-
Total suspended solids	mg/L	-	-	-	-	-	-	-	-	<4.0	-	-	-	<4.0	-
Conductivity	µS/cm	-	-	-	-	83	-	31	-	58	-	42	-	55	-
Hardness, as $CaCO_3$ (Dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Major Ions															
Bromide	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride	mg/L	150	600	<0.5	<0.5	0.30	0.30	<0.2	<0.2	0.60	0.60	<0.2	<0.2	0.50	0.50
Fluoride	mg/L	-	0.40 - 2.2[b]	-	-	<0.05	<0.05	<0.3	<0.3	-	-	<0.05	<0.05	-	-
Magnesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate	mg/L	128 - 429[b, c]	-	1.3	1.3	1.4	1.4	<0.4	<0.4	1.6	1.6	0.78	0.78	1.2	1.2
Nutrients and Biological Indicators															
Nitrate	mg-N/L	3.0	33	0.060	0.060	<0.05	<0.05	<0.05	<0.05	0.035	0.035	0.080	0.080	0.027	0.027
Nitrite	mg-N/L	0.020 - 0.20[d]	0.060 - 0.60[d]	0.0030	0.0030	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.0030	0.0030
Total ammonia	mg-N/L	0.11 - 2.0[e]	0.74 - 26[f]	-	-	0.030	-	0.020	-	0.0050	-	0.030	-	0.0050	-
Total Kjeldahl Nitrogen	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total phosphorus	mg-P/L	-	-	-	-	0.090	-	<0.15	-	0.10	-	<0.03	-	<0.1	-
Dissolved phosphorus	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Orthophosphate	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Biochemical oxygen demand	mg/L	-	-	-	-	<10	-	-	-	-	-	-	-	-	-
Chemical oxygen demand	mg/L	-	-	-	-	<20	-	27	-	-	-	-	-	-	-
Total Metals															
Aluminum	mg/L	-	-	-	-	0.018	-	0.051	-	0.032	-	0.035	-	0.035	-
Antimony	mg/L	0.0090	-	0.000027	0.000027	<0.001	<0.001	<0.001	<0.001	0.000011	0.000011	<0.0002	<0.0002	0.0000050	0.0000050
Arsenic	mg/L	-	0.005	0.00010	0.00010	<0.001	<0.001	<0.001	<0.001	0.00010	0.00010	<0.0002	<0.0002	0.00010	0.00010
Barium	mg/L	1.0	-	0.020	0.020	0.024	0.024	0.010	0.010	0.017	0.017	0.011	0.011	0.015	0.015
Beryllium	mg/L	0.00013	-	<0.00002	<0.00002	<0.001[DL>Mn]	<0.001[DL>Mn]	<0.001[DL>Mn]	<0.001[DL>Mn]	0.000020	0.000020	<0.0002[DL>Mn]	<0.0002[DL>Mn]	<0.00002	<0.00002
Bismuth	mg/L	-	-	-	-	<0.001	-	<0.001	-	0.000020	-	<0.0002	-	<0.00002	-
Boron	mg/L	1.2	-	-	-	<0.05	<0.05	<0.05	<0.05	0.0080	0.0080	<0.01	<0.01	<0.008	<0.008
Cadmium	mg/L	-	-	<0.00001	<0.00001	<0.0002	<0.0002	<0.0002	<0.0002	0.000010	0.000010	<0.00004	<0.00004	<0.00001	<0.00001
Calcium	mg/L	-	-	-	-	11	-	5.5	-	10	-	6.1	-	10	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	0.0010[g]	-	<0.0002	<0.0002	<0.001	<0.001	<0.001	<0.001	0.00020	0.00020	<0.0002	<0.0002	<0.0002	<0.0002
Cobalt	mg/L	0.0040	0.11	0.000044	0.000044	<0.001	<0.001	<0.001	<0.001	0.000026	0.000026	<0.0002	<0.0002	0.000018	0.000018
Copper	mg/L	-	-	0.00075	0.00075	<0.001	<0.001	<0.001	<0.001	0.00077	0.00077	0.00060	0.00060	0.00073	0.00073
Iron	mg/L	-	1.0	-	-	<0.05	-	<0.05	-	0.015	-	<0.01	-	0.014	-
Lead	mg/L	0.020[b]	0.0030 - 0.42[b]	0.000080	0.000080	<0.001	<0.001	<0.001	<0.001	0.000010	0.000010	<0.0002	<0.0002	<0.00001	<0.00001
Lithium	mg/L	-	-	-	-	<0.001	-	<0.001	-	0.000050	-	<0.0002	-	<0.00005	-
Magnesium	mg/L	-	-	-	-	0.86	-	0.45	-	0.77	-	0.56	-	0.66	-
Manganese	mg/L	0.77 - 2.6[b]	0.82 - 3.4[b]	-	-	0.0090	-	0.0050	-	0.0019	-	0.0042	-	0.0015	-
Mercury	mg/L	0.000010	-	-	-	<0.00002[DL>Mn]	<0.00002[DL>Mn]	<0.02[DL>Mn]	<0.02[DL>Mn]	0.000050[Mn]	0.000050[Mn]	<0.02[DL>Mn]	<0.02[DL>Mn]	<0.00005[DL>Mn]	<0.00005[DL>Mn]
Molybdenum	mg/L	7.6	46	0.00064	0.00064	<0.0005	<0.0005	<0.0005	<0.0005	0.00034	0.00034	<0.0001	<0.0001	0.00029	0.00029
Nickel	mg/L	0.025 - 0.15[b]	-	<0.00005	<0.00005	<0.001	<0.001	<0.001	<0.001	0.00023	0.00023	0.00030	0.00030	<0.00005	<0.00005
Potassium	mg/L	-	-	-	-	0.98	-	0.50	-	2.0	-	0.60	-	<1.0	-
Rubidium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/L	0.0020	-	<0.0002	<0.0002	<0.001	<0.001	<0.001	<0.001	0.00020	0.00020	<0.0002	<0.0002	<0.0002	<0.0002
Silicon	mg/L	-	-	-	-	5.2	-	4.1	-	-	-	4.8	-	-	-
Silver	mg/L	0.000050 - 0.0015[b]	0.00010 - 0.0030[b]	<0.00002	<0.00002	<0.0001[DL>Mn]	<0.0001[DL>Mn]	<0.00025[DL>Mn, DL>Mx]	<0.00025[DL>Mn, DL>Mx]	0.000020	0.000020	<0.00005	<0.00005	<0.00002	<0.00002
Sodium	mg/L	-	-	-	-	1.1	-	0.67	-	1.5	-	1.1	-	1.1	-
Strontium	mg/L	-	-	-	-	0.045	-	0.021	-	0.036	-	0.025	-	0.033	-
Sulphur	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	0.50	-	-	-	0.40	-	-	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	0.00080	-	0.0000020	0.0000020	<0.00002	<0.00002	<0.000002	<0.000002	0.050[Mn]	0.050[Mn]	<0.0002	<0.0002	-	-
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	-	<0.0002	-	-	-	-	-	<0.0001	-	-	-
Titanium	mg/L	-	-	-	-	0.00030	-	<0.003	-	0.000030	-	<0.0002	-	-	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	0.0085	-	0.000021	0.000021	<0.0001	<0.0001	0.000018	0.000018	-	-	-	-	-	-
Vanadium	mg/L	-	-	-	-	0.00030	-	0.00036	-	-	-	-	-	-	-
Zinc	mg/L	0.0075 - 0.19[b]	0.033 - 0.34[b]	0.00010	0.00010	<0.001	<0.001	<0.0001	<0.0001	-	-	-	-	-	-
Zirconium	mg/L	-	-	-	-	<0.002	-	<0.005	-	-	-	-	-	-	-
Dissolved Metals															
Aluminum	mg/L	0.0074 - 0.050[h]	0.024 - 0.10[h]	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bismuth	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/L	0.000018 - 0.00046[b]	0.000038 - 0.0028[b]	-	-	-	-	-	-	-	-	-	-	-	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	mg/L	0.002[i]	0.00020 - 0.00046[i]	-	-	-	-	-	-	-	-	-	-	-	-
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	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zirconium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table Notes:
BC WQG = British Columbia Approved (updated December 2021) and Working (updated February 2021) Water Quality Guidelines for the protection of freshwater aquatic life (AW-F)
[a] = guideline is a minimum value.
[b] = guideline is hardness dependent.
[c] = for some samples, water hardness was greater than 250 mg/L.
[d] = guideline is chloride dependent.
[e] & [f] = the ammonia guideline is pH and temperature dependent.
[g] = guideline is for chromium VI.
[h] = guideline is pH dependent.
[i] = guideline for dissolved copper is pH, hardness, and dissolved organic carbon dependent.
[Mn] = Exceeds BC WQG long-term chronic (30-day mean)
[Mx] = Exceeds BC WQG short-term acute (maximum)
[DL>Mn] = Detection Limit exceeds BC WQG 30-day mean
[DL>Mx] = Detection Limit exceeds BC WQG maximum
< Indicates parameter was below laboratory equipment detection limit.
- Chemical not analyzed or criteria not defined

Appendix C
Results of Surface Water Analyses
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name		SW-1	SW-1B	SW-1	SW-1B	SW-1	SW-1B	SW-1	SW-1B	SW-1	SW-1B	SW-1
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	2006-06-01	2006-06-01	2007-01-02	2007-01-02	2007-06-18	2007-06-18	2008-05-27	2008-05-27	2008-10-10	2008-10-10	2009-08-26
Field Measured														
pH	-	6.5 - 9.0	6.5 - 9.0	-	-	-	-	-	-	-	-	-	-	-
Temperature	°C	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved oxygen	mg/L	8[a]	5[a]	-	-	-	-	-	-	-	-	-	-	-
Conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation reduction potential	mV	-	-	-	-	-	-	-	-	-	-	-	-	-
Conventional Parameters														
pH, lab	-	6.5 - 9.0	6.5 - 9.0	**6.3**[Mn, Mx]	-	7.6	-	7.1	-	7.1	-	7.8	-	7.0
Specific conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	75
Hardness, as $CaCO_3$	mg/L	-	-	<0.05	-	19	-	10	-	13	-	35	-	38
Total alkalinity, as $CaCO_3$	mg/L	20[a]	-	-	-	-	-	-	-	-	-	-	-	-
Total suspended solids	mg/L	-	-	0.030	-	<0.01	-	<0.01	-	<0.01	-	<4.0	-	-
Conductivity	µS/cm	-	-	41	-	46	-	26	-	19.6	-	73	-	-
Hardness, as $CaCO_3$ (Dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Major Ions														
Bromide	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride	mg/L	150	600	0.24	0.24	0.71	0.71	0.23	0.23	<1.0	<1.0	0.80	0.80	<1.0
Fluoride	mg/L	-	0.40 - 2.2[b]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	<0.1
Magnesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate	mg/L	128 - 429[b, c]	-	0.80	0.80	1.2	1.2	0.51	0.51	<1.0	<1.0	-	-	-
Nutrients and Biological Indicators														
Nitrate	mg-N/L	3.0	33	<0.05	<0.05	0.13	0.13	<0.05	<0.05	0.061	0.061	-	-	-
Nitrite	mg-N/L	0.020 - 0.20[d]	0.060 - 0.60[d]	<0.002	<0.002	<0.002	<0.002	<2.0[DL>Mn; DL>Mx]	<2.0[DL>Mn; DL>Mx]	<0.1[DL>Mn; DL>Mx]	<0.1[DL>Mn; DL>Mx]	0.0020	0.0020	-
Total ammonia	mg-N/L	0.11 - 2.0[e]	0.74 - 26[f]	-	-	-	-	-	-	<0.01	-	<0.005	-	<0.03
Total Kjeldahl Nitrogen	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Total phosphorus	mg-P/L	-	-	<0.15	-	<0.15	-	<0.15	-	-	-	0.0030	-	-
Dissolved phosphorus	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Orthophosphate	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Biochemical oxygen demand	mg/L	-	-	<10	-	<10	-	<10	-	<6.0	-	<10	-	<4.0
Chemical oxygen demand	mg/L	-	-	<20	-	<20	-	22	-	<30	-	11	-	<30
Total Metals														
Aluminum	mg/L	-	-	0.010	-	0.024	-	0.049	-	0.067	-	0.027	-	0.016
Antimony	mg/L	0.0090	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0006	<0.0006	<0.00002	<0.00002	-
Arsenic	mg/L	-	0.005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.000030	0.000030	-
Barium	mg/L	1.0	-	0.011	0.011	0.015	0.015	0.0070	0.0070	0.010	0.010	0.023	0.023	0.079
Beryllium	mg/L	0.00013	-	<0.001[DL>Mn]	<0.001[DL>Mn]	<0.001[DL>Mn]	<0.001[DL>Mn]	<0.001[DL>Mn]	<0.001[DL>Mn]	<0.0004[DL>Mn]	<0.0004[DL>Mn]	<0.00001	<0.00001	-
Bismuth	mg/L	-	-	<0.001	-	<0.001	-	<0.001	-	-	-	<0.000005	-	-
Boron	mg/L	1.2	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.0040	0.0040	<0.05	<0.05	-
Cadmium	mg/L	-	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.00030	0.00030	<0.00005	<0.00005	0.00026
Calcium	mg/L	-	-	5.6	-	6.5	-	3.6	-	12	-	11	-	14
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	0.0010[g]	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.0010	0.0010	<0.0001	<0.0001	-
Cobalt	mg/L	0.0040	0.11	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.0001	0.000025	0.000025	-
Copper	mg/L	-	-	<0.001	<0.001	0.0020	0.0020	<0.001	<0.001	0.01	0.01	0.00052	0.00052	0.0065
Iron	mg/L	-	1.0	<0.05	-	<0.05	-	<0.05	-	0.060	-	0.034	-	0.10
Lead	mg/L	0.020[b]	0.0030 - 0.42[b]	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0002	<0.0002	<0.000005	<0.000005	0.00030
Lithium	mg/L	-	-	<0.001	-	<0.001	-	<0.005	-	<0.0004	-	<0.0005	-	<0.005
Magnesium	mg/L	-	-	0.39	-	0.54	-	0.25	-	0.38	-	0.88	-	0.98
Manganese	mg/L	0.77 - 2.6[b]	0.82 - 3.4[b]	0.0010	-	0.014	-	<0.001	-	0.0074	-	0.0061	-	0.023
Mercury	mg/L	0.000010	-	<0.02[DL>Mn]	<0.02[DL>Mn]	<0.00002[DL>Mn]	<0.00002[DL>Mn]	<0.0002[DL>Mn]	<0.0002[DL>Mn]	<0.00006[DL>Mn]	<0.00006[DL>Mn]	-	-	-
Molybdenum	mg/L	7.6	46	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00030	0.00030	0.00024	0.00024	-
Nickel	mg/L	0.025 - 0.15[b]	-	<0.001	<0.001	0.0010	0.0010	<0.001	<0.001	<0.001	<0.001	0.000080	0.000080	0.0020
Potassium	mg/L	-	-	0.50	-	0.80	-	0.40	-	-	-	0.77	-	0.89
Rubidium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/L	0.0020	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.00004	<0.00004	-
Silicon	mg/L	-	-	1.6	-	1.8	-	1.1	-	-	-	2.2	-	3.0
Silver	mg/L	0.000050 - 0.0015[b]	0.00010 - 0.0030[b]	<0.00025[DL>Mn, DL>Mx]	<0.00025[DL>Mn, DL>Mx]	<0.00025[DL>Mn, DL>Mx]	<0.00025[DL>Mn, DL>Mx]	<0.00025[DL>Mn, DL>Mx]	<0.00025[DL>Mn, DL>Mx]	<0.00008[DL>Mn]	<0.00008[DL>Mn]	<0.000005	<0.000005	<0.000005
Sodium	mg/L	-	-	0.65	-	1.4	-	0.53	-	0.93	-	1.1	-	1.7
Strontium	mg/L	-	-	0.021	-	0.026	-	0.015	-	-	-	0.046	-	0.056
Sulphur	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	-	-	-	-	<3.0	-	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	0.00080	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.000002	<0.000002	-
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	<0.001	-	<0.001	-	<0.001	-	-	-	<0.00001	-	-
Titanium	mg/L	-	-	<0.001	-	<0.001	-	<0.001	-	<0.02	-	<0.0005	-	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	0.0085	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	-	-	0.000013	0.000013	-
Vanadium	mg/L	-	-	<0.001	-	<0.001	-	<0.001	-	<0.002	-	0.00030	-	-
Zinc	mg/L	0.0075 - 0.19[b]	0.033 - 0.34[b]	<0.005	<0.005	<0.005	<0.005	**0.011**[Mn]	**0.011**[Mn]	**0.018**[Mn]	**0.018**[Mn]	0.00020	0.00020	**0.037**[Mn, Mx]
Zirconium	mg/L	-	-	<0.01	-	<0.01	-	<0.01	-	-	-	-	-	-
Dissolved Metals														
Aluminum	mg/L	0.0074 - 0.050[h]	0.024 - 0.10[h]	-	-	-	-	-	-	-	-	-	-	-
Antimony	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Bismuth	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/L	0.000018 - 0.00046[b]	0.000038 - 0.0028[b]	-	-	-	-	-	-	-	-	-	-	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	mg/L	0.002[i]	0.00020 - 0.00046[i]	-	-	-	-	-	-	-	-	-	-	-
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	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Zirconium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-

Table Notes:
BC WQG = British Columbia Approved (updated December 2021) and Working (updated February 2021) Water Quality Guidelines for the protection of freshwater aquatic life (AW-F)
[a] = guideline is a minimum value.
[b] = guideline is hardness dependent.
[c] = for some samples, water hardness was greater than 250 mg/L.
[d] = guideline is chloride dependent.
[e] & [f] = the ammonia guideline is pH and temperature dependent.
[g] = guideline is for chromium VI.
[h] = guideline is pH dependent.
[i] = guideline for dissolved copper is pH, hardness, and dissolved organic carbon dependent.
[Mn] = Exceeds BC WQG long-term chronic (30-day mean)
[Mx] = Exceeds BC WQG short-term acute (maximum)
[DL>Mn] = Detection Limit exceeds BC WQG 30-day mean
[DL>Mx] = Detection Limit exceeds BC WQG maximum
< Indicates parameter was below laboratory equipment detection limit.
- Chemical not analyzed or criteria not defined

Appendix C
Results of Surface Water Analyses
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name		SW-1B	SW-1	SW-1B	SW-1	SW-1B	SW-1	SW-1B	SW-1	SW-1B	SW-1	SW-1B	SW-1	SW-1B
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	2009-08-26	2010-02-22	2010-02-22	2010-06-15	2010-06-15	2010-10-25	2010-10-25	2011-02-15	2011-02-15	2012-02-22	2012-02-22	2012-05-08	2012-05-08
Field Measured																
pH	-	6.5 - 9.0	6.5 - 9.0	-	-	-	-	-	-	-	-	-	-	-	-	-
Temperature	°C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved oxygen	mg/L	8[a]	5[a]	-	-	-	-	-	-	-	-	-	-	-	-	-
Conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation reduction potential	mV	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conventional Parameters																
pH, lab	-	6.5 - 9.0	6.5 - 9.0	-	7.0	-	6.6	-	7.4	-	7.1	-	7.3	-	7.1	-
Specific conductivity	µS/cm	-	-	-	54	-	40	-	60	-	-	-	-	-	-	-
Hardness, as $CaCO_3$	mg/L	-	-	-	21	-	17	-	27	-	22	-	26	-	21	-
Total alkalinity, as $CaCO_3$	mg/L	20[a]	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total suspended solids	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conductivity	µS/cm	-	-	-	-	-	-	-	-	-	44.3	-	58.5	-	42.6	-
Hardness, as $CaCO_3$ (Dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Major Ions																
Bromide	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride	mg/L	150	600	<1.0	<1.0	<1.0	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<1.0
Fluoride	mg/L	-	0.40 - 2.2[b]	<0.1	<0.1	<0.1	<0.1	<0.1	0.030	0.030	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Magnesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate	mg/L	128 - 429[b, c]	-	-	1.7	1.7	-	-	0.60	0.60	1.3	1.3	<1.0	<1.0	0.90	0.90
Nutrients and Biological Indicators																
Nitrate	mg-N/L	3.0	33	-	0.11	-	<0.1	-	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nitrite	mg-N/L	0.020 - 0.20[d]	0.060 - 0.60[d]	-	<0.01	-	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total ammonia	mg-N/L	0.11 - 2.0[e]	0.74 - 26[f]	-	<0.03	-	<0.03	-	<0.03	-	<0.03	-	<0.03	-	<0.03	-
Total Kjeldahl Nitrogen	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total phosphorus	mg-P/L	-	-	-	-	-	-	-	-	-	<0.01	-	<0.01	-	<0.01	-
Dissolved phosphorus	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Orthophosphate	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Biochemical oxygen demand	mg/L	-	-	-	<4.0	-	<4.0	-	<4.0	-	<4.0	-	<4.0	-	<4.0	-
Chemical oxygen demand	mg/L	-	-	-	<30	-	<30	-	<30	-	31	-	<30	-	<30	-
Total Metals																
Aluminum	mg/L	-	-	-	0.025	-	0.029	-	0.060	-	0.13	-	0.041	-	0.13	-
Antimony	mg/L	0.0090	-	-	-	-	-	-	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Arsenic	mg/L	-	0.005	-	-	-	-	-	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Barium	mg/L	1.0	-	0.079	0.059	0.059	0.070	0.070	0.020	0.020	0.017	0.017	0.020	0.020	0.011	0.011
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	-
Boron	mg/L	1.2	-	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Cadmium	mg/L	-	-	0.00026	0.000030	0.000030	0.000030	0.000030	0.000050	0.000050	<0.00005	<0.00005	0.00017	0.00017	<0.00001	<0.00001
Calcium	mg/L	-	-	-	9.9	-	6.3	-	8.9	-	7.9	-	9.3	-	7.5	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	0.0010[g]	-	-	-	-	-	-	0.0010	0.0010	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cobalt	mg/L	0.0040	0.11	-	-	-	-	-	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Copper	mg/L	-	-	0.0065	0.0010	0.0010	0.015	0.015	0.014	0.014	0.0029	0.0029	0.0021	0.0021	0.0013	0.0013
Iron	mg/L	-	1.0	-	0.010	-	0.015	-	0.070	-	0.14	-	0.038	-	0.12	-
Lead	mg/L	0.020[b]	0.0030 - 0.42[b]	0.00030	-	-	-	-	**0.0049**[Mn]	0.0049	<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	-	-	-	0.74	-	0.51	-	0.65	-	0.67	-	0.70	-	0.59	-
Manganese	mg/L	0.77 - 2.6[b]	0.82 - 3.4[b]	-	0.0030	-	0.023	-	0.0060	-	0.0060	-	0.0030	-	0.0044	-
Mercury	mg/L	0.000010	-	-	-	-	-	-	**0.000030**[Mn]	**0.000030**[Mn]	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Molybdenum	mg/L	7.6	46	-	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Nickel	mg/L	0.025 - 0.15[b]	-	0.0020	-	-	0.0010	0.0010	0.0010	0.0010	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Potassium	mg/L	-	-	-	0.62	-	0.49	-	0.64	-	0.64	-	0.76	-	0.47	-
Rubidium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/L	0.0020	-	-	-	-	-	-	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Silicon	mg/L	-	-	-	2.7	-	1.9	-	2.3	-	2.7	-	2.4	-	2.1	-
Silver	mg/L	0.000050 - 0.0015[b]	0.00010 - 0.0030[b]	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005
Sodium	mg/L	-	-	-	1.1	-	1.1	-	0.93	-	0.91	-	1.1	-	1.0	-
Strontium	mg/L	-	-	-	0.043	-	0.029	-	0.037	-	0.033	-	0.036	-	0.035	-
Sulphur	mg/L	-	-	-	-	-	4.0	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	-	-	-	<3.0	-	<3.0	-	3.2	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	0.00080	-	-	-	-	-	-	-	-	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	-	-	-	-	-	-	<0.05	-	<0.05	-	<0.05	-
Titanium	mg/L	-	-	-	-	-	-	-	-	-	0.0080	-	<0.0005	-	0.0056	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	0.0085	-	-	-	-	-	-	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Vanadium	mg/L	-	-	-	-	-	-	-	-	-	<0.005	-	<0.005	-	<0.005	-
Zinc	mg/L	0.0075 - 0.19[b]	0.033 - 0.34[b]	**0.037**[Mn, Mx]	**0.020**[Mn]	**0.020**[Mn]	**0.031**[Mn]	**0.031**[Mn]	**0.011**[Mn]	**0.011**[Mn]	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Zirconium	mg/L	-	-	-	-	-	-	-	-	-	<0.0005	-	<0.0005	-	<0.0005	-
Dissolved Metals																
Aluminum	mg/L	0.0074 - 0.050[h]	0.024 - 0.10[h]	-	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bismuth	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/L	0.000018 - 0.00046[b]	0.000038 - 0.0028[b]	-	-	-	-	-	-	-	-	-	-	-	-	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	mg/L	0.002[i]	0.00020 - 0.00046[i]	-	-	-	-	-	-	-	-	-	-	-	-	-
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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zirconium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table Notes:
BC WQG = British Columbia Approved (updated December 2021) and Working (updated February 2021) Water Quality Guidelines for the protection of freshwater aquatic life (AW-F)
[a] = guideline is a minimum value.
[b] = guideline is hardness dependent.
[c] = for some samples, water hardness was greater than 250 mg/L.
[d] = guideline is chloride dependent.
[e] & [f] = the ammonia guideline is pH and temperature dependent.
[g] = guideline is for chromium VI.
[h] = guideline is pH dependent.
[i] = guideline for dissolved copper is pH, hardness, and dissolved organic carbon dependent.
[Mn] = Exceeds BC WQG long-term chronic (30-day mean)
[Mx] = Exceeds BC WQG short-term acute (maximum)
[DL>Mn] = Detection Limit exceeds BC WQG 30-day mean
[DL>Mx] = Detection Limit exceeds BC WQG maximum
< Indicates parameter was below laboratory equipment detection limit.
- Chemical not analyzed or criteria not defined

Appendix C
Results of Surface Water Analyses
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name		SW-1	SW-1B	SW-1	SW-1B	SW-1	SW-1B	SW-1	SW-1B	SW-1	SW-1B	SW-1	SW-1B
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	2013-01-04	2013-01-04	2013-04-16	2013-04-16	2013-06-06	2013-06-06	2013-10-22	2013-10-22	2014-05-06	2014-05-06	2014-10-29	2014-10-29
Field Measured															
pH	-	6.5 - 9.0	6.5 - 9.0	-	-	-	-	-	-	-	-	-	-	-	-
Temperature	°C	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved oxygen	mg/L	8[a]	5[a]	-	-	-	-	-	-	-	-	-	-	-	-
Conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation reduction potential	mV	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conventional Parameters															
pH, lab	-	6.5 - 9.0	6.5 - 9.0	7.0	-	7.1	-	7.0	-	7.2	-	7.2	-	6.9	-
Specific conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hardness, as $CaCO_3$	mg/L	-	-	27	-	28	-	19	-	43	-	19	-	28	-
Total alkalinity, as $CaCO_3$	mg/L	20[a]	-	-	-	-	-	-	-	-	-	-	-	-	-
Total suspended solids	mg/L	-	-	3.9	-	-	-	1.0	-	<1.0	-	<1.0	-	<1.0	-
Conductivity	µS/cm	-	-	59.5	-	62.8	-	29.1	-	84.3	-	42.5	-	60	-
Hardness, as $CaCO_3$ (Dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Major Ions															
Bromide	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride	mg/L	150	600	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Fluoride	mg/L	-	0.40 - 2.2[b]	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Magnesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate	mg/L	128 - 429[b, c]	-	0.75	0.75	1.0	1.0	0.68	0.68	0.64	0.64	0.90	0.90	<0.5	<0.5
Nutrients and Biological Indicators															
Nitrate	mg-N/L	3.0	33	0.14	0.14	<0.1	<0.1	<0.1	<0.1	0.11	0.11	<0.1	<0.1	0.021	0.021
Nitrite	mg-N/L	0.020 - 0.20[d]	0.060 - 0.60[d]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total ammonia	mg-N/L	0.11 - 2.0[e]	0.74 - 26[f]	<0.03	-	<0.03	-	<0.03	-	0.030	-	<0.03	-	<0.03	-
Total Kjeldahl Nitrogen	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total phosphorus	mg-P/L	-	-	<0.01	-	<0.01	-	<0.01	-	<0.01	-	<0.01	-	<0.01	-
Dissolved phosphorus	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Orthophosphate	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Biochemical oxygen demand	mg/L	-	-	<4.0	-	<4.0	-	<4.0	-	<4.0	-	<4.0	-	<4.0	-
Chemical oxygen demand	mg/L	-	-	<20	-	<20	-	<20	-	<20	-	<20	-	<20	-
Total Metals															
Aluminum	mg/L	-	-	0.037	-	0.034	-	0.087	-	0.030	-	0.051	-	0.078	-
Antimony	mg/L	0.0090	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Arsenic	mg/L	-	0.005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Barium	mg/L	1.0	-	0.018	0.018	0.018	0.018	0.013	0.013	0.025	0.025	0.011	0.011	0.018	0.018
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	<0.0001	<0.0001
Bismuth	mg/L	-	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
Boron	mg/L	1.2	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Cadmium	mg/L	-	-	<0.00001	<0.00001	0.000013	0.000013	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.000015	0.000015
Calcium	mg/L	-	-	9.6	-	10.0	-	6.8	-	15	-	6.7	-	9.9	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	0.0010[g]	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002[DL>Mn]	<0.002[DL>Mn]
Cobalt	mg/L	0.0040	0.11	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0006	<0.0006
Copper	mg/L	-	-	0.0013	0.0013	0.00063	0.00063	0.00075	0.00075	0.00069	0.00069	0.00074	0.00074	0.0011	0.0011
Iron	mg/L	-	1.0	0.056	-	0.039	-	0.076	-	0.085	-	0.024	-	0.046	-
Lead	mg/L	0.020[b]	0.0030 - 0.42[b]	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<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	-	-	0.78	-	0.77	-	0.48	-	1.1	-	0.47	-	0.73	-
Manganese	mg/L	0.77 - 2.6[b]	0.82 - 3.4[b]	0.0067	-	0.0039	-	0.0053	-	0.016	-	0.0017	-	0.0079	-
Mercury	mg/L	0.000010	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Molybdenum	mg/L	7.6	46	<0.001	<0.001	0.00046	0.00046	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Nickel	mg/L	0.025 - 0.15[b]	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Potassium	mg/L	-	-	0.69	-	0.76	-	0.55	-	0.98	-	0.51	-	0.70	-
Rubidium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/L	0.0020	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0002
Silicon	mg/L	-	-	2.3	-	2.3	-	1.7	-	2.7	-	1.8	-	2.5	-
Silver	mg/L	0.000050 - 0.0015[b]	0.00010 - 0.0030[b]	<0.000005	<0.000005	0.0000060	0.0000060	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000006	<0.000006
Sodium	mg/L	-	-	1.0	-	1.0	-	0.73	-	1.4	-	0.81	-	1.1	-
Strontium	mg/L	-	-	0.041	-	0.041	-	0.026	-	0.054	-	0.028	-	0.041	-
Sulphur	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	<3.0	-	<3.0	-	<3.0	-	<3.0	-	<3.0	-	<4.0	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	0.00080	-	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-
Titanium	mg/L	-	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	0.0085	-	<0.0001	<0.0001	0.000012	0.000012	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Vanadium	mg/L	-	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-
Zinc	mg/L	0.0075 - 0.19[b]	0.033 - 0.34[b]	<0.005	<0.005	0.0013	0.0013	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.0063	0.0063
Zirconium	mg/L	-	-	<0.0005	-	<0.0005	-	<0.0005	-	<0.0005	-	<0.0005	-	<0.0005	-
Dissolved Metals															
Aluminum	mg/L	0.0074 - 0.050[h]	0.024 - 0.10[h]	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bismuth	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/L	0.000018 - 0.00046[b]	0.000038 - 0.0028[b]	-	-	-	-	-	-	-	-	-	-	-	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	mg/L	0.002[i]	0.00020 - 0.00046[i]	-	-	-	-	-	-	-	-	-	-	-	-
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	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zirconium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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[e] & [f] = the ammonia guideline is pH and temperature dependent.
[g] = guideline is for chromium VI.
[h] = guideline is pH dependent.
[i] = guideline for dissolved copper is pH, hardness, and dissolved organic carbon dependent.
[Mn] = Exceeds BC WQG long-term chronic (30-day mean)
[Mx] = Exceeds BC WQG short-term acute (maximum)
[DL>Mn] = Detection Limit exceeds BC WQG 30-day mean
[DL>Mx] = Detection Limit exceeds BC WQG maximum
< Indicates parameter was below laboratory equipment detection limit.
- Chemical not analyzed or criteria not defined

Appendix C
Results of Surface Water Analyses
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name		SW-1	SW-1B	SW-1	SW-1B	SW-1	SW-1B	SW-1	SW-1B	SW-1	SW-1B	SW-1	SW-1B
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	2015-03-31	2015-03-31	2015-08-11	2015-08-11	2015-11-04	2015-11-04	2016-03-22	2016-03-22	2016-07-25	2016-07-25	2016-10-13	2016-10-13
Field Measured															
pH	-	6.5 - 9.0	6.5 - 9.0	-	-	-	-	-	-	-	-	-	-	-	-
Temperature	°C	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved oxygen	mg/L	8[a]	5[a]	-	-	-	-	-	-	-	-	-	-	-	-
Conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation reduction potential	mV	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conventional Parameters															
pH, lab	-	6.5 - 9.0	6.5 - 9.0	7.5	-	7.3	-	7.4	-	7.0	-	7.3	-	7.3	-
Specific conductivity	µS/cm	-	-	56	-	-	-	-	-	-	-	-	-	-	-
Hardness, as $CaCO_3$	mg/L	-	-	26	-	35	-	-	-	39	-	40	-	36	-
Total alkalinity, as $CaCO_3$	mg/L	20[a]	-	-	-	-	-	-	-	-	-	-	-	-	-
Total suspended solids	mg/L	-	-	-	-	<1.0	-	2.8	-	1.5	-	<1.0	-	<1.0	-
Conductivity	µS/cm	-	-	-	-	68.6	-	65.3	-	70	-	79.9	-	83.8	-
Hardness, as $CaCO_3$ (Dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Major Ions															
Bromide	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride	mg/L	150	600	-	-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.2	1.2
Fluoride	mg/L	-	0.40 - 2.2[b]	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Magnesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate	mg/L	128 - 429[b, c]	-	1.1	1.1	<1.0	<1.0	-	-	1.5	1.5	1.1	1.1	1.4	1.4
Nutrients and Biological Indicators															
Nitrate	mg-N/L	3.0	33	0.030	-	0.010	0.010	0.020	0.020	0.020	0.020	0.061	0.061	0.053	0.053
Nitrite	mg-N/L	0.020 - 0.20[d]	0.060 - 0.60[d]	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total ammonia	mg-N/L	0.11 - 2.0[e]	0.74 - 26[f]	-	-	<0.03	-	<0.03	-	<0.03	-	<0.03	-	0.057	-
Total Kjeldahl Nitrogen	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total phosphorus	mg-P/L	-	-	-	-	0.070	-	-	-	0.030	-	<0.02	-	0.020	-
Dissolved phosphorus	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Orthophosphate	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Biochemical oxygen demand	mg/L	-	-	-	-	<4.0	-	<4.0	-	<4.0	-	<4.0	-	<4.0	-
Chemical oxygen demand	mg/L	-	-	-	-	<20	-	<20	-	<20	-	<20	-	<20	-
Total Metals															
Aluminum	mg/L	-	-	0.083	-	0.052	-	-	-	0.045	-	0.24	-	0.029	-
Antimony	mg/L	0.0090	-	-	-	<0.0001	<0.0001	-	-	<0.0001	<0.0001	0.00010	0.00010	0.00020	0.00020
Arsenic	mg/L	-	0.005	-	-	<0.0005	<0.0005	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Barium	mg/L	1.0	-	0.018	0.018	0.024	0.024	-	-	0.022	0.022	0.028	0.028	0.024	0.024
Beryllium	mg/L	0.00013	-	-	-	<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	-
Boron	mg/L	1.2	-	0.0040	0.0040	0.021	0.021	-	-	0.0070	0.0070	0.019	0.019	0.14	0.14
Cadmium	mg/L	-	-	-	-	<0.00001	<0.00001	-	-	0.000010	0.000010	0.000090	0.000090	<0.00001	<0.00001
Calcium	mg/L	-	-	9.3	-	13	-	-	-	14	-	14	-	13	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	0.0010[g]	-	-	-	<0.0005	<0.0005	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Cobalt	mg/L	0.0040	0.11	-	-	0.000060	0.000060	-	-	<0.00005	<0.00005	0.00021	0.00021	<0.00005	<0.00005
Copper	mg/L	-	-	0.0011	0.0011	0.0011	0.0011	-	-	0.0013	0.0013	0.0033	0.0033	0.0010	0.0010
Iron	mg/L	-	1.0	0.070	-	0.070	-	-	-	0.050	-	0.34	-	0.040	-
Lead	mg/L	0.020[b]	0.0030 - 0.42[b]	-	-	<0.0001	<0.0001	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Lithium	mg/L	-	-	0.00020	-	<0.0001	-	-	-	<0.0001	-	<0.0001	-	<0.0001	-
Magnesium	mg/L	-	-	0.65	-	0.88	-	-	-	1.1	-	1.0	-	0.88	-
Manganese	mg/L	0.77 - 2.6[b]	0.82 - 3.4[b]	0.0044	-	0.017	-	-	-	0.0064	-	0.030	-	0.017	-
Mercury	mg/L	0.000010	-	-	-	<0.00002[DL>Mn]	<0.00002[DL>Mn]	-	-	<0.00002[DL>Mn]	<0.00002[DL>Mn]	<0.00002[DL>Mn]	<0.00002[DL>Mn]	<0.00002[DL>Mn]	<0.00002[DL>Mn]
Molybdenum	mg/L	7.6	46	0.0015	0.0015	0.00030	0.00030	-	-	0.00060	0.00060	0.00020	0.00020	0.00050	0.00050
Nickel	mg/L	0.025 - 0.15[b]	-	0.00030	0.00030	<0.0002	<0.0002	-	-	<0.0002	<0.0002	0.00030	0.00030	<0.0002	<0.0002
Potassium	mg/L	-	-	0.70	-	0.81	-	-	-	1.3	-	0.95	-	0.82	-
Rubidium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/L	0.0020	-	-	-	<0.0005	<0.0005	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Silicon	mg/L	-	-	2.5	-	3.1	-	-	-	3.1	-	3.0	-	2.4	-
Silver	mg/L	0.000050 - 0.0015[b]	0.00010 - 0.0030[b]	-	-	<0.00005	<0.00005	-	-	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Sodium	mg/L	-	-	0.96	-	1.3	-	-	-	2.3	-	1.4	-	1.3	-
Strontium	mg/L	-	-	0.035	-	0.049	-	-	-	0.049	-	0.056	-	0.055	-
Sulphur	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	<1.0	-	-	-	1.0	-	<1.0	-	<1.0	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	0.00080	-	-	-	<0.00002	<0.00002	-	-	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	-	0.00020	-	-	-	<0.0002	-	0.00030	-	<0.0002	-
Titanium	mg/L	-	-	-	-	<0.005	-	-	-	<0.005	-	0.013	-	<0.005	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	0.0085	-	0.000030	0.000030	<0.00002	<0.00002	-	-	<0.00002	<0.00002	0.000050	0.000050	0.000020	0.000020
Vanadium	mg/L	-	-	-	-	<0.001	-	-	-	<0.001	-	0.0010	-	<0.001	-
Zinc	mg/L	0.0075 - 0.19[b]	0.033 - 0.34[b]	-	-	<0.004	<0.004	-	-	<0.004	<0.004	0.0070	0.0070	<0.004	<0.004
Zirconium	mg/L	-	-	-	-	<0.0001	-	-	-	<0.0001	-	<0.0001	-	<0.0001	-
Dissolved Metals															
Aluminum	mg/L	0.0074 - 0.050[h]	0.024 - 0.10[h]	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bismuth	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/L	0.000018 - 0.00046[b]	0.000038 - 0.0028[b]	-	-	-	-	-	-	-	-	-	-	-	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	mg/L	0.002[i]	0.00020 - 0.00046[i]	-	-	-	-	-	-	-	-	-	-	-	-
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	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zirconium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table Notes:
BC WQG = British Columbia Approved (updated December 2021) and Working (updated February 2021) Water Quality Guidelines for the protection of freshwater aquatic life (AW-F)
[a] = guideline is a minimum value.
[b] = guideline is hardness dependent.
[c] = for some samples, water hardness was greater than 250 mg/L.
[d] = guideline is chloride dependent.
[e] & [f] = the ammonia guideline is pH and temperature dependent.
[g] = guideline is for chromium VI.
[h] = guideline is pH dependent.
[i] = guideline for dissolved copper is pH, hardness, and dissolved organic carbon dependent.
[Mn] = Exceeds BC WQG long-term chronic (30-day mean)
[Mx] = Exceeds BC WQG short-term acute (maximum)
[DL>Mn] = Detection Limit exceeds BC WQG 30-day mean
[DL>Mx] = Detection Limit exceeds BC WQG maximum
< Indicates parameter was below laboratory equipment detection limit.
- Chemical not analyzed or criteria not defined

Appendix C
Results of Surface Water Analyses
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name		SW-1	SW-1B	SW-1	SW-1B	SW-1	SW-1B	SW-1	SW-1B	SW-1	SW-1B	SW-1	SW-1B
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	2017-03-28	2017-03-28	2017-08-24	2017-08-24	2018-03-19	2018-03-19	2018-07-04	2018-07-04	2018-09-10	2018-09-10	2019-07-17	2019-07-17
Field Measured															
pH	-	6.5 - 9.0	6.5 - 9.0	-	-	-	-	-	-	**6.2**[(Mn, Mx)]	-	7.5	-	7.5	-
Temperature	°C	-	-	-	-	-	-	-	-	8.7	-	12	-	11	-
Dissolved oxygen	mg/L	8[(a)]	5[(a)]	-	-	-	-	-	-	**7.8**[(Mn)]	-	-	-	8.1	-
Conductivity	µS/cm	-	-	-	-	-	-	-	-	37	-	73	-	62	-
Oxidation reduction potential	mV	-	-	-	-	-	-	-	-	442	-	-	-	242	-
Conventional Parameters															
pH, lab	-	6.5 - 9.0	6.5 - 9.0	7.2	-	7.4	-	7.8	-	7.6	-	7.6	-	7.8	-
Specific conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hardness, as $CaCO_3$	mg/L	-	-	25	-	31	-	30	-	26	-	39	-	39	-
Total alkalinity, as $CaCO_3$	mg/L	20[(a)]	-	-	-	-	-	27	-	56	-	37	-	42	-
Total suspended solids	mg/L	-	-	<1.0	-	<1.0	-	<3.0	-	<3.0	-	3.0	-	5.8	-
Conductivity	µS/cm	-	-	56.5	-	65.8	-	66.4	-	52.8	-	87.6	-	85.3	-
Hardness, as $CaCO_3$ (Dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Major Ions															
Bromide	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	-
Calcium	mg/L	-	-	-	-	-	-	88	-	9.2	-	14	-	14	-
Chloride	mg/L	150	600	<1.0	<1.0	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoride	mg/L	-	0.40 - 2.2[(b)]	<0.1	<0.1	<0.1	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.023	0.023
Magnesium	mg/L	-	-	-	-	-	-	17	-	0.68	-	0.98	-	0.95	-
Potassium	mg/L	-	-	-	-	-	-	28	-	0.70	-	1.1	-	0.86	-
Sodium	mg/L	-	-	-	-	-	-	49	-	1.0	-	1.3	-	1.3	-
Sulphate	mg/L	128 - 429[(b, c)]	-	1.2	1.2	<1.0	<1.0	1.3	1.3	0.77	0.77	3.3	3.3	1.1	1.1
Nutrients and Biological Indicators															
Nitrate	mg-N/L	3.0	33	0.026	0.026	0.022	0.022	0.17	0.17	0.024	0.024	1.00	1.00	0.039	0.039
Nitrite	mg-N/L	0.020 - 0.20[(d)]	0.060 - 0.60[(d)]	<0.01	<0.01	<0.01	<0.01	<0.001	<0.001	<0.001	<0.001	0.0018	0.0018	<0.001	<0.001
Total ammonia	mg-N/L	0.11 - 2.0[(e)]	0.74 - 26[(f)]	<0.03	-	<0.03	-	0.0056	-	<0.005	-	0.014	-	<0.005	-
Total Kjeldahl Nitrogen	mg-N/L	-	-	-	-	-	-	<0.05	-	<0.05	-	0.21	-	0.085	-
Total phosphorus	mg-P/L	-	-	<0.05	-	<0.05	-	<0.05	-	0.0023	-	0.0083	-	0.0061	-
Dissolved phosphorus	mg-P/L	-	-	-	-	-	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-
Orthophosphate	mg-P/L	-	-	-	-	-	-	-	-	<0.001	-	<0.001	-	<0.001	-
Biochemical oxygen demand	mg/L	-	-	<4.0	-	<4.0	-	<2.0	-	<2.0	-	<2.0	-	<2.0	-
Chemical oxygen demand	mg/L	-	-	<20	-	<20	-	<20	-	<20	-	<20	-	<20	-
Total Metals															
Aluminum	mg/L	-	-	0.032	-	0.053	-	0.030	-	0.036	-	0.094	-	0.054	-
Antimony	mg/L	0.0090	-	<0.0001	<0.0001	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Arsenic	mg/L	-	0.005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	0.00017	0.00017	<0.0001	<0.0001
Barium	mg/L	1.0	-	0.018	0.018	0.021	0.021	0.019	0.019	0.021	0.021	0.034	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	<0.0001	<0.0001
Bismuth	mg/L	-	-	<0.0001	-	<0.0001	-	<0.00005	-	<0.00005	-	<0.00005	-	<0.00005	-
Boron	mg/L	1.2	-	0.030	0.030	0.18	0.18	<0.01	<0.01	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01
Cadmium	mg/L	-	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.000005	<0.000005	<0.000005	<0.000005	0.0000065	0.0000065	<0.000005	<0.000005
Calcium	mg/L	-	-	8.7	-	11	-	10	-	8.6	-	14	-	14	-
Cesium	mg/L	-	-	-	-	-	-	<0.00001	-	<0.00001	-	<0.00001	-	<0.00001	-
Chromium	mg/L	0.0010[(g)]	-	<0.0005	<0.0005	<0.0005	<0.0005	0.00047	0.00047	<0.0001	<0.0001	0.00013	0.00013	0.00010	0.00010
Cobalt	mg/L	0.0040	0.11	<0.00005	<0.00005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.00015	0.00015	<0.0001	<0.0001
Copper	mg/L	-	-	0.0011	0.0011	0.00061	0.00061	<0.0005	<0.0005	0.00051	0.00051	0.0016	0.0016	0.00068	0.00068
Iron	mg/L	-	1.0	0.020	-	0.057	-	0.025	-	0.024	-	0.20	-	0.060	-
Lead	mg/L	0.020[(b)]	0.0030 - 0.42[(b)]	<0.0001	<0.0001	<0.0002	<0.0002	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Lithium	mg/L	-	-	<0.0001	-	<0.0001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
Magnesium	mg/L	-	-	0.69	-	0.79	-	0.74	-	0.69	-	1.0	-	0.99	-
Manganese	mg/L	0.77 - 2.6[(b)]	0.82 - 3.4[(b)]	0.0013	-	0.0095	-	0.0015	-	0.0035	-	0.054	-	0.0095	-
Mercury	mg/L	0.000010	-	<0.00002[(DL>Mn)]	<0.00002[(DL>Mn)]	<0.00001	<0.00001	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005
Molybdenum	mg/L	7.6	46	0.00010	0.00010	0.00020	0.00020	0.00016	0.00016	0.00015	0.00015	0.00023	0.00023	0.00034	0.00034
Nickel	mg/L	0.025 - 0.15[(b)]	-	<0.0002	<0.0002	<0.0004	<0.0004	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Potassium	mg/L	-	-	0.59	-	0.79	-	0.61	-	0.71	-	1.1	-	0.91	-
Rubidium	mg/L	-	-	-	-	-	-	0.00071	-	0.00085	-	0.0017	-	0.0011	-
Selenium	mg/L	0.0020	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.00005	<0.00005	<0.00005	<0.00005	0.000095	0.000095	0.000081	0.000081
Silicon	mg/L	-	-	2.5	-	2.6	-	2.4	-	2.4	-	3.0	-	2.7	-
Silver	mg/L	0.000050 - 0.0015[(b)]	0.00010 - 0.0030[(b)]	<0.00005	<0.00005	<0.00005	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Sodium	mg/L	-	-	0.89	-	1.1	-	0.99	-	1.0	-	1.3	-	1.3	-
Strontium	mg/L	-	-	0.038	-	0.045	-	0.042	-	0.039	-	0.064	-	0.056	-
Sulphur	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	<1.0	-	<3.0	-	0.54	-	<0.5	-	1.1	-	<0.5	-
Tellurium	mg/L	-	-	<0.0002	-	<0.0005	-	<0.0002	-	<0.0002	-	<0.0002	-	<0.0002	-
Thallium	mg/L	0.00080	-	<0.00002	<0.00002	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Thorium-232	mg/L	-	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-
Tin	mg/L	-	-	<0.0002	-	<0.0002	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-
Titanium	mg/L	-	-	<0.005	-	<0.005	-	0.00092	-	0.00089	-	<0.003	-	0.0016	-
Tungsten	mg/L	-	-	-	-	-	-	0.00019	-	<0.0001	-	<0.0001	-	<0.0001	-
Uranium	mg/L	0.0085	-	<0.00002	<0.00002	<0.00002	<0.00002	<0.00001	<0.00001	0.000011	0.000011	0.000023	0.000023	0.000017	0.000017
Vanadium	mg/L	-	-	<0.001	-	<0.001	-	<0.0005	-	<0.0005	-	0.00066	-	0.00054	-
Zinc	mg/L	0.0075 - 0.19[(b)]	0.033 - 0.34[(b)]	<0.004	<0.004	0.0066	0.0066	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Zirconium	mg/L	-	-	<0.0001	-	<0.0001	-	<0.00006	-	<0.00006	-	<0.00006	-	<0.0002	-
Dissolved Metals															
Aluminum	mg/L	0.0074 - 0.050[(h)]	0.024 - 0.10[(h)]	-	-	-	-	0.0023	-	0.024	-	0.043	-	0.027	-
Antimony	mg/L	-	-	-	-	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Arsenic	mg/L	-	-	-	-	-	-	0.00060	0.00060	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Barium	mg/L	-	-	-	-	-	-	0.26	0.26	0.020	0.020	0.037	0.037	0.029	0.029
Beryllium	mg/L	-	-	-	-	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Bismuth	mg/L	-	-	-	-	-	-	<0.00005	-	<0.00005	-	<0.00005	-	<0.00005	-
Boron	mg/L	-	-	-	-	-	-	0.96	0.96	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	mg/L	0.000018 - 0.00046[(b)]	0.000038 - 0.0028[(b)]	-	-	-	-	0.000021	0.000021	<0.000005	<0.000005	<0.000005	<0.000005	0.000033	0.000033
Cesium	mg/L	-	-	-	-	-	-	0.00010	-	<0.00001	-	<0.00001	-	<0.00001	-
Chromium	mg/L	-	-	-	-	-	-	0.00033	0.00033	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	mg/L	-	-	-	-	-	-	0.0017	0.0017	<0.0001	<0.0001	0.00014	0.00014	<0.0001	<0.0001
Copper	mg/L	0.002[(i)]	0.00020 - 0.00046[(i)]	-	-	-	-	**0.00189**[(Mn, Mx)]	**0.00189**[(Mn, Mx)]	**0.00039**[(Mn, Mx)]	**0.00039**[(Mn, Mx)]	**0.00133**[(Mn, Mx)]	**0.00133**[(Mn, Mx)]	**0.00141**[(Mn, Mx)]	**0.00141**[(Mn, Mx)]
Iron	mg/L	-	0.35	-	-	-	-	0.020	-	<0.01	-	0.12	-	0.028	-
Lead	mg/L	-	-	-	-	-	-	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Lithium	mg/L	-	-	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
Manganese	mg/L	-	-	-	-	-	-	2.6	-	0.0022	-	0.063	-	0.0076	-
Mercury	mg/L	-	-	-	-	-	-	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005
Molybdenum	mg/L	-	-	-	-	-	-	0.00032	0.00032	0.00015	0.00015	0.00022	0.00022	0.00033	0.00033
Nickel	mg/L	-	-	-	-	-	-	0.0025	0.0025	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Rubidium	mg/L	-	-	-	-	-	-	0.018	-	0.00098	-	0.0016	-	0.0011	-
Selenium	mg/L	-	-	-	-	-	-	0.00016	0.00016	<0.00005	<0.00005	0.000083	0.000083	<0.00005	<0.00005
Silicon	mg/L	-	-	-	-	-	-	5.5	-	2.2	-	2.9	-	2.8	-
Silver	mg/L	-	-	-	-	-	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Strontium	mg/L	-	-	-	-	-	-	0.51	-	0.038	-	0.056	-	0.053	-
Sulphur	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	4.1	-	<0.5	-	0.94	-	<0.5	-
Tellurium	mg/L	-	-	-	-	-	-	<0.0002	-	<0.0002	-	<0.0002	-	<0.0002	-
Thallium	mg/L	-	-	-	-	-	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Thorium-232	mg/L	-	-	-	-	-	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-
Tin	mg/L	-	-	-	-	-	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-
Titanium	mg/L	-	-	-	-	-	-	<0.0003	-	<0.0003	-	0.00088	-	0.00041	-
Tungsten	mg/L	-	-	-	-	-	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-
Uranium	mg/L	-	-	-	-	-	-	0.000078	0.000078	0.000011	0.000011	0.000019	0.000019	0.000015	0.000015
Vanadium	mg/L	-	-	-	-	-	-	<0.0005	-	<0.0005	-	<0.0005	-	<0.0005	-
Zinc	mg/L	-	-	-	-	-	-	0.0012	0.0012	<0.001	<0.001	<0.001	<0.001	0.0011	0.0011
Zirconium	mg/L	-	-	-	-	-	-	<0.00006	-	<0.00006	-	<0.00006	-	<0.0002	-

Table Notes:
BC WQG = British Columbia Approved (updated December 2021) and Working (updated February 2021) Water Quality Guidelines for the protection of freshwater aquatic life (AW-F)
[(a)] = guideline is a minimum value.
[(b)] = guideline is hardness dependent.
[(c)] = for some samples, water hardness was greater than 250 mg/L.
[(d)] = guideline is chloride dependent.
[(e) & (f)] = the ammonia guideline is pH and temperature dependent.
[(g)] = guideline is for chromium VI.
[(h)] = guideline is pH dependent.
[(i)] = guideline for dissolved copper is pH, hardness, and dissolved organic carbon dependent.
[(Mn)] = Exceeds BC WQG long-term chronic (30-day mean)
[(Mx)] = Exceeds BC WQG short-term acute (maximum)
[(DL>Mn)] = Detection Limit exceeds BC WQG 30-day mean
[(DL>Mx)] = Detection Limit exceeds BC WQG maximum
< Indicates parameter was below laboratory equipment detection limit.
- Chemical not analyzed or criteria not defined

Appendix C
Results of Surface Water Analyses
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name		SW-1	SW-1B	SW-1	SW-1B	SW-1	SW-1B	SW-1	SW-1B	SW-3	SW-3B	SW-3	SW-3B
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	2019-10-10	2019-10-10	2020-04-30	2020-04-30	2020-09-01	2020-09-01	2020-10-07	2020-10-07	1996-10-01	1996-10-01	1997-06-01	1997-06-01
Field Measured															
pH	-	6.5 - 9.0	6.5 - 9.0	8.3	-	7.1	-	7.1	-	7.6	-	-	-	-	-
Temperature	°C	-	-	7.5	-	4.4	-	10	-	9.3	-	-	-	-	-
Dissolved oxygen	mg/L	8[a]	5[a]	11	-	17	-	5.5[Mn]	-	6.6[Mn]	-	-	-	-	-
Conductivity	µS/cm	-	-	44	-	30	-	39	-	42	-	-	-	-	-
Oxidation reduction potential	mV	-	-	167	-	363	-	272	-	182	-	-	-	-	-
Conventional Parameters															
pH, lab	-	6.5 - 9.0	6.5 - 9.0	7.7	-	7.5	-	7.5	-	7.5	-	8.0	-	7.8	-
Specific conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hardness, as $CaCO_3$	mg/L	-	-	30	-	23	-	25	-	29	-	439	-	460	-
Total alkalinity, as $CaCO_3$	mg/L	20[a]	-	30	-	23	-	27	-	29	-	-	-	-	-
Total suspended solids	mg/L	-	-	<3.0	-	<3.0	-	<3.0	-	58	-	199	-	10	-
Conductivity	µS/cm	-	-	64.8	-	47.8	-	54.9	-	61.1	-	1590	-	1760	-
Hardness, as $CaCO_3$ (Dissolved)	mg/L	-	-	-	-	23	-	25	-	30	-	-	-	-	-
Major Ions															
Bromide	mg/L	-	-	-	-	<0.05	-	<0.05	-	-	-	-	-	-	-
Calcium	mg/L	-	-	11	-	8.4	-	9.1	-	11	-	-	-	-	-
Chloride	mg/L	150	600	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	131	131	151[Mn]	151[Mn]
Fluoride	mg/L	-	0.40 - 2.2[b]	<0.02	<0.02	0.023	0.023	0.020	0.020	<0.02	<0.02	-	-	-	-
Magnesium	mg/L	-	-	0.78	-	0.54	-	0.63	-	0.75	-	-	-	-	-
Potassium	mg/L	-	-	0.76	-	0.55	-	0.65	-	0.80	-	-	-	-	-
Sodium	mg/L	-	-	1.1	-	0.88	-	1.0	-	1.1	-	-	-	-	-
Sulphate	mg/L	128 - 429[b, c]	-	1.0	1.0	0.94	0.94	0.94	0.94	0.96	0.96	12	12	18	18
Nutrients and Biological Indicators															
Nitrate	mg-N/L	3.0	33	0.053	0.053	0.017	0.017	0.033	0.033	0.048	0.048	9.9[Mn]	9.9[Mn]	16[Mn]	16[Mn]
Nitrite	mg-N/L	0.020 - 0.20[d]	0.060 - 0.60[d]	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.38[Mn]	0.38[Mn]	0.26[Mn]	0.26[Mn]
Total ammonia	mg-N/L	0.11 - 2.0[e]	0.74 - 26[f]	<0.005	-	<0.005	-	<0.005	-	0.014	-	12[Mn, Mx]	-	19[Mn, Mx]	-
Total Kjeldahl Nitrogen	mg-N/L	-	-	0.077	-	<0.05	-	<0.05	-	0.14	-	-	-	-	-
Total phosphorus	mg-P/L	-	-	0.0024	-	<0.05	-	<0.05	-	<0.05	-	-	-	-	-
Dissolved phosphorus	mg-P/L	-	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	-	-	-	-
Orthophosphate	mg-P/L	-	-	<0.001	-	<0.001	-	<0.001	-	0.0012	-	-	-	-	-
Biochemical oxygen demand	mg/L	-	-	<2.0	-	<2.0	-	<2.0	-	<2.0	-	-	-	27	-
Chemical oxygen demand	mg/L	-	-	<20	-	<20	-	<20	-	<20	-	-	-	95	-
Total Metals															
Aluminum	mg/L	-	-	0.040	-	0.046	-	0.061	-	0.099	-	0.040	-	<0.05	-
Antimony	mg/L	0.0090	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	-	<0.2[DL>Mn]	<0.2[DL>Mn]
Arsenic	mg/L	-	0.005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.00020	0.00020	<0.2[DL>Mx]	<0.2[DL>Mx]
Barium	mg/L	1.0	-	0.021	0.021	0.014	0.014	0.019	0.019	0.019	0.019	0.18	0.18	0.17	0.17
Beryllium	mg/L	0.00013	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.005[DL>Mn]	<0.005[DL>Mn]	<0.005[DL>Mn]	<0.005[DL>Mn]
Bismuth	mg/L	-	-	<0.00005	-	<0.00005	-	<0.00005	-	<0.00005	-	-	-	-	-
Boron	mg/L	1.2	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.8[Mn]	1.8[Mn]	-	-
Cadmium	mg/L	-	-	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	0.0000053	0.0000053	<0.0002	<0.0002	<0.002	<0.002
Calcium	mg/L	-	-	11	-	8.4	-	9.0	-	11	-	127	-	129	-
Cesium	mg/L	-	-	<0.00001	-	<0.00001	-	<0.00001	-	<0.00001	-	-	-	-	-
Chromium	mg/L	0.0010[g]	-	0.00012	0.00012	<0.0001	<0.0001	<0.0001	<0.0001	0.00011	0.00011	0.002[Mn]	0.002[Mn]	<0.01[DL>Mn]	<0.01[DL>Mn]
Cobalt	mg/L	0.0040	0.11	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.02[DL>Mn]	<0.02[DL>Mn]	<0.01[DL>Mn]	<0.01[DL>Mn]
Copper	mg/L	-	-	0.00061	0.00061	0.00075	0.00075	0.00067	0.00067	0.00089	0.00089	0.0020	0.0020	<0.01	<0.01
Iron	mg/L	-	1.0	0.030	-	0.027	-	0.052	-	0.084	-	0.060	-	<0.03	-
Lead	mg/L	0.020[b]	0.0030 - 0.42[b]	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.001	<0.001	<0.01	<0.01[DL>Mn]
Lithium	mg/L	-	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.02	-	-	-
Magnesium	mg/L	-	-	0.71	-	0.59	-	0.65	-	0.69	-	30	-	34	-
Manganese	mg/L	0.77 - 2.6[b]	0.82 - 3.4[b]	0.0044	-	0.0014	-	0.0041	-	0.0049	-	2.6[Mn]	-	2.4	-
Mercury	mg/L	0.000010	-	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.00005[DL>Mn]	<0.00005[DL>Mn]	<0.00005[DL>Mn]	<0.00005[DL>Mn]
Molybdenum	mg/L	7.6	46	0.00019	0.00019	0.00025	0.00025	0.00019	0.00019	0.00041	0.00041	<0.03	<0.03	<0.03	<0.03
Nickel	mg/L	0.025 - 0.15[b]	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.02	<0.02	<0.02	<0.02
Potassium	mg/L	-	-	0.68	-	0.58	-	0.68	-	0.72	-	-	-	-	-
Rubidium	mg/L	-	-	0.00089	-	0.00060	-	0.00085	-	0.00095	-	-	-	-	-
Selenium	mg/L	0.0020	-	0.000052	0.000052	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.0005	<0.0005	<0.01[DL>Mn]	<0.01[DL>Mn]
Silicon	mg/L	-	-	2.5	-	2.3	-	2.5	-	2.9	-	-	-	-	-
Silver	mg/L	0.000050 - 0.0015[b]	0.00010 - 0.030[b]	<0.00001	<0.00001	0.000020	0.000020	<0.00001	<0.00001	<0.00001	<0.00001	<0.0001	<0.0001[DL>Mn]	<0.001	<0.001[DL>Mn, DL>Mx]
Sodium	mg/L	-	-	1.0	-	0.93	-	1.00	-	1.0	-	133	-	-	-
Strontium	mg/L	-	-	0.041	-	0.033	-	0.038	-	0.042	-	-	-	-	-
Sulphur	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	-	-	-	-
Tellurium	mg/L	-	-	<0.0002	-	<0.0002	-	<0.0002	-	<0.0002	-	-	-	-	-
Thallium	mg/L	0.00080	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	-	-	-	-
Thorium-232	mg/L	-	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	-	-	-	-
Tin	mg/L	-	-	0.00052	-	<0.0001	-	<0.0001	-	<0.0001	-	-	-	-	-
Titanium	mg/L	-	-	0.00075	-	0.00068	-	0.0027	-	0.0036	-	-	-	-	-
Tungsten	mg/L	-	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	-	-	-	-
Uranium	mg/L	0.0085	-	0.000013	0.000013	0.000015	0.000015	0.000017	0.000017	0.000022	0.000022	-	-	-	-
Vanadium	mg/L	-	-	<0.0005	-	<0.0005	-	<0.0005	-	0.00063	-	<0.03	-	-	-
Zinc	mg/L	0.0075 - 0.19[b]	0.033 - 0.34[b]	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.0080	0.0080[Mn]	0.11	0.11[Mn, Mx]
Zirconium	mg/L	-	-	<0.0002	-	<0.0002	-	<0.0002	-	<0.0002	-	-	-	-	-
Dissolved Metals															
Aluminum	mg/L	0.0074 - 0.050[h]	0.024 - 0.10[h]	0.033	-	0.031	-	0.031	-	0.038	-	-	-	-	-
Antimony	mg/L	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	-	-	-
Arsenic	mg/L	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	-	-	-
Barium	mg/L	-	-	0.022	0.022	0.013	0.013	0.019	0.019	0.019	0.019	-	-	-	-
Beryllium	mg/L	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	-	-	-
Bismuth	mg/L	-	-	<0.00005	-	<0.00005	-	<0.00005	-	<0.00005	-	-	-	-	-
Boron	mg/L	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	-
Cadmium	mg/L	0.000018 - 0.00046[b]	0.000038 - 0.0028[b]	<0.000005	<0.000005	<0.000005	<0.000005	0.0000097	0.0000097	<0.000005	<0.000005	-	-	-	-
Cesium	mg/L	-	-	<0.00001	-	<0.00001	-	<0.00001	-	<0.00001	-	-	-	-	-
Chromium	mg/L	-	-	<0.0001	<0.0001	0.00012	0.00012	<0.0001	<0.0001	<0.0001	<0.0001	-	-	-	-
Cobalt	mg/L	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	-	-	-
Copper	mg/L	0.002[i]	0.00020 - 0.00046[i]	0.00072[Mn, Mx]	0.00072[Mn, Mx]	0.00064[Mn, Mx]	0.00064[Mn, Mx]	0.0008[Mn, Mx]	0.0008[Mn, Mx]	0.00074[Mn, Mx]	0.00074[Mn, Mx]	-	-	-	-
Iron	mg/L	-	0.35	0.024	-	<0.01	-	0.011	-	0.015	-	-	-	-	-
Lead	mg/L	-	-	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	-	-	-	-
Lithium	mg/L	-	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	-	-	-	-
Manganese	mg/L	-	-	0.0048	-	0.00065	-	0.0024	-	0.0021	-	-	-	-	-
Mercury	mg/L	-	-	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	-	-	-	-
Molybdenum	mg/L	-	-	0.00021	0.00021	0.00023	0.00023	0.00017	0.00017	0.00043	0.00043	-	-	-	-
Nickel	mg/L	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	-	-	-	-
Rubidium	mg/L	-	-	0.00090	-	0.00060	-	0.00082	-	0.00079	-	-	-	-	-
Selenium	mg/L	-	-	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	-	-	-	-
Silicon	mg/L	-	-	2.5	-	2.2	-	2.4	-	2.7	-	-	-	-	-
Silver	mg/L	-	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	-	-	-	-
Strontium	mg/L	-	-	0.044	-	0.031	-	0.039	-	0.045	-	-	-	-	-
Sulphur	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	-	-	-	-
Tellurium	mg/L	-	-	<0.0002	-	<0.0002	-	<0.0002	-	<0.0002	-	-	-	-	-
Thallium	mg/L	-	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	-	-	-	-
Thorium-232	mg/L	-	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	-	-	-	-
Tin	mg/L	-	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	-	-	-	-
Titanium	mg/L	-	-	0.00031	-	<0.0003	-	<0.0003	-	0.00042	-	-	-	-	-
Tungsten	mg/L	-	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	-	-	-	-
Uranium	mg/L	-	-	0.000013	0.000013	0.000012	0.000012	0.000014	0.000014	0.000021	0.000021	-	-	-	-
Vanadium	mg/L	-	-	<0.0005	-	<0.0005	-	<0.0005	-	<0.0005	-	-	-	-	-
Zinc	mg/L	-	-	<0.001	<0.001	<0.001	<0.001	0.0028	0.0028	0.0019	0.0019	-	-	-	-
Zirconium	mg/L	-	-	<0.0002	-	<0.0002	-	<0.0002	-	<0.0002	-	-	-	-	-

Table Notes:
BC WQG = British Columbia Approved (updated December 2021) and Working (updated February 2021) Water Quality Guidelines for the protection of freshwater aquatic life (AW-F)
[a] = guideline is a minimum value.
[b] = guideline is hardness dependent.
[c] = for some samples, water hardness was greater than 250 mg/L.
[d] = guideline is chloride dependent.
[e] & [f] = the ammonia guideline is pH and temperature dependent.
[g] = guideline is for chromium VI.
[h] = guideline is pH dependent.
[i] = guideline for dissolved copper is pH, hardness, and dissolved organic carbon dependent.
[Mn] = Exceeds BC WQG long-term chronic (30-day mean)
[Mx] = Exceeds BC WQG short-term acute (maximum)
[DL>Mn] = Detection Limit exceeds BC WQG 30-day mean
[DL>Mx] = Detection Limit exceeds BC WQG maximum
< Indicates parameter was below laboratory equipment detection limit.
- Chemical not analyzed or criteria not defined

Appendix C
Results of Surface Water Analyses
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name		SW-3	SW-3B	SW-3	SW-3B	SW-3C	SW-3D	SW-3	SW-3B	SW-3	SW-3B	SW-3	SW-3B
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	1997-12-04	1997-12-04	1998-05-04	1998-05-04	1998-05-04	1998-05-04	1998-09-24	1998-09-24	1999-01-27	1999-01-27	1999-04-30	1999-04-30
Field Measured															
pH	-	6.5 - 9.0	6.5 - 9.0	-	-	-	-	-	-	-	-	-	-	-	-
Temperature	°C	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved oxygen	mg/L	8[a]	5[a]	-	-	-	-	-	-	-	-	-	-	-	-
Conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation reduction potential	mV	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conventional Parameters															
pH, lab	-	6.5 - 9.0	6.5 - 9.0	7.7	-	-	7.9	-	-	7.9	-	-	-	-	-
Specific conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hardness, as $CaCO_3$	mg/L	-	-	618	-	-	603	-	-	651	-	640	-	611	-
Total alkalinity, as $CaCO_3$	mg/L	20[a]	-	-	-	-	-	-	-	-	-	-	-	-	-
Total suspended solids	mg/L	-	-	408	-	183	-	-	-	515	-	-	-	-	-
Conductivity	µS/cm	-	-	2400	-	-	2160	-	-	2090	-	-	-	2160	-
Hardness, as $CaCO_3$ (Dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Major Ions															
Bromide	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride	mg/L	150	600	**187**[Mn]	**187**[Mn]	-	-	**168**[Mn]	**168**[Mn]	**183**[Mn]	**183**[Mn]	140	140	131	131
Fluoride	mg/L	-	0.40 - 2.2[b]	-	-	-	-	-	-	-	-	-	-	-	-
Magnesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate	mg/L	128 - 429[b, c]	-	16	16	-	-	63	63	9.0	9.0	20	20	17	17
Nutrients and Biological Indicators															
Nitrate	mg-N/L	3.0	33	**7.4**[Mn]	**7.4**[Mn]	-	-	**11**[Mn]	**11**[Mn]	**7.3**[Mn]	**7.3**[Mn]	2.5	2.5	2.3	2.3
Nitrite	mg-N/L	0.020 - 0.20[d]	0.060 - 0.60[d]	**0.27**[Mn]	**0.27**[Mn]	-	-	**0.81**[Mn, Mx]	**0.81**[Mn, Mx]	**0.59**[Mn]	**0.59**[Mn]	**0.21**[Mn]	**0.21**[Mn]	**0.25**[Mn]	**0.25**[Mn]
Total ammonia	mg-N/L	0.11 - 2.0[e]	0.74 - 26[f]	**50**[Mn, Mx]	-	-	**33**[Mn, Mx]	-	-	**90**[Mn, Mx]	-	**48**[Mn, Mx]	-	**46**[Mn, Mx]	-
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	-	-	61	-	-	84	-	-	<5.0	-	-	-	<10	-
Chemical oxygen demand	mg/L	-	-	299	-	-	164	-	-	184	-	375	-	104	-
Total Metals															
Aluminum	mg/L	-	-	0.018	-	-	0.019	-	-	0.080	-	0.050	-	0.024	-
Antimony	mg/L	0.0090	-	<0.001	<0.001	-	-	0.00030	0.00030	<0.001	<0.001	**0.035**[Mn]	**0.035**[Mn]	<0.001	<0.001
Arsenic	mg/L	-	0.005	0.0030	0.0030	-	-	0.00060	0.00060	0.0020	0.0020	**0.14**[Mx]	**0.14**[Mx]	0.0020	0.0020
Barium	mg/L	1.0	-	0.35	0.35	-	-	0.35	0.35	0.42	0.42	0.37	0.37	0.34	0.34
Beryllium	mg/L	0.00013	-	<0.005[DL>Mn]	<0.005[DL>Mn]	-	-	<0.005[DL>Mn]	<0.005[DL>Mn]	<0.005[DL>Mn]	<0.005[DL>Mn]	<0.001[DL>Mn]	<0.001[DL>Mn]	<0.001[DL>Mn]	<0.001[DL>Mn]
Bismuth	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	1.2	-	-	-	-	-	-	-	-	-	**2.2**[Mn]	**2.2**[Mn]	**2.3**[Mn]	**2.3**[Mn]
Cadmium	mg/L	-	-	<0.0002	<0.0002	-	-	<0.0002	<0.0002	0.00030	0.00030	<0.0001	<0.0001	<0.0002	<0.0002
Calcium	mg/L	-	-	175	-	-	166	-	-	183	-	187	-	183	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	0.0010[g]	-	**0.003**[Mn]	**0.003**[Mn]	-	-	**0.0030**[Mn]	**0.0030**[Mn]	**0.0020**[Mn]	**0.0020**[Mn]	**0.0080**[Mn]	**0.0080**[Mn]	**0.0020**[Mn]	**0.0020**[Mn]
Cobalt	mg/L	0.0040	0.11	<0.01[DL>Mn]	<0.01[DL>Mn]	-	-	<0.01[DL>Mn]	<0.01[DL>Mn]	<0.01[DL>Mn]	<0.01[DL>Mn]	0.0030	0.0030	0.0020	0.0020
Copper	mg/L	-	-	0.0030	0.003	-	-	0.003	0.003	<0.001	<0.001	0.011	0.011	0.0050	0.005
Iron	mg/L	-	1.0	0.070	-	-	0.030	-	-	0.050	-	0.083	-	0.28	-
Lead	mg/L	0.020[b]	0.0030 - 0.42[b]	<0.001	<0.001	-	-	0.0020	0.0020	<0.001	<0.001	<0.02[DL>Mn]	<0.02[DL>Mn]	0.0020	0.0020
Lithium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Magnesium	mg/L	-	-	44	-	-	46	-	-	47	-	42	-	37	-
Manganese	mg/L	0.77 - 2.6[b]	0.82 - 3.4[b]	2.1	-	-	1.5	-	-	2.3	-	**3.0**[Mn]	-	**3.0**[Mn]	-
Mercury	mg/L	0.000010	-	0.000010	0.000010	<0.00001	<0.00001	-	-	<0.00001	<0.00001	**0.000050**[Mn]	**0.000050**[Mn]	<0.00005[DL>Mn]	<0.00005[DL>Mn]
Molybdenum	mg/L	7.6	46	<0.03	<0.03	-	-	<0.03	<0.03	<0.03	<0.03	<0.004	<0.004	<0.001	<0.001
Nickel	mg/L	0.025 - 0.15[b]	-	<0.02	<0.02	-	-	0.020	0.020	<0.05	<0.05	<0.008	<0.008	0.0080	0.0080
Potassium	mg/L	-	-	-	-	-	-	-	-	-	-	89	-	91	-
Rubidium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/L	0.0020	-	<0.0005	<0.0005	-	-	0.00050	0.00050	0.00050	0.00050	<0.001	<0.001	<0.002	<0.002
Silicon	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver	mg/L	0.000050 - 0.0015[b]	0.00010 - 0.0030[b]	<0.0001	<0.0001[DL>Mn]	-	-	<0.0001[DL>Mn]	<0.0001[DL>Mn]	<0.0001	<0.0001[DL>Mn]	<0.0001	<0.0001[DL>Mn]	<0.0001	<0.0001[DL>Mn]
Sodium	mg/L	-	-	-	-	-	-	-	-	-	-	141	-	125	-
Strontium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	-	-	-	-	8.3	-	-	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	0.00080	-	<0.001[DL>Mn]	<0.001[DL>Mn]	<0.0001	<0.0001	-	-	**0.0010**[Mn]	**0.0010**[Mn]	<0.0001	<0.0001	<0.0001	<0.0001
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	mg/L	-	-	<0.01	-	-	<0.01	-	-	<0.01	-	<0.003	-	<0.001	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	0.0085	-	0.00030	0.00030	0.00020	0.00020	-	-	0.00010	0.00010	-	-	<0.0005	<0.0005
Vanadium	mg/L	-	-	<0.03	-	-	<0.03	-	-	<0.03	-	<0.003	-	0.0010	-
Zinc	mg/L	0.0075 - 0.19[b]	0.033 - 0.34[b]	0.0070	0.0070	-	-	<0.005	<0.005	<0.005	<0.005	0.013	**0.013**[Mn]	0.016	**0.016**[Mn]
Zirconium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Metals															
Aluminum	mg/L	0.0074 - 0.050[h]	0.024 - 0.10[h]	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bismuth	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/L	0.000018 - 0.00046[b]	0.000038 - 0.0028[b]	-	-	-	-	-	-	-	-	-	-	-	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	mg/L	0.002[i]	0.00020 - 0.00046[i]	-	-	-	-	-	-	-	-	-	-	-	-
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	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zirconium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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[g] = guideline is for chromium VI.
[h] = guideline is pH dependent.
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Appendix C
Results of Surface Water Analyses
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name		SW-3	SW-3B	SW-3	SW-3B	SW-3	SW-3B	SW-3	SW-3B	SW-3	SW-3B	SW-3	SW-3B
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	1999-11-01	1999-11-01	2000-03-17	2000-03-17	2000-08-15	2000-08-15	2000-12-20	2000-12-20	2001-05-07	2001-05-07	2001-12-01	2001-12-01
Field Measured															
pH	-	6.5 - 9.0	6.5 - 9.0	-	-	-	-	-	-	-	-	-	-	-	-
Temperature	°C	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved oxygen	mg/L	8[a]	5[a]	-	-	-	-	-	-	-	-	-	-	-	-
Conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation reduction potential	mV	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conventional Parameters															
pH, lab	-	6.5 - 9.0	6.5 - 9.0	-	-	7.3	-	7.2	-	7.4	-	7.6	-	7.1	-
Specific conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hardness, as $CaCO_3$	mg/L	-	-	549	-	480	-	529	-	493	-	534	-	551	-
Total alkalinity, as $CaCO_3$	mg/L	20[a]	-	-	-	-	-	-	-	-	-	-	-	-	-
Total suspended solids	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conductivity	µS/cm	-	-	-	-	1780	-	-	-	-	-	1790	-	2000	-
Hardness, as $CaCO_3$ (Dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Major Ions															
Bromide	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride	mg/L	150	600	134	134	104	104	**176**[Mn]	**176**[Mn]	125	125	111	111	107	107
Fluoride	mg/L	-	0.40 - 2.2[b]	-	-	0.37	0.37	<0.1	<0.1	<0.1	<0.1	<0.25	<0.25	<0.05	<0.05
Magnesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate	mg/L	128 - 429[b, c]	-	21	21	2.1	2.1	<1.0	<1.0	19	19	9.3	9.3	21	21
Nutrients and Biological Indicators															
Nitrate	mg-N/L	3.0	33	0.12	0.12	-	-	<0.05	<0.05	0.31	0.31	1.8	1.8	0.13	0.13
Nitrite	mg-N/L	0.020 - 0.20[d]	0.060 - 0.60[d]	0.076	0.076	-	-	<0.002	<0.002	0.038	0.038	0.18	0.18	0.011	0.011
Total ammonia	mg-N/L	0.11 - 2.0[e]	0.74 - 26[f]	-	-	**27**[Mn, Mx]	-	**47**[Mn, Mx]	-	**43**[Mn, Mx]	-	**26**[Mn, Mx]	-	**45**[Mn, Mx]	-
Total Kjeldahl Nitrogen	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total phosphorus	mg-P/L	-	-	-	-	0.080	-	<0.01	-	0.10	-	0.11	-	0.070	-
Dissolved phosphorus	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Orthophosphate	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Biochemical oxygen demand	mg/L	-	-	<10	-	<10	-	<10	-	<10	-	<10	-	<10	-
Chemical oxygen demand	mg/L	-	-	-	-	84	-	88	-	72	-	62	-	86	-
Total Metals															
Aluminum	mg/L	-	-	0.019	-	0.27	-	0.012	-	0.042	-	0.026	-	0.011	-
Antimony	mg/L	0.0090	-	0.0010	0.0010	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Arsenic	mg/L	-	0.005	0.0020	0.0020	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	<0.001	<0.001	0.0010	0.0010
Barium	mg/L	1.0	-	0.32	0.32	0.26	0.26	0.26	0.26	0.028	0.028	0.28	0.28	0.43	0.43
Beryllium	mg/L	0.00013	-	<0.001[DL>Mn]	<0.001[DL>Mn]	<0.001[DL>Mn]	<0.001[DL>Mn]	<0.001[DL>Mn]	<0.001[DL>Mn]	<0.001[DL>Mn]	<0.001[DL>Mn]	<0.001[DL>Mn]	<0.001[DL>Mn]	<0.001[DL>Mn]	<0.001[DL>Mn]
Bismuth	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	1.2	-	**1.5**[Mn]	**1.5**[Mn]	**1.5**[Mn]	**1.5**[Mn]	**2.1**[Mn]	**2.1**[Mn]	**1.9**[Mn]	**1.9**[Mn]	**1.5**[Mn]	**1.5**[Mn]	**1.6**[Mn]	**1.6**[Mn]
Cadmium	mg/L	-	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Calcium	mg/L	-	-	160	-	142	-	163	-	137	-	150	-	162	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	0.0010[g]	-	**0.0020**[Mn]	**0.0020**[Mn]	**0.0040**[Mn]	**0.0040**[Mn]	**0.0020**[Mn]	**0.0020**[Mn]	**0.0020**[Mn]	**0.0020**[Mn]	0.0010	0.0010	**0.0030**[Mn]	**0.0030**[Mn]
Cobalt	mg/L	0.0040	0.11	0.0020	0.0020	0.0020	0.0020	0.0040	0.0040	0.0030	0.0030	0.0020	0.0020	**0.0050**[Mn]	**0.0050**[Mn]
Copper	mg/L	-	-	0.0010	0.0010	0.0050	0.005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.0020	0.0020
Iron	mg/L	-	1.0	0.33	-	0.25	-	0.28	-	0.34	-	0.33	-	0.44	-
Lead	mg/L	0.020[b]	0.0030 - 0.42[b]	<0.001	<0.001	0.0020	0.0020	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Lithium	mg/L	-	-	-	-	-	-	-	-	-	-	0.0020	-	-	-
Magnesium	mg/L	-	-	36	-	31	-	29	-	36	-	28	-	35	-
Manganese	mg/L	0.77 - 2.6[b]	0.82 - 3.4[b]	**2.9**[Mn]	-	2.4	-	**2.9**[Mn]	-	**3.0**[Mn]	-	2.4	-	**4.8**[Mn, Mx]	-
Mercury	mg/L	0.000010	-	<0.00005[DL>Mn]	<0.00005[DL>Mn]	<0.00002[DL>Mn]	<0.00002[DL>Mn]	<0.00002[DL>Mn]	<0.00002[DL>Mn]	<0.00002[DL>Mn]	<0.00002[DL>Mn]	<0.00002[DL>Mn]	<0.00002[DL>Mn]	<0.00002[DL>Mn]	<0.00002[DL>Mn]
Molybdenum	mg/L	7.6	46	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Nickel	mg/L	0.025 - 0.15[b]	-	0.0060	0.0060	0.0060	0.0060	0.0080	0.0080	0.0080	0.0080	0.0060	0.0060	0.0070	0.0070
Potassium	mg/L	-	-	76	-	61	-	89	-	77	-	69	-	68	-
Rubidium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/L	0.0020	-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Silicon	mg/L	-	-	-	-	12	-	25	-	19	-	15	-	22	-
Silver	mg/L	0.000050 - 0.0015[b]	0.00010 - 0.0030[b]	0.00010	0.00010	<0.0001	<0.0001[DL>Mn]	<0.0001	<0.0001[DL>Mn]	<0.0001	<0.0001[DL>Mn]	<0.0001	<0.0001[DL>Mn]	<0.0001	<0.0001[DL>Mn]
Sodium	mg/L	-	-	122	-	102	-	105	-	123	-	114	-	108	-
Strontium	mg/L	-	-	-	-	0.90	-	1.1	-	0.95	-	1.0	-	1.1	-
Sulphur	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	0.00080	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
Titanium	mg/L	-	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	0.0085	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Vanadium	mg/L	-	-	0.0010	-	0.0040	-	<0.001	-	0.0020	-	<0.001	-	0.0050	-
Zinc	mg/L	0.0075 - 0.19[b]	0.033 - 0.34[b]	<0.005	<0.005	0.014	**0.014**[Mn]	<0.005	<0.005	<0.005	<0.005	0.011	**0.011**[Mn]	<0.005	<0.005
Zirconium	mg/L	-	-	-	-	<0.01	-	<0.02	-	<0.03	-	<0.04	-	<0.01	-
Dissolved Metals															
Aluminum	mg/L	0.0074 - 0.050[h]	0.024 - 0.10[h]	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bismuth	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/L	0.000018 - 0.00046[b]	0.000038 - 0.0028[b]	-	-	-	-	-	-	-	-	-	-	-	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	mg/L	0.002[i]	0.00020 - 0.00046[i]	-	-	-	-	-	-	-	-	-	-	-	-
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	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zirconium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table Notes:
BC WQG = British Columbia Approved (updated December 2021) and Working (updated February 2021) Water Quality Guidelines for the protection of freshwater aquatic life (AW-F)
[a] = guideline is a minimum value.
[b] = guideline is hardness dependent.
[c] = for some samples, water hardness was greater than 250 mg/L.
[d] = guideline is chloride dependent.
[e] & [f] = the ammonia guideline is pH and temperature dependent.
[g] = guideline is for chromium VI.
[h] = guideline is pH dependent.
[i] = guideline for dissolved copper is pH, hardness, and dissolved organic carbon dependent.
[Mn] = Exceeds BC WQG long-term chronic (30-day mean)
[Mx] = Exceeds BC WQG short-term acute (maximum)
[DL>Mn] = Detection Limit exceeds BC WQG 30-day mean
[DL>Mx] = Detection Limit exceeds BC WQG maximum
< Indicates parameter was below laboratory equipment detection limit.
- Chemical not analyzed or criteria not defined

Appendix C
Results of Surface Water Analyses
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name		SW-3	SW-3B	SW-3	SW-3B	SW-3	SW-3B	SW-3	SW-3B	SW-3C	SW-3D	SW-3	SW-3B
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	2002-04-01	2002-04-01	2002-06-01	2002-06-01	2003-01-01	2003-01-01	2003-03-01	2003-03-01	2003-03-01	2003-03-01	2003-08-01	2003-08-01
Field Measured															
pH	-	6.5 - 9.0	6.5 - 9.0	-	-	-	-	-	-	-	-	-	-	-	-
Temperature	°C	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved oxygen	mg/L	8[a]	5[a]	-	-	-	-	-	-	-	-	-	-	-	-
Conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation reduction potential	mV	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conventional Parameters															
pH, lab	-	6.5 - 9.0	6.5 - 9.0	7.3	-	7.6	-	7.3	-	-	7.4	-	-	7.5	-
Specific conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hardness, as $CaCO_3$	mg/L	-	-	316	-	93	-	156	-	527	-	-	-	601	-
Total alkalinity, as $CaCO_3$	mg/L	20[a]	-	-	-	-	-	-	-	-	-	-	-	-	-
Total suspended solids	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conductivity	µS/cm	-	-	79	-	1980	-	518	-	-	1710	-	-	2050	-
Hardness, as $CaCO_3$ (Dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Major Ions															
Bromide	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride	mg/L	150	600	57	57	122	122	23	23	-	-	95	95	128	128
Fluoride	mg/L	-	0.40 - 2.2[b]	<0.05	<0.05	<0.25	<0.25	<0.05	<0.05	<0.05	<0.05	-	-	<0.05	<0.05
Magnesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate	mg/L	128 - 429[b, c]	-	22	22	6.7	6.7	13	13	-	-	7.8	7.8	0.60	0.60
Nutrients and Biological Indicators															
Nitrate	mg-N/L	3.0	33	2.4	2.4	2.3	2.3	2.5	2.5	-	-	**3.4**[(Mn)]	**3.4**[(Mn)]	0.79	0.79
Nitrite	mg-N/L	0.020 - 0.20[d]	0.060 - 0.60[d]	**2.4**[(Mn, Mx)]	**2.4**[(Mn, Mx)]	**0.47**[(Mn)]	**0.47**[(Mn)]	0.035	0.035	-	-	**0.34**[(Mn)]	**0.34**[(Mn)]	0.041	0.041
Total ammonia	mg-N/L	0.11 - 2.0[e]	0.74 - 26[f]	1.6	-	**44**[(Mn, Mx)]	-	**6.0**[(Mn)]	-	-	**41**[(Mn, Mx)]	-	-	**34**[(Mn, Mx)]	-
Total Kjeldahl Nitrogen	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total phosphorus	mg-P/L	-	-	0.080	-	0.10	-	0.060	-	0.14	-	-	-	0.15	-
Dissolved phosphorus	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Orthophosphate	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Biochemical oxygen demand	mg/L	-	-	<10	-	76	-	<10	-	-	<10	-	-	<10	-
Chemical oxygen demand	mg/L	-	-	41	-	102	-	38	-	-	66	-	-	73	-
Total Metals															
Aluminum	mg/L	-	-	0.022	-	<0.005	-	0.085	-	-	0.0050	-	-	0.017	-
Antimony	mg/L	0.0090	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	-	<0.001	<0.001	<0.001	<0.001
Arsenic	mg/L	-	0.005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	-	<0.001	<0.001	0.0010	0.0010
Barium	mg/L	1.0	-	0.25	0.25	0.031	0.031	0.13	0.13	-	-	0.32	0.32	0.37	0.37
Beryllium	mg/L	0.00013	-	<0.001[(DL>Mn)]	<0.001[(DL>Mn)]	<0.001[(DL>Mn)]	<0.001[(DL>Mn)]	<0.001[(DL>Mn)]	<0.001[(DL>Mn)]	-	-	<0.001[(DL>Mn)]	<0.001[(DL>Mn)]	<0.001[(DL>Mn)]	<0.001[(DL>Mn)]
Bismuth	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	1.2	-	1.0	1.0	0.080	0.080	0.47	0.47	**2.0**[(Mn)]	**2.0**[(Mn)]	-	-	**1.7**[(Mn)]	**1.7**[(Mn)]
Cadmium	mg/L	-	-	<0.0002	<0.0002	0.0011	0.0011	<0.0002	<0.0002	-	-	<0.0002	<0.0002	<0.0002	<0.0002
Calcium	mg/L	-	-	92	-	25	-	48	-	148	-	-	-	172	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	0.0010[g]	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	-	**0.0020**[(Mn)]	**0.0020**[(Mn)]	0.0010	0.0010
Cobalt	mg/L	0.0040	0.11	-	-	0.0030	0.0030	<0.001	<0.001	-	-	0.0030	0.0030	0.0030	0.0030
Copper	mg/L	-	-	0.0070	0.007	<0.001	<0.001	0.0040	0.004	-	-	0.005	0.005	<0.001	<0.001
Iron	mg/L	-	1.0	0.41	-	0.42	-	0.22	-	0.080	-	-	-	<0.05	-
Lead	mg/L	0.020[b]	0.0030 - 0.42[b]	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	-	<0.001	<0.001	<0.001	<0.001
Lithium	mg/L	-	-	-	-	<0.001	-	<0.001	-	-	0.0030	-	-	0.0030	-
Magnesium	mg/L	-	-	21	-	7.3	-	9.1	-	38	-	-	-	42	-
Manganese	mg/L	0.77 - 2.6[b]	0.82 - 3.4[b]	1.5	-	**3.9**[(Mn, Mx)]	-	0.53	-	-	**2.7**[(Mn, Mx)]	-	-	**2.8**[(Mn)]	-
Mercury	mg/L	0.000010	-	<0.00002[(DL>Mn)]	<0.00002[(DL>Mn)]	<0.00002[(DL>Mn)]	<0.00002[(DL>Mn)]	<0.00002[(DL>Mn)]	<0.00002[(DL>Mn)]	<0.00002[(DL>Mn)]	<0.00002[(DL>Mn)]	-	-	<0.00002[(DL>Mn)]	<0.00002[(DL>Mn)]
Molybdenum	mg/L	7.6	46	<0.001	<0.001	<0.0005	<0.0005	<0.0005	<0.0005	-	-	0.013	0.013	<0.0005	<0.0005
Nickel	mg/L	0.025 - 0.15[b]	-	0.0050	0.0050	0.010	0.010	0.0020	0.0020	-	-	0.0080	0.0080	0.0060	0.0060
Potassium	mg/L	-	-	39	-	2.1	-	19	-	66	-	-	-	73	-
Rubidium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/L	0.0020	-	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	-	-	<0.001	<0.001	<0.001	<0.001
Silicon	mg/L	-	-	11	-	9.9	-	7.8	-	17	-	-	-	21	-
Silver	mg/L	0.000050 - 0.0015[b]	0.00010 - 0.0030[b]	<0.0001	<0.0001[(DL>Mn)]	<0.0001[(DL>Mn)]	<0.0001[(DL>Mn)]	<0.0001	<0.0001[(DL>Mn)]	-	-	<0.0001[(DL>Mn)]	<0.0001[(DL>Mn)]	<0.0001	<0.0001[(DL>Mn)]
Sodium	mg/L	-	-	65	-	8.5	-	27	-	121	-	-	-	124	-
Strontium	mg/L	-	-	0.63	-	0.18	-	0.28	-	-	1.0	-	-	1.1	-
Sulphur	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	0.00080	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	-	<0.0001	<0.0001	<0.0001	<0.0001
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	<0.001	-	<0.001	-	<0.001	-	-	<0.001	-	-	<0.001	-
Titanium	mg/L	-	-	<0.001	-	<0.001	-	0.0020	-	0.0010	-	-	-	0.0020	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	0.0085	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	-	-	<0.0005	<0.0005	<0.0005	<0.0005
Vanadium	mg/L	-	-	<0.001	-	<0.001	-	<0.001	-	-	<0.001	-	-	<0.001	-
Zinc	mg/L	0.0075 - 0.19[b]	0.033 - 0.34[b]	<0.005	<0.005	0.0070	0.0070	<0.005	<0.005	-	-	<0.005	<0.005	<0.005	<0.005
Zirconium	mg/L	-	-	<0.01	-	<0.01	-	<0.01	-	<0.01	-	-	-	<0.01	-
Dissolved Metals															
Aluminum	mg/L	0.0074 - 0.050[h]	0.024 - 0.10[h]	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bismuth	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/L	0.000018 - 0.00046[b]	0.000038 - 0.0028[b]	-	-	-	-	-	-	-	-	-	-	-	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	mg/L	0.002[i]	0.00020 - 0.00046[i]	-	-	-	-	-	-	-	-	-	-	-	-
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	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zirconium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table Notes:
BC WQG = British Columbia Approved (updated December 2021) and Working (updated February 2021) Water Quality Guidelines for the protection of freshwater aquatic life (AW-F)
[a] = guideline is a minimum value.
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[d] = guideline is chloride dependent.
[e] & [f] = the ammonia guideline is pH and temperature dependent.
[g] = guideline is for chromium VI.
[h] = guideline is pH dependent.
[i] = guideline for dissolved copper is pH, hardness, and dissolved organic carbon dependent.
[(Mn)] = Exceeds BC WQG long-term chronic (30-day mean)
[(Mx)] = Exceeds BC WQG short-term acute (maximum)
[(DL>Mn)] = Detection Limit exceeds BC WQG 30-day mean
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Appendix C
Results of Surface Water Analyses
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name		SW-3	SW-3B	SW-3	SW-3B	SW-3	SW-3B	SW-3	SW-3B	SW-3	SW-3B	SW-3	SW-3B
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	2003-12-03	2003-12-03	2004-10-18	2004-10-18	2005-06-01	2005-06-01	2005-11-01	2005-11-01	2006-06-01	2006-06-01	2007-01-02	2007-01-02
Field Measured															
pH	-	6.5 - 9.0	6.5 - 9.0	-	-	-	-	-	-	-	-	-	-	-	-
Temperature	°C	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved oxygen	mg/L	8[a]	5[a]	-	-	-	-	-	-	-	-	-	-	-	-
Conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation reduction potential	mV	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conventional Parameters															
pH, lab	-	6.5 - 9.0	6.5 - 9.0	6.8	-	7.2	-	7.4	-	8.1	-	7.4	-	10[(Mn, Mx)]	-
Specific conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hardness, as $CaCO_3$	mg/L	-	-	21	-	653	-	573	-	500	-	559	-	28	-
Total alkalinity, as $CaCO_3$	mg/L	20[a]	-	-	-	-	-	-	-	-	-	-	-	-	-
Total suspended solids	mg/L	-	-	-	-	8.0	-	-	-	10	-	-	-	-	-
Conductivity	µS/cm	-	-	852	-	1930	-	2470	-	1460	-	2490	-	76	-
Hardness, as $CaCO_3$ (Dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Major Ions															
Bromide	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride	mg/L	150	600	0.40	0.40	116	116	141	141	90	90	164[(Mn)]	164[(Mn)]	2.6	2.6
Fluoride	mg/L	-	0.40 - 2.2[b]	<0.05	<0.05	-	-	<0.25	<0.25	-	-	<0.05	<0.05	<0.25	<0.25
Magnesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate	mg/L	128 - 429[b, c]	-	1.2	1.2	14	14	<2.5	<2.5	13	13	2.1	2.1	2.5	2.5
Nutrients and Biological Indicators															
Nitrate	mg-N/L	3.0	33	0.20	0.20	0.54	0.54	1.2	1.2	1.3	1.3	1.2	1.2	<0.25	<0.25
Nitrite	mg-N/L	0.020 - 0.20[d]	0.060 - 0.60[d]	<0.002	<0.002	0.060	0.060	0.013	0.013	0.080	0.080	<0.002	<0.002	0.080[(Mn)]	0.080[(Mn)]
Total ammonia	mg-N/L	0.11 - 2.0[e]	0.74 - 26[f]	0.040	-	30[(Mn, Mx)]	-	55[(Mn, Mx)]	-	25[(Mn, Mx)]	-	49[(Mn, Mx)]	-	0.27[(Mn)]	-
Total Kjeldahl Nitrogen	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total phosphorus	mg-P/L	-	-	0.36	-	0.10	-	0.080	-	0.10	-	<0.15	-	<0.15	-
Dissolved phosphorus	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Orthophosphate	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Biochemical oxygen demand	mg/L	-	-	<10	-	<10	-	<10	-	<10	-	11	-	<10	-
Chemical oxygen demand	mg/L	-	-	<25	-	110	-	111	-	98	-	134	-	<20	-
Total Metals															
Aluminum	mg/L	-	-	0.063	-	0.012	-	0.0060	-	0.0092	-	<0.005	-	0.074	-
Antimony	mg/L	0.0090	-	<0.001	<0.001	0.00034	0.00034	<0.0002	<0.0002	0.00018	0.00018	<0.001	<0.001	<0.001	<0.001
Arsenic	mg/L	-	0.005	<0.001	<0.001	0.0016	0.0016	0.0012	0.0012	0.0013	0.0013	0.0010	0.0010	<0.001	<0.001
Barium	mg/L	1.0	-	0.017	0.017	0.45	0.45	0.37	0.37	0.30	0.30	0.39	0.39	0.012	0.012
Beryllium	mg/L	0.00013	-	<0.001[(DL>Mn)]	<0.001[(DL>Mn)]	<0.00002	<0.00002	<0.0002[(DL>Mn)]	<0.0002[(DL>Mn)]	0.000020	0.000020	<0.001[(DL>Mn)]	<0.001[(DL>Mn)]	<0.001[(DL>Mn)]	<0.001[(DL>Mn)]
Bismuth	mg/L	-	-	-	-	-	-	-	-	-	-	<0.001	-	<0.001	-
Boron	mg/L	1.2	-	<0.05	<0.05	1.6[(Mn)]	1.6[(Mn)]	1.9[(Mn)]	1.9[(Mn)]	1.4[(Mn)]	1.4[(Mn)]	2.2[(Mn)]	2.2[(Mn)]	<0.05	<0.05
Cadmium	mg/L	-	-	<0.0002	<0.0002	0.000050	0.000050	<0.00004	<0.00004	0.000030	0.000030	<0.0002	<0.0002	0.00020	0.00020
Calcium	mg/L	-	-	7.4	-	202	-	171	-	139	-	171	-	9.8	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	0.0010[g]	-	<0.001	<0.001	<0.002[(DL>Mn)]	<0.002[(DL>Mn)]	0.0015[(Mn)]	0.0015[(Mn)]	0.0064[(Mn)]	0.0064[(Mn)]	0.0020[(Mn)]	0.0020[(Mn)]	<0.001	<0.001
Cobalt	mg/L	0.0040	0.11	<0.001	<0.001	0.0029	0.0029	0.0026	0.0026	0.0018	0.0018	0.0020	0.0020	<0.001	<0.001
Copper	mg/L	-	-	<0.001	<0.001	0.0062	0.0062	0.0021	0.0021	0.0023	0.0023	<0.001	<0.001	0.0010	0.0010
Iron	mg/L	-	1.0	<0.05	-	0.053	-	0.080	-	1.3[(Mx)]	-	<0.05	-	0.14	-
Lead	mg/L	0.020[b]	0.0030 - 0.42[b]	<0.001	<0.001	<0.1[(DL>Mn)]	<0.1[(DL>Mn, DL>Mx)]	<0.0002	<0.0002	0.000010	0.000010	<0.001	<0.001	<0.001	<0.001
Lithium	mg/L	-	-	<0.001	-	0.00082	-	0.0025	-	0.0017	-	0.0030	-	<0.001	-
Magnesium	mg/L	-	-	0.59	-	36	-	35	-	25	-	32	-	0.80	-
Manganese	mg/L	0.77 - 2.6[b]	0.82 - 3.4[b]	0.0040	-	2.8[(Mn)]	-	2.5	-	1.6	-	2.4	-	0.0070	-
Mercury	mg/L	0.000010	-	<0.00002[(DL>Mn)]	<0.00002[(DL>Mn)]	<0.00005[(DL>Mn)]	<0.00005[(DL>Mn)]	<0.02[(DL>Mn)]	<0.02[(DL>Mn)]	-	-	<0.02[(DL>Mn)]	<0.02[(DL>Mn)]	<0.00002[(DL>Mn)]	<0.00002[(DL>Mn)]
Molybdenum	mg/L	7.6	46	<0.0005	<0.0005	0.00075	0.00075	<0.0001	<0.0001	0.00016	0.00016	<0.0005	<0.0005	<0.0005	<0.0005
Nickel	mg/L	0.025 - 0.15[b]	-	<0.001	<0.001	0.0093	0.0093	0.0084	0.0084	0.0052	0.0052	0.0060	0.0060	<0.001	<0.001
Potassium	mg/L	-	-	0.52	-	68	-	71	-	57	-	69	-	1.2	-
Rubidium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/L	0.0020	-	<0.001	<0.001	<0.002	<0.002	0.0012	0.0012	0.00060	0.00060	<0.001	<0.001	<0.001	<0.001
Silicon	mg/L	-	-	4.2	-	-	-	20	-	-	-	8.2	-	2.1	-
Silver	mg/L	0.000050 - 0.0015[b]	0.00010 - 0.0030[b]	<0.0001[(DL>Mn)]	<0.0001[(DL>Mn)]	<0.0002	<0.0002[(DL>Mn, DL>Mx)]	<0.00005	<0.00005	0.000020	0.000020	<0.00025	<0.00025[(DL>Mn, DL>Mx)]	<0.00025[(DL>Mn, DL>Mx)]	<0.00025[(DL>Mn, DL>Mx)]
Sodium	mg/L	-	-	0.80	-	121	-	126	-	97	-	137	-	2.4	-
Strontium	mg/L	-	-	0.030	-	1.2	-	1.1	-	0.79	-	1.2	-	0.028	-
Sulphur	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	5.9	-	-	-	5.3	-	-	-	-	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	0.00080	-	<0.0001	<0.0001	0.000022	0.000022	<0.00002	<0.00002	0.0000060	0.0000060	<0.0001	<0.0001	<0.0001	<0.0001
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	<0.001	-	0.00022	-	0.00020	-	-	-	<0.001	-	<0.001	-
Titanium	mg/L	-	-	0.0030	-	<0.003	-	0.00070	-	0.0030	-	<0.001	-	0.0010	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	0.0085	-	<0.0005	<0.0005	0.00021	0.00021	<0.0001	<0.0001	0.000063	0.000063	<0.0005	<0.0005	<0.0005	<0.0005
Vanadium	mg/L	-	-	<0.001	-	<0.0006	-	0.00060	-	0.00086	-	0.0010	-	<0.001	-
Zinc	mg/L	0.0075 - 0.19[b]	0.033 - 0.34[b]	<0.005	<0.005	0.00080	0.00080	0.0020	0.0020	0.00020	0.00020	<0.005	<0.005	<0.005	<0.005
Zirconium	mg/L	-	-	<0.01	-	0.0050	-	<0.002	-	0.0050	-	<0.01	-	<0.01	-
Dissolved Metals															
Aluminum	mg/L	0.0074 - 0.050[h]	0.024 - 0.10[h]	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bismuth	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/L	0.000018 - 0.00046[b]	0.000038 - 0.0028[b]	-	-	-	-	-	-	-	-	-	-	-	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	mg/L	0.002[i]	0.00020 - 0.00046[i]	-	-	-	-	-	-	-	-	-	-	-	-
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	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zirconium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Appendix C
Results of Surface Water Analyses
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name		SW-3	SW-3B	SW-3	SW-3B	SW-3	SW-3B	SW-3	SW-3B	SW-3	SW-3B	SW-3	SW-3B
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	2007-06-18	2007-06-18	2008-05-27	2008-05-27	2008-10-10	2008-10-10	2010-02-22	2010-02-22	2010-06-15	2010-06-15	2010-10-25	2010-10-25
Field Measured															
pH	-	6.5 - 9.0	6.5 - 9.0	-	-	-	-	-	-	-	-	-	-	-	-
Temperature	°C	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved oxygen	mg/L	8[a]	5[a]	-	-	-	-	-	-	-	-	-	-	-	-
Conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation reduction potential	mV	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conventional Parameters															
pH, lab	-	6.5 - 9.0	6.5 - 9.0	7.7	-	7.5	-	8.0	-	7.0	-	6.9	-	7.6	-
Specific conductivity	µS/cm	-	-	-	-	-	-	-	-	1,645	-	2,120	-	1,930	-
Hardness, as $CaCO_3$	mg/L	-	-	492	-	470	-	592	-	486	-	537	-	541	-
Total alkalinity, as $CaCO_3$	mg/L	20[a]	-	-	-	-	-	-	-	-	-	-	-	-	-
Total suspended solids	mg/L	-	-	-	-	-	-	10	-	-	-	-	-	-	-
Conductivity	µS/cm	-	-	1790	-	1760	-	1800	-	-	-	-	-	-	-
Hardness, as $CaCO_3$ (Dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Major Ions															
Bromide	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride	mg/L	150	600	0.11	0.11	**173**[Mn]	**173**[Mn]	110	110	95	95	127	127	73	73
Fluoride	mg/L	-	0.40 - 2.2[b]	<0.25	<0.25	<0.1	<0.1	-	-	-	-	-	-	-	-
Magnesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate	mg/L	128 - 429[b, c]	-	2.5	2.5	3.6	3.6	-	-	13	13	-	-	17	17
Nutrients and Biological Indicators															
Nitrate	mg-N/L	3.0	33	**4.2**[Mn]	**4.2**[Mn]	2.0	2.0	-	-	1.7	-	-	-	0.71	-
Nitrite	mg-N/L	0.020 - 0.20[d]	0.060 - 0.60[d]	**0.18**[Mn, Mx]	**0.18**[Mn, Mx]	0.061	0.061	0.11	0.11	0.013	-	-	-	0.019	-
Total ammonia	mg-N/L	0.11 - 2.0[e]	0.74 - 26[f]	**41**[Mn, Mx]	-	**41**[Mn, Mx]	-	**37**[Mn, Mx]	-	**55**[Mn, Mx]	-	**64**[Mn, Mx]	-	**57**[Mn, Mx]	-
Total Kjeldahl Nitrogen	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total phosphorus	mg-P/L	-	-	<0.15	-	-	-	0.032	-	-	-	-	-	-	-
Dissolved phosphorus	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Orthophosphate	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Biochemical oxygen demand	mg/L	-	-	12	-	28	-	<10	-	-	-	9.3	-	21	-
Chemical oxygen demand	mg/L	-	-	111	-	140	-	89	-	104	-	132	-	181	-
Total Metals															
Aluminum	mg/L	-	-	<0.005	-	0.015	-	0.0060	-	0.0070	-	0.013	-	0.0070	-
Antimony	mg/L	0.0090	-	<0.001	<0.001	<0.0006	<0.0006	0.00010	0.00010	-	-	-	-	-	-
Arsenic	mg/L	-	0.005	<0.001	<0.001	<0.001	<0.001	0.00080	0.00080	0.00070	0.00070	0.00090	0.00090	0.00050	0.00050
Barium	mg/L	1.0	-	0.37	0.37	0.40	0.40	0.40	0.40	0.34	0.34	0.32	0.32	-	-
Beryllium	mg/L	0.00013	-	<0.001[DL>Mn]	<0.001[DL>Mn]	<0.0004[DL>Mn]	<0.0004[DL>Mn]	<0.00005	<0.00005	-	-	-	-	-	-
Bismuth	mg/L	-	-	<0.001	-	-	-	<0.00003	-	-	-	0.38	-	0.38	-
Boron	mg/L	1.2	-	0.15	0.15	**2.2**[Mn]	**2.2**[Mn]	**1.9**[Mn]	**1.9**[Mn]	**1.9**[Mn]	**1.9**[Mn]	**1.9**[Mn]	**1.9**[Mn]	**2.0**[Mn]	**2.0**[Mn]
Cadmium	mg/L	-	-	<0.0002	<0.0002	0.00030	0.00030	<0.00003	<0.00003	0.000030	0.000030	0.000016	0.000016	0.000090	0.000090
Calcium	mg/L	-	-	150	-	142	-	180	-	172	-	157	-	166	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	0.0010[g]	-	0.0010	0.0010	**0.0050**[Mn]	**0.0050**[Mn]	0.00060	0.00060	0.0010	0.0010	**0.0030**[Mn]	**0.0030**[Mn]	0.0010	0.0010
Cobalt	mg/L	0.0040	0.11	0.0020	0.0020	0.0019	0.0019	0.0018	0.0018	0.0015	0.0015	0.0022	0.0022	0.0018	0.0018
Copper	mg/L	-	-	0.0010	0.0010	0.018	0.018	0.00050	0.00050	0.00090	0.00090	0.051	0.051	0.021	0.021
Iron	mg/L	-	1.0	0.090	-	0.48	-	0.072	-	0.54	-	0.069	-	0.057	-
Lead	mg/L	0.020[b]	0.0030 - 0.42[b]	<0.001	<0.001	0.00020	0.00020	<0.00003	<0.00003	0.00040	0.00040	0.0021	0.0021	0.00020	0.00020
Lithium	mg/L	-	-	<0.005	-	0.0017	-	<0.003	-	-	-	0.0050	-	0.0060	-
Magnesium	mg/L	-	-	282	-	25	-	34	-	28	-	29	-	26	-
Manganese	mg/L	0.77 - 2.6[b]	0.82 - 3.4[b]	2.2	-	2.2	-	2.2	-	**2.6**[Mn]	-	**2.7**[Mn]	-	**2.9**[Mn]	-
Mercury	mg/L	0.000010	-	<0.00002[DL>Mn]	<0.00002[DL>Mn]	<0.00006[DL>Mn]	<0.00006[DL>Mn]	-	-	**0.000030**[Mn]	**0.000030**[Mn]	**0.000030**[Mn]	**0.000030**[Mn]	**0.000040**[Mn]	**0.000040**[Mn]
Molybdenum	mg/L	7.6	46	<0.0005	<0.0005	0.00020	0.00020	<0.0003	<0.0003	-	-	-	-	-	-
Nickel	mg/L	0.025 - 0.15[b]	-	0.0050	0.0050	0.0080	0.0080	0.0055	0.0055	0.0060	0.0060	0.0050	0.0050	0.012	0.012
Potassium	mg/L	-	-	64	-	-	-	70	-	65	-	72	-	63	-
Rubidium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/L	0.0020	-	<0.001	<0.001	<0.001	<0.001	<0.0002	<0.0002	-	-	-	-	-	-
Silicon	mg/L	-	-	6.8	-	-	-	7.6	-	12	-	12	-	11	-
Silver	mg/L	0.000050 - 0.0015[b]	0.00010 - 0.0030[b]	<0.00025	<0.00025[DL>Mn, DL>Mx]	<0.00008	<0.00008[DL>Mn]	<0.00003	<0.00003	-	-	-	-	-	-
Sodium	mg/L	-	-	113	-	99	-	118	-	99	-	108	-	102	-
Strontium	mg/L	-	-	1.0	-	-	-	1.1	-	1.1	-	1.1	-	1.1	-
Sulphur	mg/L	-	-	-	-	-	-	-	-	5.0	-	5.0	-	6.0	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	<3.0	-	-	-	-	-	-	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	0.00080	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.00001	<0.00001	-	-	-	-	-	-
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	<0.001	-	-	-	0.00018	-	-	-	-	-	-	-
Titanium	mg/L	-	-	0.0010	-	<0.02	-	<0.003	-	-	-	-	-	-	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	0.0085	-	<0.0005	<0.0005	<0.0001	<0.0001	0.000040	0.000040	-	-	-	-	-	-
Vanadium	mg/L	-	-	<0.001	-	<0.002	-	<0.001	-	-	-	-	-	-	-
Zinc	mg/L	0.0075 - 0.19[b]	0.033 - 0.34[b]	<0.005	<0.005	0.014	**0.014**[Mn]	0.00070	0.00070	0.026	**0.026**[Mn]	0.024	**0.024**[Mn]	0.077	**0.077**[Mn, Mx]
Zirconium	mg/L	-	-	<0.01	-	-	-	-	-	-	-	-	-	-	-
Dissolved Metals															
Aluminum	mg/L	0.0074 - 0.050[h]	0.024 - 0.10[h]	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bismuth	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/L	0.000018 - 0.00046[b]	0.000038 - 0.0028[b]	-	-	-	-	-	-	-	-	-	-	-	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	mg/L	0.002[i]	0.00020 - 0.00046[i]	-	-	-	-	-	-	-	-	-	-	-	-
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	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zirconium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table Notes:
BC WQG = British Columbia Approved (updated December 2021) and Working (updated February 2021) Water Quality Guidelines for the protection of freshwater aquatic life (AW-F)
[a] = guideline is a minimum value.
[b] = guideline is hardness dependent.
[c] = for some samples, water hardness was greater than 250 mg/L.
[d] = guideline is chloride dependent.
[e] & [f] = the ammonia guideline is pH and temperature dependent.
[g] = guideline is for chromium VI.
[h] = guideline is pH dependent.
[i] = guideline for dissolved copper is pH, hardness, and dissolved organic carbon dependent.
[Mn] = Exceeds BC WQG long-term chronic (30-day mean)
[Mx] = Exceeds BC WQG short-term acute (maximum)
[DL>Mn] = Detection Limit exceeds BC WQG 30-day mean
[DL>Mx] = Detection Limit exceeds BC WQG maximum
< Indicates parameter was below laboratory equipment detection limit.
- Chemical not analyzed or criteria not defined

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Results of Surface Water Analyses
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name		SW-3	SW-3B	SW-3	SW-3B	SW-3	SW-3B	SW-3	SW-3B	SW-3	SW-3B	SW-3	SW-3B
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	2011-02-15	2011-02-15	2012-02-22	2012-02-22	2012-05-08	2012-05-08	2013-01-04	2013-01-04	2013-04-16	2013-04-16	2013-06-06	2013-06-06
Field Measured															
pH	-	6.5 - 9.0	6.5 - 9.0	-	-	-	-	-	-	-	-	-	-	-	-
Temperature	°C	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved oxygen	mg/L	8[a]	5[a]	-	-	-	-	-	-	-	-	-	-	-	-
Conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation reduction potential	mV	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conventional Parameters															
pH, lab	-	6.5 - 9.0	6.5 - 9.0	6.9	-	6.8	-	6.7	-	7.5	-	7.4	-	7.6	-
Specific conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	98	-	-	-
Hardness, as $CaCO_3$	mg/L	-	-	575	-	519	-	462	-	432	-	41	-	641	-
Total alkalinity, as $CaCO_3$	mg/L	20[a]	-	-	-	-	-	-	-	-	-	-	-	-	-
Total suspended solids	mg/L	-	-	-	-	-	-	-	-	20	-	-	-	91	-
Conductivity	µS/cm	-	-	1850	-	1820	-	1650	-	1520	-	-	-	1640	-
Hardness, as $CaCO_3$ (Dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Major Ions															
Bromide	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride	mg/L	150	600	74	74	92	92	77	77	100	100	2.3	2.3	109	109
Fluoride	mg/L	-	0.40 - 2.2[b]	-	-	-	-	-	-	<0.1	<0.1	0.025	0.025	<0.1	<0.1
Magnesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate	mg/L	128 - 429[b, c]	-	29	29	20	20	5.0	5.0	7.5	7.5	1.4	1.4	11	11
Nutrients and Biological Indicators															
Nitrate	mg-N/L	3.0	33	<0.1	<0.1	<0.1	<0.1	0.20	0.20	**4.4**[(Mn)]	**4.4**[(Mn)]	0.42	-	**4.5**[(Mn)]	**4.5**[(Mn)]
Nitrite	mg-N/L	0.020 - 0.20[d]	0.060 - 0.60[d]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.014	0.014	<0.01	-	0.013	0.013
Total ammonia	mg-N/L	0.11 - 2.0[e]	0.74 - 26[f]	**54**[(Mn, Mx)]	-	**48**[(Mn, Mx)]	-	**44**[(Mn, Mx)]	-	**35**[(Mn, Mx)]	-	0.10	-	**35**[(Mn, Mx)]	-
Total Kjeldahl Nitrogen	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total phosphorus	mg-P/L	-	-	0.18	-	0.24	-	0.23	-	0.067	-	<0.01	-	0.38	-
Dissolved phosphorus	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Orthophosphate	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Biochemical oxygen demand	mg/L	-	-	6.8	-	10	-	10	-	5.6	-	<4.0	-	<4.0	-
Chemical oxygen demand	mg/L	-	-	130	-	90	-	90	-	77	-	<20	-	75	-
Total Metals															
Aluminum	mg/L	-	-	0.017	-	0.011	-	0.012	-	0.65	-	0.087	-	9.6	-
Antimony	mg/L	0.0090	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.000051	0.000051	<0.0005	<0.0005
Arsenic	mg/L	-	0.005	<0.0001	<0.0001	0.00090	0.00090	0.00072	0.00072	0.0011	0.0011	0.000094	0.000094	0.005	0.005
Barium	mg/L	1.0	-	0.42	0.42	0.39	0.39	0.37	0.37	0.26	0.26	0.020	0.020	0.49	0.49
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	**0.00016**[(Mn)]	**0.00016**[(Mn)]
Bismuth	mg/L	-	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
Boron	mg/L	1.2	-	**2.1**[(Mn)]	**2.1**[(Mn)]	**1.5**[(Mn)]	**1.5**[(Mn)]	**1.3**[(Mn)]	**1.3**[(Mn)]	**1.3**[(Mn)]	**1.3**[(Mn)]	<0.05	<0.05	**1.9**[(Mn)]	**1.9**[(Mn)]
Cadmium	mg/L	-	-	0.00010	0.00010	0.000030	0.000030	<0.00001	<0.00001	0.000020	0.000020	0.00010	0.00010	0.00011	0.00011
Calcium	mg/L	-	-	184	-	168	-	149	-	137	-	15	-	198	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	0.0010[(g)]	-	**0.0020**[(Mn)]	**0.0020**[(Mn)]	0.0010	0.0010	<0.001	<0.001	**0.0011**[(Mn)]	**0.0011**[(Mn)]	-	-	**0.012**[(Mn)]	**0.012**[(Mn)]
Cobalt	mg/L	0.0040	0.11	**0.018**[(Mn)]	**0.018**[(Mn)]	0.0016	0.0016	0.00095	0.00095	0.0021	0.0021	0.000091	0.000091	**0.0077**[(Mn)]	**0.0077**[(Mn)]
Copper	mg/L	-	-	0.0026	0.0026	0.0011	0.0011	0.00062	0.00062	0.0039	0.0039	0.0011	0.0011	0.023	0.023
Iron	mg/L	-	1.0	**13**[(Mx)]	-	**14**[(Mx)]	-	**19**[(Mx)]	-	**5.4**[(Mx)]	-	0.16	-	**22**[(Mx)]	-
Lead	mg/L	0.020[b]	0.0030 - 0.42[b]	0.00040	0.00040	<0.0002	<0.0002	<0.0002	<0.0002	0.00024	0.00024	0.000098	0.000098	0.0031	0.0031
Lithium	mg/L	-	-	<0.0005	-	<0.0005	-	<0.0005	-	<0.005	-	<0.005	-	0.0085	-
Magnesium	mg/L	-	-	28	-	24	-	22	-	22	-	1.1	-	36	-
Manganese	mg/L	0.77 - 2.6[b]	0.82 - 3.4[b]	**3.2**[(Mn)]	-	**3.0**[(Mn)]	-	**2.7**[(Mn)]	-	**3.0**[(Mn)]	-	0.016	-	**5.0**[(Mn, Mx)]	-
Mercury	mg/L	0.000010	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Molybdenum	mg/L	7.6	46	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.00040	0.00040	<0.001	<0.001
Nickel	mg/L	0.025 - 0.15[b]	-	0.0090	0.0090	0.0060	0.0060	0.0036	0.0036	0.0046	0.0046	0.00024	0.00024	0.018	0.018
Potassium	mg/L	-	-	70	-	57	-	46	-	45	-	1.5	-	71	-
Rubidium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/L	0.0020	-	0.00010	0.00010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.00027	0.00027
Silicon	mg/L	-	-	12	-	11	-	10	-	8.5	-	2.8	-	23	-
Silver	mg/L	0.000050 - 0.0015[b]	0.00010 - 0.0030[b]	0.000030	0.000030	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	0.000026	0.000026
Sodium	mg/L	-	-	104	-	89	-	74	-	78	-	2.4	-	122	-
Strontium	mg/L	-	-	1.1	-	1.0	-	0.93	-	0.86	-	0.059	-	1.2	-
Sulphur	mg/L	-	-	-	-	-	-	-	-	-	-	<3.0	-	-	-
Sulphur (colloidal)	mg/L	-	-	13	-	<3.0	-	6.2	-	3.4	-	-	-	4.2	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	0.00080	-	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	0.000057	0.000057
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-	0.00032	-	0.00032	-
Titanium	mg/L	-	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	0.0085	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.000046	0.000046	0.000046	0.000046
Vanadium	mg/L	-	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-	0.00062	-	0.00062	-
Zinc	mg/L	0.0075 - 0.19[b]	0.033 - 0.34[b]	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.0053	0.0053	0.0025	0.0025	0.0025	0.0025
Zirconium	mg/L	-	-	<0.0005	-	<0.0005	-	<0.0005	-	<0.0005	-	<0.0005	-	<0.0005	-
Dissolved Metals															
Aluminum	mg/L	0.0074 - 0.050[h]	0.024 - 0.10[h]	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bismuth	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/L	0.000018 - 0.00046[b]	0.000038 - 0.0028[b]	-	-	-	-	-	-	-	-	-	-	-	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	mg/L	0.002[(i)]	0.00020 - 0.00046[(i)]	-	-	-	-	-	-	-	-	-	-	-	-
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	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zirconium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table Notes:
BC WQG = British Columbia Approved (updated December 2021) and Working (updated February 2021) Water Quality Guidelines for the protection of freshwater aquatic life (AW-F)
[a] = guideline is a minimum value.
[b] = guideline is hardness dependent.
[c] = for some samples, water hardness was greater than 250 mg/L.
[d] = guideline is chloride dependent.
[e] & [f] = the ammonia guideline is pH and temperature dependent.
[g] = guideline is for chromium VI.
[h] = guideline is pH dependent.
[i] = guideline for dissolved copper is pH, hardness, and dissolved organic carbon dependent.
[Mn] = Exceeds BC WQG long-term chronic (30-day mean)
[Mx] = Exceeds BC WQG short-term acute (maximum)
[DL>Mn] = Detection Limit exceeds BC WQG 30-day mean
[DL>Mx] = Detection Limit exceeds BC WQG maximum
< Indicates parameter was below laboratory equipment detection limit.
- Chemical not analyzed or criteria not defined

Appendix C
Results of Surface Water Analyses
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name		SW-3	SW-3B	SW-3	SW-3B	SW-3	SW-3B	SW-3	SW-3B	SW-3	SW-3B	SW-3	SW-3B
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	2013-10-22	2013-10-22	2014-05-06	2014-05-06	2014-10-29	2014-10-29	2015-03-31	2015-03-31	2015-08-11	2015-08-11	2015-11-04	2015-11-04
Field Measured															
pH	-	6.5 - 9.0	6.5 - 9.0	-	-	-	-	-	-	-	-	-	-	-	-
Temperature	°C	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved oxygen	mg/L	8[a]	5[a]	-	-	-	-	-	-	-	-	-	-	-	-
Conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation reduction potential	mV	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conventional Parameters															
pH, lab	-	6.5 - 9.0	6.5 - 9.0	7.4	-	7.4	-	7.3	-	7.6	-	7.5	-	7.5	-
Specific conductivity	µS/cm	-	-	-	-	-	-	-	-	1,620	-	-	-	-	-
Hardness, as $CaCO_3$	mg/L	-	-	631	-	535	-	518	-	516	-	640	-	-	-
Total alkalinity, as $CaCO_3$	mg/L	20[a]	-	-	-	-	-	-	-	-	-	-	-	-	-
Total suspended solids	mg/L	-	-	460	-	33	-	8.0	-	35	-	49	-	42	-
Conductivity	µS/cm	-	-	1740	-	1840	-	1760	-	-	-	1820	-	1980	-
Hardness, as $CaCO_3$ (Dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Major Ions															
Bromide	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride	mg/L	150	600	107	107	119	119	122	122	104	104	125	125	115	115
Fluoride	mg/L	-	0.40 - 2.2[b]	<0.1	<0.1	<0.1	<0.1	0.11	0.11	0.11	0.11	0.11	0.11	0.13	0.13
Magnesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate	mg/L	128 - 429[b, c]	-	16	16	20	20	81	81	97	97	55	55	-	-
Nutrients and Biological Indicators															
Nitrate	mg-N/L	3.0	33	0.14	0.14	2.6	2.6	**5.1**[Mn]	**5.1**[Mn]	**4.6**[Mn]	-	**4.7**[Mn]	**4.7**[Mn]	**4.4**[Mn]	**4.4**[Mn]
Nitrite	mg-N/L	0.020 - 0.20[d]	0.060 - 0.60[d]	0.061	0.061	0.045	0.045	0.029	0.029	0.090	-	-	-	0.029	0.029
Total ammonia	mg-N/L	0.11 - 2.0[e]	0.74 - 26[f]	**36**[Mn, Mx]	-	<0.03	-	**37**[Mn, Mx]	-	**27**[Mn, Mx]	-	**23**[Mn, Mx]	-	**38**[Mn, Mx]	-
Total Kjeldahl Nitrogen	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total phosphorus	mg-P/L	-	-	0.41	-	0.079	-	0.17	-	0.14	-	0.27	-	-	-
Dissolved phosphorus	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Orthophosphate	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Biochemical oxygen demand	mg/L	-	-	-	-	<4.0	-	12	-	-	-	19	-	16	-
Chemical oxygen demand	mg/L	-	-	230	-	115	-	114	-	120	-	108	-	121	-
Total Metals															
Aluminum	mg/L	-	-	0.99	-	0.28	-	0.92	-	0.72	-	0.63	-	-	-
Antimony	mg/L	0.0090	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00050	0.00050	0.00040	0.00040	-	-
Arsenic	mg/L	-	0.005	0.0018	0.0018	0.0013	0.0013	0.0023	0.0023	0.0018	0.0018	0.0023	0.0023	-	-
Barium	mg/L	1.0	-	**1.5**[Mn]	**1.5**[Mn]	0.33	0.33	0.36	0.36	0.33	0.33	0.41	0.41	-	-
Beryllium	mg/L	0.00013	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	-	<0.0001	<0.0001	-	-
Bismuth	mg/L	-	-	<0.001	-	<0.001	-	<0.001	-	-	-	<0.0001	-	-	-
Boron	mg/L	1.2	-	**1.8**[Mn]	**1.8**[Mn]	**1.6**[Mn]	**1.6**[Mn]	**1.9**[Mn]	**1.9**[Mn]	**2.7**[Mn]	**2.7**[Mn]	**3.9**[Mn]	**3.9**[Mn]	-	-
Cadmium	mg/L	-	-	0.000079	0.000079	0.000048	0.000048	0.00014	0.00014	0.000090	0.000090	0.000050	0.000050	-	-
Calcium	mg/L	-	-	203	-	173	-	168	-	169	-	204	-	-	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	0.0010[g]	-	**0.0019**[Mn]	**0.0019**[Mn]	**0.0011**[Mn]	**0.0011**[Mn]	**0.0024**[Mn]	**0.0024**[Mn]	**0.0020**[Mn]	**0.0020**[Mn]	**0.0021**[Mn]	**0.0021**[Mn]	-	-
Cobalt	mg/L	0.0040	0.11	0.0034	0.0034	0.0026	0.0026	0.0029	0.0029	0.0029	0.0029	0.0032	0.0032	-	-
Copper	mg/L	-	-	0.0071	0.0071	0.0031	0.0031	0.0078	0.0078	0.0069	0.0069	0.0051	0.0051	-	-
Iron	mg/L	-	1.0	**5.3**[Mx]	-	**6.5**[Mx]	-	**12**[Mx]	-	**7.2**[Mx]	-	**8.9**[Mx]	-	-	-
Lead	mg/L	0.020[b]	0.0030 - 0.42[b]	0.00034	0.00034	0.00034	0.00034	0.00051	0.00051	0.00030	0.00030	0.00020	0.00020	-	-
Lithium	mg/L	-	-	<0.005	-	<0.005	-	<0.005	-	0.0029	-	0.0023	-	-	-
Magnesium	mg/L	-	-	30	-	25	-	24	-	23	-	31	-	-	-
Manganese	mg/L	0.77 - 2.6[b]	0.82 - 3.4[b]	**5.0**[Mn, Mx]	-	**4.7**[Mn, Mx]	-	**3.2**[Mn]	-	**3.4**[Mn, Mx]	-	**2.9**[Mn]	-	-	-
Mercury	mg/L	0.000010	-	<0.00001	<0.00001	<0.00001	<0.00001	**0.000023**[Mn]	**0.000023**[Mn]	-	-	<0.00002[DL>Mn]	<0.00002[DL>Mn]	-	-
Molybdenum	mg/L	7.6	46	<0.001	<0.001	<0.001	<0.001	0.0012	0.0012	0.00090	0.00090	0.00070	0.00070	-	-
Nickel	mg/L	0.025 - 0.15[b]	-	0.0073	0.0073	0.0059	0.0059	0.0090	0.0090	0.0076	0.0076	0.0075	0.0075	-	-
Potassium	mg/L	-	-	64	-	55	-	53	-	54	-	64	-	-	-
Rubidium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/L	0.0020	-	0.00019	0.00019	0.00016	0.00016	0.00014	0.00014	-	-	<0.0005	<0.0005	-	-
Silicon	mg/L	-	-	12	-	10	-	9.8	-	11	-	14	-	-	-
Silver	mg/L	0.000050 - 0.0015[b]	0.00010 - 0.0030[b]	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	-	-	<0.00005	<0.00005	-	-
Sodium	mg/L	-	-	114	-	102	-	113	-	115	-	161	-	-	-
Strontium	mg/L	-	-	1.1	-	0.99	-	0.95	-	0.94	-	1.2	-	-	-
Sulphur	mg/L	-	-	-	-	-	-	-	-	37	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	9.8	-	7.9	-	29	-	-	-	30	-	-	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	0.00080	-	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	-	-	<0.00002	<0.00002	-	-
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	<0.005	-	<0.005	-	<0.005	-	-	-	0.00040	-	-	-
Titanium	mg/L	-	-	0.033	-	0.013	-	0.038	-	0.026	-	0.021	-	-	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	0.0085	-	0.00020	0.00020	0.00013	0.00013	0.00020	0.00020	0.00023	0.00023	0.00030	0.00030	-	-
Vanadium	mg/L	-	-	<0.005	-	<0.005	-	<0.005	-	0.0020	-	0.0020	-	-	-
Zinc	mg/L	0.0075 - 0.19[b]	0.033 - 0.34[b]	**0.22**[Mn]	**0.22**[Mn, Mx]	0.11	**0.11**[Mn, Mx]	0.078	**0.078**[Mn, Mx]	0.041	**0.041**[Mn, Mx]	0.049	**0.049**[Mn, Mx]	-	-
Zirconium	mg/L	-	-	<0.0005	-	<0.0005	-	0.00086	-	0.00050	-	0.00090	-	-	-
Dissolved Metals															
Aluminum	mg/L	0.0074 - 0.050[h]	0.024 - 0.10[h]	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bismuth	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/L	0.000018 - 0.00046[b]	0.000038 - 0.0028[b]	-	-	-	-	-	-	-	-	-	-	-	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	mg/L	0.002[i]	0.00020 - 0.00046[i]	-	-	-	-	-	-	-	-	-	-	-	-
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	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zirconium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table Notes:
BC WQG = British Columbia Approved (updated December 2021) and Working (updated February 2021) Water Quality Guidelines for the protection of freshwater aquatic life (AW-F)
[a] = guideline is a minimum value.
[b] = guideline is hardness dependent.
[c] = for some samples, water hardness was greater than 250 mg/L.
[d] = guideline is chloride dependent.
[e] & [f] = the ammonia guideline is pH and temperature dependent.
[g] = guideline is for chromium VI.
[h] = guideline is pH dependent.
[i] = guideline for dissolved copper is pH, hardness, and dissolved organic carbon dependent.
[Mn] = Exceeds BC WQG long-term chronic (30-day mean)
[Mx] = Exceeds BC WQG short-term acute (maximum)
[DL>Mn] = Detection Limit exceeds BC WQG 30-day mean
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< Indicates parameter was below laboratory equipment detection limit.
- Chemical not analyzed or criteria not defined

Appendix C
Results of Surface Water Analyses
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name		SW-3	SW-3B	SW-3	SW-3B	SW-3	SW-3B	SW-3	SW-3B	SW-3	SW-3B	SW-3	SW-3B
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	2016-03-22	2016-03-22	2016-07-25	2016-07-25	2016-10-13	2016-10-13	2017-08-24	2017-08-24	2018-03-19	2018-03-19	2018-07-04	2018-07-04
Field Measured															
pH	-	6.5 - 9.0	6.5 - 9.0	-	-	-	-	-	-	-	-	-	-	7.4	-
Temperature	°C	-	-	-	-	-	-	-	-	-	-	-	-	19	-
Dissolved oxygen	mg/L	8[a]	5[a]	-	-	-	-	-	-	-	-	-	-	5.7[Mn]	-
Conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	1,458	-
Oxidation reduction potential	mV	-	-	-	-	-	-	-	-	-	-	-	-	386	-
Conventional Parameters															
pH, lab	-	6.5 - 9.0	6.5 - 9.0	7.7	-	8.0	-	7.0	-	7.6	-	8.2	-	8.2	-
Specific conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hardness, as $CaCO_3$	mg/L	-	-	801	-	429	-	709	-	386	-	289	-	447	-
Total alkalinity, as $CaCO_3$	mg/L	20[a]	-	-	-	-	-	-	-	-	-	22	-	717	-
Total suspended solids	mg/L	-	-	10	-	18	-	75	-	31	-	21	-	21	-
Conductivity	µS/cm	-	-	2110	-	1360	-	2560	-	1420	-	890	-	1500	-
Hardness, as $CaCO_3$ (Dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Major Ions															
Bromide	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	mg/L	-	-	-	-	-	-	-	-	-	-	88	-	129	-
Chloride	mg/L	150	600	182[Mn]	182[Mn]	123	123	206[Mn]	206[Mn]	98	98	35	35	86	86
Fluoride	mg/L	-	0.40 - 2.2[b]	0.13	0.13	0.13	0.13	0.11	0.11	<0.1	<0.1	<0.1	<0.1	0.10	0.10
Magnesium	mg/L	-	-	-	-	-	-	-	-	-	-	17	-	30	-
Potassium	mg/L	-	-	-	-	-	-	-	-	-	-	28	-	61	-
Sodium	mg/L	-	-	-	-	-	-	-	-	-	-	49	-	115	-
Sulphate	mg/L	128 - 429[b, c]	-	67	67	7.1	7.1	7.4	7.4	11	11	11	11	4.5	4.5
Nutrients and Biological Indicators															
Nitrate	mg-N/L	3.0	33	2.6	2.6	1.2	1.2	0.62	0.62	0.38	0.38	2.5	2.5	0.55	0.55
Nitrite	mg-N/L	0.020 - 0.20[d]	0.060 - 0.60[d]	0.017	0.017	0.97[Mn, Mx]	0.97[Mn, Mx]	<0.01	<0.01	0.050	0.050	0.018	0.018	0.20	0.20
Total ammonia	mg-N/L	0.11 - 2.0[e]	0.74 - 26[f]	45[Mn, Mx]	-	29[Mn, Mx]	-	61[Mn, Mx]	-	35[Mn, Mx]	-	22[Mn, Mx]	-	42[Mn, Mx]	-
Total Kjeldahl Nitrogen	mg-N/L	-	-	-	-	-	-	-	-	-	-	23	-	42	-
Total phosphorus	mg-P/L	-	-	0.10	-	<0.02	-	0.12	-	0.11	-	0.056	-	0.032	-
Dissolved phosphorus	mg-P/L	-	-	-	-	-	-	-	-	-	-	<0.05	-	<0.05	-
Orthophosphate	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	-
Biochemical oxygen demand	mg/L	-	-	13	-	8.9	-	10	-	11	-	2.7	-	5.8	-
Chemical oxygen demand	mg/L	-	-	152	-	137	-	234	-	93	-	48	-	122	-
Total Metals															
Aluminum	mg/L	-	-	0.26	-	0.65	-	0.050	-	0.51	-	0.20	-	0.20	-
Antimony	mg/L	0.0090	-	0.00040	0.00040	0.00040	0.00040	0.00060	0.00060	0.00020	0.00020	0.00010	0.00010	0.00021	0.00021
Arsenic	mg/L	-	0.005	0.0020	0.0020	0.0021	0.0021	0.0071[Mx]	0.0071[Mx]	0.0025	0.0025	0.0014	0.0014	0.0021	0.0021
Barium	mg/L	1.0	-	0.45	0.45	0.30	0.30	1.1[Mn]	1.1[Mn]	0.37	0.37	0.26	0.26	0.40	0.40
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	<0.0001	<0.0001
Bismuth	mg/L	-	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.00005	-	<0.00005	-
Boron	mg/L	1.2	-	3.8[Mn]	3.8[Mn]	2.2[Mn]	2.2[Mn]	3.1[Mn]	3.1[Mn]	1.9[Mn]	1.9[Mn]	0.95	0.95	2.1[Mn]	2.1[Mn]
Cadmium	mg/L	-	-	0.000040	0.000040	0.000070	0.000070	0.00014	0.00014	0.000050	0.000050	0.000032	0.000032	0.000018	0.000018
Calcium	mg/L	-	-	260	-	115	-	231	-	112	-	81	-	121	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	0.00010	-	0.00024	-
Chromium	mg/L	0.0010[g]	-	0.0023[Mn]	0.0023[Mn]	0.0015[Mn]	0.0015[Mn]	0.0022[Mn]	0.0022[Mn]	0.0015[Mn]	0.0015[Mn]	0.00071	0.00071	0.00097	0.00097
Cobalt	mg/L	0.0040	0.11	0.0031	0.0031	0.0055[Mn]	0.0055[Mn]	0.010[Mn]	0.010[Mn]	0.0035	0.0035	0.0018	0.0018	0.0036	0.0036
Copper	mg/L	-	-	0.0030	0.003	0.0098	0.0098	0.0041	0.0041	0.0037	0.0037	0.0025	0.0025	0.0022	0.0022
Iron	mg/L	-	1.0	4.8[Mx]	-	2.0[Mx]	-	28[Mx]	-	3.9[Mx]	-	5.2[Mx]	-	1.8[Mx]	-
Lead	mg/L	0.020[b]	0.0030 - 0.42[b]	<0.0001	<0.0001	0.00020	0.00020	0.00010	0.00010	0.00021	0.00021	0.000058	0.000058	0.000075	0.000075
Lithium	mg/L	-	-	0.0033	-	0.0018	-	0.0018	-	0.0017	-	0.0011	-	0.0014	-
Magnesium	mg/L	-	-	37	-	34	-	32	-	26	-	14	-	30	-
Manganese	mg/L	0.77 - 2.6[b]	0.82 - 3.4[b]	4.3[Mn, Mx]	-	2.0	-	14[Mn, Mx]	-	3.5[Mn, Mx]	-	2.4[Mn]	-	2.0	-
Mercury	mg/L	0.000010	-	<0.00002[DL>Mn]	<0.00002[DL>Mn]	<0.00002[DL>Mn]	<0.00002[DL>Mn]	<0.00002[DL>Mn]	<0.00002[DL>Mn]	<0.00001	<0.00001	<0.000005	<0.000005	<0.000005	<0.000005
Molybdenum	mg/L	7.6	46	0.00070	0.00070	0.0023	0.0023	0.0018	0.0018	0.00093	0.00093	0.00032	0.00032	0.00073	0.00073
Nickel	mg/L	0.025 - 0.15[b]	-	0.0079	0.0079	0.0079	0.0079	0.011	0.011	0.0053	0.0053	0.0026	0.0026	0.0062	0.0062
Potassium	mg/L	-	-	88	-	46	-	65	-	46	-	24	-	55	-
Rubidium	mg/L	-	-	-	-	-	-	-	-	-	-	0.016	-	0.038	-
Selenium	mg/L	0.0020	-	<0.0005	<0.0005	0.00080	0.00080	<0.0005	<0.0005	0.00057	0.00057	0.00012	0.00012	0.00025	0.00025
Silicon	mg/L	-	-	14	-	9.3	-	12	-	9.8	-	6.1	-	8.3	-
Silver	mg/L	0.000050 - 0.0015[b]	0.00010 - 0.0030[b]	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001
Sodium	mg/L	-	-	187	-	122	-	147	-	99	-	46	-	108	-
Strontium	mg/L	-	-	1.4	-	0.81	-	1.5	-	0.80	-	0.47	-	0.96	-
Sulphur	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	33	-	4.0	-	3.0	-	4.5	-	4.2	-	3.0	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	<0.0005	-	<0.0002	-	<0.0002	-
Thallium	mg/L	0.00080	-	<0.00002	<0.00002	0.000020	0.000020	<0.00002	<0.00002	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001
Thorium-232	mg/L	-	-	-	-	-	-	-	-	<0.0001	-	<0.0001	-	<0.0001	-
Tin	mg/L	-	-	0.00030	-	0.00020	-	0.00030	-	<0.0002	-	<0.0001	-	0.00017	-
Titanium	mg/L	-	-	0.011	-	0.020	-	<0.005	-	0.012	-	0.0053	-	0.0051	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	0.00027	-	<0.0001	-
Uranium	mg/L	0.0085	-	0.00020	0.00020	0.00086	0.00086	0.00061	0.00061	0.00024	0.00024	0.000078	0.000078	0.00023	0.00023
Vanadium	mg/L	-	-	0.0020	-	0.0020	-	0.0030	-	0.0016	-	0.00080	-	0.00080	-
Zinc	mg/L	0.0075 - 0.19[b]	0.033 - 0.34[b]	0.026	0.026[Mn]	0.0070	0.0070	0.012	0.012[Mn]	0.0065	0.0065	<0.003	<0.003	<0.003	<0.003
Zirconium	mg/L	-	-	0.00080	-	0.00070	-	0.0013	-	0.00096	-	0.00023	-	0.00043	-
Dissolved Metals															
Aluminum	mg/L	0.0074 - 0.050[h]	0.024 - 0.10[h]	-	-	-	-	-	-	-	-	0.0023	-	0.0094	-
Antimony	mg/L	-	-	-	-	-	-	-	-	-	-	<0.0001	<0.0001	0.00018	0.00018
Arsenic	mg/L	-	-	-	-	-	-	-	-	-	-	0.00060	0.00060	0.0018	0.0018
Barium	mg/L	-	-	-	-	-	-	-	-	-	-	0.26	0.26	0.38	0.38
Beryllium	mg/L	-	-	-	-	-	-	-	-	-	-	<0.0001	<0.0001	<0.0001	<0.0001
Bismuth	mg/L	-	-	-	-	-	-	-	-	-	-	<0.00005	-	<0.00005	-
Boron	mg/L	-	-	-	-	-	-	-	-	-	-	0.96	0.96	2.1	2.1
Cadmium	mg/L	0.000018 - 0.00046[b]	0.000038 - 0.0028[b]	-	-	-	-	-	-	-	-	0.000021	0.000021	0.000013	0.000013
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	0.00010	-	0.00022	-
Chromium	mg/L	-	-	-	-	-	-	-	-	-	-	0.00033	0.00033	0.00074	0.00074
Cobalt	mg/L	-	-	-	-	-	-	-	-	-	-	0.0017	0.0017	0.0034	0.0034
Copper	mg/L	0.002[i]	0.00020 - 0.00046[i]	-	-	-	-	-	-	-	-	0.00189[Mn, Mx]	0.00189[Mn, Mx]	0.00173[Mn, Mx]	0.00173[Mn, Mx]
Iron	mg/L	-	0.35	-	-	-	-	-	-	-	-	0.020	-	0.062	-
Lead	mg/L	-	-	-	-	-	-	-	-	-	-	<0.00005	<0.00005	<0.00005	<0.00005
Lithium	mg/L	-	-	-	-	-	-	-	-	-	-	<0.001	-	0.0012	-
Manganese	mg/L	-	-	-	-	-	-	-	-	-	-	2.6	-	1.9	-
Mercury	mg/L	-	-	-	-	-	-	-	-	-	-	<0.000005	<0.000005	<0.000005	<0.000005
Molybdenum	mg/L	-	-	-	-	-	-	-	-	-	-	0.00032	0.00032	0.00071	0.00071
Nickel	mg/L	-	-	-	-	-	-	-	-	-	-	0.0025	0.0025	0.0061	0.0061
Rubidium	mg/L	-	-	-	-	-	-	-	-	-	-	0.018	-	0.039	-
Selenium	mg/L	-	-	-	-	-	-	-	-	-	-	0.00016	0.00016	0.00024	0.00024
Silicon	mg/L	-	-	-	-	-	-	-	-	-	-	5.5	-	7.7	-
Silver	mg/L	-	-	-	-	-	-	-	-	-	-	<0.00001	<0.00001	<0.00001	<0.00001
Strontium	mg/L	-	-	-	-	-	-	-	-	-	-	0.51	-	0.96	-
Sulphur	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	-	-	-	-	4.1	-	2.7	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	<0.0002	-	<0.0002	-
Thallium	mg/L	-	-	-	-	-	-	-	-	-	-	<0.00001	<0.00001	<0.00001	<0.00001
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	<0.0001	-	<0.0001	-
Tin	mg/L	-	-	-	-	-	-	-	-	-	-	<0.0001	-	0.00027	-
Titanium	mg/L	-	-	-	-	-	-	-	-	-	-	<0.0003	-	<0.0003	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	<0.0001	-	<0.0001	-
Uranium	mg/L	-	-	-	-	-	-	-	-	-	-	0.000078	0.000078	0.00023	0.00023
Vanadium	mg/L	-	-	-	-	-	-	-	-	-	-	<0.0005	-	<0.0005	-
Zinc	mg/L	-	-	-	-	-	-	-	-	-	-	0.0012	0.0012	0.0013	0.0013
Zirconium	mg/L	-	-	-	-	-	-	-	-	-	-	<0.00006	-	0.00022	-

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[g] = guideline is for chromium VI.
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[Mn] = Exceeds BC WQG long-term chronic (30-day mean)
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Appendix C
Results of Surface Water Analyses
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name		SW-3	SW-3B	SW-3	SW-3B	SW-3	SW-3B	SW-3	SW-3B	SW-3	SW-3B	SW-3	SW-3B
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	2018-09-10	2018-09-10	2019-04-11	2019-04-11	2019-07-17	2019-07-17	2019-10-10	2019-10-10	2020-04-30	2020-04-30	2020-09-01	2020-09-01
Field Measured															
pH	-	6.5 - 9.0	6.5 - 9.0	6.5	-	6.6	-	6.9	-	6.8	-	6.5	-	6.4 (Mn, Mx)	-
Temperature	°C	-	-	14	-	9.5	-	15	-	10	-	11	-	15	-
Dissolved oxygen	mg/L	8 (a)	5 (a)	3.2 (Mn, Mx)	-	0.80 (Mn, Mx)	-	0.20 (Mn, Mx)	-	0.80 (Mn, Mx)	-	0.40 (Mn, Mx)	-	2.2 (Mn, Mx)	-
Conductivity	µS/cm	-	-	1,877	-	1,511	-	1,877	-	1,532	-	1,604	-	1,567	-
Oxidation reduction potential	mV	-	-	-102	-	-45	-	-125	-	-18	-	38	-	218	-
Conventional Parameters															
pH, lab	-	6.5 - 9.0	6.5 - 9.0	7.4	-	7.0	-	7.9	-	7.1	-	6.9	-	7.1	-
Specific conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hardness, as $CaCO_3$	mg/L	-	-	540	-	512	-	423	-	531	-	586	-	498	-
Total alkalinity, as $CaCO_3$	mg/L	20 (a)	-	962	-	933	-	347	-	856	-	960	-	852	-
Total suspended solids	mg/L	-	-	122	-	-	-	57	-	109	-	79	-	66	-
Conductivity	µS/cm	-	-	2020	-	1940	-	746	-	1740	-	1900	-	1720	-
Hardness, as $CaCO_3$ (Dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	552	-	494	-
Major Ions															
Bromide	mg/L	-	-	-	-	0.79	-	0.27	-	-	-	0.57	-	0.58	-
Calcium	mg/L	-	-	162	-	153	-	126	-	155	-	165	-	151	-
Chloride	mg/L	150	600	117	117	94	94	31	31	83	83	79	79	73	73
Fluoride	mg/L	-	0.40 - 2.2 (b)	<0.2	<0.2	<0.22	<0.22	<0.1	<0.1	<0.2	<0.2	<0.2	<0.2	0.11	0.11
Magnesium	mg/L	-	-	33	-	32	-	27	-	35	-	34	-	28	-
Potassium	mg/L	-	-	72	-	66	-	48	-	66	-	64	-	53	-
Sodium	mg/L	-	-	127	-	116	-	82	-	116	-	109	-	91	-
Sulphate	mg/L	128 - 429 (b, c)	-	<3.0	<3.0	<3.0	<3.0	1.5	1.5	<3.0	<3.0	<3.0	<3.0	<1.5	<1.5
Nutrients and Biological Indicators															
Nitrate	mg-N/L	3.0	33	0.21	0.21	0.067	0.067	0.016	0.016	0.11	0.11	<0.05	<0.05	<0.025	<0.025
Nitrite	mg-N/L	0.020 - 0.20 (d)	0.060 - 0.60 (d)	0.025	0.025	<0.01	<0.01	0.0048	0.0048	<0.01	<0.01	<0.01	<0.01	0.0056	0.0056
Total ammonia	mg-N/L	0.11 - 2.0 (e)	0.74 - 26 (f)	67 (Mn, Mx)	-	59 (Mn, Mx)	-	59 (Mn, Mx)	-	68 (Mn, Mx)	-	61 (Mn, Mx)	-	47 (Mn, Mx)	-
Total Kjeldahl Nitrogen	mg-N/L	-	-	72	-	65	-	58	-	64	-	63	-	51	-
Total phosphorus	mg-P/L	-	-	0.33	-	0.52	-	0.42	-	0.41	-	0.27	-	0.26	-
Dissolved phosphorus	mg-P/L	-	-	0.056	-	<0.05	-	0.18	-	0.24	-	<0.05	-	0.094	-
Orthophosphate	mg-P/L	-	-	<0.001	-	<0.001	-	0.0011	-	<0.001	-	<0.001	-	<0.001	-
Biochemical oxygen demand	mg/L	-	-	8.3	-	-	-	7.5	-	6.0	-	9.4	-	4.3	-
Chemical oxygen demand	mg/L	-	-	155	-	-	-	140	-	150	-	113	-	120	-
Total Metals															
Aluminum	mg/L	-	-	0.12	-	0.056	-	0.53	-	0.098	-	0.032	-	0.067	-
Antimony	mg/L	0.0090	-	0.00014	0.00014	0.00012	0.00012	0.00013	0.00013	0.00013	0.00013	0.00011	0.00011	0.00013	0.00013
Arsenic	mg/L	-	0.005	0.014 (Mx)	0.014 (Mx)	0.011 (Mx)	0.011 (Mx)	0.015 (Mx)	0.015 (Mx)	0.023 (Mx)	0.023 (Mx)	0.0091 (Mx)	0.0091 (Mx)	0.011 (Mx)	0.011 (Mx)
Barium	mg/L	1.0	-	0.90	0.90	0.93	0.93	0.63	0.63	0.90	0.90	0.79	0.79	0.66	0.66
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	<0.0001	<0.0001
Bismuth	mg/L	-	-	<0.00005	-	<0.00005	-	<0.00005	-	<0.00005	-	<0.00005	-	<0.00005	-
Boron	mg/L	1.2	-	2.1 (Mn)	2.1 (Mn)	2.0 (Mn)	2.0 (Mn)	1.4 (Mn)	1.4 (Mn)	2.1 (Mn)	2.1 (Mn)	1.9 (Mn)	1.9 (Mn)	1.8 (Mn)	1.8 (Mn)
Cadmium	mg/L	-	-	0.0000090	0.0000090	0.0000063	0.0000063	0.000015	0.000015	0.0000059	0.0000059	0.0000081	0.0000081	0.000010	0.000010
Calcium	mg/L	-	-	162	-	169	-	119	-	164	-	177	-	150	-
Cesium	mg/L	-	-	0.00033	-	0.00027	-	0.00021	-	0.00026	-	0.00024	-	0.00023	-
Chromium	mg/L	0.0010 (g)	-	0.0014 (Mn)	0.0014 (Mn)	0.0013 (Mn)	0.0013 (Mn)	0.0013 (Mn)	0.0013 (Mn)	0.0012 (Mn)	0.0012 (Mn)	0.0010	0.0010	0.0013 (Mn)	0.0013 (Mn)
Cobalt	mg/L	0.0040	0.11	0.0037	0.0037	0.0030	0.0030	0.0028	0.0028	0.0029	0.0029	0.0027	0.0027	0.0029	0.0029
Copper	mg/L	-	-	0.00051	0.00051	<0.0005	<0.0005	0.0019	0.0019	<0.0005	<0.0005	0.00064	0.00064	<0.0005	<0.0005
Iron	mg/L	-	1.0	53 (Mx)	-	52 (Mx)	-	34 (Mx)	-	48 (Mx)	-	45 (Mx)	-	43 (Mx)	-
Lead	mg/L	0.020 (b)	0.0030 - 0.42 (b)	0.000061	0.000061	<0.00005	<0.00005	0.00013	0.00013	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Lithium	mg/L	-	-	0.0029	-	0.0023	-	0.0022	-	0.0031	-	0.0022	-	0.0022	-
Magnesium	mg/L	-	-	33	-	37	-	25	-	32	-	35	-	30	-
Manganese	mg/L	0.77 - 2.6 (b)	0.82 - 3.4 (b)	3.1 (Mn)	-	3.2 (Mn)	-	2.3	-	2.7 (Mn)	-	4.2 (Mn, Mx)	-	3.8 (Mn, Mx)	-
Mercury	mg/L	0.000010	-	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005
Molybdenum	mg/L	7.6	46	0.00053	0.00053	0.00037	0.00037	0.00074	0.00074	0.00037	0.00037	0.00026	0.00026	0.00068	0.00068
Nickel	mg/L	0.025 - 0.15 (b)	-	0.0055	0.0055	0.0056	0.0056	0.0038	0.0038	0.0045	0.0045	0.0051	0.0051	0.0050	0.0050
Potassium	mg/L	-	-	67	-	72	-	45	-	65	-	68	-	56	-
Rubidium	mg/L	-	-	0.053	-	0.051	-	0.032	-	0.050	-	0.047	-	0.040	-
Selenium	mg/L	0.0020	-	0.00015	0.00015	0.00012	0.00012	0.00014	0.00014	0.00015	0.00015	0.00012	0.00012	0.00014	0.00014
Silicon	mg/L	-	-	12	-	13	-	9.7	-	12	-	12	-	12	-
Silver	mg/L	0.000050 - 0.0015 (b)	0.00010 - 0.0030 (b)	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Sodium	mg/L	-	-	121	-	122	-	76	-	107	-	113	-	98	-
Strontium	mg/L	-	-	1.2	-	1.2	-	0.78	-	1.1	-	1.2	-	1.0	-
Sulphur	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	1.2	-	1.6	-	0.94	-	1.2	-	0.94	-	1.2	-
Tellurium	mg/L	-	-	0.00020	-	<0.0002	-	<0.0002	-	<0.0002	-	<0.0002	-	0.00025	-
Thallium	mg/L	0.00080	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Thorium-232	mg/L	-	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-
Tin	mg/L	-	-	0.00022	-	0.00021	-	0.00014	-	0.00025	-	0.00016	-	0.00015	-
Titanium	mg/L	-	-	0.0060	-	0.0034	-	0.017	-	0.0056	-	0.0019	-	0.0032	-
Tungsten	mg/L	-	-	0.00013	-	<0.0001	-	<0.0001	-	0.00012	-	<0.0001	-	<0.0001	-
Uranium	mg/L	0.0085	-	0.000048	0.000048	0.000049	0.000049	0.000065	0.000065	0.000031	0.000031	0.000085	0.000085	0.000084	0.000084
Vanadium	mg/L	-	-	0.0026	-	0.0021	-	0.0030	-	0.0033	-	0.0016	-	0.0017	-
Zinc	mg/L	0.0075 - 0.19 (b)	0.033 - 0.34 (b)	0.0057	0.0057	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.0033	0.0033
Zirconium	mg/L	-	-	0.00053	-	0.00048	-	0.00086	-	0.00062	-	0.00042	-	0.00048	-
Dissolved Metals															
Aluminum	mg/L	0.0074 - 0.050 (h)	0.024 - 0.10 (h)	0.0086	-	0.0063	-	0.019	-	0.020	-	0.0061	-	0.012	-
Antimony	mg/L	-	-	0.00012	0.00012	<0.0001	<0.0001	0.00012	0.00012	0.00013	0.00013	0.00011	0.00011	0.00012	0.00012
Arsenic	mg/L	-	-	0.012	0.012	0.0089	0.0089	0.017	0.017	0.029	0.029	0.0085	0.0085	0.010	0.010
Barium	mg/L	-	-	0.86	0.86	0.67	0.67	0.66	0.66	0.78	0.78	0.74	0.74	0.61	0.61
Beryllium	mg/L	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Bismuth	mg/L	-	-	<0.00005	-	<0.00005	-	<0.00005	-	<0.00005	-	<0.00005	-	<0.00005	-
Boron	mg/L	-	-	2.1	2.1	1.8	1.8	1.5	1.5	1.9	1.9	1.7	1.7	1.6	1.6
Cadmium	mg/L	0.000018 - 0.00046 (b)	0.000038 - 0.0028 (b)	0.0000090	0.0000090	0.0000013	0.0000013	0.0000070	0.0000070	<0.000005	<0.000005	0.0000089	0.0000089	0.000018	0.000018
Cesium	mg/L	-	-	0.00033	-	0.00028	-	0.00020	-	0.00027	-	0.00026	-	0.00021	-
Chromium	mg/L	-	-	0.0011	0.0011	0.00090	0.00090	0.00076	0.00076	0.0013	0.0013	0.00096	0.00096	0.00090	0.00090
Cobalt	mg/L	-	-	0.0036	0.0036	0.0028	0.0028	0.0026	0.0026	0.0032	0.0032	0.0025	0.0025	0.0027	0.0027
Copper	mg/L	0.002 (i)	0.00020 - 0.00046 (i)	<0.0002	<0.0002	<0.0002	<0.0002	0.0007 (Mn, Mx)	0.0007 (Mn, Mx)	0.00023 (Mn, Mx)	0.00023 (Mn, Mx)	<0.0002	<0.0002	0.00027 (Mn, Mx)	0.00027 (Mn, Mx)
Iron	mg/L	-	0.35	50 (Mx)	-	36 (Mx)	-	37 (Mx)	-	55 (Mx)	-	39 (Mx)	-	39 (Mx)	-
Lead	mg/L	-	-	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Lithium	mg/L	-	-	0.0030	-	0.0021	-	0.0020	-	0.0030	-	0.0020	-	0.0021	-
Manganese	mg/L	-	-	3.1	-	2.9	-	2.2	-	2.8	-	4.0	-	3.7	-
Mercury	mg/L	-	-	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005
Molybdenum	mg/L	-	-	0.00054	0.00054	0.00032	0.00032	0.00056	0.00056	0.00039	0.00039	0.00036	0.00036	0.00052	0.00052
Nickel	mg/L	-	-	0.0057	0.0057	0.0056	0.0056	0.0039	0.0039	0.0050	0.0050	0.0051	0.0051	0.0049	0.0049
Rubidium	mg/L	-	-	0.053	-	0.051	-	0.036	-	0.052	-	0.046	-	0.037	-
Selenium	mg/L	-	-	0.00022	0.00022	0.00016	0.00016	0.00021	0.00021	0.00022	0.00022	0.00013	0.00013	0.00015	0.00015
Silicon	mg/L	-	-	14	-	12	-	10	-	12	-	11	-	11	-
Silver	mg/L	-	-	<0.00001	<0.00001	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Strontium	mg/L	-	-	1.2	-	1.1	-	0.91	-	1.1	-	1.2	-	0.98	-
Sulphur	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	1.5	-	1.0	-	1.3	-	1.2	-	0.82	-	1.0	-
Tellurium	mg/L	-	-	<0.0002	-	<0.0002	-	<0.0002	-	<0.0002	-	<0.0002	-	<0.0002	-
Thallium	mg/L	-	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Thorium-232	mg/L	-	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-
Tin	mg/L	-	-	0.00021	-	0.00016	-	0.00017	-	0.00021	-	0.00020	-	0.00013	-
Titanium	mg/L	-	-	0.0013	-	0.00067	-	0.0023	-	0.0033	-	0.00063	-	0.0011	-
Tungsten	mg/L	-	-	0.00014	-	<0.0001	-	<0.0001	-	0.00013	-	<0.0001	-	<0.0001	-
Uranium	mg/L	-	-	0.000042	0.000042	0.000052	0.000052	0.000043	0.000043	0.000033	0.000033	0.000072	0.000072	0.000088	0.000088
Vanadium	mg/L	-	-	0.0014	-	0.00064	-	0.0018	-	0.0030	-	0.00068	-	0.0012	-
Zinc	mg/L	-	-	<0.001	<0.001	0.0017	0.0017	0.0012	0.0012	0.0013	0.0013	<0.001	<0.001	0.0049	0.0049
Zirconium	mg/L	-	-	0.00050	-	0.00035	-	0.00045	-	0.00056	-	0.00036	-	0.00034	-

Table Notes:
BC WQG = British Columbia Approved (updated December 2021) and Working (updated February 2021) Water Quality Guidelines for the protection of freshwater aquatic life (AW-F)
(a) = guideline is a minimum value.
(b) = guideline is hardness dependent.
(c) = for some samples, water hardness was greater than 250 mg/L.
(d) = guideline is chloride dependent.
(e) & (f) = the ammonia guideline is pH and temperature dependent.
(g) = guideline is for chromium VI.
(h) = guideline is pH dependent.
(i) = guideline for dissolved copper is pH, hardness, and dissolved organic carbon dependent.
(Mn) = Exceeds BC WQG long-term chronic (30-day mean)
(Mx) = Exceeds BC WQG short-term acute (maximum)
(DL>Mn) = Detection Limit exceeds BC WQG 30-day mean
(DL>Mx) = Detection Limit exceeds BC WQG maximum
< Indicates parameter was below laboratory equipment detection limit.
- Chemical not analyzed or criteria not defined

Appendix C
Results of Surface Water Analyses
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name: BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	SW-3 2020-10-07	SW-3B 2020-10-07	SW-3 2021-04-12	SW-3 2021-07-06	SW-3 2021-10-07	SW-6 1996-06-01	SW-6B 1996-06-01	SW-6 1996-10-01	SW-6B 1996-10-01	SW-6 1997-06-01	SW-6B 1997-06-01	SW-6 1997-12-04
Field Measured															
pH	-	6.5 - 9.0	6.5 - 9.0	6.5	-	6.7	7.1	6.7	-	-	-	-	-	-	-
Temperature	°C	-	-	13	-	9.1	13	12	-	-	-	-	-	-	-
Dissolved oxygen	mg/L	8[a]	5[a]	**6.0**[(Mn)]	-	**0.70**[(Mn, Mx)]	**0.10**[(Mn, Mx)]	**1.5**[(Mn, Mx)]	-	-	-	-	-	-	-
Conductivity	µS/cm	-	-	1,475	-	1,151	1,609	1,271	-	-	-	-	-	-	-
Oxidation reduction potential	mV	-	-	94	-	42	-140	123	-	-	-	-	-	-	-
Conventional Parameters															
pH, lab	-	6.5 - 9.0	6.5 - 9.0	7.3	-	7.0	6.9	7.3	-	-	7.5	-	7.4	-	7.2
Specific conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hardness, as $CaCO_3$	mg/L	-	-	498	-	486	583	503	-	-	58	-	40	-	44
Total alkalinity, as $CaCO_3$	mg/L	20[a]	-	877	-	712	875	722	-	-	-	-	-	-	-
Total suspended solids	mg/L	-	-	76	-	72	154	96	<5.0	-	4.0	-	5.0	-	<1.0
Conductivity	µS/cm	-	-	1760	-	1470	1720	1470	-	-	131	-	92	-	103
Hardness, as $CaCO_3$ (Dissolved)	mg/L	-	-	543	-	-	-	-	-	-	-	-	-	-	-
Major Ions															
Bromide	mg/L	-	-	-	-	-	<1.0	-	-	-	-	-	-	-	-
Calcium	mg/L	-	-	163	-	136	171	141	-	-	-	-	-	-	-
Chloride	mg/L	150	600	58	58	51	76	48	0.40	0.40	1.9	1.9	0.60	0.60	2.5
Fluoride	mg/L	-	0.40 - 2.2[b]	<0.2	<0.2	<0.2	<0.4	<0.1	-	-	-	-	-	-	-
Magnesium	mg/L	-	-	33	-	25	30	26	-	-	-	-	-	-	-
Potassium	mg/L	-	-	57	-	44	58	43	-	-	-	-	-	-	-
Sodium	mg/L	-	-	92	-	67	91	66	-	-	-	-	-	-	-
Sulphate	mg/L	128 - 429[b, c]	-	<3.0	<3.0	8.8	<6.0	22	1.6	1.6	2.2	2.2	2.0	2.0	3.0
Nutrients and Biological Indicators															
Nitrate	mg-N/L	3.0	33	<0.05	<0.05	0.093	<0.1	<0.025	-	-	0.14	0.14	0.022	0.022	0.48
Nitrite	mg-N/L	0.020 - 0.20[d]	0.060 - 0.60[d]	<0.01	<0.01	<0.01	<0.02	<0.005	-	-	0.0060	0.0060	0.0010	0.0010	0.0060
Total ammonia	mg-N/L	0.11 - 2.0[e]	0.74 - 26[f]	**47**[(Mn, Mx)]	-	**37**[(Mn, Mx)]	**55**[(Mn, Mx)]	**35**[(Mn, Mx)]	<0.1	-	0.040	-	<0.005	-	0.040
Total Kjeldahl Nitrogen	mg-N/L	-	-	42	-	33	59	40	-	-	-	-	-	-	-
Total phosphorus	mg-P/L	-	-	0.29	-	0.24	0.30	0.27	-	-	-	-	-	-	-
Dissolved phosphorus	mg-P/L	-	-	0.24	-	<0.05	0.055	0.27	-	-	-	-	-	-	-
Orthophosphate	mg-P/L	-	-	<0.001	-	-	-	-	-	-	-	-	-	-	-
Biochemical oxygen demand	mg/L	-	-	<6.0	-	6.4	8.5	2.9	-	-	-	-	<5.0	-	<5.0
Chemical oxygen demand	mg/L	-	-	101	-	80	156	111	-	-	-	-	<20	-	<20
Total Metals															
Aluminum	mg/L	-	-	0.052	-	0.076	0.16	0.045	<0.1	-	0.050	-	<0.05	-	0.050
Antimony	mg/L	0.0090	-	0.00013	0.00013	<0.0001	0.00013	0.00015	<0.001	<0.001	-	-	<0.02[(DL>Mn)]	<0.02[(DL>Mn)]	<0.0001
Arsenic	mg/L	-	0.005	**0.0091**[(Mx)]	**0.0091**[(Mx)]	**0.0071**[(Mx)]	**0.043**[(Mx)]	**0.013**[(Mx)]	<0.001	<0.001	0.00020	0.00020	<0.2[(DL>Mx)]	<0.2[(DL>Mx)]	0.00010
Barium	mg/L	1.0	-	0.64	0.64	0.58	**1.0**[(Mn)]	0.67	<0.1	<0.1	0.020	0.020	0.010	0.010	0.020
Beryllium	mg/L	0.00013	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.001[(DL>Mn)]	<0.001[(DL>Mn)]	<0.005[(DL>Mn)]	<0.005[(DL>Mn)]	<0.005[(DL>Mn)]	<0.005[(DL>Mn)]	<0.005[(DL>Mn)]
Bismuth	mg/L	-	-	<0.00005	-	<0.00005	<0.00005	<0.00005	-	-	-	-	-	-	-
Boron	mg/L	1.2	-	**1.8**[(Mn)]	**1.8**[(Mn)]	**1.6**[(Mn)]	**2.0**[(Mn)]	**1.5**[(Mn)]	-	-	<0.1	<0.1	-	-	-
Cadmium	mg/L	-	-	0.000011	0.000011	0.000021	0.000013	0.0000067	0.0050	0.0050	<0.0002	<0.0002	<0.002	<0.002	<0.0002
Calcium	mg/L	-	-	153	-	150	180	156	19	-	22	-	15	-	16
Cesium	mg/L	-	-	0.00023	-	0.00016	0.00021	0.00019	-	-	-	-	-	-	-
Chromium	mg/L	0.0010[g]	-	0.00092	0.00092	0.00088	**0.0014**[(Mn)]	**0.0011**[(Mn)]	<0.02[(DL>Mn)]	<0.02[(DL>Mn)]	<0.001	<0.001	<0.01	<0.01	<0.001
Cobalt	mg/L	0.0040	0.11	0.0024	0.0024	0.0021	0.0032	0.0029	<0.02[(DL>Mn)]	<0.02[(DL>Mn)]	<0.02[(DL>Mn)]	<0.02[(DL>Mn)]	<0.01[(DL>Mn)]	<0.01[(DL>Mn)]	<0.01[(DL>Mn)]
Copper	mg/L	-	-	<0.0005	<0.0005	0.00056	<0.0005	0.00058	<0.01	<0.01	0.0010	0.0010	<0.01	<0.01	<0.001
Iron	mg/L	-	1.0	**45**[(Mx)]	-	**34**[(Mx)]	**85**[(Mx)]	**52**[(Mx)]	<0.1	-	0.080	-	0.040	-	0.12
Lead	mg/L	0.020[b]	0.0030 - 0.42[b]	<0.00005	<0.00005	<0.00005	0.000058	0.000051	0.0010	0.0010	0.0010	0.0010	<0.01[(DL>Mn)]	<0.01[(DL>Mn)]	<0.001
Lithium	mg/L	-	-	0.0024	-	0.0018	0.0024	0.0023	-	-	<0.02	-	-	-	-
Magnesium	mg/L	-	-	28	-	27	33	28	0.60	-	0.97	-	0.51	-	1.2
Manganese	mg/L	0.77 - 2.6[b]	0.82 - 3.4[b]	**3.8**[(Mn, Mx)]	-	**4.3**[(Mn, Mx)]	**3.4**[(Mn, Mx)]	**4.4**[(Mn, Mx)]	<0.01	-	<0.005	-	0.0080	-	0.19
Mercury	mg/L	0.000010	-	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	-	-	<0.00005[(DL>Mn)]	<0.00005[(DL>Mn)]	<0.00005[(DL>Mn)]	<0.00005[(DL>Mn)]	<0.00001
Molybdenum	mg/L	7.6	46	0.00051	0.00051	0.00024	0.00031	0.00026	<0.01	<0.01	<0.03	<0.03	<0.03	<0.03	<0.03
Nickel	mg/L	0.025 - 0.15[b]	-	0.0046	0.0046	0.0041	0.0043	0.0040	<0.01	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02
Potassium	mg/L	-	-	55	-	47	59	46	<5.0	-	-	-	-	-	-
Rubidium	mg/L	-	-	0.038	-	0.033	0.042	0.036	-	-	-	-	-	-	-
Selenium	mg/L	0.0020	-	0.00011	0.00011	0.000066	0.00012	0.000089	-	-	<0.0005	<0.0005	<0.01[(DL>Mn)]	<0.01[(DL>Mn)]	<0.0005
Silicon	mg/L	-	-	12	-	11	14	12	-	-	-	-	-	-	-
Silver	mg/L	0.000050 - 0.0015[b]	0.00010 - 0.0030[b]	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.01[(DL>Mn, DL>Mx)]	<0.01[(DL>Mn, DL>Mx)]	<0.0001[(DL>Mn)]	<0.0001[(DL>Mn)]	<0.001[(DL>Mn, DL>Mx)]	<0.001[(DL>Mn, DL>Mx)]	<0.0001[(DL>Mn)]
Sodium	mg/L	-	-	81	-	72	94	70	<1.0	-	3.0	-	-	-	-
Strontium	mg/L	-	-	1.0	-	0.96	1.1	1.1	-	-	-	-	-	-	-
Sulphur	mg/L	-	-	-	-	4.0	1.2	11	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	2.1	-	-	-	-	-	-	-	-	-	-	-
Tellurium	mg/L	-	-	<0.0002	-	<0.0002	<0.0002	0.00023	-	-	-	-	-	-	-
Thallium	mg/L	0.00080	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	-	-	-	-	-	-	<0.0001
Thorium-232	mg/L	-	-	<0.0001	-	<0.0001	<0.0001	<0.0001	-	-	-	-	-	-	-
Tin	mg/L	-	-	0.00013	-	0.00011	0.00018	0.00016	-	-	-	-	-	-	-
Titanium	mg/L	-	-	0.0024	-	0.0027	0.0078	0.0021	<0.01	-	-	-	-	-	<0.01
Tungsten	mg/L	-	-	<0.0001	-	<0.0001	0.00010	<0.0001	-	-	-	-	-	-	-
Uranium	mg/L	0.0085	-	0.000066	0.000066	0.000060	0.000027	0.000034	-	-	-	-	-	-	0.000050
Vanadium	mg/L	-	-	0.0016	-	0.0011	0.0043	0.0016	<0.01	-	<0.03	-	-	-	<0.03
Zinc	mg/L	0.0075 - 0.19[b]	0.033 - 0.34[b]	<0.003	<0.003	0.027	0.026	<0.003	<0.01[(DL>Mn)]	<0.01[(DL>Mn)]	<0.005	<0.005	<0.005	<0.005	<0.005
Zirconium	mg/L	-	-	0.00043	-	0.00033	0.00069	0.00039	-	-	-	-	-	-	-
Dissolved Metals															
Aluminum	mg/L	0.0074 - 0.050[h]	0.024 - 0.10[h]	0.036	-	0.0014	0.014	0.018	-	-	-	-	-	-	-
Antimony	mg/L	-	-	0.00011	0.00011	<0.0001	0.00012	0.00014	-	-	-	-	-	-	-
Arsenic	mg/L	-	-	0.012	0.012	0.0011	0.045	0.012	-	-	-	-	-	-	-
Barium	mg/L	-	-	0.66	0.66	0.34	1.0	0.61	-	-	-	-	-	-	-
Beryllium	mg/L	-	-	<0.0001	<0.0001	<0.00002	<0.0001	<0.0001	-	-	-	-	-	-	-
Bismuth	mg/L	-	-	<0.00005	-	<0.00005	<0.00005	<0.00005	-	-	-	-	-	-	-
Boron	mg/L	-	-	1.5	1.5	1.4	1.7	1.4	-	-	-	-	-	-	-
Cadmium	mg/L	0.000018 - 0.00046[b]	0.000038 - 0.0028[b]	<0.000005	<0.000005	<0.000005	<0.000005	0.0000089	-	-	-	-	-	-	-
Cesium	mg/L	-	-	0.00024	-	0.00016	0.00022	0.00018	-	-	-	-	-	-	-
Chromium	mg/L	-	-	0.00088	0.00088	<0.0005	0.0011	0.00093	-	-	-	-	-	-	-
Cobalt	mg/L	-	-	0.0024	0.0024	0.0017	0.0032	0.0027	-	-	-	-	-	-	-
Copper	mg/L	0.002[(i)]	0.00020 - 0.00046[(i)]	**0.00021**[(Mn, Mx)]	**0.00021**[(Mn, Mx)]	<0.0002	<0.0002	**0.00027**[(Mn, Mx)]	-	-	-	-	-	-	-
Iron	mg/L	-	0.35	**45**[(Mx)]	-	0.017	**89**[(Mx)]	**48**[(Mx)]	-	-	-	-	-	-	-
Lead	mg/L	-	-	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	-	-	-	-	-	-	-
Lithium	mg/L	-	-	0.0020	-	0.0016	0.0018	0.0021	-	-	-	-	-	-	-
Manganese	mg/L	-	-	3.9	-	4.0	3.4	4.1	-	-	-	-	-	-	-
Mercury	mg/L	-	-	<0.000005	<0.000005	-	<0.000005	<0.000005	-	-	-	-	-	-	-
Molybdenum	mg/L	-	-	0.00040	0.00040	0.00019	0.00034	0.00027	-	-	-	-	-	-	-
Nickel	mg/L	-	-	0.0047	0.0047	0.0037	0.0038	0.0039	-	-	-	-	-	-	-
Rubidium	mg/L	-	-	0.040	-	0.031	0.041	0.034	-	-	-	-	-	-	-
Selenium	mg/L	-	-	0.00016	0.00016	0.000089	0.00022	0.00014	-	-	-	-	-	-	-
Silicon	mg/L	-	-	12	-	9.0	14	11	-	-	-	-	-	-	-
Silver	mg/L	-	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	-	-	-	-	-	-	-
Strontium	mg/L	-	-	1.1	-	0.88	1.2	0.98	-	-	-	-	-	-	-
Sulphur	mg/L	-	-	-	-	3.6	1.0	10	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	1.9	-	-	-	-	-	-	-	-	-	-	-
Tellurium	mg/L	-	-	<0.0002	-	<0.0002	<0.0002	<0.0002	-	-	-	-	-	-	-
Thallium	mg/L	-	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	-	-	-	-	-	-	-
Thorium-232	mg/L	-	-	<0.0001	-	<0.0001	<0.0001	<0.0001	-	-	-	-	-	-	-
Tin	mg/L	-	-	0.00012	-	<0.0001	0.00015	0.00011	-	-	-	-	-	-	-
Titanium	mg/L	-	-	0.0016	-	<0.0003	0.0014	0.0014	-	-	-	-	-	-	-
Tungsten	mg/L	-	-	<0.0001	-	<0.0001	0.00011	<0.0001	-	-	-	-	-	-	-
Uranium	mg/L	-	-	0.000068	0.000068	0.000049	0.000022	0.000031	-	-	-	-	-	-	-
Vanadium	mg/L	-	-	0.0016	-	<0.0005	0.0027	0.0013	-	-	-	-	-	-	-
Zinc	mg/L	-	-	0.0031	0.0031	0.0048	0.0024	0.0017	-	-	-	-	-	-	-
Zirconium	mg/L	-	-	0.00037	-	<0.0003	0.00071	0.00036	-	-	-	-	-	-	-

Table Notes:
BC WQG = British Columbia Approved (updated December 2021) and Working (updated February 2021) Water Quality Guidelines for the protection of freshwater aquatic life (AW-F)
[a] = guideline is a minimum value.
[b] = guideline is hardness dependent.
[c] = for some samples, water hardness was greater than 250 mg/L.
[d] = guideline is chloride dependent.
[e] & [f] = the ammonia guideline is pH and temperature dependent.
[g] = guideline is for chromium VI.
[h] = guideline is pH dependent.
[i] = guideline for dissolved copper is pH, hardness, and dissolved organic carbon dependent.
[(Mn)] = Exceeds BC WQG long-term chronic (30-day mean)
[(Mx)] = Exceeds BC WQG short-term acute (maximum)
[(DL>Mn)] = Detection Limit exceeds BC WQG 30-day mean
[(DL>Mx)] = Detection Limit exceeds BC WQG maximum
< Indicates parameter was below laboratory equipment detection limit.
- Chemical not analyzed or criteria not defined

Appendix C
Results of Surface Water Analyses
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name		SW-6B	SW-6	SW-6B	SW-6C	SW-6D	SW-6	SW-6B	SW-6	SW-6B	SW-6	SW-6B	SW-6
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	1997-12-04	1998-05-04	1998-05-04	1998-05-04	1998-05-04	1998-09-24	1998-09-24	1999-01-27	1999-01-27	1999-04-01	1999-04-01	1999-11-01
Field Measured															
pH	-	6.5 - 9.0	6.5 - 9.0	-	-	-	-	-	-	-	-	-	-	-	-
Temperature	°C	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved oxygen	mg/L	8[a]	5[a]	-	-	-	-	-	-	-	-	-	-	-	-
Conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation reduction potential	mV	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conventional Parameters															
pH, lab	-	6.5 - 9.0	6.5 - 9.0	-	-	7.4	-	-	7.9	-	-	-	-	-	-
Specific conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hardness, as $CaCO_3$	mg/L	-	-	-	-	35	-	-	63	-	49	-	36	-	39
Total alkalinity, as $CaCO_3$	mg/L	20[a]	-	-	-	-	-	-	-	-	-	-	-	-	-
Total suspended solids	mg/L	-	-	-	23	-	-	-	19	-	-	-	-	-	-
Conductivity	µS/cm	-	-	-	-	75	-	-	136	-	-	-	80	-	-
Hardness, as $CaCO_3$ (Dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Major Ions															
Bromide	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride	mg/L	150	600	2.5	-	-	1.0	1.0	2.5	2.5	2.8	2.8	0.70	0.70	1.7
Fluoride	mg/L	-	0.40 - 2.2[b]	-	-	-	-	-	-	-	-	-	-	-	-
Magnesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate	mg/L	128 - 429[b, c]	-	3.0	-	-	2.0	2.0	3.0	3.0	2.2	2.2	1.7	1.7	1.8
Nutrients and Biological Indicators															
Nitrate	mg-N/L	3.0	33	0.48	-	-	0.047	0.047	0.14	0.14	0.44	0.44	0.10	0.10	0.24
Nitrite	mg-N/L	0.020 - 0.20[d]	0.060 - 0.60[d]	0.0060	-	-	0.0030	0.0030	0.0020	0.0020	<0.005	<0.005	<0.002	<0.002	0.0040
Total ammonia	mg-N/L	0.11 - 2.0[e]	0.74 - 26[f]	-	-	0.0070	-	-	0.0080	-	0.24	-	<0.02	-	0.11
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	-	-	-	<10	-	<10
Chemical oxygen demand	mg/L	-	-	-	-	<20	-	-	<20	-	<10	-	<25	-	-
Total Metals															
Aluminum	mg/L	-	-	-	-	0.062	-	-	0.010	-	0.020	-	0.037	-	0.041
Antimony	mg/L	0.0090	-	<0.0001	-	-	0.00010	0.00010	<0.0001	<0.0001	<0.015[DL>Mn]	<0.015[DL>Mn]	<0.001	<0.001	<0.001
Arsenic	mg/L	-	0.005	0.00010	-	-	0.00010	0.00010	0.00020	0.00020	<0.04[DL>Mx]	<0.04[DL>Mx]	<0.001	<0.001	<0.001
Barium	mg/L	1.0	-	0.020	-	-	0.010	0.010	0.020	0.020	0.017	0.017	0.011	0.011	0.013
Beryllium	mg/L	0.00013	-	<0.005[DL>Mn]	-	-	<0.005[DL>Mn]	<0.005[DL>Mn]	<0.005[DL>Mn]	<0.005[DL>Mn]	<0.001[DL>Mn]	<0.001[DL>Mn]	<0.001[DL>Mn]	<0.001[DL>Mn]	<0.001[DL>Mn]
Bismuth	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	1.2	-	-	-	-	-	-	-	-	0.034	0.034	<0.05	<0.05	<0.05
Cadmium	mg/L	-	-	<0.0002	-	-	<0.0002	<0.0002	0.00020	0.00020	<0.0001	<0.0001	<0.0002	<0.0002	<0.0002
Calcium	mg/L	-	-	-	-	13	-	-	23	-	17	-	13	-	14
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	0.0010[g]	-	<0.001	-	-	<0.001	<0.001	<0.001	<0.001	<0.002[DL>Mn]	<0.002[DL>Mn]	<0.001	<0.001	<0.001
Cobalt	mg/L	0.0040	0.11	<0.01[DL>Mn]	-	-	<0.01[DL>Mn]	<0.01[DL>Mn]	<0.01[DL>Mn]	<0.01[DL>Mn]	<0.003	<0.003	<0.001	<0.001	<0.001
Copper	mg/L	-	-	<0.001	-	-	0.0020	0.0020	0.0010	0.0010	0.0020	0.0020	0.0020	0.0020	<0.001
Iron	mg/L	-	1.0	-	-	0.050	-	-	0.12	-	0.060	-	<0.05	-	0.11
Lead	mg/L	0.020[b]	0.0030 - 0.42[b]	<0.001	-	-	<0.001	<0.001	<0.001	<0.001	<0.02[DL>Mn]	<0.02[DL>Mn]	<0.001	<0.001	<0.001
Lithium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Magnesium	mg/L	-	-	-	-	0.50	-	-	1.4	-	1.6	-	0.70	-	1.1
Manganese	mg/L	0.77 - 2.6[b]	0.82 - 3.4[b]	-	-	0.0070	-	-	<0.005	-	0.017	-	0.0070	-	0.0060
Mercury	mg/L	0.000010	-	<0.00001	<0.00001	<0.00001	-	-	<0.00001	<0.00001	<0.00005[DL>Mn]	<0.00005[DL>Mn]	<0.00005[DL>Mn]	<0.00005[DL>Mn]	<0.00005[DL>Mn]
Molybdenum	mg/L	7.6	46	<0.03	-	-	<0.03	<0.03	<0.03	<0.03	<0.004	<0.004	<0.001	<0.001	<0.001
Nickel	mg/L	0.025 - 0.15[b]	-	<0.02	-	-	<0.02	<0.02	<0.05	<0.05	<0.008	<0.008	<0.001	<0.001	<0.001
Potassium	mg/L	-	-	-	-	-	-	-	-	-	1.9	-	0.69	-	1.4
Rubidium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/L	0.0020	-	<0.0005	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.001	<0.002	<0.002	<0.002
Silicon	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver	mg/L	0.000050 - 0.0015[b]	0.00010 - 0.0030[b]	<0.0001[DL>Mn]	-	-	<0.0001[DL>Mn]	<0.0001[DL>Mn]	<0.0001[DL>Mn]	<0.0001[DL>Mn]	<0.0001[DL>Mn]	<0.0001[DL>Mn]	<0.0001[DL>Mn]	<0.0001[DL>Mn]	<0.0001[DL>Mn]
Sodium	mg/L	-	-	-	-	-	-	-	-	-	4.3	-	1.1	-	2.3
Strontium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	-	-	-	1.2	-	-	-	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	0.00080	-	<0.0001	<0.0001	<0.0001	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	mg/L	-	-	-	-	<0.01	-	-	<0.01	-	<0.003	-	0.0010	-	0.0010
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	0.0085	-	0.000050	0.000050	0.000050	-	-	0.000070	0.000070	-	-	<0.0005	<0.0005	<0.0005
Vanadium	mg/L	-	-	-	-	<0.03	-	-	<0.03	-	<0.003	-	<0.001	-	<0.001
Zinc	mg/L	0.0075 - 0.19[b]	0.033 - 0.34[b]	<0.005	-	-	<0.005	<0.005	<0.005	<0.005	0.0040	0.0040	<0.005	<0.005	<0.005
Zirconium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Metals															
Aluminum	mg/L	0.0074 - 0.050[h]	0.024 - 0.10[h]	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bismuth	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/L	0.000018 - 0.00046[b]	0.000038 - 0.0028[b]	-	-	-	-	-	-	-	-	-	-	-	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	mg/L	0.002[i]	0.00020 - 0.00046[i]	-	-	-	-	-	-	-	-	-	-	-	-
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	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zirconium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table Notes:
BC WQG = British Columbia Approved (updated December 2021) and Working (updated February 2021) Water Quality Guidelines for the protection of freshwater aquatic life (AW-F)
[a] = guideline is a minimum value.
[b] = guideline is hardness dependent.
[c] = for some samples, water hardness was greater than 250 mg/L.
[d] = guideline is chloride dependent.
[e] & [f] = the ammonia guideline is pH and temperature dependent.
[g] = guideline is for chromium VI.
[h] = guideline is pH dependent.
[i] = guideline for dissolved copper is pH, hardness, and dissolved organic carbon dependent.
[Mn] = Exceeds BC WQG long-term chronic (30-day mean)
[Mx] = Exceeds BC WQG short-term acute (maximum)
[DL>Mn] = Detection Limit exceeds BC WQG 30-day mean
[DL>Mx] = Detection Limit exceeds BC WQG maximum
< Indicates parameter was below laboratory equipment detection limit.
- Chemical not analyzed or criteria not defined

Appendix C
Results of Surface Water Analyses
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name		SW-6B	SW-6	SW-6B	SW-6	SW-6B	SW-6	SW-6B	SW-6	SW-6B	SW-6	SW-6B	SW-6
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	1999-11-01	2000-03-17	2000-03-17	2000-08-15	2000-08-15	2000-12-20	2000-12-20	2001-05-07	2001-05-07	2001-12-01	2001-12-01	2002-04-01
Field Measured															
pH	-	6.5 - 9.0	6.5 - 9.0	-	-	-	-	-	-	-	-	-	-	-	-
Temperature	°C	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved oxygen	mg/L	8[a]	5[a]	-	-	-	-	-	-	-	-	-	-	-	-
Conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation reduction potential	mV	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conventional Parameters															
pH, lab	-	6.5 - 9.0	6.5 - 9.0	-	7.3	-	7.7	-	7.5	-	8.1	-	7.1	-	7.3
Specific conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hardness, as $CaCO_3$	mg/L	-	-	-	34	-	48	-	43	-	42	-	41	-	24
Total alkalinity, as $CaCO_3$	mg/L	20[a]	-	-	-	-	-	-	-	-	-	-	-	-	-
Total suspended solids	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conductivity	µS/cm	-	-	-	77	-	-	-	-	-	60	-	97	-	76
Hardness, as $CaCO_3$ (Dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Major Ions															
Bromide	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride	mg/L	150	600	1.7	3.2	3.2	1.7	1.7	2.4	2.4	0.30	0.30	1.3	1.3	3.4
Fluoride	mg/L	-	0.40 - 2.2[b]	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Magnesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate	mg/L	128 - 429[b, c]	-	1.8	2.1	2.1	1.8	1.8	2.3	2.3	1.3	1.3	2.0	2.0	35
Nutrients and Biological Indicators															
Nitrate	mg-N/L	3.0	33	0.24	-	-	0.18	0.18	0.060	0.060	0.24	0.24	0.16	0.16	0.70
Nitrite	mg-N/L	0.020 - 0.20[d]	0.060 - 0.60[d]	0.0040	-	-	<0.002	<0.002	0.0040	0.0040	0.0040	0.0040	<0.002	<0.002	0.012
Total ammonia	mg-N/L	0.11 - 2.0[e]	0.74 - 26[f]	-	0.030	-	0.29	-	0.030	-	-	-	0.11	-	<0.005
Total Kjeldahl Nitrogen	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total phosphorus	mg-P/L	-	-	-	0.010	-	<0.01	-	0.060	-	0.050	-	0.050	-	0.040
Dissolved phosphorus	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Orthophosphate	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Biochemical oxygen demand	mg/L	-	-	-	<10	-	<10	-	<10	-	<10	-	<10	-	<10
Chemical oxygen demand	mg/L	-	-	-	<25	-	<25	-	<25	-	<25	-	<25	-	<25
Total Metals															
Aluminum	mg/L	-	-	-	0.14	-	0.016	-	0.027	-	0.062	-	0.022	-	0.11
Antimony	mg/L	0.0090	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Arsenic	mg/L	-	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
Barium	mg/L	1.0	-	0.013	0.044	0.044	0.013	0.013	0.016	0.016	0.012	0.012	0.013	0.013	0.010
Beryllium	mg/L	0.00013	-	<0.001[DL>Mn]	<0.001[DL>Mn]	<0.001[DL>Mn]	<0.001[DL>Mn]	<0.001[DL>Mn]	<0.001[DL>Mn]	<0.001[DL>Mn]	<0.001[DL>Mn]	<0.001[DL>Mn]	<0.001[DL>Mn]	<0.001[DL>Mn]	<0.001[DL>Mn]
Bismuth	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	1.2	-	<0.05	0.060	0.060	<0.05	<0.05	<0.05	<0.05	0.11	0.11	0.050	0.050	<0.05
Cadmium	mg/L	-	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Calcium	mg/L	-	-	-	12	-	18	-	15	-	15	-	15	-	7.6
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	0.0010[g]	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cobalt	mg/L	0.0040	0.11	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	mg/L	-	-	<0.001	0.0010	0.0010	<0.001	<0.001	<0.001	<0.001	0.0010	0.0010	<0.001	<0.001	<0.001
Iron	mg/L	-	1.0	-	0.20	-	0.20	-	0.12	-	0.090	-	0.13	-	0.14
Lead	mg/L	0.020[b]	0.0030 - 0.42[b]	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Lithium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Magnesium	mg/L	-	-	-	1.2	-	0.68	-	1.2	-	0.93	-	1.0	-	1.2
Manganese	mg/L	0.77 - 2.6[b]	0.82 - 3.4[b]	-	0.035	-	0.015	-	0.0080	-	0.0060	-	0.016	-	0.017
Mercury	mg/L	0.000010	-	<0.00005[DL>Mn]	<0.00002[DL>Mn]	<0.00002[DL>Mn]	<0.00002[DL>Mn]	<0.00002[DL>Mn]	<0.00002[DL>Mn]	<0.00002[DL>Mn]	<0.00002[DL>Mn]	<0.00002[DL>Mn]	<0.00002[DL>Mn]	<0.00002[DL>Mn]	<0.00002[DL>Mn]
Molybdenum	mg/L	7.6	46	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Nickel	mg/L	0.025 - 0.15[b]	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Potassium	mg/L	-	-	-	1.5	-	0.75	-	1.4	-	0.96	-	1.1	-	1.6
Rubidium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/L	0.0020	-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Silicon	mg/L	-	-	-	4.0	-	6.6	-	6.0	-	5.2	-	6.1	-	4.8
Silver	mg/L	0.000050 - 0.0015[b]	0.00010 - 0.0030[b]	<0.0001	<0.0001[DL>Mn]	<0.0001[DL>Mn]	<0.0001[DL>Mn]	<0.0001[DL>Mn]	<0.0001[DL>Mn]	<0.0001[DL>Mn]	<0.0001[DL>Mn]	<0.0001[DL>Mn]	<0.0001[DL>Mn]	<0.0001[DL>Mn]	<0.0001[DL>Mn]
Sodium	mg/L	-	-	-	3.1	-	1.2	-	2.1	-	1.7	-	1.8	-	3.3
Strontium	mg/L	-	-	-	0.042	-	0.051	-	0.045	-	0.039	-	0.041	-	0.44
Sulphur	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	0.00080	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001
Titanium	mg/L	-	-	-	0.0020	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	0.0030
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	0.0085	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Vanadium	mg/L	-	-	-	0.0010	-	0.0010	-	<0.001	-	<0.001	-	<0.001	-	<0.001
Zinc	mg/L	0.0075 - 0.19[b]	0.033 - 0.34[b]	<0.005	<0.005	<0.005	0.0060	0.0060	<0.005	<0.005	0.0060	0.0060	<0.005	<0.005	<0.005
Zirconium	mg/L	-	-	-	<0.01	-	<0.01	-	<0.01	-	0.020	-	<0.01	-	<0.01
Dissolved Metals															
Aluminum	mg/L	0.0074 - 0.050[h]	0.024 - 0.10[h]	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bismuth	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/L	0.000018 - 0.00046[b]	0.000038 - 0.0028[b]	-	-	-	-	-	-	-	-	-	-	-	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	mg/L	0.002[i]	0.00020 - 0.00046[i]	-	-	-	-	-	-	-	-	-	-	-	-
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	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zirconium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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[h] = guideline is pH dependent.
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[Mn] = Exceeds BC WQG long-term chronic (30-day mean)
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Appendix C
Results of Surface Water Analyses
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name		SW-6B	SW-6	SW-6B	SW-6	SW-6B	SW-6	SW-6B	SW-6C	SW-6D	SW-6	SW-6B	SW-6
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	2002-04-01	2002-06-01	2002-06-01	2003-01-01	2003-01-01	2003-03-01	2003-03-01	2003-03-01	2003-03-01	2003-08-03	2003-08-03	2003-12-18
Field Measured															
pH	-	6.5 - 9.0	6.5 - 9.0	-	-	-	-	-	-	-	-	-	-	-	-
Temperature	°C	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved oxygen	mg/L	8[a]	5[a]	-	-	-	-	-	-	-	-	-	-	-	-
Conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation reduction potential	mV	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conventional Parameters															
pH, lab	-	6.5 - 9.0	6.5 - 9.0	-	7.4	-	6.9	-	7.5	7.4	-	-	7.9	-	7.0
Specific conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hardness, as $CaCO_3$	mg/L	-	-	-	31	-	19	-	45	-	-	-	64	-	31
Total alkalinity, as $CaCO_3$	mg/L	20[a]	-	-	-	-	-	-	-	-	-	-	-	-	-
Total suspended solids	mg/L	-	-	-	-	-	-	-	<4.0	-	-	-	-	-	-
Conductivity	µS/cm	-	-	-	76	-	42	-	121	127	-	-	155	-	106
Hardness, as $CaCO_3$ (Dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Major Ions															
Bromide	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride	mg/L	150	600	3.4	1.7	1.7	0.80	0.80	5.9	5.9	5.4	5.4	5.3	5.3	8.9
Fluoride	mg/L	-	0.40 - 2.2[b]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	<0.05	<0.05	<0.05
Magnesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate	mg/L	128 - 429[b, c]	-	35	2.3	2.3	1.0	1.0	2.8	2.8	2.6	2.6	3.0	3.0	3.0
Nutrients and Biological Indicators															
Nitrate	mg-N/L	3.0	33	0.70	<0.05	<0.05	0.15	0.15	0.65	0.65	0.62	0.62	<0.05	<0.05	0.49
Nitrite	mg-N/L	0.020 - 0.20[d]	0.060 - 0.60[d]	0.012	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.0050	0.0050	<0.002	<0.002	<0.002
Total ammonia	mg-N/L	0.11 - 2.0[e]	0.74 - 26[f]	-	<0.005	-	<0.005	-	<0.01	<0.005	-	-	<0.01	-	0.11
Total Kjeldahl Nitrogen	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total phosphorus	mg-P/L	-	-	-	0.11	-	0.040	-	0.070	-	-	-	0.090	-	0.45
Dissolved phosphorus	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Orthophosphate	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Biochemical oxygen demand	mg/L	-	-	-	<10	-	11	-	<10	<6.0	-	-	<10	-	<10
Chemical oxygen demand	mg/L	-	-	-	<25	-	38	-	<25	<10	-	-	<25	-	<25
Total Metals															
Aluminum	mg/L	-	-	-	0.025	-	0.13	-	0.070	0.031	-	-	0.020	-	0.44
Antimony	mg/L	0.0090	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.000023	0.000023	<0.001	<0.001	<0.001
Arsenic	mg/L	-	0.005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.00020	0.00020	<0.001	<0.001	<0.001
Barium	mg/L	1.0	-	0.010	0.0090	0.0090	0.0080	0.0080	0.015	0.015	0.018	0.018	0.023	0.023	0.021
Beryllium	mg/L	0.00013	-	<0.001[DL>Mn]	<0.001[DL>Mn]	<0.001[DL>Mn]	<0.001[DL>Mn]	<0.001[DL>Mn]	<0.001[DL>Mn]	<0.001[DL>Mn]	<0.00002	<0.00002	<0.001[DL>Mn]	<0.001[DL>Mn]	<0.001[DL>Mn]
Bismuth	mg/L	-	-	-	-	-	-	-	-	-	-	-	<0.001	-	-
Boron	mg/L	1.2	-	<0.05	0.080	0.080	<0.05	<0.05	0.070	0.070	-	-	<0.05	<0.05	<0.05
Cadmium	mg/L	-	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.00001	<0.00001	0.00090	0.00090	<0.0002
Calcium	mg/L	-	-	-	11	-	6.5	-	15	-	-	-	23	-	9.7
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	0.0010[g]	-	<0.001	<0.001	<0.001	**1.0[Mn]**	**1.0[Mn]**	<0.001	<0.001	<0.0002	<0.0002	<0.001	<0.001	<0.001
Cobalt	mg/L	0.0040	0.11	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.00011	0.00011	<0.001	<0.001	<0.001
Copper	mg/L	-	-	<0.001	0.0010	0.0010	<0.001	<0.001	0.0020	0.0020	0.00067	0.00067	<0.001	<0.001	0.0020
Iron	mg/L	-	1.0	-	0.10	-	0.080	-	0.15	-	-	-	0.36	-	0.95
Lead	mg/L	0.020[b]	0.0030 - 0.42[b]	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.000090	0.000090	<0.001	<0.001	<0.001
Lithium	mg/L	-	-	-	<0.05	-	<0.05	-	<0.05	0.00038	-	-	<0.001	-	-
Magnesium	mg/L	-	-	-	0.61	-	0.56	-	1.9	-	-	-	1.8	-	1.6
Manganese	mg/L	0.77 - 2.6[b]	0.82 - 3.4[b]	-	0.0030	-	0.0090	-	0.011	0.023	-	-	0.023	-	0.078
Mercury	mg/L	0.000010	-	<0.00002[DL>Mn]	<0.00002[DL>Mn]	<0.00002[DL>Mn]	<0.00002[DL>Mn]	<0.00002[DL>Mn]	<0.00002[DL>Mn]	<0.00002[DL>Mn]	-	-	<0.00002[DL>Mn]	<0.00002[DL>Mn]	<0.00002[DL>Mn]
Molybdenum	mg/L	7.6	46	<0.001	<0.001	<0.001	<0.001	<0.001	0.0016	0.0016	0.00055	0.00055	0.00080	0.00080	<0.0005
Nickel	mg/L	0.025 - 0.15[b]	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.00005	<0.00005	<0.001	<0.001	0.0010
Potassium	mg/L	-	-	-	0.48	-	0.77	-	2.1	-	-	-	1.9	-	1.4
Rubidium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/L	0.0020	-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0002	<0.0002	<0.001	<0.001	<0.001
Silicon	mg/L	-	-	-	2.8	-	3.3	-	5.7	-	-	-	6.8	-	5.8
Silver	mg/L	0.000050 - 0.0015[b]	0.00010 - 0.0030[b]	<0.0001[DL>Mn]	<0.0001[DL>Mn]	<0.0001[DL>Mn]	<0.0001[DL>Mn]	<0.0001[DL>Mn]	<0.0001[DL>Mn]	<0.0001[DL>Mn]	<0.00002	<0.00002	<0.0001[DL>Mn]	<0.0001[DL>Mn]	<0.0001[DL>Mn]
Sodium	mg/L	-	-	-	1.8	-	1.3	-	6.3	-	-	-	5.5	-	5.7
Strontium	mg/L	-	-	-	0.026	-	0.018	-	0.053	0.0063	-	-	0.073	-	0.044
Sulphur	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	0.00080	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0000040	0.0000040	<0.0001	<0.0001	<0.0001
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	<0.001	-	<0.001	-	<0.001	0.000030	-	-	<0.001	-	<0.001
Titanium	mg/L	-	-	-	<0.001	-	0.0010	-	0.0020	-	-	-	0.0010	-	0.015
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	0.0085	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.000079	0.000079	<0.0005	<0.0005	<0.0005
Vanadium	mg/L	-	-	-	<0.001	-	<0.001	-	<0.001	0.00028	-	-	<0.001	-	0.0010
Zinc	mg/L	0.0075 - 0.19[b]	0.033 - 0.34[b]	<0.005	0.0060	0.0060	<0.005	<0.005	<0.005	<0.005	0.0060	0.0060	<0.005	<0.005	**0.0080[Mn]**
Zirconium	mg/L	-	-	-	<0.01	-	<0.01	-	<0.01	-	-	-	<0.01	-	<0.01
Dissolved Metals															
Aluminum	mg/L	0.0074 - 0.050[h]	0.024 - 0.10[h]	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bismuth	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/L	0.000018 - 0.00046[b]	0.000038 - 0.0028[b]	-	-	-	-	-	-	-	-	-	-	-	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	mg/L	0.002[i]	0.00020 - 0.00046[i]	-	-	-	-	-	-	-	-	-	-	-	-
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	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zirconium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table Notes:
BC WQG = British Columbia Approved (updated December 2021) and Working (updated February 2021) Water Quality Guidelines for the protection of freshwater aquatic life (AW-F)
[a] = guideline is a minimum value.
[b] = guideline is hardness dependent.
[c] = for some samples, water hardness was greater than 250 mg/L.
[d] = guideline is chloride dependent.
[e] & [f] = the ammonia guideline is pH and temperature dependent.
[g] = guideline is for chromium VI.
[h] = guideline is pH dependent.
[i] = guideline for dissolved copper is pH, hardness, and dissolved organic carbon dependent.
[Mn] = Exceeds BC WQG long-term chronic (30-day mean)
[Mx] = Exceeds BC WQG short-term acute (maximum)
[DL>Mn] = Detection Limit exceeds BC WQG 30-day mean
[DL>Mx] = Detection Limit exceeds BC WQG maximum
< Indicates parameter was below laboratory equipment detection limit.
- Chemical not analyzed or criteria not defined

Appendix C
Results of Surface Water Analyses
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name		SW-6B	SW-6	SW-6B	SW-6	SW-6B	SW-6	SW-6B	SW-6	SW-6B	SW-6	SW-6B	SW-6
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	2003-12-18	2004-05-14	2004-05-14	2004-10-18	2004-10-18	2005-06-01	2005-06-01	2005-11-01	2005-11-01	2006-06-01	2006-06-01	2007-01-02
Field Measured															
pH	-	6.5 - 9.0	6.5 - 9.0	-	-	-	-	-	-	-	-	-	-	-	-
Temperature	°C	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved oxygen	mg/L	8[a]	5[a]	-	-	-	-	-	-	-	-	-	-	-	-
Conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation reduction potential	mV	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conventional Parameters															
pH, lab	-	6.5 - 9.0	6.5 - 9.0	-	7.6	-	7.1	-	7.6	-	6.8	-	**6.4[Mn, Mx]**	-	7.4
Specific conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hardness, as $CaCO_3$	mg/L	-	-	-	37	-	52	-	38	-	46	-	40	-	248
Total alkalinity, as $CaCO_3$	mg/L	20[a]	-	-	-	-	-	-	-	-	-	-	-	-	-
Total suspended solids	mg/L	-	-	-	-	-	<4.0	-	-	-	<4.0	-	-	-	18
Conductivity	µS/cm	-	-	-	97	-	109	-	85	-	92	-	500	-	1280
Hardness, as $CaCO_3$ (Dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Major Ions															
Bromide	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride	mg/L	150	600	8.9	2.2	2.2	1.6	1.6	0.45	0.45	1.4	1.4	16	16	68
Fluoride	mg/L	-	0.40 - 2.2[b]	<0.05	<0.05	<0.05	-	-	<0.05	<0.05	-	-	<0.1	<0.1	<0.05
Magnesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate	mg/L	128 - 429[b, c]	-	3.0	2.0	2.0	2.0	2.0	1.5	1.5	1.7	1.7	13	13	16
Nutrients and Biological Indicators															
Nitrate	mg-N/L	3.0	33	0.49	<0.05	<0.05	0.14	0.14	<0.05	<0.05	0.13	0.13	<0.002	<0.002	2.8
Nitrite	mg-N/L	0.020 - 0.20[d]	0.060 - 0.60[d]	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.0040	0.0040	<0.01	<0.01	0.030
Total ammonia	mg-N/L	0.11 - 2.0[e]	0.74 - 26[f]	-	0.010	-	0.11	-	0.040	-	0.21	-	0.13	-	**18[Mn, Mx]**
Total Kjeldahl Nitrogen	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total phosphorus	mg-P/L	-	-	-	<0.15	-	<0.1	-	0.030	-	0.10	-	<0.15	-	<0.15
Dissolved phosphorus	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Orthophosphate	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Biochemical oxygen demand	mg/L	-	-	-	<10	-	<10	-	<10	-	-	-	23	-	<10
Chemical oxygen demand	mg/L	-	-	-	<25	-	<10	-	50	-	12	-	<20	-	<20
Total Metals															
Aluminum	mg/L	-	-	-	0.022	-	0.031	-	0.026	-	0.074	-	<0.005	-	0.017
Antimony	mg/L	0.0090	-	<0.001	<0.001	<0.001	0.000016	0.000016	<0.0002	<0.0002	0.000023	0.000023	<0.001	<0.001	<0.001
Arsenic	mg/L	-	0.005	<0.001	<0.001	<0.001	0.00020	0.00020	<0.0002	<0.0002	0.00010	0.00010	<0.001	<0.001	<0.001
Barium	mg/L	1.0	-	0.021	0.012	0.012	0.015	0.015	0.010	0.010	0.012	0.012	0.012	0.012	0.20
Beryllium	mg/L	0.00013	-	<0.001[DL>Mn]	<0.001[DL>Mn]	<0.001[DL>Mn]	<0.00002	<0.00002	<0.0002[DL>Mn]	<0.0002[DL>Mn]	0.000020	0.000020	<0.001[DL>Mn]	<0.001[DL>Mn]	<0.001[DL>Mn]
Bismuth	mg/L	-	-	-	<0.001	-	<0.00002	-	<0.0002	-	0.000020	-	<0.001	-	<0.001
Boron	mg/L	1.2	-	<0.05	<0.05	<0.05	0.019	0.019	0.030	0.030	0.018	0.018	<0.05	<0.05	0.96
Cadmium	mg/L	-	-	<0.0002	<0.0002	<0.0002	<0.00001	<0.00001	<0.00004	<0.00004	0.000010	0.000010	<0.0002	<0.0002	<0.0002
Calcium	mg/L	-	-	-	14	-	19	-	14	-	17	-	15	-	77
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	0.0010[g]	-	<0.001	<0.001	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	0.00020	0.00020	<0.001	<0.001	<0.001
Cobalt	mg/L	0.0040	0.11	<0.001	<0.001	<0.001	0.000040	0.000040	<0.0002	<0.0002	0.000052	0.000052	<0.001	<0.001	0.0010
Copper	mg/L	-	-	0.0020	<0.001	<0.001	0.00080	0.00080	0.00060	0.00060	0.00098	0.00098	<0.001	<0.001	0.0030
Iron	mg/L	-	1.0	-	<0.05	-	0.053	-	0.080	-	0.080	-	<0.05	-	0.080
Lead	mg/L	0.020[b]	0.0030 - 0.42[b]	<0.001	<0.001	<0.001	<0.00001	<0.00001	<0.0002	<0.0002	0.000010	0.000010	<0.001	<0.001	<0.001
Lithium	mg/L	-	-	-	<0.001	-	<0.00005	-	<0.0002	-	0.000050	-	<0.001	-	<0.001
Magnesium	mg/L	-	-	-	0.70	-	0.99	-	0.79	-	0.96	-	0.50	-	13
Manganese	mg/L	0.77 - 2.6[b]	0.82 - 3.4[b]	-	0.0090	-	0.0066	-	0.0041	-	0.0055	-	0.0020	-	0.72
Mercury	mg/L	0.000010	-	<0.00002[DL>Mn]	<0.02[DL>Mn]	<0.02[DL>Mn]	<0.00005[DL>Mn]	<0.00005[DL>Mn]	<0.02[DL>Mn]	<0.02[DL>Mn]	**0.000050[Mn]**	**0.000050[Mn]**	<0.02[DL>Mn]	<0.02[DL>Mn]	<0.00002[DL>Mn]
Molybdenum	mg/L	7.6	46	<0.0005	<0.0005	<0.0005	0.00041	0.00041	0.00040	0.00040	0.00031	0.00031	<0.0005	<0.0005	<0.0005
Nickel	mg/L	0.025 - 0.15[b]	-	0.0010	<0.001	<0.001	0.00024	0.00024	0.00070	0.00070	0.00011	0.00011	<0.001	<0.001	0.0040
Potassium	mg/L	-	-	-	0.50	-	1.0	-	0.96	-	1.0	-	0.50	-	30
Rubidium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/L	0.0020	-	<0.001	<0.001	<0.001	<0.0002	<0.0002	0.00050	0.00050	0.00020	0.00020	<0.001	<0.001	<0.001
Silicon	mg/L	-	-	-	4.5	-	-	-	6.3	-	-	-	2.1	-	3.7
Silver	mg/L	0.000050 - 0.0015[b]	0.00010 - 0.0030[b]	<0.0001[DL>Mn]	<0.00025[DL>Mn, DL>Mx]	<0.00025[DL>Mn, DL>Mx]	<0.00002	<0.00002	<0.00005	<0.00005	0.000020	0.000020	<0.00025[DL>Mn, DL>Mx]	<0.00025[DL>Mn, DL>Mx]	<0.00025
Sodium	mg/L	-	-	-	1.8	-	2.0	-	1.8	-	2.1	-	0.77	-	58
Strontium	mg/L	-	-	-	0.031	-	0.046	-	0.039	-	0.037	-	0.031	-	0.51
Sulphur	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	0.70	-	-	-	0.60	-	-	-	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	0.00080	-	<0.0001	<0.0001	<0.0001	0.0000020	0.0000020	<0.00002	<0.00002	**0.0020[Mn]**	**0.0020[Mn]**	<0.0001	<0.0001	<0.0001
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	<0.001	-	0.000010	-	<0.0002	-	-	-	<0.001	-	<0.001
Titanium	mg/L	-	-	-	<0.001	-	<0.003	-	0.00060	-	0.0030	-	<0.001	-	<0.001
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	0.0085	-	<0.0005	<0.0005	<0.0005	0.000062	0.000062	<0.0001	<0.0001	0.000043	0.000043	<0.0005	<0.0005	<0.0005
Vanadium	mg/L	-	-	-	<0.001	-	0.00039	-	0.00040	-	0.00043	-	<0.001	-	<0.001
Zinc	mg/L	0.0075 - 0.19[b]	0.033 - 0.34[b]	**0.0080[Mn]**	<0.005	<0.005	<0.0001	<0.0001	<0.001	<0.001	0.00010	0.00010	<0.005	<0.005	<0.005
Zirconium	mg/L	-	-	-	<0.01	-	<0.005	-	<0.002	-	0.0050	-	<0.01	-	<0.01
Dissolved Metals															
Aluminum	mg/L	0.0074 - 0.050[h]	0.024 - 0.10[h]	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bismuth	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/L	0.000018 - 0.00046[b]	0.000038 - 0.0028[b]	-	-	-	-	-	-	-	-	-	-	-	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	mg/L	0.002[i]	0.00020 - 0.00046[i]	-	-	-	-	-	-	-	-	-	-	-	-
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	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zirconium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table Notes:
BC WQG = British Columbia Approved (updated December 2021) and Working (updated February 2021) Water Quality Guidelines for the protection of freshwater aquatic life (AW-F)
[a] = guideline is a minimum value.
[b] = guideline is hardness dependent.
[c] = for some samples, water hardness was greater than 250 mg/L.
[d] = guideline is chloride dependent.
[e] & [f] = the ammonia guideline is pH and temperature dependent.
[g] = guideline is for chromium VI.
[h] = guideline is pH dependent.
[i] = guideline for dissolved copper is pH, hardness, and dissolved organic carbon dependent.
[Mn] = Exceeds BC WQG long-term chronic (30-day mean)
[Mx] = Exceeds BC WQG short-term acute (maximum)
[DL>Mn] = Detection Limit exceeds BC WQG 30-day mean
[DL>Mx] = Detection Limit exceeds BC WQG maximum
< Indicates parameter was below laboratory equipment detection limit.
- Chemical not analyzed or criteria not defined

Appendix C
Results of Surface Water Analyses
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name		SW-6B	SW-6	SW-6B	SW-6	SW-6B	SW-6	SW-6B	SW-6	SW-6B	SW-6	SW-6B	SW-6
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	2007-01-02	2007-06-18	2007-06-18	2008-05-27	2008-05-27	2008-10-10	2008-10-10	2009-09-24	2009-09-24	2010-02-22	2010-02-22	2010-06-15
Field Measured															
pH	-	6.5 - 9.0	6.5 - 9.0	-	-	-	-	-	-	-	-	-	-	-	-
Temperature	°C	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved oxygen	mg/L	8[a]	5[a]	-	-	-	-	-	-	-	-	-	-	-	-
Conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation reduction potential	mV	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conventional Parameters															
pH, lab	-	6.5 - 9.0	6.5 - 9.0	-	7.6	-	7.7	-	8.0	-	7.6	-	7.0	-	7.2
Specific conductivity	µS/cm	-	-	-	-	-	-	-	-	-	111	-	99	-	95
Hardness, as $CaCO_3$	mg/L	-	-	-	29	-	27	-	62	-	51	-	42	-	41
Total alkalinity, as $CaCO_3$	mg/L	20[a]	-	-	-	-	-	-	-	-	-	-	-	-	-
Total suspended solids	mg/L	-	-	-	<0.01	-	-	-	<4.0	-	-	-	-	-	-
Conductivity	µS/cm	-	-	-	68	-	66.1	-	130	-	-	-	-	-	-
Hardness, as $CaCO_3$ (Dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Major Ions															
Bromide	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride	mg/L	150	600	68	0.33	0.33	1.0	1.0	2.4	2.4	1.8	1.8	2.8	2.8	1.1
Fluoride	mg/L	-	0.40 - 2.2[b]	<0.05	<0.5	<0.5	<0.1	<0.1	<0.005	<0.005	-	-	-	-	-
Magnesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate	mg/L	128 - 429[b, c]	-	16	0.80	0.80	1.1	1.1	<0.5	<0.5	2.0	2.0	2.5	2.5	18
Nutrients and Biological Indicators															
Nitrate	mg-N/L	3.0	33	2.8	<0.05	<0.05	<0.1	<0.1	-	-	-	-	0.60	-	-
Nitrite	mg-N/L	0.020 - 0.20[d]	0.060 - 0.60[d]	0.030	<0.002	<0.002	<0.01	<0.01	0.0020	0.0020	-	-	-	-	-
Total ammonia	mg-N/L	0.11 - 2.0[e]	0.74 - 26[f]	-	<0.01	-	<0.03	-	0.20	-	<0.03	-	<0.03	-	<0.03
Total Kjeldahl Nitrogen	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total phosphorus	mg-P/L	-	-	-	<0.15	-	-	-	0.0070	-	-	-	-	-	-
Dissolved phosphorus	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Orthophosphate	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Biochemical oxygen demand	mg/L	-	-	-	<10	-	<6.0	-	<10	-	<4.0	-	<4.0	-	<4.0
Chemical oxygen demand	mg/L	-	-	-	<20	-	<30	-	15	-	<30	-	<30	-	<30
Total Metals															
Aluminum	mg/L	-	-	-	0.034	-	0.050	-	0.037	-	0.022	-	0.029	-	0.022
Antimony	mg/L	0.0090	-	<0.001	<0.001	<0.001	<0.0006	<0.0006	<0.00002	<0.00002	-	-	-	-	-
Arsenic	mg/L	-	0.005	<0.001	<0.001	<0.001	<0.001	<0.001	0.00013	0.00013	0.00010	0.00010	-	-	-
Barium	mg/L	1.0	-	0.20	0.0070	0.0070	0.010	0.010	0.018	0.018	0.069	0.069	0.051	0.051	0.061
Beryllium	mg/L	0.00013	-	<0.001[(DL>Mn)]	<0.001[(DL>Mn)]	<0.001[(DL>Mn)]	<0.0004[(DL>Mn)]	<0.0004[(DL>Mn)]	<0.00001	<0.00001	-	-	-	-	-
Bismuth	mg/L	-	-	-	<0.001	-	-	-	<0.000005	-	-	-	-	-	-
Boron	mg/L	1.2	-	0.96	<0.05	<0.05	0.0040	0.0040	<0.05	<0.05	-	-	-	-	-
Cadmium	mg/L	-	-	<0.0002	<0.0002	<0.0002	0.00030	0.00030	<0.000005	<0.000005	0.000010	0.000010	0.000040	0.000040	0.000020
Calcium	mg/L	-	-	-	11	-	12	-	20	-	19	-	16	-	16
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	0.0010[g]	-	<0.001	<0.001	<0.001	0.0010	0.0010	<0.0001	<0.0001	-	-	-	-	-
Cobalt	mg/L	0.0040	0.11	0.0010	<0.001	<0.001	<0.0001	<0.0001	0.000045	0.000045	-	-	-	-	-
Copper	mg/L	-	-	0.003	<0.001	<0.001	0.01	0.01	0.00058	0.00058	0.0015	0.0015	0.0015	0.0015	0.0049
Iron	mg/L	-	1.0	-	<0.05	-	0.060	-	0.15	-	0.15	-	0.077	-	0.042
Lead	mg/L	0.020[b]	0.0030 - 0.42[b]	<0.001	<0.001	<0.001	<0.0002	<0.0002	0.000013	0.000013	-	-	0.00040	0.00040	-
Lithium	mg/L	-	-	-	<0.005	-	<0.0004	-	<0.0005	-	-	-	-	-	-
Magnesium	mg/L	-	-	-	0.32	-	0.38	-	1.1	-	0.96	-	1.1	-	0.58
Manganese	mg/L	0.77 - 2.6[b]	0.82 - 3.4[b]	-	0.0040	-	0.0074	-	0.0060	-	0.0040	-	0.0090	-	0.0080
Mercury	mg/L	0.000010	-	<0.00002[(DL>Mn)]	<0.00002[(DL>Mn)]	<0.00002[(DL>Mn)]	<0.00006[(DL>Mn)]	<0.00006[(DL>Mn)]	-	-	**0.000040[(Mn)]**	**0.000040[(Mn)]**	-	-	-
Molybdenum	mg/L	7.6	46	<0.0005	<0.0005	<0.0005	0.00030	0.00030	0.00053	0.00053	-	-	-	-	-
Nickel	mg/L	0.025 - 0.15[b]	-	0.0040	<0.001	<0.001	<0.001	<0.001	-	-	-	-	-	-	-
Potassium	mg/L	-	-	-	0.40	-	-	-	1.4	-	1.2	-	1.4	-	0.53
Rubidium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/L	0.0020	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.00004	<0.00004	-	-	-	-	-
Silicon	mg/L	-	-	-	1.5	-	-	-	2.7	-	3.4	-	3.1	-	2.5
Silver	mg/L	0.000050 - 0.0015[b]	0.00010 - 0.0030[b]	<0.00025[(DL>Mn, DL>Mx)]	<0.00025[(DL>Mn, DL>Mx)]	<0.00025[(DL>Mn, DL>Mx)]	<0.00008[(DL>Mn)]	<0.00008[(DL>Mn)]	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005
Sodium	mg/L	-	-	-	0.61	-	0.93	-	2.3	-	2.3	-	2.9	-	1.1
Strontium	mg/L	-	-	-	0.020	-	-	-	0.058	-	0.053	-	0.050	-	0.042
Sulphur	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	-	<3.0	-	-	-	-	-	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	0.00080	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.000002	<0.000002	-	-	-	-	-
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	<0.001	-	-	-	<0.00001	-	-	-	-	-	-
Titanium	mg/L	-	-	-	<0.001	-	<0.02	-	0.0015	-	-	-	-	-	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	0.0085	-	<0.0005	<0.0005	<0.0005	<0.0001	<0.0001	0.000078	0.000078	-	-	-	-	-
Vanadium	mg/L	-	-	-	<0.001	-	<0.02	-	0.00030	-	-	-	-	-	-
Zinc	mg/L	0.0075 - 0.19[b]	0.033 - 0.34[b]	<0.005	<0.005	<0.005	**0.018[(Mn)]**	**0.018[(Mn)]**	0.00020	0.00020	**0.028[(Mn)]**	**0.028[(Mn)]**	**0.032[(Mn)]**	**0.032[(Mn)]**	**0.023[(Mn)]**
Zirconium	mg/L	-	-	-	<0.01	-	-	-	-	-	-	-	-	-	-
Dissolved Metals															
Aluminum	mg/L	0.0074 - 0.050[h]	0.024 - 0.10[h]	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bismuth	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/L	0.000018 - 0.00046[b]	0.000038 - 0.0028[b]	-	-	-	-	-	-	-	-	-	-	-	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	mg/L	0.002[i]	0.00020 - 0.00046[i]	-	-	-	-	-	-	-	-	-	-	-	-
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	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zirconium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table Notes:
BC WQG = British Columbia Approved (updated December 2021) and Working (updated February 2021) Water Quality Guidelines for the protection of freshwater aquatic life (AW-F)
[a] = guideline is a minimum value.
[b] = guideline is hardness dependent.
[c] = for some samples, water hardness was greater than 250 mg/L.
[d] = guideline is chloride dependent.
[e] & [f] = the ammonia guideline is pH and temperature dependent.
[g] = guideline is for chromium VI.
[h] = guideline is pH dependent.
[i] = guideline for dissolved copper is pH, hardness, and dissolved organic carbon dependent.
[(Mn)] = Exceeds BC WQG long-term chronic (30-day mean)
[(Mx)] = Exceeds BC WQG short-term acute (maximum)
[(DL>Mn)] = Detection Limit exceeds BC WQG 30-day mean
[(DL>Mx)] = Detection Limit exceeds BC WQG maximum
< Indicates parameter was below laboratory equipment detection limit.
- Chemical not analyzed or criteria not defined

Appendix C
Results of Surface Water Analyses
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name		SW-6B	SW-6	SW-6B	SW-6	SW-6B	SW-6	SW-6B	SW-6	SW-6B	SW-6	SW-6B	SW-6
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	2010-06-15	2010-10-25	2010-10-25	2011-02-15	2011-02-15	2012-02-22	2012-02-22	2012-05-08	2012-05-08	2013-01-04	2013-01-04	2013-04-15
Field Measured															
pH	-	6.5 - 9.0	6.5 - 9.0	-	-	-	-	-	-	-	-	-	-	-	-
Temperature	°C	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved oxygen	mg/L	8[a]	5[a]	-	-	-	-	-	-	-	-	-	-	-	-
Conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation reduction potential	mV	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conventional Parameters															
pH, lab	-	6.5 - 9.0	6.5 - 9.0	-	7.8	-	7.4	-	7.4	-	7.5	-	7.1	-	8.4
Specific conductivity	µS/cm	-	-	-	108	-	-	-	-	-	-	-	-	-	-
Hardness, as $CaCO_3$	mg/L	-	-	-	49	-	35	-	33	-	36	-	49	-	47
Total alkalinity, as $CaCO_3$	mg/L	20[a]	-	-	-	-	-	-	-	-	-	-	-	-	-
Total suspended solids	mg/L	-	-	-	-	-	-	-	-	-	-	-	<1.0	-	-
Conductivity	µS/cm	-	-	-	-	-	79.8	-	90	-	75.6	-	126	-	104
Hardness, as $CaCO_3$ (Dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Major Ions															
Bromide	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride	mg/L	150	600	1.1	1.2	1.2	2.2	2.2	3.3	3.3	<1.0	<1.0	5.8	5.8	2.1
Fluoride	mg/L	-	0.40 - 2.2[b]	-	0.030	0.030	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.026
Magnesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate	mg/L	128 - 429[b, c]	-	18	0.60	0.60	1.8	1.8	<1.0	<1.0	0.97	0.97	1.4	1.4	1.8
Nutrients and Biological Indicators															
Nitrate	mg-N/L	3.0	33	-	0.17	-	0.40	0.40	0.44	0.44	<0.1	<0.1	0.80	0.80	0.20
Nitrite	mg-N/L	0.020 - 0.20[d]	0.060 - 0.60[d]	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total ammonia	mg-N/L	0.11 - 2.0[e]	0.74 - 26[f]	-	0.18	-	<0.03	-	0.18	-	0.040	-	0.24	-	<0.03
Total Kjeldahl Nitrogen	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total phosphorus	mg-P/L	-	-	-	-	-	0.030	-	0.017	-	0.020	-	0.012	-	<0.01
Dissolved phosphorus	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Orthophosphate	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Biochemical oxygen demand	mg/L	-	-	-	<4.0	-	<4.0	-	<4.0	-	<4.0	-	<4.0	-	<4.0
Chemical oxygen demand	mg/L	-	-	-	<30	-	33	-	<30	-	<30	-	<20	-	<20
Total Metals															
Aluminum	mg/L	-	-	-	0.042	-	0.83	-	0.49	-	0.51	-	0.22	-	0.052
Antimony	mg/L	0.0090	-	-	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00012
Arsenic	mg/L	-	0.005	-	-	-	0.00010	0.00010	0.00010	0.00010	0.00024	0.00024	<0.0001	<0.0001	0.000098
Barium	mg/L	1.0	-	0.061	0.017	0.017	0.020	0.020	0.018	0.018	0.015	0.015	0.021	0.021	0.016
Beryllium	mg/L	0.00013	-	-	-	-	<0.0001	<0.0001	<0.0001	<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
Boron	mg/L	1.2	-	-	-	-	0.055	0.055	0.054	0.054	<0.05	<0.05	0.056	0.056	<0.05
Cadmium	mg/L	-	-	0.000020	0.000090	0.000090	0.000020	0.000020	0.000020	0.000020	0.000016	0.000016	0.000060	0.000060	0.000011
Calcium	mg/L	-	-	-	17	-	12	-	11	-	13	-	17	-	17
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	0.0010[g]	-	-	-	-	**0.0020[Mn]**	**0.0020[Mn]**	0.0010	0.0010	<0.001	<0.001	<0.001	<0.001	<0.001
Cobalt	mg/L	0.0040	0.11	-	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.000048
Copper	mg/L	-	-	0.0049	0.0048	0.0048	0.0031	0.0031	0.0031	0.0031	0.0021	0.0021	0.0021	0.0021	0.00082
Iron	mg/L	-	1.0	-	0.055	-	0.95	-	0.61	-	0.65	-	0.31	-	0.090
Lead	mg/L	0.020[b]	0.0030 - 0.42[b]	-	0.0022	0.0022	0.00030	0.00030	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Lithium	mg/L	-	-	-	-	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-	0.0017
Magnesium	mg/L	-	-	-	0.85	-	1.3	-	1.2	-	0.77	-	1.5	-	0.96
Manganese	mg/L	0.77 - 2.6[b]	0.82 - 3.4[b]	-	0.0040	-	0.033	-	0.022	-	0.026	-	0.022	-	0.0072
Mercury	mg/L	0.000010	-	-	**0.000030[Mn]**	**0.000030[Mn]**	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Molybdenum	mg/L	7.6	46	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.00059
Nickel	mg/L	0.025 - 0.15[b]	-	-	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	<0.001	<0.001	0.0013	0.0013	0.00021
Potassium	mg/L	-	-	-	1.2	-	1.7	-	1.6	-	0.74	-	2.2	-	1.3
Rubidium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/L	0.0020	-	-	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.000058
Silicon	mg/L	-	-	-	2.8	-	4.1	-	4.1	-	2.8	-	3.0	-	2.9
Silver	mg/L	0.000050 - 0.0015[b]	0.00010 - 0.0030[b]	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.00002	<0.00002	0.0000070
Sodium	mg/L	-	-	-	2.0	-	2.9	-	3.3	-	1.1	-	4.5	-	1.8
Strontium	mg/L	-	-	-	0.045	-	0.043	-	0.042	-	0.034	-	0.061	-	0.047
Sulphur	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	<3.0	-	<3.0	-	<3.0	-	<3.0	-	<3.0
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	0.00080	-	-	-	-	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	-	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-	0.00056
Titanium	mg/L	-	-	-	-	-	0.028	-	0.018	-	0.022	-	<0.005	-	<0.005
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	0.0085	-	-	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.000060
Vanadium	mg/L	-	-	-	-	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-	<0.005
Zinc	mg/L	0.0075 - 0.19[b]	0.033 - 0.34[b]	**0.023[Mn]**	**0.021[Mn]**	**0.021[Mn]**	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.0053	0.0053	0.0015
Zirconium	mg/L	-	-	-	-	-	<0.0005	-	<0.0005	-	<0.0005	-	<0.0005	-	<0.0005
Dissolved Metals															
Aluminum	mg/L	0.0074 - 0.050[h]	0.024 - 0.10[h]	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bismuth	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/L	0.000018 - 0.00046[b]	0.000038 - 0.0028[b]	-	-	-	-	-	-	-	-	-	-	-	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	mg/L	0.002[i]	0.00020 - 0.00046[i]	-	-	-	-	-	-	-	-	-	-	-	-
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	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zirconium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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BC WQG = British Columbia Approved (updated December 2021) and Working (updated February 2021) Water Quality Guidelines for the protection of freshwater aquatic life (AW-F)
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[d] = guideline is chloride dependent.
[e] & [f] = the ammonia guideline is pH and temperature dependent.
[g] = guideline is for chromium VI.
[h] = guideline is pH dependent.
[i] = guideline for dissolved copper is pH, hardness, and dissolved organic carbon dependent.
[Mn] = Exceeds BC WQG long-term chronic (30-day mean)
[Mx] = Exceeds BC WQG short-term acute (maximum)
[DL>Mn] = Detection Limit exceeds BC WQG 30-day mean
[DL>Mx] = Detection Limit exceeds BC WQG maximum
< Indicates parameter was below laboratory equipment detection limit.
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Appendix C
Results of Surface Water Analyses
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name		SW-6B	SW-6	SW-6B	SW-6	SW-6B	SW-6	SW-6B	SW-6	SW-6B	SW-6	SW-6B	SW-6
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	2013-04-15	2013-06-06	2013-06-06	2013-10-22	2013-10-22	2014-05-06	2014-05-06	2014-10-29	2014-10-29	2015-03-31	2015-03-31	2015-08-11
Field Measured															
pH	-	6.5 - 9.0	6.5 - 9.0	-	-	-	-	-	-	-	-	-	-	-	-
Temperature	°C	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved oxygen	mg/L	8[a]	5[a]	-	-	-	-	-	-	-	-	-	-	-	-
Conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation reduction potential	mV	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conventional Parameters															
pH, lab	-	6.5 - 9.0	6.5 - 9.0	-	7.7	-	7.4	-	7.5	-	7.4	-	7.6	-	7.8
Specific conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	86	-	-
Hardness, as $CaCO_3$	mg/L	-	-	-	35	-	74	-	40	-	44	-	39	-	65
Total alkalinity, as $CaCO_3$	mg/L	20[a]	-	-	-	-	-	-	-	-	-	-	-	-	-
Total suspended solids	mg/L	-	-	-	4.5	-	<1.0	-	3.9	-	2.3	-	9.6	-	<1.0
Conductivity	µS/cm	-	-	-	64.1	-	156	-	89.9	-	101	-	-	-	128
Hardness, as $CaCO_3$ (Dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Major Ions															
Bromide	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride	mg/L	150	600	2.1	<1.0	<1.0	3.5	3.5	1.0	1.0	7.4	7.4	2.0	2.0	1.3
Fluoride	mg/L	-	0.40 - 2.2[b]	0.026	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	<0.1
Magnesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate	mg/L	128 - 429[b, c]	-	1.8	1.0	1.0	6.1	6.1	0.70	0.70	<0.5	<0.5	1.9	1.9	1.8
Nutrients and Biological Indicators															
Nitrate	mg-N/L	3.0	33	0.20	<0.1	<0.1	0.28	0.28	0.10	0.10	0.21	0.21	0.33	-	0.050
Nitrite	mg-N/L	0.020 - 0.20[d]	0.060 - 0.60[d]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-
Total ammonia	mg-N/L	0.11 - 2.0[e]	0.74 - 26[f]	-	<0.03	-	0.040	-	<0.03	-	<0.03	-	-	-	<0.03
Total Kjeldahl Nitrogen	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total phosphorus	mg-P/L	-	-	-	<0.01	-	<0.01	-	<0.01	-	0.010	-	0.024	-	0.060
Dissolved phosphorus	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Orthophosphate	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Biochemical oxygen demand	mg/L	-	-	-	<4.0	-	<4.0	-	<4.0	-	<4.0	-	-	-	<4.0
Chemical oxygen demand	mg/L	-	-	-	<20	-	<20	-	<20	-	<20	-	-	-	<20
Total Metals															
Aluminum	mg/L	-	-	-	0.18	-	0.040	-	0.14	-	0.31	-	0.96	-	0.079
Antimony	mg/L	0.0090	-	0.00012	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	-	-	<0.0001
Arsenic	mg/L	-	0.005	0.000098	<0.0001	<0.0001	0.00013	0.00013	0.00011	0.00011	0.00022	0.00022	-	-	<0.0005
Barium	mg/L	1.0	-	0.016	0.011	0.011	0.022	0.022	0.012	0.012	0.017	0.017	0.021	0.021	0.019
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	-	-	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	-	-	<0.0001
Boron	mg/L	1.2	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.072	0.072	0.063
Cadmium	mg/L	-	-	0.000011	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.000010	0.000010	<0.00001
Calcium	mg/L	-	-	-	13	-	27	-	15	-	16	-	14	-	24
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	0.0010[g]	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.0010	0.0010	<0.0005
Cobalt	mg/L	0.0040	0.11	0.000048	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00044	0.00044	0.000080
Copper	mg/L	-	-	0.00082	0.00091	0.00091	0.00066	0.00066	0.00079	0.00079	0.0017	0.0017	0.0028	0.0028	0.0011
Iron	mg/L	-	1.0	-	0.21	-	0.16	-	0.16	-	0.34	-	0.97	-	0.16
Lead	mg/L	0.020[b]	0.0030 - 0.42[b]	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.00020	0.00020	<0.0001
Lithium	mg/L	-	-	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-	0.00070	-	0.00010
Magnesium	mg/L	-	-	-	0.48	-	1.3	-	0.57	-	1.0	-	1.1	-	0.95
Manganese	mg/L	0.77 - 2.6[b]	0.82 - 3.4[b]	-	0.010	-	0.016	-	0.0060	-	0.012	-	0.029	-	0.014
Mercury	mg/L	0.000010	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	-	-	<0.00002[(DL>Mn)]
Molybdenum	mg/L	7.6	46	0.00059	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.00060	0.00060	0.00060
Nickel	mg/L	0.025 - 0.15[b]	-	0.00021	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.0011	0.0011	<0.0002
Potassium	mg/L	-	-	-	0.53	-	1.8	-	0.61	-	1.4	-	1.2	-	1.0
Rubidium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/L	0.0020	-	0.000058	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	-	<0.0005
Silicon	mg/L	-	-	-	2.2	-	3.2	-	2.7	-	3.2	-	4.2	-	3.7
Silver	mg/L	0.000050 - 0.0015[b]	0.00010 - 0.0030[b]	0.0000070	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	-	-	<0.00005
Sodium	mg/L	-	-	-	0.72	-	3.1	-	0.96	-	2.7	-	2.2	-	2.0
Strontium	mg/L	-	-	-	0.030	-	0.069	-	0.034	-	0.045	-	0.041	-	0.060
Sulphur	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	<3.0	-	<3.0	-	<3.0	-	<3.0	-	-	-	1.0
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	0.00080	-	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	-	-	<0.00002
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-	-	-	<0.0002
Titanium	mg/L	-	-	-	0.0063	-	<0.005	-	<0.005	-	<0.005	-	0.029	-	<0.005
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	0.0085	-	0.000060	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.000070	0.000070	0.000090
Vanadium	mg/L	-	-	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-	0.0020	-	<0.001
Zinc	mg/L	0.0075 - 0.19[b]	0.033 - 0.34[b]	0.0015	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.0050	0.0050	<0.004
Zirconium	mg/L	-	-	-	<0.0005	-	<0.0005	-	<0.0005	-	<0.0005	-	0.00030	-	<0.0001
Dissolved Metals															
Aluminum	mg/L	0.0074 - 0.050[h]	0.024 - 0.10[h]	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bismuth	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/L	0.000018 - 0.00046[b]	0.000038 - 0.0028[b]	-	-	-	-	-	-	-	-	-	-	-	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	mg/L	0.002[i]	0.00020 - 0.00046[i]	-	-	-	-	-	-	-	-	-	-	-	-
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	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zirconium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table Notes:
BC WQG = British Columbia Approved (updated December 2021) and Working (updated February 2021) Water Quality Guidelines for the protection of freshwater aquatic life (AW-F)
[a] = guideline is a minimum value.
[b] = guideline is hardness dependent.
[c] = for some samples, water hardness was greater than 250 mg/L.
[d] = guideline is chloride dependent.
[e] & [f] = the ammonia guideline is pH and temperature dependent.
[g] = guideline is for chromium VI.
[h] = guideline is pH dependent.
[i] = guideline for dissolved copper is pH, hardness, and dissolved organic carbon dependent.
[Mn] = Exceeds BC WQG long-term chronic (30-day mean)
[Mx] = Exceeds BC WQG short-term acute (maximum)
[DL>Mn] = Detection Limit exceeds BC WQG 30-day mean
[DL>Mx] = Detection Limit exceeds BC WQG maximum
< Indicates parameter was below laboratory equipment detection limit.
- Chemical not analyzed or criteria not defined

Appendix C
Results of Surface Water Analyses
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name		SW-6B	SW-6	SW-6B	SW-6	SW-6B	SW-6	SW-6B	SW-6	SW-6B	SW-6	SW-6B	SW-6
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	2015-08-11	2015-11-04	2015-11-04	2016-03-22	2016-03-22	2016-07-25	2016-07-25	2016-10-13	2016-10-13	2017-03-28	2017-03-28	2017-08-24
Field Measured															
pH	-	6.5 - 9.0	6.5 - 9.0	-	-	-	-	-	-	-	-	-	-	-	-
Temperature	°C	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved oxygen	mg/L	8[a]	5[a]	-	-	-	-	-	-	-	-	-	-	-	-
Conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation reduction potential	mV	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conventional Parameters															
pH, lab	-	6.5 - 9.0	6.5 - 9.0	-	7.7	-	7.6	-	7.7	-	7.7	-	7.1	-	7.8
Specific conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hardness, as $CaCO_3$	mg/L	-	-	-	-	-	60	-	73	-	57	-	27	-	52
Total alkalinity, as $CaCO_3$	mg/L	20[a]	-	-	-	-	-	-	-	-	-	-	-	-	-
Total suspended solids	mg/L	-	-	-	1.3	-	<1.0	-	<1.0	-	<1.0	-	5.4	-	2.7
Conductivity	µS/cm	-	-	-	115	-	121	-	156	-	128	-	71.6	-	112
Hardness, as $CaCO_3$ (Dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Major Ions															
Bromide	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride	mg/L	150	600	1.3	1.9	1.9	3.6	3.6	3.3	3.3	1.7	1.7	3.6	3.6	1.3
Fluoride	mg/L	-	0.40 - 2.2[b]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Magnesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate	mg/L	128 - 429[b, c]	-	1.8	-	-	2.5	2.5	2.8	2.8	2.5	2.5	1.6	1.6	1.7
Nutrients and Biological Indicators															
Nitrate	mg-N/L	3.0	33	0.050	0.30	0.30	0.50	0.50	0.26	0.26	0.055	0.055	0.070	0.070	0.10
Nitrite	mg-N/L	0.020 - 0.20[d]	0.060 - 0.60[d]	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.018	0.018	<0.01	<0.01	<0.01
Total ammonia	mg-N/L	0.11 - 2.0[e]	0.74 - 26[f]	-	0.15	-	0.27	-	0.036	-	<0.03	-	0.16	-	<0.03
Total Kjeldahl Nitrogen	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total phosphorus	mg-P/L	-	-	-	-	-	0.040	-	<0.02	-	<0.02	-	<0.05	-	<0.05
Dissolved phosphorus	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Orthophosphate	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Biochemical oxygen demand	mg/L	-	-	-	<4.0	-	<4.0	-	<4.0	-	<4.0	-	0.0040	-	<4.0
Chemical oxygen demand	mg/L	-	-	-	<20	-	<20	-	<20	-	<20	-	0.00040	-	<20
Total Metals															
Aluminum	mg/L	-	-	-	-	-	0.14	-	0.054	-	0.037	-	0.73	-	0.093
Antimony	mg/L	0.0090	-	<0.0001	-	-	<0.0001	<0.0001	0.00010	0.00010	0.00020	0.00020	<0.0001	<0.0001	<0.0002
Arsenic	mg/L	-	0.005	<0.0005	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Barium	mg/L	1.0	-	0.019	-	-	0.021	0.021	0.024	0.024	0.017	0.017	0.020	0.020	0.017
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
Boron	mg/L	1.2	-	0.063	-	-	0.052	0.052	0.045	0.045	0.017	0.017	0.039	0.039	0.022
Cadmium	mg/L	-	-	<0.00001	-	-	0.000010	0.000010	0.000050	0.000050	<0.00001	<0.00001	0.000010	0.000010	0.000019
Calcium	mg/L	-	-	-	-	-	22	-	27	-	21	-	11	-	19
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	0.0010[g]	-	<0.0005	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00080	0.00080	<0.0005
Cobalt	mg/L	0.0040	0.11	0.000080	-	-	0.000090	0.000090	0.00010	0.00010	<0.00005	<0.00005	0.00033	0.00033	<0.0001
Copper	mg/L	-	-	0.0011	-	-	0.00090	0.00090	0.0010	0.0010	0.00090	0.00090	0.0020	0.0020	0.0014
Iron	mg/L	-	1.0	-	-	-	0.18	-	0.21	-	0.10	-	0.73	-	0.13
Lead	mg/L	0.020[b]	0.0030 - 0.42[b]	<0.0001	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.00020	0.00020	<0.0002
Lithium	mg/L	-	-	-	-	-	0.00010	-	<0.0001	-	<0.0001	-	0.00040	-	<0.0001
Magnesium	mg/L	-	-	-	-	-	1.4	-	1.4	-	0.92	-	1.2	-	0.89
Manganese	mg/L	0.77 - 2.6[b]	0.82 - 3.4[b]	-	-	-	0.013	-	0.017	-	0.0093	-	0.035	-	0.0095
Mercury	mg/L	0.000010	-	<0.00002[(DL>Mn)]	-	-	<0.00002[(DL>Mn)]	<0.00002[(DL>Mn)]	<0.00002[(DL>Mn)]	<0.00002[(DL>Mn)]	<0.00002[(DL>Mn)]	<0.00002[(DL>Mn)]	<0.00002[(DL>Mn)]	<0.00002[(DL>Mn)]	<0.00001
Molybdenum	mg/L	7.6	46	0.00060	-	-	0.0011	0.0011	0.00080	0.00080	0.00070	0.00070	0.00030	0.00030	0.00057
Nickel	mg/L	0.025 - 0.15[b]	-	<0.0002	-	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.00090	0.00090	<0.0004
Potassium	mg/L	-	-	-	-	-	2.2	-	1.8	-	0.87	-	1.2	-	0.98
Rubidium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/L	0.0020	-	<0.0005	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Silicon	mg/L	-	-	-	-	-	3.8	-	3.4	-	2.8	-	3.6	-	3.1
Silver	mg/L	0.000050 - 0.0015[b]	0.00010 - 0.0030[b]	<0.00005	-	-	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Sodium	mg/L	-	-	-	-	-	4.5	-	3.5	-	1.5	-	3.5	-	1.6
Strontium	mg/L	-	-	-	-	-	0.057	-	0.074	-	0.054	-	0.037	-	0.049
Sulphur	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	1.0	-	1.0	-	<1.0	-	<1.0	-	<3.0
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	<0.0002	-	<0.0005
Thallium	mg/L	0.00080	-	<0.00002	-	-	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	<0.0001	-	<0.0001
Tin	mg/L	-	-	-	-	-	<0.0002	-	<0.0002	-	<0.0002	-	<0.0002	-	<0.0002
Titanium	mg/L	-	-	-	-	-	<0.005	-	<0.005	-	<0.005	-	0.021	-	<0.005
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	0.0085	-	0.000090	-	-	0.000070	0.000070	0.00011	0.00011	0.000090	0.000090	0.000040	0.000040	0.000077
Vanadium	mg/L	-	-	-	-	-	0.0010	-	<0.001	-	<0.001	-	0.0020	-	<0.001
Zinc	mg/L	0.0075 - 0.19[b]	0.033 - 0.34[b]	<0.004	-	-	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Zirconium	mg/L	-	-	-	-	-	0.00020	-	<0.0001	-	<0.0001	-	0.00030	-	<0.0001
Dissolved Metals															
Aluminum	mg/L	0.0074 - 0.050[h]	0.024 - 0.10[h]	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bismuth	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/L	0.000018 - 0.00046[b]	0.000038 - 0.0028[b]	-	-	-	-	-	-	-	-	-	-	-	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	mg/L	0.002[i]	0.00020 - 0.00046[i]	-	-	-	-	-	-	-	-	-	-	-	-
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	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zirconium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table Notes:
BC WQG = British Columbia Approved (updated December 2021) and Working (updated February 2021) Water Quality Guidelines for the protection of freshwater aquatic life (AW-F)
[a] = guideline is a minimum value.
[b] = guideline is hardness dependent.
[c] = for some samples, water hardness was greater than 250 mg/L.
[d] = guideline is chloride dependent.
[e] & [f] = the ammonia guideline is pH and temperature dependent.
[g] = guideline is for chromium VI.
[h] = guideline is pH dependent.
[i] = guideline for dissolved copper is pH, hardness, and dissolved organic carbon dependent.
[Mn] = Exceeds BC WQG long-term chronic (30-day mean)
[Mx] = Exceeds BC WQG short-term acute (maximum)
[DL>Mn] = Detection Limit exceeds BC WQG 30-day mean
[DL>Mx] = Detection Limit exceeds BC WQG maximum
< Indicates parameter was below laboratory equipment detection limit.
- Chemical not analyzed or criteria not defined

Appendix C
Results of Surface Water Analyses
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name		SW-6B	SW-6	SW-6B	SW-6	SW-6B	SW-6	SW-6B	SW-6	SW-6B	SW-6	SW-6B	SW-6
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	2017-08-24	2018-03-19	2018-03-19	2018-07-04	2018-07-04	2018-09-10	2018-09-10	2019-04-11	2019-04-11	2019-07-17	2019-07-17	2019-10-10
Field Measured															
pH	-	6.5 - 9.0	6.5 - 9.0	-	-	-	7.4	-	7.1	-	7.6	-	7.7	-	7.1
Temperature	°C	-	-	-	-	-	12	-	11	-	4.2	-	13	-	3.3
Dissolved oxygen	mg/L	8[a]	5[a]	-	-	-	6.9[Mn]	-	6.1[Mn]	-	14	-	8.9	-	20
Conductivity	µS/cm	-	-	-	-	-	83	-	137	-	61	-	104	-	72
Oxidation reduction potential	mV	-	-	-	-	-	293	-	146	-	261	-	265	-	248
Conventional Parameters															
pH, lab	-	6.5 - 9.0	6.5 - 9.0	-	7.6	-	8.0	-	8.0	-	7.8	-	8.0	-	8.0
Specific conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hardness, as $CaCO_3$	mg/L	-	-	-	32	-	52	-	74	-	48	-	55	-	60
Total alkalinity, as $CaCO_3$	mg/L	20[a]	-	-	30	-	56	-	86	-	48	-	62	-	64
Total suspended solids	mg/L	-	-	-	5.6	-	<3.0	-	10	-	-	-	14	-	3.8
Conductivity	µS/cm	-	-	-	72.1	-	108	-	191	-	101	-	134	-	130
Hardness, as $CaCO_3$ (Dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Major Ions															
Bromide	mg/L	-	-	-	-	-	-	-	-	-	<0.05	-	<0.05	-	-
Calcium	mg/L	-	-	-	11	-	20	-	27	-	18	-	20	-	22
Chloride	mg/L	150	600	1.3	2.0	2.0	0.66	0.66	5.9	5.9	1.0	1.0	2.8	2.8	0.95
Fluoride	mg/L	-	0.40 - 2.2[b]	<0.1	0.042	0.042	0.020	0.020	0.033	0.033	0.024	0.024	0.035	0.035	<0.02
Magnesium	mg/L	-	-	-	1.3	-	0.83	-	1.8	-	0.82	-	1.1	-	0.97
Potassium	mg/L	-	-	-	1.2	-	0.99	-	3.6	-	0.84	-	1.3	-	0.93
Sodium	mg/L	-	-	-	2.5	-	1.5	-	7.7	-	1.6	-	3.2	-	1.4
Sulphate	mg/L	128 - 429[b, c]	-	1.7	1.5	1.5	1.7	1.7	3.0	3.0	1.7	1.7	1.9	1.9	2.1
Nutrients and Biological Indicators															
Nitrate	mg-N/L	3.0	33	0.10	0.16	0.16	0.064	0.064	0.31	0.31	0.16	0.16	0.086	0.086	0.072
Nitrite	mg-N/L	0.020 - 0.20[d]	0.060 - 0.60[d]	<0.01	0.0016	0.0016	<0.001	<0.001	0.0043	0.0043	0.0040	0.0040	0.0018	0.0018	<0.001
Total ammonia	mg-N/L	0.11 - 2.0[e]	0.74 - 26[f]	-	0.033	-	<0.005	-	0.015	-	0.0058	-	0.025	-	<0.005
Total Kjeldahl Nitrogen	mg-N/L	-	-	-	0.28	-	0.078	-	0.30	-	0.055	-	0.26	-	<0.05
Total phosphorus	mg-P/L	-	-	-	<0.05	-	0.0062	-	0.021	-	0.0066	-	0.040	-	0.0037
Dissolved phosphorus	mg-P/L	-	-	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05
Orthophosphate	mg-P/L	-	-	-	-	-	<0.001	-	0.0031	-	<0.001	-	<0.001	-	<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	-	-	-	0.62	-	0.067	-	0.31	-	0.22	-	1.5	-	0.068
Antimony	mg/L	0.0090	-	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Arsenic	mg/L	-	0.005	<0.0005	0.00034	0.00034	0.00016	0.00016	0.00047	0.00047	0.00017	0.00017	0.00078	0.00078	0.00014
Barium	mg/L	1.0	-	0.017	0.015	0.015	0.019	0.019	0.029	0.029	0.018	0.018	0.036	0.036	0.018
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	<0.0001	<0.0001
Bismuth	mg/L	-	-	-	<0.00005	-	<0.00005	-	<0.00005	-	<0.00005	-	<0.00005	-	<0.00005
Boron	mg/L	1.2	-	0.022	<0.02	<0.02	0.012	0.012	0.10	0.10	<0.01	<0.01	0.020	0.020	<0.01
Cadmium	mg/L	-	-	0.000019	0.000012	0.000012	<0.000005	<0.000005	0.0000061	0.0000061	<0.000005	<0.000005	0.000014	0.000014	<0.000005
Calcium	mg/L	-	-	-	9.6	-	19	-	27	-	18	-	22	-	24
Cesium	mg/L	-	-	-	0.000049	-	0.000010	-	0.000032	-	0.000019	-	0.00014	-	<0.00001
Chromium	mg/L	0.001[g]	-	<0.0005	0.00064	0.00064	<0.0001	<0.0001	0.00034	0.00034	0.00024	0.00024	0.0015[Mn]	0.0015[Mn]	0.00013
Cobalt	mg/L	0.0040	0.11	<0.0001	0.00032	0.00032	<0.0001	<0.0001	0.00027	0.00027	0.00012	0.00012	0.00075	0.00075	<0.0001
Copper	mg/L	-	-	0.0014	0.0017	0.0017	0.00076	0.00076	0.0016	0.0016	0.0013	0.0013	0.0033	0.0033	0.00070
Iron	mg/L	-	1.0	-	0.71	-	0.12	-	0.52	-	0.22	-	1.9[Mx]	-	0.10
Lead	mg/L	0.020[b]	0.0030 - 0.42[b]	<0.0002	0.00012	0.00012	<0.00005	<0.00005	0.00010	0.00010	<0.00005	<0.00005	0.00037	0.00037	<0.00005
Lithium	mg/L	-	-	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001
Magnesium	mg/L	-	-	-	1.2	-	0.75	-	1.9	-	0.85	-	1.5	-	0.92
Manganese	mg/L	0.77 - 2.6[b]	0.82 - 3.4[b]	-	0.12	-	0.012	-	0.036	-	0.017	-	0.11	-	0.013
Mercury	mg/L	0.000010	-	<0.00001	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.00005[DL>Mn]	<0.00005[DL>Mn]	<0.000005
Molybdenum	mg/L	7.6	46	0.00057	0.00083	0.00083	0.00062	0.00062	0.00071	0.00071	0.00060	0.00060	0.00068	0.00068	0.00052
Nickel	mg/L	0.025 - 0.15[b]	-	<0.0004	0.00070	0.00070	<0.0005	<0.0005	0.00057	0.00057	<0.0005	<0.0005	0.0015	0.0015	<0.0005
Potassium	mg/L	-	-	-	1.2	-	0.95	-	3.5	-	0.83	-	1.7	-	0.91
Rubidium	mg/L	-	-	-	0.0011	-	0.0013	-	0.0031	-	0.00093	-	0.0026	-	0.0010
Selenium	mg/L	0.0020	-	<0.0005	0.000069	0.000069	<0.00005	<0.00005	0.000070	0.000070	<0.00005	<0.00005	0.000080	0.000080	<0.00005
Silicon	mg/L	-	-	-	3.7	-	2.7	-	3.6	-	3.2	-	5.1	-	3.0
Silver	mg/L	0.000050 - 0.0015[b]	0.00010 - 0.0030[b]	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Sodium	mg/L	-	-	-	2.5	-	1.5	-	7.7	-	1.5	-	3.6	-	1.4
Strontium	mg/L	-	-	-	0.033	-	0.048	-	0.085	-	0.049	-	0.063	-	0.053
Sulphur	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	0.70	-	<0.5	-	0.99	-	0.82	-	<0.5	-	0.74
Tellurium	mg/L	-	-	-	<0.0002	-	<0.0002	-	<0.0002	-	<0.0002	-	<0.0002	-	<0.0002
Thallium	mg/L	0.00080	-	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Thorium-232	mg/L	-	-	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001
Tin	mg/L	-	-	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001
Titanium	mg/L	-	-	-	0.016	-	0.0018	-	0.011	-	0.0060	-	0.039	-	0.0017
Tungsten	mg/L	-	-	-	0.00013	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001
Uranium	mg/L	0.0085	-	0.000077	0.00019	0.00019	0.000069	0.000069	0.00016	0.00016	0.000088	0.000088	0.00012	0.00012	0.00011
Vanadium	mg/L	-	-	-	0.0015	-	0.00066	-	0.0013	-	0.00085	-	0.0039	-	<0.0005
Zinc	mg/L	0.0075 - 0.19[b]	0.033 - 0.34[b]	<0.004	0.0038	0.0038	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.0049	0.0049	<0.003
Zirconium	mg/L	-	-	-	0.00029	-	<0.00006	-	0.00017	-	0.000065	-	0.00030	-	<0.0002
Dissolved Metals															
Aluminum	mg/L	0.0074 - 0.050[h]	0.024 - 0.10[h]	-	0.11[Mn, Mx]	-	0.025	-	0.038	-	0.036	-	0.066[Mn]	-	0.033
Antimony	mg/L	-	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Arsenic	mg/L	-	-	-	0.00023	0.00023	0.00014	0.00014	0.00035	0.00035	0.00011	0.00011	0.00031	0.00031	0.00012
Barium	mg/L	-	-	-	0.012	0.012	0.018	0.018	0.028	0.028	0.015	0.015	0.020	0.020	0.018
Beryllium	mg/L	-	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Bismuth	mg/L	-	-	-	<0.00005	-	<0.00005	-	<0.00005	-	<0.00005	-	<0.00005	-	<0.00005
Boron	mg/L	-	-	-	0.015	0.015	<0.01	<0.01	0.11	0.11	<0.01	<0.01	0.020	0.020	<0.01
Cadmium	mg/L	0.000018 - 0.00046[b]	0.000038 - 0.028[b]	-	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	0.000012
Cesium	mg/L	-	-	-	<0.00001	-	<0.00001	-	<0.00001	-	<0.00001	-	<0.00001	-	<0.00001
Chromium	mg/L	-	-	-	0.00015	0.00015	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.00010	0.00010	<0.0001
Cobalt	mg/L	-	-	-	<0.0001	<0.0001	<0.0001	<0.0001	0.00015	0.00015	<0.0001	<0.0001	0.00014	0.00014	<0.0001
Copper	mg/L	0.002[i]	0.00020 - 0.00046[i]	-	0.00109[Mn, Mx]	0.00109[Mn, Mx]	0.00072[Mn, Mx]	0.00072[Mn, Mx]	0.00105[Mn, Mx]	0.00105[Mn, Mx]	0.00082[Mn, Mx]	0.00082[Mn, Mx]	0.00105[Mn, Mx]	0.00105[Mn, Mx]	0.00073[Mn, Mx]
Iron	mg/L	-	0.35	-	0.25	-	0.064	-	0.23	-	0.061	-	0.23	-	0.080
Lead	mg/L	-	-	-	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Lithium	mg/L	-	-	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001
Manganese	mg/L	-	-	-	0.0033	-	0.0099	-	0.032	-	0.012	-	0.070	-	0.012
Mercury	mg/L	-	-	-	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005
Molybdenum	mg/L	-	-	-	0.00079	0.00079	0.00059	0.00059	0.00071	0.00071	0.00057	0.00057	0.00069	0.00069	0.00055
Nickel	mg/L	-	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Rubidium	mg/L	-	-	-	0.0085	-	0.0013	-	0.0029	-	0.00093	-	0.0016	-	0.0011
Selenium	mg/L	-	-	-	0.000064	0.000064	<0.00005	<0.00005	0.000072	0.000072	0.000099	0.000099	<0.00005	<0.00005	<0.00005
Silicon	mg/L	-	-	-	3.0	-	2.6	-	3.2	-	2.8	-	3.2	-	3.0
Silver	mg/L	-	-	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Strontium	mg/L	-	-	-	0.035	-	0.048	-	0.079	-	0.049	-	0.059	-	0.056
Sulphur	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	<0.5	-	0.50	-	0.86	-	0.62	-	0.68	-	0.64
Tellurium	mg/L	-	-	-	<0.0002	-	<0.0002	-	<0.0002	-	<0.0002	-	<0.0002	-	<0.0002
Thallium	mg/L	-	-	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Thorium-232	mg/L	-	-	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001
Tin	mg/L	-	-	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001
Titanium	mg/L	-	-	-	0.0049	-	0.00051	-	<0.0012	-	0.00099	-	0.0030	-	0.00088
Tungsten	mg/L	-	-	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001
Uranium	mg/L	-	-	-	0.00017	0.00017	0.000077	0.000077	0.00015	0.00015	0.000089	0.000089	0.000094	0.000094	0.00011
Vanadium	mg/L	-	-	-	0.00051	-	0.00054	-	0.00054	-	<0.0005	-	0.00063	-	<0.0005
Zinc	mg/L	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Zirconium	mg/L	-	-	-	0.00028	-	<0.00006	-	0.000064	-	0.000098	-	<0.0002	-	<0.0002

Table Notes:
BC WQG = British Columbia Approved (updated December 2021) and Working (updated February 2021) Water Quality Guidelines for the protection of freshwater aquatic life (AW-F)
[a] = guideline is a minimum value.
[b] = guideline is hardness dependent.
[c] = for some samples, water hardness was greater than 250 mg/L.
[d] = guideline is chloride dependent.
[e] & [f] = the ammonia guideline is pH and temperature dependent.
[g] = guideline is for chromium VI.
[h] = guideline is pH dependent.
[i] = guideline for dissolved copper is pH, hardness, and dissolved organic carbon dependent.
[Mn] = Exceeds BC WQG long-term chronic (30-day mean)
[Mx] = Exceeds BC WQG short-term acute (maximum)
[DL>Mn] = Detection Limit exceeds BC WQG 30-day mean
[DL>Mx] = Detection Limit exceeds BC WQG maximum
< Indicates parameter was below laboratory equipment detection limit.
- Chemical not analyzed or criteria not defined

Appendix C
Results of Surface Water Analyses
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name		SW-6B	SW-6	SW-6B	SW-6	SW-6B	SW-6	SW-6B	SW-6	SW-6	SW-6	SW-16	SW-16B
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	2019-10-10	2020-04-30	2020-04-30	2020-09-01	2020-09-01	2020-10-07	2020-10-07	2021-04-12	2021-07-06	2021-10-07	2016-03-22	2016-03-22
Field Measured															
pH	-	6.5 - 9.0	6.5 - 9.0	-	7.1	-	7.5	-	7.7	-	7.4	7.5	7.5	-	-
Temperature	°C	-	-	-	4.4	-	11	-	8.5	-	3.4	15	6.1	-	-
Dissolved oxygen	mg/L	8[a]	5[a]	-	15	-	9.7	-	**5.5[Mn]**	-	15	9.2	14	-	-
Conductivity	µS/cm	-	-	-	56	-	74	-	64	-	49	74	58	-	-
Oxidation reduction potential	mV	-	-	-	392	-	284	-	256	-	157	255	192	-	-
Conventional Parameters															
pH, lab	-	6.5 - 9.0	6.5 - 9.0	-	7.8	-	7.8	-	7.7	-	7.6	7.9	7.9	7.6	-
Specific conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hardness, as $CaCO_3$	mg/L	-	-	-	47	-	48	-	48	-	38	48	45	57	-
Total alkalinity, as $CaCO_3$	mg/L	20[a]	-	-	44	-	52	-	49	-	35	48	46	-	-
Total suspended solids	mg/L	-	-	-	3.4	-	3.2	-	<3.0	-	<3.0	5.3	<3.0	<1.0	-
Conductivity	µS/cm	-	-	-	93.1	-	102	-	99.4	-	81.3	93.3	94.6	125	-
Hardness, as $CaCO_3$ (Dissolved)	mg/L	-	-	-	43	-	51	-	50	-	-	-	-	-	-
Major Ions															
Bromide	mg/L	-	-	-	<0.05	-	<0.05	-	-	-	-	-	-	-	-
Calcium	mg/L	-	-	-	16	-	19	-	18	-	13	17	15	-	-
Chloride	mg/L	150	600	0.95	0.58	0.58	0.62	0.62	0.66	0.66	1.3	<0.5	0.55	5.0	5.0
Fluoride	mg/L	-	0.40 - 2.2[b]	<0.02	0.024	0.024	0.024	0.024	0.020	0.020	0.024	<0.2	0.020	<0.1	<0.1
Magnesium	mg/L	-	-	-	0.67	-	0.69	-	0.88	-	1.0	0.53	0.73	-	-
Potassium	mg/L	-	-	-	0.69	-	0.75	-	0.92	-	1.2	0.70	0.80	-	-
Sodium	mg/L	-	-	-	1.1	-	1.2	-	1.4	-	2.2	0.86	1.1	-	-
Sulphate	mg/L	128 - 429[b, c]	-	2.1	1.4	1.4	1.3	1.3	1.2	1.2	1.7	1.2	1.2	2.5	2.5
Nutrients and Biological Indicators															
Nitrate	mg-N/L	3.0	33	0.072	0.082	0.082	0.085	0.085	0.12	0.12	0.42	0.037	0.096	0.63	0.63
Nitrite	mg-N/L	0.020 - 0.20[d]	0.060 - 0.60[d]	<0.001	0.0013	0.0013	0.0014	0.0014	<0.001	<0.001	0.0034	<0.001	<0.001	<0.01	<0.01
Total ammonia	mg-N/L	0.11 - 2.0[e]	0.74 - 26[f]	-	0.011	-	<0.005	-	0.013	-	0.024	<0.005	<0.005	0.67	-
Total Kjeldahl Nitrogen	mg-N/L	-	-	-	0.086	-	0.12	-	0.35	-	0.12	<0.5	0.080	-	-
Total phosphorus	mg-P/L	-	-	-	<0.05	-	<0.05	-	<0.05	-	0.0051	0.0040	0.0061	<0.02	-
Dissolved phosphorus	mg-P/L	-	-	-	<0.05	-	<0.05	-	<0.05	-	<0.05	<0.05	<0.05	-	-
Orthophosphate	mg-P/L	-	-	-	<0.001	-	<0.001	-	0.0029	-	0.0011	0.0015	0.0011	-	-
Biochemical oxygen demand	mg/L	-	-	-	<2.0	-	<2.0	-	<2.0	-	<2.0	<2.0	<2.0	<4.0	-
Chemical oxygen demand	mg/L	-	-	-	<20	-	<20	-	<20	-	<20	<20	<20	30	-
Total Metals															
Aluminum	mg/L	-	-	-	0.16	-	0.15	-	0.18	-	0.22	0.090	0.11	0.12	-
Antimony	mg/L	0.0090	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Arsenic	mg/L	-	0.005	0.00014	0.00012	0.00012	0.00015	0.00015	0.00020	0.00020	0.00014	0.00016	0.00012	<0.0005	<0.0005
Barium	mg/L	1.0	-	0.018	0.015	0.015	0.017	0.017	0.017	0.017	0.018	0.015	0.016	0.025	0.025
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	<0.0001	<0.0001
Bismuth	mg/L	-	-	-	<0.00005	-	<0.00005	-	<0.00005	-	<0.00005	<0.00005	<0.00005	<0.0001	-
Boron	mg/L	1.2	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.018	<0.01	<0.01	0.086	0.086
Cadmium	mg/L	-	-	<0.000005	<0.000005	<0.000005	0.000017	0.000017	0.0000054	0.0000054	<0.000005	<0.000005	<0.000005	0.000010	0.000010
Calcium	mg/L	-	-	-	17	-	18	-	18	-	14	18	17	20	-
Cesium	mg/L	-	-	-	0.000013	-	0.000015	-	0.000015	-	0.000016	<0.00001	<0.00001	-	-
Chromium	mg/L	0.0010[g]	-	0.00013	0.00022	0.00022	0.00016	0.00016	0.00017	0.00017	0.00022	<0.0005	<0.0005	<0.0005	<0.0005
Cobalt	mg/L	0.0040	0.11	<0.0001	0.00011	0.00011	<0.0001	<0.0001	<0.0001	<0.0001	0.00012	<0.0001	<0.0001	0.00012	0.00012
Copper	mg/L	-	-	0.00070	0.0012	0.0012	0.0013	0.0013	0.0010	0.0010	0.0010	0.00072	0.00095	0.00090	0.00090
Iron	mg/L	-	1.0	-	0.19	-	0.18	-	0.20	-	0.26	0.11	0.13	0.19	-
Lead	mg/L	0.020[b]	0.0030 - 0.42[b]	<0.00005	<0.00005	<0.00005	0.000057	0.000057	<0.00005	<0.00005	0.000053	<0.00005	<0.00005	<0.0001	<0.0001
Lithium	mg/L	-	-	-	<0.001	-	<0.001	-	<0.001	-	<0.001	<0.001	<0.001	0.00010	-
Magnesium	mg/L	-	-	-	0.75	-	0.74	-	0.82	-	1.1	0.58	0.78	1.7	-
Manganese	mg/L	0.77 - 2.6[b]	0.82 - 3.4[b]	-	0.011	-	0.011	-	0.014	-	0.016	0.0086	0.0085	0.013	-
Mercury	mg/L	0.000010	-	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.00002[DL>Mn]	<0.00002[DL>Mn]
Molybdenum	mg/L	7.6	46	0.00052	0.00043	0.00043	0.00040	0.00040	0.00047	0.00047	0.00042	0.00046	0.00048	0.00060	0.00060
Nickel	mg/L	0.025 - 0.15[b]	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00040	0.00040
Potassium	mg/L	-	-	-	0.75	-	0.83	-	0.86	-	1.2	0.69	0.85	3.1	-
Rubidium	mg/L	-	-	-	0.00092	-	0.0010	-	0.0011	-	0.0010	0.00099	0.00094	-	-
Selenium	mg/L	0.0020	-	<0.00005	0.000058	0.000058	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	0.000065	<0.0005	<0.0005
Silicon	mg/L	-	-	-	2.9	-	3.0	-	3.5	-	3.2	2.6	3.2	3.5	-
Silver	mg/L	0.000050 - 0.0015[b]	0.00010 - 0.0030[b]	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00005	<0.00005
Sodium	mg/L	-	-	-	1.2	-	1.2	-	1.3	-	2.3	0.86	1.2	6.2	-
Strontium	mg/L	-	-	-	0.039	-	0.043	-	0.046	-	0.043	0.039	0.043	0.075	-
Sulphur	mg/L	-	-	-	-	-	-	-	-	-	<0.5	<0.5	<0.5	-	-
Sulphur (colloidal)	mg/L	-	-	-	<0.5	-	<0.5	-	<0.5	-	-	-	-	<1.0	-
Tellurium	mg/L	-	-	-	<0.0002	-	<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	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00002	<0.00002
Thorium-232	mg/L	-	-	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	<0.0001	<0.0001	-	-
Tin	mg/L	-	-	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	<0.0001	<0.0001	<0.0002	-
Titanium	mg/L	-	-	-	0.0055	-	0.0041	-	0.0054	-	0.0060	0.0024	<0.0027	<0.005	-
Tungsten	mg/L	-	-	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	<0.0001	<0.0001	-	-
Uranium	mg/L	0.0085	-	0.00011	0.000068	0.000068	0.000070	0.000070	0.000064	0.000064	0.000036	0.000051	0.000058	0.000050	0.000050
Vanadium	mg/L	-	-	-	0.00072	-	0.00073	-	0.00081	-	0.00071	0.00065	0.00062	0.0010	-
Zinc	mg/L	0.0075 - 0.19[b]	0.033 - 0.34[b]	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.004	<0.004
Zirconium	mg/L	-	-	-	<0.0002	-	<0.0002	-	0.00031	-	<0.0002	<0.0002	<0.0002	0.00030	-
Dissolved Metals															
Aluminum	mg/L	0.0074 - 0.050[h]	0.024 - 0.10[h]	-	0.034	-	**0.052[Mn]**	-	**0.059[Mn]**	-	**0.068[Mn]**	0.033	0.048	-	-
Antimony	mg/L	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	-
Arsenic	mg/L	-	-	0.00012	<0.0001	<0.0001	0.00011	0.00011	0.00012	0.00012	0.00011	0.00014	0.00010	-	-
Barium	mg/L	-	-	0.018	0.013	0.013	0.015	0.015	0.017	0.017	0.016	0.014	0.015	-	-
Beryllium	mg/L	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.00002	<0.0001	<0.0001	-	-
Bismuth	mg/L	-	-	-	<0.00005	-	<0.00005	-	<0.00005	-	<0.00005	<0.00005	<0.00005	-	-
Boron	mg/L	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.022	<0.01	<0.01	-	-
Cadmium	mg/L	0.000018 - 0.00046[b]	0.000038 - 0.0028[b]	0.000012	<0.000005	<0.000005	0.000012	0.000012	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	-	-
Cesium	mg/L	-	-	-	<0.00001	-	<0.00001	-	<0.00001	-	<0.00001	<0.00001	<0.00001	-	-
Chromium	mg/L	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005	<0.0005	-	-
Cobalt	mg/L	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	-
Copper	mg/L	0.002[i]	0.00020 - 0.00046[i]	**0.00073[Mn, Mx]**	**0.00064[Mn, Mx]**	**0.00064[Mn, Mx]**	**0.00092[Mn, Mx]**	**0.00092[Mn, Mx]**	**0.00124[Mn, Mx]**	**0.00124[Mn, Mx]**	**0.00079[Mn, Mx]**	**0.00062[Mn, Mx]**	**0.0008[Mn, Mx]**	-	-
Iron	mg/L	-	0.35	-	0.038	-	0.066	-	0.081	-	0.093	0.052	0.065	-	-
Lead	mg/L	-	-	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	-	-
Lithium	mg/L	-	-	-	<0.001	-	<0.001	-	<0.001	-	<0.001	<0.001	<0.001	-	-
Manganese	mg/L	-	-	-	0.0054	-	0.0072	-	0.0100	-	0.013	0.0066	0.0065	-	-
Mercury	mg/L	-	-	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	-	<0.000005	0.0000066	-	-
Molybdenum	mg/L	-	-	0.00055	0.00045	0.00045	0.00036	0.00036	0.00043	0.00043	0.00045	0.00046	0.00049	-	-
Nickel	mg/L	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	-	-
Rubidium	mg/L	-	-	-	0.00076	-	0.00092	-	0.0011	-	0.00086	0.0010	0.00088	-	-
Selenium	mg/L	-	-	<0.00005	0.000099	0.000099	<0.00005	<0.00005	0.000064	0.000064	<0.00005	<0.00005	<0.00005	-	-
Silicon	mg/L	-	-	-	2.6	-	2.8	-	3.2	-	3.0	2.5	2.9	-	-
Silver	mg/L	-	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	-	-
Strontium	mg/L	-	-	-	0.039	-	0.045	-	0.050	-	0.044	0.040	0.042	-	-
Sulphur	mg/L	-	-	-	-	-	-	-	-	-	<0.5	<0.5	<0.5	-	-
Sulphur (colloidal)	mg/L	-	-	-	<0.5	-	<0.5	-	<0.5	-	-	-	-	-	-
Tellurium	mg/L	-	-	-	<0.0002	-	<0.0002	-	<0.0002	-	<0.0002	<0.0002	<0.0002	-	-
Thallium	mg/L	-	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	-	-
Thorium-232	mg/L	-	-	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	<0.0001	<0.0001	-	-
Tin	mg/L	-	-	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	<0.0001	<0.0001	-	-
Titanium	mg/L	-	-	-	0.00056	-	0.0014	-	0.0014	-	0.0020	0.00058	0.0012	-	-
Tungsten	mg/L	-	-	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	<0.0001	<0.0001	-	-
Uranium	mg/L	-	-	0.00011	0.000057	0.000057	0.000064	0.000064	0.000063	0.000063	0.000032	0.000050	0.000052	-	-
Vanadium	mg/L	-	-	-	<0.0005	-	<0.0005	-	<0.0005	-	<0.0005	0.00052	<0.0005	-	-
Zinc	mg/L	-	-	<0.001	<0.001	<0.001	0.0019	0.0019	0.0011	0.0011	<0.001	0.0089	<0.001	-	-
Zirconium	mg/L	-	-	-	<0.0002	-	<0.0002	-	<0.0002	-	<0.0003	<0.0002	<0.0002	-	-

Table Notes:
BC WQG = British Columbia Approved (updated December 2021) and Working (updated February 2021) Water Quality Guidelines for the protection of freshwater aquatic life (AW-F)
[a] = guideline is a minimum value.
[b] = guideline is hardness dependent.
[c] = for some samples, water hardness was greater than 250 mg/L.
[d] = guideline is chloride dependent.
[e] & [f] = the ammonia guideline is pH and temperature dependent.
[g] = guideline is for chromium VI.
[h] = guideline is pH dependent.
[i] = guideline for dissolved copper is pH, hardness, and dissolved organic carbon dependent.
[Mn] = Exceeds BC WQG long-term chronic (30-day mean)
[Mx] = Exceeds BC WQG short-term acute (maximum)
[DL>Mn] = Detection Limit exceeds BC WQG 30-day mean
[DL>Mx] = Detection Limit exceeds BC WQG maximum
< Indicates parameter was below laboratory equipment detection limit.
- Chemical not analyzed or criteria not defined

Appendix C
Results of Surface Water Analyses
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name		SW-16	SW-16B	SW-16	SW-16B	SW-16	SW-16B	SW-17	SW-17	SW-17B	SW-17	SW-17B	SW-17
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	2016-07-25	2016-07-25	2016-10-13	2016-10-13	2017-03-28	2017-03-28	1996-11-01	2010-10-25	2010-10-25	2011-02-15	2011-02-15	2012-02-22
Field Measured															
pH	-	6.5 - 9.0	6.5 - 9.0	-	-	-	-	-	-	-	-	-	-	-	-
Temperature	°C	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved oxygen	mg/L	8[a]	5[a]	-	-	-	-	-	-	-	-	-	-	-	-
Conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation reduction potential	mV	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conventional Parameters															
pH, lab	-	6.5 - 9.0	6.5 - 9.0	7.7	-	7.6	-	7.3	-	-	7.7	-	7.3	-	7.4
Specific conductivity	µS/cm	-	-	-	-	-	-	-	-	-	108	-	-	-	-
Hardness, as $CaCO_3$	mg/L	-	-	67	-	45	-	31	-	-	45	-	35	-	40
Total alkalinity, as $CaCO_3$	mg/L	20[a]	-	-	-	-	-	-	-	-	-	-	-	-	-
Total suspended solids	mg/L	-	-	1.4	-	<1.0	-	4.4	-	-	-	-	-	-	-
Conductivity	µS/cm	-	-	140	-	107	-	82.7	-	67	-	-	79.6	-	119
Hardness, as $CaCO_3$ (Dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Major Ions															
Bromide	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride	mg/L	150	600	3.7	3.7	1.8	1.8	2.5	2.5	-	1.8	1.8	2.1	2.1	4.4
Fluoride	mg/L	-	0.40 - 2.2[b]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	0.030	0.030	<0.1	<0.1	<0.1
Magnesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate	mg/L	128 - 429[b, c]	-	2.7	2.7	2.3	2.3	1.5	1.5	-	-	-	1.8	1.8	<1.0
Nutrients and Biological Indicators															
Nitrate	mg-N/L	3.0	33	0.35	0.35	0.11	0.11	0.098	0.098	-	0.21	-	0.40	0.40	0.21
Nitrite	mg-N/L	0.020 - 0.20[d]	0.060 - 0.60[d]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01
Total ammonia	mg-N/L	0.11 - 2.0[e]	0.74 - 26[f]	<0.03	-	<0.03	-	0.36	-	-	0.046	-	<0.03	-	0.47
Total Kjeldahl Nitrogen	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total phosphorus	mg-P/L	-	-	<0.02	-	0.020	-	<0.05	-	-	-	-	0.025	-	<0.01
Dissolved phosphorus	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Orthophosphate	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Biochemical oxygen demand	mg/L	-	-	<4.0	-	<4.0	-	<4.0	-	-	<4.0	-	<4.0	-	<4.0
Chemical oxygen demand	mg/L	-	-	<20	-	<20	-	<20	-	-	<30	-	39	-	22
Total Metals															
Aluminum	mg/L	-	-	0.078	-	0.039	-	0.62	-	-	0.036	-	0.69	-	0.11
Antimony	mg/L	0.0090	-	0.00010	0.00010	0.00020	0.00020	<0.0001	<0.0001	-	-	-	<0.0005	<0.0005	<0.0005
Arsenic	mg/L	-	0.005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	-	-	-	<0.0001	<0.0001	<0.0001
Barium	mg/L	1.0	-	0.026	0.026	0.018	0.018	0.023	0.023	-	0.020	0.020	0.019	0.019	0.023
Beryllium	mg/L	0.00013	-	<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	-	-	-	-	<0.001	-	<0.001
Boron	mg/L	1.2	-	0.12	0.12	0.028	0.028	0.050	0.050	-	0.052	0.052	<0.05	<0.05	<0.05
Cadmium	mg/L	-	-	0.000020	0.000020	0.000020	0.000020	<0.00001	<0.00001	-	0.000020	0.000020	0.000010	0.000010	0.000020
Calcium	mg/L	-	-	24	-	17	-	11	-	-	15	-	12	-	13
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	0.0010[g]	-	<0.0005	<0.0005	<0.0005	<0.0005	0.00070	0.00070	-	<0.001	<0.001	0.0010	0.0010	<0.001
Cobalt	mg/L	0.0040	0.11	0.00012	0.00012	0.000050	0.000050	0.00029	0.00029	-	-	-	<0.0005	<0.0005	<0.0005
Copper	mg/L	-	-	0.00090	0.00090	0.0010	0.0010	0.0019	0.0019	-	0.0029	0.0029	0.0027	0.0027	0.0018
Iron	mg/L	-	1.0	0.22	-	0.10	-	0.64	-	-	0.045	-	0.75	-	0.18
Lead	mg/L	0.020[b]	0.0030 - 0.42[b]	<0.0001	<0.0001	<0.0001	<0.0001	0.00020	0.00020	-	0.00060	0.00060	0.00020	0.00020	<0.0002
Lithium	mg/L	-	-	<0.0001	-	<0.0001	-	0.00030	-	-	-	-	<0.005	-	<0.005
Magnesium	mg/L	-	-	1.5	-	0.95	-	1.2	-	-	1.1	-	1.3	-	1.5
Manganese	mg/L	0.77 - 2.6[b]	0.82 - 3.4[b]	0.015	-	0.013	-	0.055	-	-	0.0040	-	0.027	-	0.014
Mercury	mg/L	0.000010	-	<0.00002[DL>Mn]	<0.00002[DL>Mn]	<0.00002[DL>Mn]	<0.00002[DL>Mn]	<0.00002[DL>Mn]	<0.00002[DL>Mn]	-	-	-	<0.00001	<0.00001	<0.00001
Molybdenum	mg/L	7.6	46	0.00070	0.00070	0.00050	0.00050	0.00030	0.00030	-	-	-	<0.001	<0.001	<0.001
Nickel	mg/L	0.025 - 0.15[b]	-	<0.0002	<0.0002	<0.0002	<0.0002	0.00080	0.00080	-	0.0010	0.0010	<0.001	<0.001	<0.001
Potassium	mg/L	-	-	2.1	-	0.95	-	1.4	-	-	1.8	-	1.7	-	2.8
Rubidium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/L	0.0020	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	-	-	-	<0.0001	<0.0001	<0.0001
Silicon	mg/L	-	-	3.6	-	2.7	-	3.5	-	-	3.0	-	3.7	-	2.8
Silver	mg/L	0.000050 - 0.0015[b]	0.00010 - 0.0030[b]	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	-	-	-	<0.000005	<0.000005	<0.000005
Sodium	mg/L	-	-	4.2	-	1.7	-	2.6	-	-	3.0	-	3.0	-	4.6
Strontium	mg/L	-	-	0.089	-	0.060	-	0.046	-	-	0.061	-	0.042	-	0.065
Sulphur	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	1.0	-	<1.0	-	<1.0	-	-	-	-	<3.0	-	<3.0
Tellurium	mg/L	-	-	-	-	-	-	<0.0002	-	-	-	-	-	-	-
Thallium	mg/L	0.00080	-	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	-	-	-	<0.00005	<0.00005	<0.00005
Thorium-232	mg/L	-	-	-	-	-	-	<0.0001	-	-	-	-	-	-	-
Tin	mg/L	-	-	<0.0002	-	<0.0002	-	<0.0002	-	-	-	-	<0.005	-	<0.005
Titanium	mg/L	-	-	<0.005	-	<0.005	-	0.025	-	-	-	-	<0.005	-	<0.005
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	0.0085	-	0.000080	0.000080	0.000050	0.000050	0.000040	0.000040	-	-	-	<0.0001	<0.0001	<0.0001
Vanadium	mg/L	-	-	<0.001	-	<0.001	-	0.0020	-	-	-	-	<0.005	-	<0.005
Zinc	mg/L	0.0075 - 0.19[b]	0.033 - 0.34[b]	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	-	**0.0090[Mn]**	**0.0090[Mn]**	<0.005	<0.005	<0.005
Zirconium	mg/L	-	-	<0.0001	-	<0.0001	-	0.00020	-	-	-	-	<0.0005	-	<0.0005
Dissolved Metals															
Aluminum	mg/L	0.0074 - 0.050[h]	0.024 - 0.10[h]	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bismuth	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/L	0.000018 - 0.00046[b]	0.000038 - 0.0028[b]	-	-	-	-	-	-	-	-	-	-	-	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	mg/L	0.002[i]	0.00020 - 0.00046[i]	-	-	-	-	-	-	-	-	-	-	-	-
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	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zirconium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table Notes:
BC WQG = British Columbia Approved (updated December 2021) and Working (updated February 2021) Water Quality Guidelines for the protection of freshwater aquatic life (AW-F)
[a] = guideline is a minimum value.
[b] = guideline is hardness dependent.
[c] = for some samples, water hardness was greater than 250 mg/L.
[d] = guideline is chloride dependent.
[e] & [f] = the ammonia guideline is pH and temperature dependent.
[g] = guideline is for chromium VI.
[h] = guideline is pH dependent.
[i] = guideline for dissolved copper is pH, hardness, and dissolved organic carbon dependent.
[Mn] = Exceeds BC WQG long-term chronic (30-day mean)
[Mx] = Exceeds BC WQG short-term acute (maximum)
[DL>Mn] = Detection Limit exceeds BC WQG 30-day mean
[DL>Mx] = Detection Limit exceeds BC WQG maximum
< Indicates parameter was below laboratory equipment detection limit.
- Chemical not analyzed or criteria not defined

Appendix C
Results of Surface Water Analyses
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name		SW-17B	SW-17	SW-17B	SW-17	SW-17B	SW-17	SW-17B	SW-17	SW-17B	SW-17	SW-17B	SW-17
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	2012-02-22	2012-05-08	2012-05-08	2013-01-04	2013-01-04	2013-06-06	2013-06-06	2013-10-22	2013-10-22	2014-05-06	2014-05-06	2014-10-29
Field Measured															
pH	-	6.5 - 9.0	6.5 - 9.0	-	-	-	-	-	-	-	-	-	-	-	-
Temperature	°C	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved oxygen	mg/L	8[a]	5[a]	-	-	-	-	-	-	-	-	-	-	-	-
Conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation reduction potential	mV	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conventional Parameters															
pH, lab	-	6.5 - 9.0	6.5 - 9.0	-	7.4	-	7.2	-	7.4	-	7.5	-	7.4	-	7.3
Specific conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hardness, as $CaCO_3$	mg/L	-	-	-	37	-	53	-	24	-	66	-	33	-	41
Total alkalinity, as $CaCO_3$	mg/L	20[a]	-	-	-	-	-	-	-	-	-	-	-	-	-
Total suspended solids	mg/L	-	-	-	-	-	-	-	5.1	-	5.1	-	2.1	-	<1.0
Conductivity	µS/cm	-	-	-	77.4	-	155	-	41.7	-	151	-	74.3	-	106
Hardness, as $CaCO_3$ (Dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Major Ions															
Bromide	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride	mg/L	150	600	4.4	<1.0	<1.0	7.7	7.7	<1.0	<1.0	5.3	5.3	1.1	1.1	4.5
Fluoride	mg/L	-	0.40 - 2.2[b]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Magnesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate	mg/L	128 - 429[b, c]	-	<1.0	1.5	1.5	1.5	1.5	0.74	0.74	1.9	1.9	0.96	0.96	<0.5
Nutrients and Biological Indicators															
Nitrate	mg-N/L	3.0	33	0.21	0.10	0.10	1.2	1.2	0.041	0.041	0.56	0.56	0.14	0.14	0.40
Nitrite	mg-N/L	0.020 - 0.20[d]	0.060 - 0.60[d]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total ammonia	mg-N/L	0.11 - 2.0[e]	0.74 - 26[f]	-	0.040	-	0.56	-	<0.03	-	0.050	-	<0.03	-	<0.03
Total Kjeldahl Nitrogen	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total phosphorus	mg-P/L	-	-	-	0.026	-	<0.01	-	<0.1	-	<0.1	-	<0.1	-	<0.1
Dissolved phosphorus	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Orthophosphate	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Biochemical oxygen demand	mg/L	-	-	-	<4.0	-	<4.0	-	<4.0	-	<4.0	-	<4.0	-	<4.0
Chemical oxygen demand	mg/L	-	-	-	22	-	<20	-	<20	-	<20	-	<20	-	<20
Total Metals															
Aluminum	mg/L	-	-	-	0.75	-	0.084	-	0.20	-	0.031	-	0.097	-	0.15
Antimony	mg/L	0.0090	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Arsenic	mg/L	-	0.005	<0.0001	0.00026	0.00026	<0.0001	<0.0001	<0.0001	<0.0001	0.00010	0.00010	<0.0001	<0.0001	0.00015
Barium	mg/L	1.0	-	0.023	0.016	0.016	0.026	0.026	0.012	0.012	0.025	0.025	0.013	0.013	0.022
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	<0.0001	<0.0001
Bismuth	mg/L	-	-	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001
Boron	mg/L	1.2	-	<0.05	<0.05	<0.05	0.094	0.094	<0.05	<0.05	0.067	0.067	<0.05	<0.05	0.066
Cadmium	mg/L	-	-	0.000020	0.00026	0.00026	<0.00001	<0.00001	0.000014	0.000014	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Calcium	mg/L	-	-	-	13	-	18	-	8.9	-	24	-	12	-	14
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	0.001[g]	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cobalt	mg/L	0.0040	0.11	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Copper	mg/L	-	-	0.0018	0.0029	0.0029	0.0010	0.0010	0.0012	0.0012	0.00070	0.00070	0.00097	0.00097	0.0016
Iron	mg/L	-	1.0	-	0.93	-	0.16	-	0.24	-	0.11	-	0.13	-	0.16
Lead	mg/L	0.020[b]	0.0030 - 0.42[b]	<0.0002	0.00022	0.00022	<0.0002	<0.0002	<0.0002	<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	-	-	-	0.84	-	2.1	-	0.52	-	1.6	-	0.58	-	1.3
Manganese	mg/L	0.77 - 2.6[b]	0.82 - 3.4[b]	-	0.034	-	0.019	-	0.011	-	0.0090	-	0.0052	-	0.011
Mercury	mg/L	0.000010	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Molybdenum	mg/L	7.6	46	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Nickel	mg/L	0.025 - 0.15[b]	-	<0.001	<0.001	<0.001	0.0012	0.0012	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Potassium	mg/L	-	-	-	0.74	-	3.4	-	0.64	-	2.6	-	0.68	-	2.2
Rubidium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/L	0.0020	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Silicon	mg/L	-	-	-	3.1	-	2.8	-	2.2	-	3.3	-	3.0	-	3.0
Silver	mg/L	0.000050 - 0.0015[b]	0.00010 - 0.0030[b]	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
Sodium	mg/L	-	-	-	1.1	-	6.3	-	0.94	-	4.9	-	1.1	-	4.2
Strontium	mg/L	-	-	-	0.032	-	0.085	-	0.032	-	0.089	-	0.039	-	0.062
Sulphur	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	<3.0	-	<3.0	-	<3.0	-	<3.0	-	<3.0	-	<3.0
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	0.00080	-	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-	<0.005
Titanium	mg/L	-	-	-	0.032	-	<0.005	-	0.0092	-	<0.005	-	<0.005	-	<0.005
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	0.0085	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Vanadium	mg/L	-	-	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-	<0.005
Zinc	mg/L	0.0075 - 0.19[b]	0.033 - 0.34[b]	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Zirconium	mg/L	-	-	-	<0.0005	-	<0.0005	-	<0.0005	-	<0.0005	-	<0.0005	-	<0.0005
Dissolved Metals															
Aluminum	mg/L	0.0074 - 0.050[h]	0.024 - 0.10[h]	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bismuth	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/L	0.000018 - 0.00046[b]	0.000038 - 0.0028[b]	-	-	-	-	-	-	-	-	-	-	-	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	mg/L	0.002[i]	0.00020 - 0.00046[i]	-	-	-	-	-	-	-	-	-	-	-	-
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	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zirconium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table Notes:
BC WQG = British Columbia Approved (updated December 2021) and Working (updated February 2021) Water Quality Guidelines for the protection of freshwater aquatic life (AW-F)
[a] = guideline is a minimum value.
[b] = guideline is hardness dependent.
[c] = for some samples, water hardness was greater than 250 mg/L.
[d] = guideline is chloride dependent.
[e] & [f] = the ammonia guideline is pH and temperature dependent.
[g] = guideline is for chromium VI.
[h] = guideline is pH dependent.
[i] = guideline for dissolved copper is pH, hardness, and dissolved organic carbon dependent.
[Mn] = Exceeds BC WQG long-term chronic (30-day mean)
[Mx] = Exceeds BC WQG short-term acute (maximum)
[DL>Mn] = Detection Limit exceeds BC WQG 30-day mean
[DL>Mx] = Detection Limit exceeds BC WQG maximum
< Indicates parameter was below laboratory equipment detection limit.
- Chemical not analyzed or criteria not defined

Appendix C
Results of Surface Water Analyses
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name		SW-17B	SW-17	SW-17B	SW-17	SW-17B	SW-17	SW-17B	SW-17	SW-17B	SW-17	SW-17B	SW-17
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	2014-10-29	2015-03-31	2015-03-31	2015-08-11	2015-08-11	2015-11-04	2015-11-04	2016-03-22	2016-03-22	2016-07-25	2016-07-25	2016-10-13
Field Measured															
pH	-	6.5 - 9.0	6.5 - 9.0	-	-	-	-	-	-	-	-	-	-	-	-
Temperature	°C	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved oxygen	mg/L	8[a]	5[a]	-	-	-	-	-	-	-	-	-	-	-	-
Conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation reduction potential	mV	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conventional Parameters															
pH, lab	-	6.5 - 9.0	6.5 - 9.0	-	7.5	-	7.7	-	7.6	-	7.6	-	7.7	-	7.6
Specific conductivity	µS/cm	-	-	-	87	-	-	-	-	-	-	-	-	-	-
Hardness, as $CaCO_3$	mg/L	-	-	-	35	-	52	-	-	-	57	-	65	-	50
Total alkalinity, as $CaCO_3$	mg/L	20[a]	-	-	-	-	-	-	-	-	-	-	-	-	-
Total suspended solids	mg/L	-	-	-	1.4	-	3.6	-	1.7	-	1.8	-	1.6	-	1.4
Conductivity	µS/cm	-	-	-	-	-	106	-	102	-	119	-	140	-	115
Hardness, as $CaCO_3$ (Dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Major Ions															
Bromide	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride	mg/L	150	600	4.5	2.6	2.6	2.3	2.3	2.4	2.4	4.1	4.1	3.3	3.3	1.5
Fluoride	mg/L	-	0.40 - 2.2[b]	<0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Magnesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate	mg/L	128 - 429[b, c]	-	<0.5	2.2	2.2	1.8	1.8	-	-	2.4	2.4	2.6	2.6	2.3
Nutrients and Biological Indicators															
Nitrate	mg-N/L	3.0	33	0.40	0.59	-	0.080	0.080	0.38	0.38	0.57	0.57	0.32	0.32	0.11
Nitrite	mg-N/L	0.020 - 0.20[d]	0.060 - 0.60[d]	<0.01	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total ammonia	mg-N/L	0.11 - 2.0[e]	0.74 - 26[f]	-	-	-	<0.03	-	0.30	-	0.49	-	<0.03	-	<0.03
Total Kjeldahl Nitrogen	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total phosphorus	mg-P/L	-	-	-	-	-	0.090	-	-	-	0.030	-	<0.02	-	0.020
Dissolved phosphorus	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Orthophosphate	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Biochemical oxygen demand	mg/L	-	-	-	-	-	<4.0	-	<4.0	-	<4.0	-	<4.0	-	<4.0
Chemical oxygen demand	mg/L	-	-	-	-	-	<20	-	<20	-	<20	-	<20	-	<20
Total Metals															
Aluminum	mg/L	-	-	-	0.22	-	0.14	-	-	-	0.13	-	0.078	-	0.045
Antimony	mg/L	0.0090	-	<0.0005	-	-	<0.0001	<0.0001	-	-	<0.0001	<0.0001	<0.0001	<0.0001	0.00020
Arsenic	mg/L	-	0.005	0.00015	-	-	<0.0005	<0.0005	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Barium	mg/L	1.0	-	0.022	0.020	0.020	0.021	0.021	-	-	0.023	0.023	0.026	0.026	0.020
Beryllium	mg/L	0.00013	-	<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
Boron	mg/L	1.2	-	0.066	0.20	0.20	0.068	0.068	-	-	0.073	0.073	0.051	0.051	0.038
Cadmium	mg/L	-	-	<0.00001	-	-	<0.00001	<0.00001	-	-	<0.00001	<0.00001	0.000020	0.000020	<0.00001
Calcium	mg/L	-	-	-	12	-	19	-	-	-	20	-	24	-	18
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	0.0010[g]	-	<0.001	-	-	<0.0005	<0.0005	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Cobalt	mg/L	0.0040	0.11	<0.0005	0.00017	0.00017	0.00013	0.00013	-	-	0.00013	0.00013	0.00011	0.00011	0.000070
Copper	mg/L	-	-	0.0016	0.0017	0.0017	0.0012	0.0012	-	-	0.0010	0.0010	0.0011	0.0011	0.0011
Iron	mg/L	-	1.0	-	0.25	-	0.22	-	-	-	0.21	-	0.24	-	0.13
Lead	mg/L	0.020[b]	0.0030 - 0.42[b]	<0.0002	0.00020	0.00020	<0.0001	<0.0001	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Lithium	mg/L	-	-	-	0.00020	-	0.00020	-	-	-	0.00010	-	<0.0001	-	<0.0001
Magnesium	mg/L	-	-	-	1.1	-	1.0	-	-	-	1.6	-	1.5	-	1.0
Manganese	mg/L	0.77 - 2.6[b]	0.82 - 3.4[b]	-	0.014	-	0.015	-	-	-	0.015	-	0.014	-	0.014
Mercury	mg/L	0.000010	-	<0.00001	-	-	<0.00002[(DL>Mn)]	<0.00002[(DL>Mn)]	-	-	<0.00002[(DL>Mn)]	<0.00002[(DL>Mn)]	<0.00002[(DL>Mn)]	<0.00002[(DL>Mn)]	<0.00002[(DL>Mn)]
Molybdenum	mg/L	7.6	46	<0.001	0.00050	0.00050	0.00050	0.00050	-	-	0.00050	0.00050	0.00070	0.00070	0.00060
Nickel	mg/L	0.025 - 0.15[b]	-	<0.001	0.0020	0.0020	<0.0002	<0.0002	-	-	0.00030	0.00030	<0.0002	<0.0002	<0.0002
Potassium	mg/L	-	-	-	1.8	-	1.2	-	-	-	2.7	-	2.0	-	1.0
Rubidium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/L	0.0020	-	<0.0001	-	-	<0.0005	<0.0005	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Silicon	mg/L	-	-	-	3.1	-	3.8	-	-	-	3.9	-	3.7	-	3.0
Silver	mg/L	0.000050 - 0.0015[b]	0.00010 - 0.0030[b]	<0.00002	-	-	<0.00005	<0.00005	-	-	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Sodium	mg/L	-	-	-	3.2	-	2.6	-	-	-	5.3	-	3.8	-	1.7
Strontium	mg/L	-	-	-	0.054	-	0.070	-	-	-	0.069	-	0.085	-	0.062
Sulphur	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	<1.0	-	-	-	2.0	-	<1.0	-	<1.0
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	0.00080	-	<0.00005	-	-	<0.00002	<0.00002	-	-	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	-	-	<0.0002	-	-	-	<0.0002	-	<0.0002	-	<0.0002
Titanium	mg/L	-	-	-	0.013	-	0.0070	-	-	-	<0.005	-	<0.005	-	<0.005
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	0.0085	-	<0.0001	0.000040	0.000040	0.000060	0.000060	-	-	0.000060	0.000060	0.000080	0.000080	0.000060
Vanadium	mg/L	-	-	-	-	-	0.0010	-	-	-	0.0010	-	<0.001	-	<0.001
Zinc	mg/L	0.0075 - 0.19[b]	0.033 - 0.34[b]	<0.005	-	-	<0.004	<0.004	-	-	<0.004	<0.004	<0.004	<0.004	<0.004
Zirconium	mg/L	-	-	-	-	-	<0.0001	-	-	-	<0.0001	-	<0.0001	-	<0.0001
Dissolved Metals															
Aluminum	mg/L	0.0074 - 0.050[h]	0.024 - 0.10[h]	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bismuth	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/L	0.000018 - 0.00046[b]	0.000038 - 0.0028[b]	-	-	-	-	-	-	-	-	-	-	-	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	mg/L	0.002[i]	0.00020 - 0.00046[i]	-	-	-	-	-	-	-	-	-	-	-	-
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	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zirconium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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[h] = guideline is pH dependent.
[i] = guideline for dissolved copper is pH, hardness, and dissolved organic carbon dependent.
[(Mn)] = Exceeds BC WQG long-term chronic (30-day mean)
[(Mx)] = Exceeds BC WQG short-term acute (maximum)
[(DL>Mn)] = Detection Limit exceeds BC WQG 30-day mean
[(DL>Mx)] = Detection Limit exceeds BC WQG maximum
< Indicates parameter was below laboratory equipment detection limit.
- Chemical not analyzed or criteria not defined

Appendix C
Results of Surface Water Analyses
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name		SW-17B	SW-17	SW-17B	SW-17	SW-17B	SW-17	SW-17B	SW-17	SW-17	SW-17B	SW-17	SW-17B
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	2016-10-13	2017-03-28	2017-03-28	2017-08-24	2017-08-24	2018-07-04	2018-07-04	2018-09-10	2019-04-11	2019-04-11	2020-04-30	2020-04-30
Field Measured															
pH	-	6.5 - 9.0	6.5 - 9.0	-	-	-	-	-	7.7	-	-	7.3	-	7.4	-
Temperature	°C	-	-	-	-	-	-	-	12	-	-	4.0	-	4.7	-
Dissolved oxygen	mg/L	8[a]	5[a]	-	-	-	-	-	6.8[(Mn)]	-	-	13	-	17	-
Conductivity	µS/cm	-	-	-	-	-	-	-	81	-	-	45	-	48	-
Oxidation reduction potential	mV	-	-	-	-	-	-	-	290	-	-	225	-	366	-
Conventional Parameters															
pH, lab	-	6.5 - 9.0	6.5 - 9.0	-	7.3	-	7.6	-	7.9	-	-	7.6	-	7.7	-
Specific conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hardness, as $CaCO_3$	mg/L	-	-	-	31	-	41	-	43	-	-	34	-	39	-
Total alkalinity, as $CaCO_3$	mg/L	20[a]	-	-	-	-	-	-	50	-	-	36	-	37	-
Total suspended solids	mg/L	-	-	-	6.6	-	2.9	-	<3.0	-	-	-	-	3.4	-
Conductivity	µS/cm	-	-	-	77.1	-	93.4	-	104	-	-	80.8	-	79.8	-
Hardness, as $CaCO_3$ (Dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	37	-
Major Ions															
Bromide	mg/L	-	-	-	-	-	-	-	-	-	-	<0.05	-	<0.05	-
Calcium	mg/L	-	-	-	-	-	-	-	15	-	-	12	-	14	-
Chloride	mg/L	150	600	1.5	2.1	2.1	1.2	1.2	2.3	2.3	-	1.4	1.4	0.60	0.60
Fluoride	mg/L	-	0.40 - 2.2[b]	<0.1	<0.1	<0.1	<0.1	<0.1	0.022	0.022	-	0.027	0.027	0.024	0.024
Magnesium	mg/L	-	-	-	-	-	-	-	1.4	-	-	1.1	-	0.68	-
Potassium	mg/L	-	-	-	-	-	-	-	2.1	-	-	1.3	-	0.82	-
Sodium	mg/L	-	-	-	-	-	-	-	3.9	-	-	2.4	-	1.2	-
Sulphate	mg/L	128 - 429[b, c]	-	2.3	1.4	1.4	1.6	1.6	1.2	1.2	-	1.8	1.8	1.4	1.4
Nutrients and Biological Indicators															
Nitrate	mg-N/L	3.0	33	0.11	0.088	0.088	0.13	0.13	0.38	0.38	-	0.49	0.49	0.12	0.12
Nitrite	mg-N/L	0.020 - 0.20[d]	0.060 - 0.60[d]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001	<0.001	-	0.0019	0.0019	0.0017	0.0017
Total ammonia	mg-N/L	0.11 - 2.0[e]	0.74 - 26[f]	-	0.29	-	<0.03	-	0.0053	-	-	0.0099	-	0.021	-
Total Kjeldahl Nitrogen	mg-N/L	-	-	-	-	-	-	-	0.19	-	-	0.11	-	0.098	-
Total phosphorus	mg-P/L	-	-	-	<0.05	-	<0.05	-	0.0081	-	-	0.0052	-	<0.05	-
Dissolved phosphorus	mg-P/L	-	-	-	-	-	-	-	<0.05	-	-	<0.05	-	<0.05	-
Orthophosphate	mg-P/L	-	-	-	-	-	-	-	0.0011	-	-	<0.001	-	<0.001	-
Biochemical oxygen demand	mg/L	-	-	-	-	-	<4.0	-	<2.0	-	-	-	-	<2.0	-
Chemical oxygen demand	mg/L	-	-	-	-	-	<20	-	<20	-	-	-	-	<20	-
Total Metals															
Aluminum	mg/L	-	-	-	0.63	-	0.11	-	0.12	-	-	0.13	-	0.12	-
Antimony	mg/L	0.0090	-	0.00020	<0.0001	<0.0001	<0.0002	<0.0002	<0.0001	<0.0001	-	<0.0001	<0.0001	<0.0001	<0.0001
Arsenic	mg/L	-	0.005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00019	0.00019	-	0.00012	0.00012	0.00011	0.00011
Barium	mg/L	1.0	-	0.020	0.021	0.021	0.018	0.018	0.027	0.027	-	0.021	0.021	0.015	0.015
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	<0.0001
Bismuth	mg/L	-	-	-	<0.0001	-	<0.0001	-	<0.00005	-	-	<0.00005	-	<0.00005	-
Boron	mg/L	1.2	-	0.038	0.044	0.044	0.057	0.057	0.053	0.053	-	0.027	0.027	<0.01	<0.01
Cadmium	mg/L	-	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.0000069	0.0000069	-	<0.000005	<0.000005	<0.000005	<0.000005
Calcium	mg/L	-	-	-	11	-	15	-	15	-	-	12	-	14	-
Cesium	mg/L	-	-	-	-	-	-	-	0.000014	-	-	<0.00001	-	0.000011	-
Chromium	mg/L	0.0010[g]	-	<0.0005	0.00070	0.00070	<0.0005	<0.0005	0.00025	0.00025	-	0.00017	0.00017	0.00019	0.00019
Cobalt	mg/L	0.0040	0.11	0.000070	0.00030	0.00030	<0.0001	<0.0001	0.00013	0.00013	-	0.00010	0.00010	<0.0001	<0.0001
Copper	mg/L	-	-	0.0011	0.0020	0.0020	0.00099	0.00099	0.0010	0.0010	-	0.0012	0.0012	0.00090	0.00090
Iron	mg/L	-	1.0	-	0.64	-	0.16	-	0.25	-	-	0.15	-	0.14	-
Lead	mg/L	0.020[b]	0.0030 - 0.42[b]	<0.0001	0.00020	0.00020	<0.0002	<0.0002	<0.00005	<0.00005	-	<0.00005	<0.00005	<0.00005	<0.00005
Lithium	mg/L	-	-	-	0.00030	-	<0.0001	-	<0.001	-	-	<0.001	-	<0.001	-
Magnesium	mg/L	-	-	-	1.2	-	0.90	-	1.3	-	-	1.1	-	0.77	-
Manganese	mg/L	0.77 - 2.6[b]	0.82 - 3.4[b]	-	0.046	-	0.011	-	0.023	-	-	0.013	-	0.0082	-
Mercury	mg/L	0.000010	-	<0.00002[(DL>Mn)]	<0.00002[(DL>Mn)]	<0.00002[(DL>Mn)]	<0.00001	<0.00001	<0.000005	<0.000005	-	<0.000005	<0.000005	<0.000005	<0.000005
Molybdenum	mg/L	7.6	46	0.00060	0.00030	0.00030	0.00048	0.00048	0.00042	0.00042	-	0.00035	0.00035	0.00033	0.00033
Nickel	mg/L	0.025 - 0.15[b]	-	<0.0002	0.00080	0.00080	<0.0004	<0.0004	<0.0005	<0.0005	-	<0.0005	<0.0005	<0.0005	<0.0005
Potassium	mg/L	-	-	-	1.3	-	1.0	-	1.9	-	-	1.3	-	0.83	-
Rubidium	mg/L	-	-	-	-	-	-	-	0.0016	-	-	0.0011	-	0.00092	-
Selenium	mg/L	0.0020	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.00005	<0.00005	-	0.000081	0.000081	<0.00005	<0.00005
Silicon	mg/L	-	-	-	3.7	-	3.5	-	2.9	-	-	2.9	-	3.1	-
Silver	mg/L	0.000050 - 0.0015[b]	0.00010 - 0.0030[b]	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00001	<0.00001	-	<0.00001	<0.00001	<0.00001	<0.00001
Sodium	mg/L	-	-	-	2.4	-	1.8	-	3.6	-	-	2.4	-	1.3	-
Strontium	mg/L	-	-	-	0.043	-	0.056	-	0.064	-	-	0.053	-	0.044	-
Sulphur	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	<1.0	-	<3.0	-	<0.5	-	-	0.60	-	<0.5	-
Tellurium	mg/L	-	-	-	<0.0002	-	<0.0005	-	<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	<0.00001
Thorium-232	mg/L	-	-	-	<0.0001	-	<0.0001	-	<0.0001	-	-	<0.0001	-	<0.0001	-
Tin	mg/L	-	-	-	<0.0002	-	<0.0002	-	<0.0001	-	-	<0.0001	-	<0.0001	-
Titanium	mg/L	-	-	-	0.020	-	<0.005	-	0.0042	-	-	0.0039	-	0.0042	-
Tungsten	mg/L	-	-	-	-	-	-	-	<0.0001	-	-	<0.0001	-	<0.0001	-
Uranium	mg/L	0.0085	-	0.000060	0.000040	0.000040	0.000049	0.000049	0.000041	0.000041	-	0.000024	0.000024	0.000060	0.000060
Vanadium	mg/L	-	-	-	0.0020	-	<0.001	-	0.00076	-	-	0.00070	-	0.00069	-
Zinc	mg/L	0.0075 - 0.19[b]	0.033 - 0.34[b]	<0.004	<0.004	<0.004	<0.004	<0.004	<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003
Zirconium	mg/L	-	-	-	0.00060	-	<0.0001	-	0.000095	-	-	0.000073	-	<0.0002	-
Dissolved Metals															
Aluminum	mg/L	0.0074 - 0.050[h]	0.024 - 0.10[h]	-	-	-	-	-	0.034	-	-	0.042	-	0.032	-
Antimony	mg/L	-	-	-	-	-	-	-	<0.0001	<0.0001	-	<0.0001	<0.0001	<0.0001	<0.0001
Arsenic	mg/L	-	-	-	-	-	-	-	0.00013	0.00013	-	<0.0001	<0.0001	<0.0001	<0.0001
Barium	mg/L	-	-	-	-	-	-	-	0.026	0.026	-	0.020	0.020	0.015	0.015
Beryllium	mg/L	-	-	-	-	-	-	-	<0.0001	<0.0001	-	<0.0001	<0.0001	<0.0001	<0.0001
Bismuth	mg/L	-	-	-	-	-	-	-	<0.00005	-	-	<0.00005	-	<0.00005	-
Boron	mg/L	-	-	-	-	-	-	-	0.056	0.056	-	0.030	0.030	<0.01	<0.01
Cadmium	mg/L	0.000018 - 0.00046[b]	0.000038 - 0.0028[b]	-	-	-	-	-	0.000032	0.000032	-	<0.000005	<0.000005	<0.000005	<0.000005
Cesium	mg/L	-	-	-	-	-	-	-	<0.00001	-	-	<0.00001	-	<0.00001	-
Chromium	mg/L	-	-	-	-	-	-	-	<0.0001	<0.0001	-	0.00014	0.00014	<0.0001	<0.0001
Cobalt	mg/L	-	-	-	-	-	-	-	<0.0001	<0.0001	-	<0.0001	<0.0001	<0.0001	<0.0001
Copper	mg/L	0.002[(i)]	0.00020 - 0.00046[(i)]	-	-	-	-	-	**0.00106[(Mn, Mx)]**	**0.00106[(Mn, Mx)]**	-	**0.0008[(Mn, Mx)]**	**0.0008[(Mn, Mx)]**	**0.00081[(Mn, Mx)]**	**0.00081[(Mn, Mx)]**
Iron	mg/L	-	0.35	-	-	-	-	-	0.11	-	-	0.067	-	0.032	-
Lead	mg/L	-	-	-	-	-	-	-	<0.00005	<0.00005	-	<0.00005	<0.00005	<0.00005	<0.00005
Lithium	mg/L	-	-	-	-	-	-	-	<0.001	-	-	<0.001	-	<0.001	-
Manganese	mg/L	-	-	-	-	-	-	-	0.017	-	-	0.0093	-	0.0039	-
Mercury	mg/L	-	-	-	-	-	-	-	<0.000005	<0.000005	-	<0.000005	<0.000005	<0.000005	<0.000005
Molybdenum	mg/L	-	-	-	-	-	-	-	0.00038	0.00038	-	0.00036	0.00036	0.00036	0.00036
Nickel	mg/L	-	-	-	-	-	-	-	<0.0005	<0.0005	-	<0.0005	<0.0005	<0.0005	<0.0005
Rubidium	mg/L	-	-	-	-	-	-	-	0.0016	-	-	0.00093	-	0.00086	-
Selenium	mg/L	-	-	-	-	-	-	-	0.000064	0.000064	-	<0.00005	<0.00005	0.000072	0.000072
Silicon	mg/L	-	-	-	-	-	-	-	2.8	-	-	2.7	-	3.0	-
Silver	mg/L	-	-	-	-	-	-	-	<0.00001	<0.00001	-	<0.00001	<0.00001	<0.00001	<0.00001
Strontium	mg/L	-	-	-	-	-	-	-	0.063	-	-	0.052	-	0.042	-
Sulphur	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	-	<0.5	-	-	<0.5	-	<0.5	-
Tellurium	mg/L	-	-	-	-	-	-	-	<0.0002	-	-	<0.0002	-	<0.0002	-
Thallium	mg/L	-	-	-	-	-	-	-	<0.00001	<0.00001	-	<0.00001	<0.00001	<0.00001	<0.00001
Thorium-232	mg/L	-	-	-	-	-	-	-	<0.0001	-	-	<0.0001	-	<0.0001	-
Tin	mg/L	-	-	-	-	-	-	-	<0.0001	-	-	<0.0001	-	<0.0001	-
Titanium	mg/L	-	-	-	-	-	-	-	0.00080	-	-	0.0013	-	0.00062	-
Tungsten	mg/L	-	-	-	-	-	-	-	<0.0001	-	-	<0.0001	-	<0.0001	-
Uranium	mg/L	-	-	-	-	-	-	-	0.000036	0.000036	-	0.000028	0.000028	0.000041	0.000041
Vanadium	mg/L	-	-	-	-	-	-	-	<0.0005	-	-	<0.0005	-	<0.0005	-
Zinc	mg/L	-	-	-	-	-	-	-	0.0024	0.0024	-	<0.001	<0.001	<0.001	<0.001
Zirconium	mg/L	-	-	-	-	-	-	-	<0.00006	-	-	0.00011	-	<0.0002	-

Table Notes:
BC WQG = British Columbia Approved (updated December 2021) and Working (updated February 2021) Water Quality Guidelines for the protection of freshwater aquatic life (AW-F)
[a] = guideline is a minimum value.
[b] = guideline is hardness dependent.
[c] = for some samples, water hardness was greater than 250 mg/L.
[d] = guideline is chloride dependent.
[e] & [f] = the ammonia guideline is pH and temperature dependent.
[g] = guideline is for chromium VI.
[h] = guideline is pH dependent.
[i] = guideline for dissolved copper is pH, hardness, and dissolved organic carbon dependent.
[(Mn)] = Exceeds BC WQG long-term chronic (30-day mean)
[(Mx)] = Exceeds BC WQG short-term acute (maximum)
[(DL>Mn)] = Detection Limit exceeds BC WQG 30-day mean
[(DL>Mx)] = Detection Limit exceeds BC WQG maximum
< Indicates parameter was below laboratory equipment detection limit.
- Chemical not analyzed or criteria not defined

Appendix C
Results of Surface Water Analyses
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name		SW-17	SW-17B	SW-17	SW-17B	SW-18	SW-18B	SW-18	SW-18B	SW-18	SW-18B	SW-18	SW-18B
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	2020-09-01	2020-09-01	2020-10-07	2020-10-07	2016-03-22	2016-03-22	2016-10-13	2016-10-13	2017-03-28	2017-03-28	2017-08-24	2017-08-24
Field Measured															
pH	-	6.5 - 9.0	6.5 - 9.0	7.7	-	7.7	-	-	-	-	-	-	-	-	-
Temperature	°C	-	-	11	-	8.9	-	-	-	-	-	-	-	-	-
Dissolved oxygen	mg/L	8[a]	5[a]	9.3	-	**6.3**[Mn]	-	-	-	-	-	-	-	-	-
Conductivity	µS/cm	-	-	61	-	56	-	-	-	-	-	-	-	-	-
Oxidation reduction potential	mV	-	-	285	-	246	-	-	-	-	-	-	-	-	-
Conventional Parameters															
pH, lab	-	6.5 - 9.0	6.5 - 9.0	7.6	-	7.6	-	7.6	-	7.5	-	7.3	-	7.7	-
Specific conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hardness, as $CaCO_3$	mg/L	-	-	37	-	37	-	59	-	48	-	30	-	41	-
Total alkalinity, as $CaCO_3$	mg/L	20[a]	-	38	-	39	-	-	-	-	-	-	-	-	-
Total suspended solids	mg/L	-	-	3.4	-	3.7	-	4.3	-	<1.0	-	5.8	-	3.2	-
Conductivity	µS/cm	-	-	84.2	-	83.1	-	119	-	111	-	76.5	-	92	-
Hardness, as $CaCO_3$ (Dissolved)	mg/L	-	-	37	-	38	-	-	-	-	-	-	-	-	-
Major Ions															
Bromide	mg/L	-	-	<0.05	-	-	-	-	-	-	-	-	-	-	-
Calcium	mg/L	-	-	13	-	13	-	-	-	-	-	-	-	-	-
Chloride	mg/L	150	600	1.2	1.2	0.97	0.97	3.9	3.9	2.0	2.0	2.2	2.2	1.2	1.2
Fluoride	mg/L	-	0.40 - 2.2[b]	0.026	0.026	0.022	0.022	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Magnesium	mg/L	-	-	1.1	-	1.2	-	-	-	-	-	-	-	-	-
Potassium	mg/L	-	-	1.4	-	1.4	-	-	-	-	-	-	-	-	-
Sodium	mg/L	-	-	2.3	-	2.1	-	-	-	-	-	-	-	-	-
Sulphate	mg/L	128 - 429[b, c]	-	1.1	1.1	1.0	1.0	2.4	2.4	2.6	2.6	1.4	1.4	1.6	1.6
Nutrients and Biological Indicators															
Nitrate	mg-N/L	3.0	33	0.35	0.35	0.34	0.34	0.63	0.63	0.099	0.099	0.090	0.090	0.13	0.13
Nitrite	mg-N/L	0.020 - 0.20[d]	0.060 - 0.60[d]	0.0059	0.0059	<0.001	<0.001	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total ammonia	mg-N/L	0.11 - 2.0[e]	0.74 - 26[f]	0.019	-	0.017	-	0.50	-	<0.03	-	0.27	-	<0.03	-
Total Kjeldahl Nitrogen	mg-N/L	-	-	0.19	-	0.28	-	-	-	-	-	-	-	-	-
Total phosphorus	mg-P/L	-	-	<0.05	-	<0.05	-	0.040	-	<0.02	-	<0.05	-	<0.05	-
Dissolved phosphorus	mg-P/L	-	-	<0.05	-	<0.05	-	-	-	-	-	-	-	-	-
Orthophosphate	mg-P/L	-	-	<0.001	-	0.0023	-	-	-	-	-	-	-	-	-
Biochemical oxygen demand	mg/L	-	-	<2.0	-	<2.0	-	<4.0	-	<4.0	-	<4.0	-	<4.0	-
Chemical oxygen demand	mg/L	-	-	22	-	<20	-	<20	-	<20	-	<20	-	<20	-
Total Metals															
Aluminum	mg/L	-	-	0.11	-	0.15	-	0.14	-	0.035	-	0.51	-	0.084	-
Antimony	mg/L	0.0090	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.00020	0.00020	<0.0001	<0.0001	<0.0002	<0.0002
Arsenic	mg/L	-	0.005	0.00015	0.00015	0.00015	0.00015	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Barium	mg/L	1.0	-	0.022	0.022	0.023	0.023	0.023	0.023	0.019	0.019	0.020	0.020	0.017	0.017
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	<0.0001	<0.0001
Bismuth	mg/L	-	-	<0.00005	-	<0.00005	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-
Boron	mg/L	1.2	-	0.025	0.025	0.022	0.022	0.078	0.078	0.022	0.022	0.042	0.042	0.047	0.047
Cadmium	mg/L	-	-	0.0000069	0.0000069	0.0000058	0.0000058	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Calcium	mg/L	-	-	13	-	13	-	21	-	18	-	10	-	15	-
Cesium	mg/L	-	-	<0.00001	-	0.000010	-	-	-	-	-	-	-	-	-
Chromium	mg/L	0.0010[g]	-	0.00013	0.00013	0.00018	0.00018	<0.0005	<0.0005	<0.0005	<0.0005	0.00070	0.00070	<0.0005	<0.0005
Cobalt	mg/L	0.0040	0.11	<0.0001	<0.0001	<0.0001	<0.0001	0.00012	0.00012	<0.00005	<0.00005	0.00029	0.00029	<0.0001	<0.0001
Copper	mg/L	-	-	0.0012	0.0012	0.0011	0.0011	0.0011	0.0011	0.0011	0.0011	0.0020	0.0020	0.00086	0.00086
Iron	mg/L	-	1.0	0.16	-	0.19	-	0.23	-	0.11	-	0.63	-	0.13	-
Lead	mg/L	0.020[b]	0.0030 - 0.42[b]	<0.00005	<0.00005	<0.00005	<0.00005	<0.0001	<0.0001	<0.0001	<0.0001	0.00020	0.00020	<0.0002	<0.0002
Lithium	mg/L	-	-	<0.001	-	<0.001	-	0.00020	-	<0.0001	-	0.00030	-	<0.0001	-
Magnesium	mg/L	-	-	1.1	-	1.2	-	1.7	-	0.96	-	1.1	-	0.87	-
Manganese	mg/L	0.77 - 2.6[b]	0.82 - 3.4[b]	0.012	-	0.014	-	0.016	-	0.012	-	0.040	-	0.010	-
Mercury	mg/L	0.000010	-	<0.000005	<0.000005	<0.000005	<0.000005	<0.00002[DL>Mn]	<0.00002[DL>Mn]	<0.00002[DL>Mn]	<0.00002[DL>Mn]	<0.00002[DL>Mn]	<0.00002[DL>Mn]	<0.00001	<0.00001
Molybdenum	mg/L	7.6	46	0.00032	0.00032	0.00036	0.00036	0.00060	0.00060	0.00060	0.00060	0.00030	0.00030	0.00043	0.00043
Nickel	mg/L	0.025 - 0.15[b]	-	<0.0005	<0.0005	<0.0005	<0.0005	0.00040	0.00040	<0.0002	<0.0002	0.00080	0.00080	<0.0004	<0.0004
Potassium	mg/L	-	-	1.4	-	1.3	-	2.8	-	0.96	-	1.2	-	1.0	-
Rubidium	mg/L	-	-	0.0013	-	0.0012	-	-	-	-	-	-	-	-	-
Selenium	mg/L	0.0020	-	0.00010	0.00010	0.000066	0.000066	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Silicon	mg/L	-	-	3.1	-	3.3	-	4.0	-	2.9	-	3.3	-	3.3	-
Silver	mg/L	0.000050 - 0.0015[b]	0.00010 - 0.0030[b]	<0.00001	<0.00001	<0.00001	<0.00001	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Sodium	mg/L	-	-	2.1	-	2.0	-	5.5	-	1.7	-	2.3	-	1.8	-
Strontium	mg/L	-	-	0.054	-	0.054	-	0.071	-	0.060	-	0.041	-	0.053	-
Sulphur	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	<0.5	-	<0.5	-	2.0	-	<1.0	-	<1.0	-	<3.0	-
Tellurium	mg/L	-	-	<0.0002	-	<0.0002	-	-	-	-	-	<0.0002	-	<0.0005	-
Thallium	mg/L	0.00080	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
Thorium-232	mg/L	-	-	<0.0001	-	<0.0001	-	-	-	-	-	<0.0001	-	<0.0001	-
Tin	mg/L	-	-	<0.0001	-	<0.0001	-	<0.0002	-	<0.0002	-	<0.0002	-	<0.0002	-
Titanium	mg/L	-	-	0.0030	-	0.0050	-	0.0050	-	<0.005	-	0.015	-	<0.005	-
Tungsten	mg/L	-	-	<0.0001	-	<0.0001	-	-	-	-	-	-	-	-	-
Uranium	mg/L	0.0085	-	0.000031	0.000031	0.000027	0.000027	0.000060	0.000060	0.000060	0.000060	0.000040	0.000040	0.000050	0.000050
Vanadium	mg/L	-	-	0.0010	-	0.00073	-	0.0010	-	<0.001	-	0.0010	-	<0.001	-
Zinc	mg/L	0.0075 - 0.19[b]	0.033 - 0.34[b]	<0.003	<0.003	<0.003	<0.003	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	0.0043	0.0043
Zirconium	mg/L	-	-	<0.0002	-	<0.0002	-	<0.0001	-	<0.0001	-	0.00020	-	<0.0001	-
Dissolved Metals															
Aluminum	mg/L	0.0074 - 0.050[h]	0.024 - 0.10[h]	**0.064**[Mn]	-	**0.064**[Mn]	-	-	-	-	-	-	-	-	-
Antimony	mg/L	-	-	<0.0001	<0.0001	<0.0001	<0.0001	-	-	-	-	-	-	-	-
Arsenic	mg/L	-	-	<0.0001	<0.0001	0.00012	0.00012	-	-	-	-	-	-	-	-
Barium	mg/L	-	-	0.022	0.022	0.024	0.024	-	-	-	-	-	-	-	-
Beryllium	mg/L	-	-	<0.0001	<0.0001	<0.0001	<0.0001	-	-	-	-	-	-	-	-
Bismuth	mg/L	-	-	<0.00005	-	<0.00005	-	-	-	-	-	-	-	-	-
Boron	mg/L	-	-	0.024	0.024	0.019	0.019	-	-	-	-	-	-	-	-
Cadmium	mg/L	0.000018 - 0.00046[b]	0.000038 - 0.0028[b]	0.000016	0.000016	<0.000005	<0.000005	-	-	-	-	-	-	-	-
Cesium	mg/L	-	-	<0.00001	-	<0.00001	-	-	-	-	-	-	-	-	-
Chromium	mg/L	-	-	<0.0001	<0.0001	<0.0001	<0.0001	-	-	-	-	-	-	-	-
Cobalt	mg/L	-	-	<0.0001	<0.0001	<0.0001	<0.0001	-	-	-	-	-	-	-	-
Copper	mg/L	0.002[i]	0.00020 - 0.00046[i]	**0.00118**[Mn, Mx]	**0.00118**[Mn, Mx]	**0.00094**[Mn, Mx]	**0.00094**[Mn, Mx]	-	-	-	-	-	-	-	-
Iron	mg/L	-	0.35	0.10	-	0.096	-	-	-	-	-	-	-	-	-
Lead	mg/L	-	-	<0.00005	<0.00005	<0.00005	<0.00005	-	-	-	-	-	-	-	-
Lithium	mg/L	-	-	<0.001	-	<0.001	-	-	-	-	-	-	-	-	-
Manganese	mg/L	-	-	0.0069	-	0.0092	-	-	-	-	-	-	-	-	-
Mercury	mg/L	-	-	<0.000005	<0.000005	<0.000005	<0.000005	-	-	-	-	-	-	-	-
Molybdenum	mg/L	-	-	0.00030	0.00030	0.00034	0.00034	-	-	-	-	-	-	-	-
Nickel	mg/L	-	-	<0.0005	<0.0005	<0.0005	<0.0005	-	-	-	-	-	-	-	-
Rubidium	mg/L	-	-	0.0013	-	0.0012	-	-	-	-	-	-	-	-	-
Selenium	mg/L	-	-	<0.00005	<0.00005	0.000078	0.000078	-	-	-	-	-	-	-	-
Silicon	mg/L	-	-	2.8	-	3.0	-	-	-	-	-	-	-	-	-
Silver	mg/L	-	-	<0.00001	<0.00001	<0.00001	<0.00001	-	-	-	-	-	-	-	-
Strontium	mg/L	-	-	0.058	-	0.062	-	-	-	-	-	-	-	-	-
Sulphur	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	<0.5	-	<0.5	-	-	-	-	-	-	-	-	-
Tellurium	mg/L	-	-	<0.0002	-	<0.0002	-	-	-	-	-	-	-	-	-
Thallium	mg/L	-	-	<0.00001	<0.00001	<0.00001	<0.00001	-	-	-	-	-	-	-	-
Thorium-232	mg/L	-	-	<0.0001	-	<0.0001	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	<0.0001	-	<0.0001	-	-	-	-	-	-	-	-	-
Titanium	mg/L	-	-	0.0016	-	0.0018	-	-	-	-	-	-	-	-	-
Tungsten	mg/L	-	-	<0.0001	-	<0.0001	-	-	-	-	-	-	-	-	-
Uranium	mg/L	-	-	0.000027	0.000027	0.000027	0.000027	-	-	-	-	-	-	-	-
Vanadium	mg/L	-	-	<0.0005	-	<0.0005	-	-	-	-	-	-	-	-	-
Zinc	mg/L	-	-	0.0039	0.0039	<0.001	<0.001	-	-	-	-	-	-	-	-
Zirconium	mg/L	-	-	<0.0002	-	<0.0002	-	-	-	-	-	-	-	-	-

Table Notes:
BC WQG = British Columbia Approved (updated December 2021) and Working (updated February 2021) Water Quality Guidelines for the protection of freshwater aquatic life (AW-F)
[a] = guideline is a minimum value.
[b] = guideline is hardness dependent.
[c] = for some samples, water hardness was greater than 250 mg/L.
[d] = guideline is chloride dependent.
[e] & [f] = the ammonia guideline is pH and temperature dependent.
[g] = guideline is for chromium VI.
[h] = guideline is pH dependent.
[i] = guideline for dissolved copper is pH, hardness, and dissolved organic carbon dependent.
[Mn] = Exceeds BC WQG long-term chronic (30-day mean)
[Mx] = Exceeds BC WQG short-term acute (maximum)
[DL>Mn] = Detection Limit exceeds BC WQG 30-day mean
[DL>Mx] = Detection Limit exceeds BC WQG maximum
< Indicates parameter was below laboratory equipment detection limit.
- Chemical not analyzed or criteria not defined

Appendix C
Results of Surface Water Analyses
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name: BC WQG AW-F 30-day mean (Chronic)	Sample Name: BC WQG AW-F Maximum (Acute)	SW-21 1997-06-01	SW-21B 1997-06-01	SW-21 1997-12-04	SW-21B 1997-12-04	SW-21 1998-05-04	SW-21B 1998-05-04	SW-21C 1998-05-04	SW-21D 1998-05-04	SW-21B 1998-09-24	SW-21C 1998-09-24	SW-21D 1998-09-24	SW-21 1999-01-27
Field Measured															
pH	-	6.5 - 9.0	6.5 - 9.0	-	-	-	-	-	-	-	-	-	-	-	-
Temperature	°C	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved oxygen	mg/L	8[a]	5[a]	-	-	-	-	-	-	-	-	-	-	-	-
Conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation reduction potential	mV	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conventional Parameters															
pH, lab	-	6.5 - 9.0	6.5 - 9.0	7.7	-	7.8	-	-	8.1	-	-	8.1	-	-	-
Specific conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hardness, as $CaCO_3$	mg/L	-	-	399	-	281	-	-	287	-	-	439	-	-	441
Total alkalinity, as $CaCO_3$	mg/L	20[a]	-	-	-	-	-	-	-	-	-	-	-	-	-
Total suspended solids	mg/L	-	-	7.0	-	6.0	-	5.0	-	-	-	5.0	-	-	-
Conductivity	µS/cm	-	-	1480	-	1280	-	-	1300	-	-	1450	-	-	-
Hardness, as $CaCO_3$ (Dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Major Ions															
Bromide	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride	mg/L	150	600	130	130	99	99	-	-	97	97	-	146	146	100
Fluoride	mg/L	-	0.40 - 2.2[b]	-	-	-	-	-	-	-	-	-	-	-	-
Magnesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate	mg/L	128 - 429[b, c]	-	18	18	56	56	-	-	58	58	-	19	19	91
Nutrients and Biological Indicators															
Nitrate	mg-N/L	3.0	33	**18**[Mn]	**18**[Mn]	**8.3**[Mn]	**8.3**[Mn]	-	-	**11**[Mn]	**11**[Mn]	-	**8.8**[Mn]	**8.8**[Mn]	**14**[Mn]
Nitrite	mg-N/L	0.020 - 0.20[d]	0.060 - 0.60[d]	0.19	0.19	0.056	0.056	-	-	0.14	0.14	-	0.18	0.18	0.098
Total ammonia	mg-N/L	0.11 - 2.0[e]	0.74 - 26[f]	**3.8**[Mn]	-	**11**[Mn, Mx]	-	-	**7.6**[Mn, Mx]	-	-	**11**[Mn, Mx]	-	-	**8.2**[Mn]
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	-	-	10	-	19	-	-	8.0	-	-	45	-	-	-
Chemical oxygen demand	mg/L	-	-	62	-	82	-	-	105	-	-	144	-	-	75
Total Metals															
Aluminum	mg/L	-	-	<0.05	-	0.051	-	-	0.057	-	-	<0.005	-	-	0.030
Antimony	mg/L	0.0090	-	<0.2[DL>Mn]	<0.2[DL>Mn]	0.00040	0.00040	-	-	0.00050	0.00050	-	<0.001	<0.001	**0.026**[Mn]
Arsenic	mg/L	-	0.005	<0.2[DL>Mx]	<0.2[DL>Mx]	0.0010	0.0010	-	-	0.00080	0.00080	-	0.0020	0.0020	<0.04[DL>Mx]
Barium	mg/L	1.0	-	0.080	0.080	0.12	0.12	-	-	0.11	0.11	-	0.21	0.21	0.14
Beryllium	mg/L	0.00013	-	<0.005[DL>Mn]	<0.005[DL>Mn]	<0.005[DL>Mn]	<0.005[DL>Mn]	-	-	<0.005[DL>Mn]	<0.005[DL>Mn]	-	<0.005[DL>Mn]	<0.005[DL>Mn]	<0.001[DL>Mn]
Bismuth	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	1.2	-	-	-	-	-	-	-	-	-	-	-	-	**1.4**[Mn]
Cadmium	mg/L	-	-	<0.002	<0.002	<0.0002	<0.0002	-	-	<0.0002	<0.0002	-	<0.0002	<0.0002	0.00010
Calcium	mg/L	-	-	112	-	79	-	-	82	-	-	122	-	-	124
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	0.0010[g]	-	<0.01	<0.01	<0.001	<0.001	-	-	<0.001	<0.001	-	0.002	0.002	0.005
Cobalt	mg/L	0.0040	0.11	<0.01[DL>Mn]	<0.01[DL>Mn]	<0.01[DL>Mn]	<0.01[DL>Mn]	-	-	<0.01[DL>Mn]	<0.01[DL>Mn]	-	<0.01[DL>Mn]	<0.01[DL>Mn]	0.0030
Copper	mg/L	-	-	<0.01	<0.01	0.0020	0.0020	-	-	0.004	0.004	-	<0.001	<0.001	0.0070
Iron	mg/L	-	1.0	<0.03	-	0.090	-	-	0.050	-	-	0.050	-	-	0.045
Lead	mg/L	0.020[b]	0.0030 - 0.42[b]	<0.01	<0.01[DL>Mn]	<0.001	<0.001	-	-	<0.001	<0.001	-	<0.001	<0.001	<0.02[DL>Mn]
Lithium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Magnesium	mg/L	-	-	29	-	20	-	-	20	-	-	33	-	-	32
Manganese	mg/L	0.77 - 2.6[b]	0.82 - 3.4[b]	0.29	-	1.3	-	-	1.2	-	-	2.0	-	-	0.93
Mercury	mg/L	0.000010	-	<0.00005[DL>Mn]	<0.00005[DL>Mn]	0.000010	0.000010	<0.00001	<0.00001	-	-	-	<0.00001	<0.00001	<0.00005[DL>Mn]
Molybdenum	mg/L	7.6	46	<0.03	<0.03	<0.03	<0.03	-	-	<0.03	<0.03	-	<0.03	<0.03	<0.004
Nickel	mg/L	0.025 - 0.15[b]	-	<0.02	<0.02	0.020	0.020	-	-	<0.02	<0.02	-	<0.05	<0.05	<0.008
Potassium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	59
Rubidium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/L	0.0020	-	<0.01[DL>Mn]	<0.01[DL>Mn]	<0.0005	<0.0005	-	-	0.0015	0.0015	-	0.00050	0.00050	<0.001
Silicon	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver	mg/L	0.000050 - 0.0015[b]	0.00010 - 0.0030[b]	<0.001	<0.001[DL>Mn, DL>Mx]	<0.0001	<0.0001[DL>Mn]	-	-	<0.0001[DL>Mn]	<0.0001[DL>Mn]	-	<0.0001[DL>Mn]	<0.0001[DL>Mn]	<0.0001
Sodium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	111
Strontium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	33
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	0.00080	-	-	-	<0.0001	<0.0001	<0.0001	<0.0001	-	-	-	**0.0010**[Mn]	**0.0010**[Mn]	<0.0001
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	mg/L	-	-	-	-	<0.01	-	-	<0.01	-	-	<0.01	-	-	<0.003
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	0.0085	-	-	-	0.000090	0.000090	0.00010	0.00010	-	-	-	0.00020	0.00020	-
Vanadium	mg/L	-	-	-	-	<0.03	-	-	<0.03	-	-	<0.03	-	-	<0.003
Zinc	mg/L	0.0075 - 0.19[b]	0.033 - 0.34[b]	0.0070	0.0070	<0.005	<0.005	-	-	<0.005	<0.005	-	<0.005	<0.005	<0.002
Zirconium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Metals															
Aluminum	mg/L	0.0074 - 0.050[h]	0.024 - 0.10[h]	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bismuth	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/L	0.000018 - 0.00046[b]	0.000038 - 0.0028[b]	-	-	-	-	-	-	-	-	-	-	-	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	mg/L	0.002[i]	0.00020 - 0.00046[i]	-	-	-	-	-	-	-	-	-	-	-	-
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	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zirconium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table Notes:
BC WQG = British Columbia Approved (updated December 2021) and Working (updated February 2021) Water Quality Guidelines for the protection of freshwater aquatic life (AW-F)
[a] = guideline is a minimum value.
[b] = guideline is hardness dependent.
[c] = for some samples, water hardness was greater than 250 mg/L.
[d] = guideline is chloride dependent.
[e] & [f] = the ammonia guideline is pH and temperature dependent.
[g] = guideline is for chromium VI.
[h] = guideline is pH dependent.
[i] = guideline for dissolved copper is pH, hardness, and dissolved organic carbon dependent.
[Mn] = Exceeds BC WQG long-term chronic (30-day mean)
[Mx] = Exceeds BC WQG short-term acute (maximum)
[DL>Mn] = Detection Limit exceeds BC WQG 30-day mean
[DL>Mx] = Detection Limit exceeds BC WQG maximum
< Indicates parameter was below laboratory equipment detection limit.
- Chemical not analyzed or criteria not defined

Appendix C
Results of Surface Water Analyses
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name		SW-21B	SW-21	SW-21B	SW-21	SW-21B	SW-21	SW-21B	SW-21	SW-21B	SW-21	SW-21B	SW-21C
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	1999-01-27	1999-04-01	1999-04-01	1999-11-01	1999-11-01	2000-03-17	2000-03-17	2000-08-15	2000-08-15	2000-12-20	2000-12-20	2000-12-20
Field Measured															
pH	-	6.5 - 9.0	6.5 - 9.0	-	-	-	-	-	-	-	-	-	-	-	-
Temperature	°C	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved oxygen	mg/L	8[a]	5[a]	-	-	-	-	-	-	-	-	-	-	-	-
Conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation reduction potential	mV	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conventional Parameters															
pH, lab	-	6.5 - 9.0	6.5 - 9.0	-	-	-	-	-	7.6	-	8.0	-	-	7.6	-
Specific conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hardness, as $CaCO_3$	mg/L	-	-	-	366	-	351	-	277	-	384	-	-	402	-
Total alkalinity, as $CaCO_3$	mg/L	20[a]	-	-	-	-	-	-	-	-	-	-	-	-	-
Total suspended solids	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conductivity	µS/cm	-	-	-	1235	-	-	-	864	-	-	-	700	-	-
Hardness, as $CaCO_3$ (Dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Major Ions															
Bromide	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride	mg/L	150	600	100	71	71	97	97	65	65	144	144	-	-	102
Fluoride	mg/L	-	0.40 - 2.2[b]	-	-	-	-	-	0.15	0.15	<0.05	<0.05	-	-	<0.05
Magnesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate	mg/L	128 - 429[b, c]	-	91	28	28	22	22	28	28	3.2	3.2	-	-	25
Nutrients and Biological Indicators															
Nitrate	mg-N/L	3.0	33	**14**[Mn]	**6.5**[Mn]	**6.5**[Mn]	2.3	2.3	-	-	**9.0**[Mn]	**9.0**[Mn]	-	-	**6.1**[Mn]
Nitrite	mg-N/L	0.020 - 0.20[d]	0.060 - 0.60[d]	0.098	0.090	0.090	0.059	0.059	-	-	**0.30**[Mn]	**0.30**[Mn]	-	-	0.034
Total ammonia	mg-N/L	0.11 - 2.0[e]	0.74 - 26[f]	-	**15**[Mn]	-	**21**[Mn]	-	**8.6**[Mn]	-	**6.5**[Mn, Mx]	-	-	**28**[Mn, Mx]	-
Total Kjeldahl Nitrogen	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total phosphorus	mg-P/L	-	-	-	-	-	-	-	0.060	-	0.060	-	-	0.11	-
Dissolved phosphorus	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Orthophosphate	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Biochemical oxygen demand	mg/L	-	-	-	18	-	<10	-	<10	-	<10	-	-	<10	-
Chemical oxygen demand	mg/L	-	-	-	64	-	123	-	58	-	74	-	-	64	-
Total Metals															
Aluminum	mg/L	-	-	-	0.029	-	0.047	-	0.074	-	0.014	-	-	0.037	-
Antimony	mg/L	0.0090	-	**0.026**[Mn]	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	-	<0.001
Arsenic	mg/L	-	0.005	<0.04[DL>Mx]	<0.001	<0.001	0.0020	0.0020	<0.001	<0.001	<0.001	<0.001	-	-	<0.001
Barium	mg/L	1.0	-	0.14	0.16	0.16	0.16	0.16	0.27	0.27	0.17	0.17	-	-	0.17
Beryllium	mg/L	0.00013	-	<0.001[DL>Mn]	<0.001[DL>Mn]	<0.001[DL>Mn]	<0.001[DL>Mn]	<0.001[DL>Mn]	<0.001[DL>Mn]	<0.001[DL>Mn]	<0.001[DL>Mn]	<0.001[DL>Mn]	-	-	<0.001[DL>Mn]
Bismuth	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	1.2	-	**1.4**[Mn]	**1.3**[Mn]	**1.3**[Mn]	0.85	0.85	0.77	0.77	**1.7**[Mn]	**1.7**[Mn]	-	-	1.2
Cadmium	mg/L	-	-	0.00010	<0.0002	<0.0002	<0.0002	<0.0002	0.00020	0.00020	0.00020	0.00020	-	-	0.0010
Calcium	mg/L	-	-	-	112	-	98	-	86	-	115	-	-	116	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	0.0010[g]	-	0.005	0.0010	0.0010	0.003	0.003	0.002	0.002	0.00010	0.00010	-	-	0.0010
Cobalt	mg/L	0.0040	0.11	0.0030	0.0010	0.0010	0.0030	0.0030	<0.001	<0.001	0.0030	0.0030	-	-	0.0020
Copper	mg/L	-	-	0.007	0.0040	0.004	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	-	-	<0.001
Iron	mg/L	-	1.0	-	0.17	-	0.39	-	0.12	-	0.21	-	-	0.30	-
Lead	mg/L	0.020[b]	0.0030 - 0.42[b]	<0.02[DL>Mn]	0.0010	0.0010	0.0010	0.0010	<0.001	<0.001	<0.001	<0.001	-	-	<0.001
Lithium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Magnesium	mg/L	-	-	-	21	-	26	-	15	-	24	-	-	27	-
Manganese	mg/L	0.77 - 2.6[b]	0.82 - 3.4[b]	-	**2.3**[Mn]	-	**3.4**[Mn, Mx]	-	1.2	-	2.1	-	-	2.1	-
Mercury	mg/L	0.000010	-	<0.00005[DL>Mn]	<0.00005[DL>Mn]	<0.00005[DL>Mn]	<0.00005[DL>Mn]	<0.00005[DL>Mn]	<0.00005[DL>Mn]	<0.00005[DL>Mn]	<0.00005[DL>Mn]	<0.00005[DL>Mn]	-	-	<0.00005[DL>Mn]
Molybdenum	mg/L	7.6	46	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	-	<0.001
Nickel	mg/L	0.025 - 0.15[b]	-	<0.008	0.0060	0.0060	0.0050	0.0050	0.0030	0.0030	0.0090	0.0090	-	-	0.0070
Potassium	mg/L	-	-	-	39	-	52	-	31	-	52	-	-	55	-
Rubidium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/L	0.0020	-	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	-	-	<0.002
Silicon	mg/L	-	-	-	-	-	-	-	6.6	-	17	-	-	12	-
Silver	mg/L	0.000050 - 0.0015[b]	0.00010 - 0.0030[b]	<0.0001[DL>Mn]	<0.0001	<0.0001[DL>Mn]	0.00010	0.00010	<0.0001	<0.0001[DL>Mn]	<0.0001	<0.0001[DL>Mn]	-	-	<0.0001[DL>Mn]
Sodium	mg/L	-	-	-	64	-	91	-	50	-	85	-	-	91	-
Strontium	mg/L	-	-	-	-	-	-	-	0.51	-	0.89	-	-	0.71	-
Sulphur	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	0.00080	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	-	<0.0001
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	-	-	-	-	<0.001	-	<0.001	-	-	<0.001	-
Titanium	mg/L	-	-	-	<0.001	-	0.0020	-	<0.001	-	<0.001	-	-	<0.001	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	0.0085	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	-	-	<0.0005
Vanadium	mg/L	-	-	-	<0.001	-	0.0010	-	0.0030	-	0.0010	-	-	<0.001	-
Zinc	mg/L	0.0075 - 0.19[b]	0.033 - 0.34[b]	<0.002	0.0070	0.0070	0.012	0.012	0.042	**0.042**[Mn, Mx]	0.0060	0.0060	-	-	0.0050
Zirconium	mg/L	-	-	-	-	-	-	-	<0.01	-	<0.01	-	-	<0.01	-
Dissolved Metals															
Aluminum	mg/L	0.0074 - 0.050[h]	0.024 - 0.10[h]	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bismuth	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/L	0.000018 - 0.00046[b]	0.000038 - 0.0028[b]	-	-	-	-	-	-	-	-	-	-	-	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	mg/L	0.002[i]	0.00020 - 0.00046[i]	-	-	-	-	-	-	-	-	-	-	-	-
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	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zirconium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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[e] & [f] = the ammonia guideline is pH and temperature dependent.
[g] = guideline is for chromium VI.
[h] = guideline is pH dependent.
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[Mn] = Exceeds BC WQG long-term chronic (30-day mean)
[Mx] = Exceeds BC WQG short-term acute (maximum)
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Appendix C
Results of Surface Water Analyses
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name		SW-21D	SW-21	SW-21B	SW-21	SW-21B	SW-21	SW-21B	SW-21	SW-21B	SW-21	SW-21B	SW-21
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	2000-12-20	2001-05-07	2001-05-07	2001-12-01	2001-12-01	2002-04-01	2002-04-01	2002-06-01	2002-06-01	2003-01-01	2003-01-01	2003-03-01
Field Measured															
pH	-	6.5 - 9.0	6.5 - 9.0	-	-	-	-	-	-	-	-	-	-	-	-
Temperature	°C	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved oxygen	mg/L	8[a]	5[a]	-	-	-	-	-	-	-	-	-	-	-	-
Conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation reduction potential	mV	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conventional Parameters															
pH, lab	-	6.5 - 9.0	6.5 - 9.0	-	7.8	-	7.7	-	7.7	-	8.0	-	7.6	-	7.7
Specific conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hardness, as $CaCO_3$	mg/L	-	-	-	415	-	487	-	219	-	412	-	148	-	281
Total alkalinity, as $CaCO_3$	mg/L	20[a]	-	-	-	-	-	-	-	-	-	-	-	-	-
Total suspended solids	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conductivity	µS/cm	-	-	-	1200	-	1570	-	725	-	1310	-	495	-	1130
Hardness, as $CaCO_3$ (Dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Major Ions															
Bromide	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride	mg/L	150	600	102	82	82	96	96	31	31	104	104	22	22	80
Fluoride	mg/L	-	0.40 - 2.2[b]	<0.05	0.24	0.24	<0.05	<0.05	<0.05	<0.05	<0.25	<0.25	<0.05	<0.05	<0.05
Magnesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate	mg/L	128 - 429[b, c]	-	25	20	20	29	29	2.0	2.0	12	12	25	25	13
Nutrients and Biological Indicators															
Nitrate	mg-N/L	3.0	33	**6.1**[(Mn)]	**14**[(Mn)]	**14**[(Mn)]	**4.1**[(Mn)]	**4.1**[(Mn)]	**5.2**[(Mn)]	**5.2**[(Mn)]	**12**[(Mn)]	**12**[(Mn)]	**4.6**[(Mn)]	**4.6**[(Mn)]	**16**[(Mn)]
Nitrite	mg-N/L	0.020 - 0.20[d]	0.060 - 0.60[d]	0.034	0.19	0.19	0.030	0.030	**1.4**[(Mn, Mx)]	**1.4**[(Mn, Mx)]	**0.24**[(Mn)]	**0.24**[(Mn)]	0.034	0.034	0.084
Total ammonia	mg-N/L	0.11 - 2.0[e]	0.74 - 26[f]	-	**1.9**[(Mn)]	-	**25**[(Mn, Mx)]	-	1.5	-	0.54	-	**4.0**[(Mn)]	-	**5.3**[(Mn)]
Total Kjeldahl Nitrogen	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total phosphorus	mg-P/L	-	-	-	0.11	-	0.060	-	0.030	-	0.18	-	0.050	-	0.070
Dissolved phosphorus	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Orthophosphate	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Biochemical oxygen demand	mg/L	-	-	-	<10	-	<10	-	<10	-	<10	-	11	-	<10
Chemical oxygen demand	mg/L	-	-	-	53	-	63	-	31	-	53	-	38	-	46
Total Metals															
Aluminum	mg/L	-	-	-	0.030	-	0.015	-	0.018	-	0.011	-	0.042	-	0.010
Antimony	mg/L	0.0090	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	-	<0.001
Arsenic	mg/L	-	0.005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	-	<0.001
Barium	mg/L	1.0	-	0.17	0.16	0.16	0.21	0.21	0.12	0.12	0.15	0.15	0.072	0.072	0.12
Beryllium	mg/L	0.00013	-	<0.001[(DL>Mn)]	<0.001[(DL>Mn)]	<0.001[(DL>Mn)]	<0.001[(DL>Mn)]	<0.001[(DL>Mn)]	<0.001[(DL>Mn)]	<0.001[(DL>Mn)]	<0.001[(DL>Mn)]	<0.001[(DL>Mn)]	-	-	<0.001[(DL>Mn)]
Bismuth	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	1.2	-	1.2	1.1	1.1	1.1	1.1	0.63	0.63	**1.4**[(Mn)]	**1.4**[(Mn)]	0.49	0.49	1.0
Cadmium	mg/L	-	-	0.0010	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	-	-	<0.0002
Calcium	mg/L	-	-	-	122	-	146	-	66	-	118	-	46	-	81
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	0.0010[g]	-	0.0010	<0.001	<0.001	0.002	0.002	<0.001	<0.001	0.0010	0.0010	-	-	<0.001
Cobalt	mg/L	0.0040	0.11	0.0020	0.0010	0.0010	0.0020	0.0020	<0.001	<0.001	0.0020	0.0020	-	-	<0.001
Copper	mg/L	-	-	<0.001	0.0050	0.005	0.0020	0.0020	0.0020	0.0020	0.0030	0.003	0.0030	0.003	0.0020
Iron	mg/L	-	1.0	-	0.26	-	0.39	-	0.24	-	0.32	-	0.12	-	<0.05
Lead	mg/L	0.020[b]	0.0030 - 0.42[b]	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	-	<0.001
Lithium	mg/L	-	-	-	-	-	-	-	-	-	0.0020	-	-	-	0.0010
Magnesium	mg/L	-	-	-	27	-	30	-	13	-	28	-	8.0	-	19
Manganese	mg/L	0.77 - 2.6[b]	0.82 - 3.4[b]	-	1.8	-	**3.3**[(Mn)]	-	0.96	-	0.93	-	0.47	-	0.97
Mercury	mg/L	0.000010	-	<0.00005[(DL>Mn)]	<0.00005[(DL>Mn)]	<0.00005[(DL>Mn)]	<0.00002[(DL>Mn)]	<0.00002[(DL>Mn)]	<0.00002[(DL>Mn)]	<0.00002[(DL>Mn)]	<0.00002[(DL>Mn)]	<0.00002[(DL>Mn)]	-	-	<0.00002[(DL>Mn)]
Molybdenum	mg/L	7.6	46	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	-	0.0012
Nickel	mg/L	0.025 - 0.15[b]	-	0.0070	0.0050	0.0050	0.0050	0.0050	0.0030	0.0030	0.0060	0.0060	0.0020	0.0020	0.0050
Potassium	mg/L	-	-	-	46	-	53	-	22	-	48	-	19	-	32
Rubidium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/L	0.0020	-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	-	-	<0.001
Silicon	mg/L	-	-	-	12	-	15	-	8.3	-	12	-	7.2	-	8.7
Silver	mg/L	0.000050 - 0.0015[b]	0.00010 - 0.0030[b]	<0.0001[(DL>Mn)]	<0.0001	<0.0001[(DL>Mn)]	<0.0001	<0.0001[(DL>Mn)]	<0.0001	<0.0001[(DL>Mn)]	<0.0001	<0.0001[(DL>Mn)]	-	-	<0.0001
Sodium	mg/L	-	-	-	78	-	88	-	36	-	85	-	27	-	60
Strontium	mg/L	-	-	-	0.75	-	0.86	-	0.033	-	0.75	-	0.25	-	0.53
Sulphur	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	0.00080	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001
Titanium	mg/L	-	-	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	0.0010	-	<0.001
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	0.0085	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Vanadium	mg/L	-	-	-	<0.001	-	0.0030	-	<0.001	-	0.0020	-	<0.001	-	<0.001
Zinc	mg/L	0.0075 - 0.19[b]	0.033 - 0.34[b]	0.0050	0.010	**0.010**[(Mn)]	<0.005	<0.005	<0.005	<0.005	0.012	**0.012**[(Mn)]	<0.005	<0.005	<0.005
Zirconium	mg/L	-	-	-	<0.01	-	<0.01	-	<0.01	-	<0.01	-	<0.01	-	<0.01
Dissolved Metals															
Aluminum	mg/L	0.0074 - 0.050[h]	0.024 - 0.10[h]	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bismuth	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/L	0.000018 - 0.00046[b]	0.000038 - 0.0028[b]	-	-	-	-	-	-	-	-	-	-	-	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	mg/L	0.002[i]	0.00020 - 0.00046[i]	-	-	-	-	-	-	-	-	-	-	-	-
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	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zirconium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table Notes:
BC WQG = British Columbia Approved (updated December 2021) and Working (updated February 2021) Water Quality Guidelines for the protection of freshwater aquatic life (AW-F)
[a] = guideline is a minimum value.
[b] = guideline is hardness dependent.
[c] = for some samples, water hardness was greater than 250 mg/L.
[d] = guideline is chloride dependent.
[e] & [f] = the ammonia guideline is pH and temperature dependent.
[g] = guideline is for chromium VI.
[h] = guideline is pH dependent.
[i] = guideline for dissolved copper is pH, hardness, and dissolved organic carbon dependent.
[(Mn)] = Exceeds BC WQG long-term chronic (30-day mean)
[(Mx)] = Exceeds BC WQG short-term acute (maximum)
[(DL>Mn)] = Detection Limit exceeds BC WQG 30-day mean
[(DL>Mx)] = Detection Limit exceeds BC WQG maximum
< Indicates parameter was below laboratory equipment detection limit.
- Chemical not analyzed or criteria not defined

Appendix C
Results of Surface Water Analyses
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name		SW-21B	SW-21	SW-21B	SW-21	SW-21B	SW-21	SW-21B	SW-21	SW-21B	SW-21	SW-21B	SW-21
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	2003-03-01	2003-08-12	2003-08-12	2003-12-01	2003-12-01	2004-05-14	2004-05-14	2004-10-18	2004-10-18	2005-06-01	2005-06-01	2005-11-01
Field Measured															
pH	-	6.5 - 9.0	6.5 - 9.0	-	-	-	-	-	-	-	-	-	-	-	-
Temperature	°C	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved oxygen	mg/L	8[a]	5[a]	-	-	-	-	-	-	-	-	-	-	-	-
Conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation reduction potential	mV	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conventional Parameters															
pH, lab	-	6.5 - 9.0	6.5 - 9.0	-	6.9	-	7.5	-	7.8	-	7.7	-	7.8	-	8.2
Specific conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hardness, as $CaCO_3$	mg/L	-	-	-	452	-	155	-	377	-	536	-	444	-	320
Total alkalinity, as $CaCO_3$	mg/L	20[a]	-	-	-	-	-	-	-	-	-	-	-	-	-
Total suspended solids	mg/L	-	-	-	-	-	-	-	-	-	<4.0	-	-	-	25
Conductivity	µS/cm	-	-	-	1340	-	575	-	1240	-	1340	-	1760	-	920
Hardness, as $CaCO_3$ (Dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Major Ions															
Bromide	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride	mg/L	150	600	80	104	104	34	34	83	83	67	67	100	100	44
Fluoride	mg/L	-	0.40 - 2.2[b]	<0.05	<0.05	<0.05	0.060	0.060	<0.05	<0.05	-	-	<0.25	<0.25	-
Magnesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate	mg/L	128 - 429[b, c]	-	13	2.1	2.1	11	11	9.0	9.0	34	34	6.6	6.6	21
Nutrients and Biological Indicators															
Nitrate	mg-N/L	3.0	33	**16[Mn]**	**9.9[Mn]**	**9.9[Mn]**	**4.7[Mn]**	**4.7[Mn]**	**12[Mn]**	**12[Mn]**	**3.9[Mn]**	**3.9[Mn]**	**7.9[Mn]**	**7.9[Mn]**	1.2
Nitrite	mg-N/L	0.020 - 0.20[d]	0.060 - 0.60[d]	0.084	0.092	0.092	0.028	0.028	0.15	0.15	0.054	0.054	0.020	0.020	0.030
Total ammonia	mg-N/L	0.11 - 2.0[e]	0.74 - 26[f]	-	0.010	-	**4.4[Mn]**	-	0.74	-	**14[Mn, Mx]**	-	0.060	-	**15[Mn, Mx]**
Total Kjeldahl Nitrogen	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total phosphorus	mg-P/L	-	-	-	0.17	-	0.40	-	<0.15	-	<0.1	-	0.070	-	0.10
Dissolved phosphorus	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Orthophosphate	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Biochemical oxygen demand	mg/L	-	-	-	<10	-	<10	-	<10	-	<10	-	<10	-	<10
Chemical oxygen demand	mg/L	-	-	-	59	-	<25	-	35	-	69	-	62	-	94
Total Metals															
Aluminum	mg/L	-	-	-	0.013	-	0.072	-	0.0080	-	0.013	-	0.0090	-	0.0019
Antimony	mg/L	0.0090	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.00020	0.00020	<0.0002	<0.0002	0.00018
Arsenic	mg/L	-	0.005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.00060	0.00060	0.00070	0.00070	0.00060
Barium	mg/L	1.0	-	0.12	0.17	0.17	0.084	0.084	0.10	0.10	0.22	0.22	0.10	0.10	0.13
Beryllium	mg/L	0.00013	-	<0.001[(DL>Mn)]	<0.001[(DL>Mn)]	<0.001[(DL>Mn)]	<0.001[(DL>Mn)]	<0.001[(DL>Mn)]	<0.001[(DL>Mn)]	<0.001[(DL>Mn)]	<0.00002	<0.00002	<0.0002[(DL>Mn)]	<0.0002[(DL>Mn)]	0.000020
Bismuth	mg/L	-	-	-	<0.001	-	-	-	<0.001	-	<0.00002	-	<0.0002	-	0.000020
Boron	mg/L	1.2	-	1.0	**1.8[Mn]**	**1.8[Mn]**	0.35	0.35	**1.4[Mn]**	**1.4[Mn]**	1.1	1.1	**2.4[Mn]**	**2.4[Mn]**	0.74
Cadmium	mg/L	-	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	<0.0001	0.000070	0.000070	0.000010
Calcium	mg/L	-	-	-	121	-	48	-	112	-	168	-	139	-	104
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	0.0010[g]	-	<0.001	0.0010	0.0010	<0.001	<0.001	0.0010	0.0010	<0.002	<0.002	0.0010	0.0010	0.003
Cobalt	mg/L	0.0040	0.11	<0.001	0.0020	0.0020	<0.001	<0.001	0.0010	0.0010	0.0012	0.0012	0.0013	0.0013	0.0015
Copper	mg/L	-	-	0.0020	0.0010	0.0010	0.0030	0.003	0.0020	0.0020	0.0020	0.0020	0.0024	0.0024	0.00099
Iron	mg/L	-	1.0	-	<0.05	-	0.33	-	<0.05	-	0.022	-	0.050	-	0.060
Lead	mg/L	0.020[b]	0.0030 - 0.42[b]	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.0001	<0.0002	<0.0002	0.000010
Lithium	mg/L	-	-	-	0.0020	-	-	-	0.0010	-	0.00058	-	0.0012	-	0.0013
Magnesium	mg/L	-	-	-	36	-	8.4	-	24	-	28	-	23	-	15
Manganese	mg/L	0.77 - 2.6[b]	0.82 - 3.4[b]	-	0.18	-	0.58	-	0.25	-	2.0	-	0.054	-	1.6
Mercury	mg/L	0.000010	-	<0.00002[(DL>Mn)]	<0.00002[(DL>Mn)]	<0.00002[(DL>Mn)]	<0.00002[(DL>Mn)]	<0.00002[(DL>Mn)]	<0.02[(DL>Mn)]	<0.02[(DL>Mn)]	<0.00005[(DL>Mn)]	<0.00005[(DL>Mn)]	<0.02[(DL>Mn)]	<0.02[(DL>Mn)]	**0.000050[Mn]**
Molybdenum	mg/L	7.6	46	0.0012	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00030	0.00030	0.00032
Nickel	mg/L	0.025 - 0.15[b]	-	0.0050	0.0060	0.0060	0.0020	0.0020	0.0050	0.0050	0.0058	0.0058	0.0069	0.0069	0.0040
Potassium	mg/L	-	-	-	61	-	17	-	43	-	48	-	48	-	32
Rubidium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/L	0.0020	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	0.00090	0.00090	0.00040
Silicon	mg/L	-	-	-	16	-	6.3	-	13	-	-	-	14	-	-
Silver	mg/L	0.000050 - 0.0015[b]	0.00010 - 0.0030[b]	<0.0001[(DL>Mn)]	<0.0001	<0.0001[(DL>Mn)]	<0.0001	<0.0001[(DL>Mn)]	<0.00025	<0.00025[(DL>Mn, DL>Mx)]	<0.0002	<0.0002[(DL>Mn, DL>Mx)]	<0.00005	<0.00005	0.000020
Sodium	mg/L	-	-	-	106	-	25	-	82	-	78	-	139	-	48
Strontium	mg/L	-	-	-	0.94	-	0.32	-	0.69	-	0.92	-	0.68	-	0.50
Sulphur	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	-	-	-	13	-	-	-	7.2
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	0.00080	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.00002	<0.00002	<0.00002	<0.00002	0.0000060
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	<0.001	-	<0.001	-	<0.001	-	0.00012	-	0.00040	-	-
Titanium	mg/L	-	-	-	0.0010	-	0.0030	-	<0.001	-	<0.003	-	0.00060	-	0.0030
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	0.0085	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.000063	0.000063	0.00010	0.00010	0.000073
Vanadium	mg/L	-	-	-	<0.001	-	<0.001	-	<0.001	-	<0.0006	-	0.00040	-	0.00048
Zinc	mg/L	0.0075 - 0.19[b]	0.033 - 0.34[b]	<0.005	0.0060	0.0060	<0.005	<0.005	<0.005	<0.005	0.0011	0.0011	0.0040	0.0040	0.00090
Zirconium	mg/L	-	-	-	<0.01	-	<0.01	-	<0.01	-	<0.005	-	<0.002	-	0.0050
Dissolved Metals															
Aluminum	mg/L	0.0074 - 0.050[h]	0.024 - 0.10[h]	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bismuth	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/L	0.000018 - 0.00046[b]	0.000038 - 0.0028[b]	-	-	-	-	-	-	-	-	-	-	-	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	mg/L	0.002[i]	0.00020 - 0.00046[i]	-	-	-	-	-	-	-	-	-	-	-	-
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	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zirconium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table Notes:
BC WQG = British Columbia Approved (updated December 2021) and Working (updated February 2021) Water Quality Guidelines for the protection of freshwater aquatic life (AW-F)
[a] = guideline is a minimum value.
[b] = guideline is hardness dependent.
[c] = for some samples, water hardness was greater than 250 mg/L.
[d] = guideline is chloride dependent.
[e] & [f] = the ammonia guideline is pH and temperature dependent.
[g] = guideline is for chromium VI.
[h] = guideline is pH dependent.
[i] = guideline for dissolved copper is pH, hardness, and dissolved organic carbon dependent.
[Mn] = Exceeds BC WQG long-term chronic (30-day mean)
[Mx] = Exceeds BC WQG short-term acute (maximum)
[DL>Mn] = Detection Limit exceeds BC WQG 30-day mean
[DL>Mx] = Detection Limit exceeds BC WQG maximum
< Indicates parameter was below laboratory equipment detection limit.
- Chemical not analyzed or criteria not defined

Appendix C
Results of Surface Water Analyses
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name		SW-21B	SW-21	SW-21B	SW-21	SW-21B	SW-21	SW-21B	SW-21	SW-21B	SW-21	SW-21B
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	2005-11-01	2006-06-01	2006-06-01	2007-01-02	2007-01-02	2007-06-18	2007-06-18	2008-05-27	2008-05-27	2008-10-10	2008-10-10
Field Measured														
pH	-	6.5 - 9.0	6.5 - 9.0	-	-	-	-	-	-	-	-	-	-	-
Temperature	°C	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved oxygen	mg/L	8[a]	5[a]	-	-	-	-	-	-	-	-	-	-	-
Conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation reduction potential	mV	-	-	-	-	-	-	-	-	-	-	-	-	-
Conventional Parameters														
pH, lab	-	6.5 - 9.0	6.5 - 9.0	-	7.9	-	7.7	-	8.0	-	7.9	-	8.2	-
Specific conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-
Hardness, as $CaCO_3$	mg/L	-	-	-	396	-	184	-	361	-	337	-	363	-
Total alkalinity, as $CaCO_3$	mg/L	20[a]	-	-	-	-	-	-	-	-	-	-	-	-
Total suspended solids	mg/L	-	-	-	-	-	-	-	-	-	-	-	4.0	-
Conductivity	µS/cm	-	-	-	1490	-	790	-	1220	-	1190	-	1200	-
Hardness, as $CaCO_3$ (Dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Major Ions														
Bromide	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride	mg/L	150	600	44	113	113	45	45	84	84	134	134	87	87
Fluoride	mg/L	-	0.40 - 2.2[b]	-	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.1	<0.1	-	-
Magnesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate	mg/L	128 - 429[b, c]	-	21	4.4	4.4	17	17	5.3	5.3	5.4	5.4	<0.5	<0.5
Nutrients and Biological Indicators														
Nitrate	mg-N/L	3.0	33	1.2	**8.8[Mn]**	**8.8[Mn]**	**4.4[Mn]**	**4.4[Mn]**	**8.8[Mn]**	**8.8[Mn]**	**9.0[Mn]**	**9.0[Mn]**	-	-
Nitrite	mg-N/L	0.020 - 0.20[d]	0.060 - 0.60[d]	0.030	0.024	0.024	0.038	0.038	0.0020	0.0020	0.13	0.13	0.034	0.034
Total ammonia	mg-N/L	0.11 - 2.0[e]	0.74 - 26[f]	-	**13[Mn, Mx]**	-	**14[Mn, Mx]**	-	**14[Mn, Mx]**	-	**6.5[Mn]**	-	**7.4[Mn, Mx]**	-
Total Kjeldahl Nitrogen	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Total phosphorus	mg-P/L	-	-	-	<0.15	-	<0.15	-	<0.15	-	-	-	0.032	-
Dissolved phosphorus	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Orthophosphate	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Biochemical oxygen demand	mg/L	-	-	-	27	-	<10	-	10	-	9.4	-	<10	-
Chemical oxygen demand	mg/L	-	-	-	94	-	41	-	96	-	82	-	81	-
Total Metals														
Aluminum	mg/L	-	-	-	<0.005	-	0.043	-	0.011	-	0.012	-	0.019	-
Antimony	mg/L	0.0090	-	0.00018	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0006	<0.0006	0.00018	0.00018
Arsenic	mg/L	-	0.005	0.00060	<0.001	<0.001	0.0010	0.0010	<0.001	<0.001	<0.001	<0.001	0.00048	0.00048
Barium	mg/L	1.0	-	0.13	0.14	0.14	0.11	0.11	0.16	0.16	0.12	0.12	0.078	0.078
Beryllium	mg/L	0.00013	-	0.000020	<0.001[DL>Mn]	<0.001[DL>Mn]	<0.001[DL>Mn]	<0.001[DL>Mn]	<0.001[DL>Mn]	<0.001[DL>Mn]	<0.0004[DL>Mn]	<0.0004[DL>Mn]	0.000020	0.000020
Bismuth	mg/L	-	-	-	<0.001	-	<0.001	-	<0.001	-	-	-	0	-
Boron	mg/L	1.2	-	0.74	**1.7[Mn]**	**1.7[Mn]**	0.72	0.72	**1.5[Mn]**	**1.5[Mn]**	**1.6[Mn]**	**1.6[Mn]**	1.2	1.2
Cadmium	mg/L	-	-	0.000010	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.000060	0.000060	0.000025	0.000025
Calcium	mg/L	-	-	-	117	-	59	-	112	-	100	-	95	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	0.0010[g]	-	0.003	0.0010	0.0010	0.003	0.003	0.002	0.002	0.004	0.004	0.00080	0.00080
Cobalt	mg/L	0.0040	0.11	0.0015	0.0020	0.0020	<0.001	<0.001	0.0020	0.0020	0.0017	0.0017	0.0015	0.0015
Copper	mg/L	-	-	0.00099	0.0010	0.0010	0.0030	0.003	0.0020	0.0020	0.016	0.016	0.0017	0.0017
Iron	mg/L	-	1.0	-	<0.05	-	0.30	-	0.11	-	0.34	-	0.071	-
Lead	mg/L	0.020[b]	0.0030 - 0.42[b]	0.000010	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0002	<0.0002	0.0000060	0.0000060
Lithium	mg/L	-	-	-	0.0020	-	0.0010	-	<0.005	-	0.00090	-	0.00080	-
Magnesium	mg/L	-	-	-	25	-	9.2	-	20	-	18	-	18	-
Manganese	mg/L	0.77 - 2.6[b]	0.82 - 3.4[b]	-	1.1	-	1.2	-	1.5	-	1.2	-	0.32	-
Mercury	mg/L	0.000010	-	**0.000050[Mn]**	<0.02[DL>Mn]	<0.02[DL>Mn]	<0.00002[DL>Mn]	<0.00002[DL>Mn]	<0.0002[DL>Mn]	<0.0002[DL>Mn]	<0.00006[DL>Mn]	<0.00006[DL>Mn]	-	-
Molybdenum	mg/L	7.6	46	0.00032	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00030	0.00030	0.00041	0.00041
Nickel	mg/L	0.025 - 0.15[b]	-	0.0040	0.0060	0.0060	0.0040	0.0040	0.0050	0.0050	0.0080	0.0080	-	-
Potassium	mg/L	-	-	-	53	-	22	-	44	-	-	-	43	-
Rubidium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/L	0.0020	-	0.00040	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.00011	0.00011
Silicon	mg/L	-	-	-	6.3	-	3.4	-	5.2	-	-	-	4.7	-
Silver	mg/L	0.000050 - 0.0015[b]	0.00010 - 0.0030[b]	0.000020	<0.00025	<0.00025[DL>Mn, DL>Mx]	<0.00025	<0.00025[DL>Mn, DL>Mx]	<0.00025	<0.00025[DL>Mn, DL>Mx]	<0.00008	<0.00008[DL>Mn]	<0.00005	<0.00005
Sodium	mg/L	-	-	-	100	-	41	-	82	-	73	-	80	-
Strontium	mg/L	-	-	-	0.87	-	0.34	-	0.75	-	-	-	0.59	-
Sulphur	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	-	-	-	-	-	3.0	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	0.00080	-	0.0000060	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0000030	0.0000030
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	<0.001	-	<0.001	-	<0.001	-	-	-	0.00011	-
Titanium	mg/L	-	-	-	<0.001	-	0.0020	-	<0.001	-	<0.02	-	0.0014	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	0.0085	-	0.000073	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0001	<0.0001	0.00015	0.00015
Vanadium	mg/L	-	-	-	<0.001	-	<0.001	-	<0.001	-	<0.002	-	0.00020	-
Zinc	mg/L	0.0075 - 0.19[b]	0.033 - 0.34[b]	0.00090	<0.005	<0.005	0.018	**0.018[Mn]**	<0.005	<0.005	0.015	**0.015[Mn]**	0.0013	0.0013
Zirconium	mg/L	-	-	-	<0.01	-	<0.01	-	<0.01	-	-	-	-	-
Dissolved Metals														
Aluminum	mg/L	0.0074 - 0.050[h]	0.024 - 0.10[h]	-	-	-	-	-	-	-	-	-	-	-
Antimony	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Bismuth	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/L	0.000018 - 0.00046[b]	0.000038 - 0.0028[b]	-	-	-	-	-	-	-	-	-	-	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	mg/L	0.002[i]	0.00020 - 0.00046[i]	-	-	-	-	-	-	-	-	-	-	-
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	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Zirconium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-

Table Notes:
BC WQG = British Columbia Approved (updated December 2021) and Working (updated February 2021) Water Quality Guidelines for the protection of freshwater aquatic life (AW-F)
[a] = guideline is a minimum value.
[b] = guideline is hardness dependent.
[c] = for some samples, water hardness was greater than 250 mg/L.
[d] = guideline is chloride dependent.
[e] & [f] = the ammonia guideline is pH and temperature dependent.
[g] = guideline is for chromium VI.
[h] = guideline is pH dependent.
[i] = guideline for dissolved copper is pH, hardness, and dissolved organic carbon dependent.
[Mn] = Exceeds BC WQG long-term chronic (30-day mean)
[Mx] = Exceeds BC WQG short-term acute (maximum)
[DL>Mn] = Detection Limit exceeds BC WQG 30-day mean
[DL>Mx] = Detection Limit exceeds BC WQG maximum
< Indicates parameter was below laboratory equipment detection limit.
- Chemical not analyzed or criteria not defined

Appendix C
Results of Surface Water Analyses
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name		SW-21	SW-21B	SW-21	SW-21B	SW-21	SW-21B	SW-21	SW-21B	SW-21	SW-21B	SW-21	SW-21B
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	2009-09-24	2009-09-24	2010-02-22	2010-02-22	2010-06-15	2010-06-15	2010-10-25	2010-10-25	2011-02-15	2011-02-15	2012-02-22	2012-02-22
Field Measured															
pH	-	6.5 - 9.0	6.5 - 9.0	-	-	-	-	-	-	-	-	-	-	-	-
Temperature	°C	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved oxygen	mg/L	8[a]	5[a]	-	-	-	-	-	-	-	-	-	-	-	-
Conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation reduction potential	mV	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conventional Parameters															
pH, lab	-	6.5 - 9.0	6.5 - 9.0	7.9	-	7.6	-	7.9	-	8.1	-	7.6	-	7.9	-
Specific conductivity	µS/cm	-	-	949	-	1,077	-	1,199	-	1,540	-	-	-	-	-
Hardness, as $CaCO_3$	mg/L	-	-	281	-	332	-	358	-	424	-	310	-	283	-
Total alkalinity, as $CaCO_3$	mg/L	20[a]	-	-	-	-	-	-	-	-	-	-	-	-	-
Total suspended solids	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	895	-	1090	-
Hardness, as $CaCO_3$ (Dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Major Ions															
Bromide	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride	mg/L	150	600	82	82	80	80	110	110	89	89	41	41	60	60
Fluoride	mg/L	-	0.40 - 2.2[b]	0.11	0.11	0.16	0.16	0.16	0.16	0.040	0.040	<0.1	<0.1	<0.1	<0.1
Magnesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate	mg/L	128 - 429[b, c]	-	11	11	14	14	4.5	4.5	12	12	18	18	11	11
Nutrients and Biological Indicators															
Nitrate	mg-N/L	3.0	33	**6.8[Mn]**	-	**21[Mn]**	-	**9.2[Mn]**	-	**5.5[Mn]**	-	**15[Mn]**	**15[Mn]**	**10[Mn]**	**10[Mn]**
Nitrite	mg-N/L	0.020 - 0.20[d]	0.060 - 0.60[d]	0.11	-	0.11	-	0.11	-	0.047	-	0.047	0.047	0.038	0.038
Total ammonia	mg-N/L	0.11 - 2.0[e]	0.74 - 26[f]	0.76	-	**11[Mn, Mx]**	-	**3.3[Mn]**	-	**29[Mn, Mx]**	-	**4.7[Mn]**	-	**18[Mn, Mx]**	-
Total Kjeldahl Nitrogen	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total phosphorus	mg-P/L	-	-	-	-	-	-	-	-	-	-	0.021	-	0.031	-
Dissolved phosphorus	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Orthophosphate	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Biochemical oxygen demand	mg/L	-	-	5.4	-	-	-	17	-	<4.0	-	<4.0	-	15	-
Chemical oxygen demand	mg/L	-	-	66	-	62	-	198	-	102	-	77	-	54	-
Total Metals															
Aluminum	mg/L	-	-	0.014	-	0.013	-	0.012	-	0.019	-	0.19	-	0.44	-
Antimony	mg/L	0.0090	-	-	-	-	-	-	-	-	-	<0.0005	<0.0005	<0.0005	<0.0005
Arsenic	mg/L	-	0.005	0.00040	0.00040	0.00040	0.00040	0.00050	0.00050	0.00060	0.00060	0.00020	0.00020	0.000040	0.000040
Barium	mg/L	1.0	-	0.15	0.15	0.18	0.18	0.31	0.31	0.23	0.23	0.079	0.079	0.17	0.17
Beryllium	mg/L	0.00013	-	-	-	-	-	-	-	-	-	<0.0001	<0.0001	<0.0001	<0.0001
Bismuth	mg/L	-	-	-	-	-	-	-	-	-	-	<0.001	-	<0.001	-
Boron	mg/L	1.2	-	**1.4[Mn]**	**1.4[Mn]**	**1.4[Mn]**	**1.4[Mn]**	**1.4[Mn]**	**1.4[Mn]**	**2.2[Mn]**	**2.2[Mn]**	1.1	1.1	**1.5[Mn]**	**1.5[Mn]**
Cadmium	mg/L	-	-	0.000010	0.000010	0.000080	0.000080	0.00026	0.00026	0.00023	0.00023	0.000050	0.000050	0.000060	0.000060
Calcium	mg/L	-	-	91	-	121	-	94	-	125	-	98	-	88	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	0.0010[g]	-	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.003	0.003	0.0010	0.0010	<0.001	<0.001
Cobalt	mg/L	0.0040	0.11	0.0013	0.0013	0.0010	0.0010	0.0015	0.0015	0.0014	0.0014	0.00080	0.00080	0.0011	0.0011
Copper	mg/L	-	-	0.0032	0.0032	0.0029	0.0029	0.044	0.044	0.08	0.08	0.0030	0.003	0.0038	0.0038
Iron	mg/L	-	1.0	0.059	-	0.056	-	0.023	-	0.045	-	0.26	-	0.89	-
Lead	mg/L	0.020[b]	0.0030 - 0.42[b]	0.00030	0.00030	-	-	-	-	0.00020	0.00020	<0.0002	<0.0002	<0.0002	<0.0002
Lithium	mg/L	-	-	-	-	-	-	-	-	-	-	<0.005	-	<0.005	-
Magnesium	mg/L	-	-	17	-	21	-	21	-	23	-	16	-	15	-
Manganese	mg/L	0.77 - 2.6[b]	0.82 - 3.4[b]	0.39	-	0.22	-	0.19	-	1.3	-	0.091	-	0.67	-
Mercury	mg/L	0.000010	-	**0.000040[Mn]**	**0.000040[Mn]**	**0.000040[Mn]**	**0.000040[Mn]**	**0.000030[Mn]**	**0.000030[Mn]**	**0.000020[Mn]**	**0.000020[Mn]**	<0.00001	<0.00001	<0.00001	<0.00001
Molybdenum	mg/L	7.6	46	-	-	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001
Nickel	mg/L	0.025 - 0.15[b]	-	0.0060	0.0060	0.0060	0.0060	0.0060	0.0060	0.010	0.010	0.0040	0.0040	0.0050	0.0050
Potassium	mg/L	-	-	41	-	44	-	51	-	51	-	37	-	35	-
Rubidium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/L	0.0020	-	0.00010	0.00010	-	-	0.00010	0.00010	0.00010	0.00010	<0.0001	<0.0001	<0.0001	<0.0001
Silicon	mg/L	-	-	5.3	-	6.0	-	4.1	-	6.7	-	5.9	-	5.8	-
Silver	mg/L	0.000050 - 0.0015[b]	0.00010 - 0.0030[b]	-	-	-	-	-	-	-	-	0.0000080	0.0000080	<0.00002	<0.00002
Sodium	mg/L	-	-	76	-	83	-	92	-	98	-	56	-	61	-
Strontium	mg/L	-	-	0.57	-	0.72	-	0.71	-	0.85	-	0.57	-	0.58	-
Sulphur	mg/L	-	-	-	-	6.0	-	-	-	6.0	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	-	-	-	-	7.0	-	4.8	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	0.00080	-	-	-	-	-	-	-	-	-	<0.00005	<0.00005	<0.00005	<0.00005
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	-	-	-	-	-	-	-	<0.005	-	<0.005	-
Titanium	mg/L	-	-	-	-	-	-	-	-	-	-	0.0070	-	0.017	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	0.0085	-	0.00010	0.00010	0.00010	0.00010	0.00020	0.00020	0.00010	0.00010	0.00010	0.00010	<0.0001	<0.0001
Vanadium	mg/L	-	-	-	-	-	-	-	-	-	-	<0.005	-	<0.005	-
Zinc	mg/L	0.0075 - 0.19[b]	0.033 - 0.34[b]	0.031	**0.031[Mn]**	0.030	**0.030[Mn]**	0.032	**0.032[Mn]**	0.044	**0.044[Mn, Mx]**	<0.005	<0.005	0.0050	0.0050
Zirconium	mg/L	-	-	-	-	-	-	-	-	-	-	<0.0005	-	0.0023	-
Dissolved Metals															
Aluminum	mg/L	0.0074 - 0.050[h]	0.024 - 0.10[h]	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bismuth	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/L	0.000018 - 0.00046[b]	0.000038 - 0.0028[b]	-	-	-	-	-	-	-	-	-	-	-	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	mg/L	0.002[i]	0.00020 - 0.00046[i]	-	-	-	-	-	-	-	-	-	-	-	-
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	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zirconium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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[b] = guideline is hardness dependent.
[c] = for some samples, water hardness was greater than 250 mg/L.
[d] = guideline is chloride dependent.
[e] & [f] = the ammonia guideline is pH and temperature dependent.
[g] = guideline is for chromium VI.
[h] = guideline is pH dependent.
[i] = guideline for dissolved copper is pH, hardness, and dissolved organic carbon dependent.
[Mn] = Exceeds BC WQG long-term chronic (30-day mean)
[Mx] = Exceeds BC WQG short-term acute (maximum)
[DL>Mn] = Detection Limit exceeds BC WQG 30-day mean
[DL>Mx] = Detection Limit exceeds BC WQG maximum
< Indicates parameter was below laboratory equipment detection limit.
- Chemical not analyzed or criteria not defined

Appendix C
Results of Surface Water Analyses
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name		SW-21	SW-21B	SW-21	SW-21B	SW-21	SW-21B	SW-21	SW-21B	SW-21	SW-21B	SW-21	SW-21B
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	2012-05-08	2012-05-08	2013-01-04	2013-01-04	2013-04-15	2013-04-15	2013-06-06	2013-06-06	2013-10-22	2013-10-22	2014-05-06	2014-05-06
Field Measured															
pH	-	6.5 - 9.0	6.5 - 9.0	-	-	-	-	-	-	-	-	-	-	-	-
Temperature	°C	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved oxygen	mg/L	8[a]	5[a]	-	-	-	-	-	-	-	-	-	-	-	-
Conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation reduction potential	mV	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conventional Parameters															
pH, lab	-	6.5 - 9.0	6.5 - 9.0	7.8	-	7.6	-	7.8	-	8.0	-	7.2	-	7.8	-
Specific conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hardness, as $CaCO_3$	mg/L	-	-	272	-	357	-	394	-	476	-	478	-	361	-
Total alkalinity, as $CaCO_3$	mg/L	20[a]	-	-	-	-	-	-	-	-	-	-	-	-	-
Total suspended solids	mg/L	-	-	-	-	<1.0	-	-	-	7.8	-	<1.0	-	2.6	-
Conductivity	µS/cm	-	-	1020	-	1360	-	1260	-	1210	-	1590	-	1290	-
Hardness, as $CaCO_3$ (Dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Major Ions															
Bromide	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride	mg/L	150	600	59	59	108	108	74	74	104	104	143	143	108	108
Fluoride	mg/L	-	0.40 - 2.2[b]	<0.1	<0.1	<0.1	<0.1	0.069	0.069	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Magnesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate	mg/L	128 - 429[b, c]	-	6.8	6.8	8.5	8.5	8.8	8.8	6.7	6.7	19	19	21	21
Nutrients and Biological Indicators															
Nitrate	mg-N/L	3.0	33	**7.7[Mn]**	**7.7[Mn]**	**22[Mn]**	**22[Mn]**	**15[Mn]**	**15[Mn]**	**4.5[Mn]**	**4.5[Mn]**	**14[Mn]**	**14[Mn]**	**15[Mn]**	**15[Mn]**
Nitrite	mg-N/L	0.020 - 0.20[d]	0.060 - 0.60[d]	0.057	0.057	0.041	0.041	0.062	0.062	0.013	0.013	0.12	0.12	0.058	0.058
Total ammonia	mg-N/L	0.11 - 2.0[e]	0.74 - 26[f]	**15[Mn, Mx]**	-	**11[Mn, Mx]**	-	**13[Mn, Mx]**	-	**1.7[Mn]**	-	**12[Mn]**	-	<0.03	-
Total Kjeldahl Nitrogen	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total phosphorus	mg-P/L	-	-	0.025	-	0.022	-	<0.01	-	0.11	-	0.030	-	0.015	-
Dissolved phosphorus	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Orthophosphate	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Biochemical oxygen demand	mg/L	-	-	16	-	5.8	-	<6.0	-	10	-	13	-	4.1	-
Chemical oxygen demand	mg/L	-	-	39	-	61	-	59	-	47	-	68	-	89	-
Total Metals															
Aluminum	mg/L	-	-	0.16	-	0.020	-	0.033	-	0.056	-	0.024	-	0.037	-
Antimony	mg/L	0.0090	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0006	<0.0006	<0.0007	<0.0007	<0.0008	<0.0008	<0.0008	<0.0008
Arsenic	mg/L	-	0.005	0.00044	0.00044	0.00032	0.00032	0.00041	0.00041	0.00061	0.00061	0.00064	0.00064	0.00048	0.00048
Barium	mg/L	1.0	-	0.15	0.15	0.14	0.14	0.17	0.17	0.11	0.11	0.23	0.23	0.16	0.16
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	<0.0001	<0.0001
Bismuth	mg/L	-	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
Boron	mg/L	1.2	-	**1.2[Mn]**	**1.2[Mn]**	**1.2[Mn]**	**1.2[Mn]**	**1.8[Mn]**	**1.8[Mn]**	**1.6[Mn]**	**1.6[Mn]**	**2.4[Mn]**	**2.4[Mn]**	**1.8[Mn]**	**1.8[Mn]**
Cadmium	mg/L	-	-	0.000032	0.000032	0.000036	0.000036	0.000029	0.000029	0.000076	0.000076	0.000041	0.000041	0.000060	0.000060
Calcium	mg/L	-	-	85	-	109	-	120	-	148	-	145	-	110	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	0.0010[g]	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.0011	0.0011	<0.001	<0.001
Cobalt	mg/L	0.0040	0.11	0.00081	0.00081	0.00094	0.00094	0.0011	0.0011	0.0012	0.0012	0.0016	0.0016	0.0015	0.0015
Copper	mg/L	-	-	0.0019	0.0019	0.0024	0.0024	0.0020	0.0020	0.0030	0.003	0.0023	0.0023	0.0025	0.0025
Iron	mg/L	-	1.0	0.63	-	0.065	-	0.21	-	0.15	-	0.18	-	0.077	-
Lead	mg/L	0.020[b]	0.0030 - 0.42[b]	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.002	<0.002
Lithium	mg/L	-	-	<0.005	-	<0.0005	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-
Magnesium	mg/L	-	-	15	-	20	-	23	-	26	-	28	-	21	-
Manganese	mg/L	0.77 - 2.6[b]	0.82 - 3.4[b]	0.88	-	0.19	-	0.55	-	0.42	-	0.93	-	0.53	-
Mercury	mg/L	0.000010	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Molybdenum	mg/L	7.6	46	<0.001	<0.001	<0.001	<0.001	0.00035	0.00035	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Nickel	mg/L	0.025 - 0.15[b]	-	0.0039	0.0039	0.0044	0.0044	0.0055	0.0055	0.0053	0.0053	0.0078	0.0078	0.0066	0.0066
Potassium	mg/L	-	-	31	-	41	-	46	-	57	-	61	-	46	-
Rubidium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/L	0.0020	-	<0.0001	<0.0001	<0.00004	<0.00004	<0.00004	<0.00004	0.00016	0.00016	0.00023	0.00023	<0.00004	<0.00004
Silicon	mg/L	-	-	5.5	-	5.1	-	6.3	-	7.3	-	7.6	-	5.6	-
Silver	mg/L	0.000050 - 0.0015[b]	0.00010 - 0.0030[b]	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
Sodium	mg/L	-	-	55	-	74	-	87	-	104	-	126	-	97	-
Strontium	mg/L	-	-	0.57	-	0.73	-	0.77	-	0.90	-	0.94	-	0.75	-
Sulphur	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	4.1	-	<15	-	<75	-	3.5	-	7.7	-	<3.0	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	0.00080	-	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-
Titanium	mg/L	-	-	0.0055	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	0.0085	-	<0.0001	<0.0001	0.00014	0.00014	0.00011	0.00011	0.00021	0.00021	0.00017	0.00017	0.00014	0.00014
Vanadium	mg/L	-	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-
Zinc	mg/L	0.0075 - 0.19[b]	0.033 - 0.34[b]	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.0055	0.0055	<0.005	<0.005	0.0061	0.0061
Zirconium	mg/L	-	-	0.00054	-	<0.0005	-	<0.0005	-	<0.0005	-	<0.0005	-	<0.0005	-
Dissolved Metals															
Aluminum	mg/L	0.0074 - 0.050[h]	0.024 - 0.10[h]	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bismuth	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/L	0.000018 - 0.00046[b]	0.000038 - 0.0028[b]	-	-	-	-	-	-	-	-	-	-	-	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	mg/L	0.002[i]	0.00020 - 0.00046[i]	-	-	-	-	-	-	-	-	-	-	-	-
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	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zirconium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table Notes:
BC WQG = British Columbia Approved (updated December 2021) and Working (updated February 2021) Water Quality Guidelines for the protection of freshwater aquatic life (AW-F)
[a] = guideline is a minimum value.
[b] = guideline is hardness dependent.
[c] = for some samples, water hardness was greater than 250 mg/L.
[d] = guideline is chloride dependent.
[e] & [f] = the ammonia guideline is pH and temperature dependent.
[g] = guideline is for chromium VI.
[h] = guideline is pH dependent.
[i] = guideline for dissolved copper is pH, hardness, and dissolved organic carbon dependent.
[Mn] = Exceeds BC WQG long-term chronic (30-day mean)
[Mx] = Exceeds BC WQG short-term acute (maximum)
[DL>Mn] = Detection Limit exceeds BC WQG 30-day mean
[DL>Mx] = Detection Limit exceeds BC WQG maximum
< Indicates parameter was below laboratory equipment detection limit.
- Chemical not analyzed or criteria not defined

Appendix C
Results of Surface Water Analyses
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name		SW-21	SW-21B	SW-21	SW-21B	SW-21	SW-21B	SW-21	SW-21B	SW-21	SW-21B	SW-21	SW-21B
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	2014-10-29	2014-10-29	2015-03-31	2015-03-31	2015-08-11	2015-08-11	2015-11-04	2015-11-04	2016-03-22	2016-03-22	2016-07-25	2016-07-25
Field Measured															
pH	-	6.5 - 9.0	6.5 - 9.0	-	-	-	-	-	-	-	-	-	-	-	-
Temperature	°C	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved oxygen	mg/L	8[a]	5[a]	-	-	-	-	-	-	-	-	-	-	-	-
Conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation reduction potential	mV	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conventional Parameters															
pH, lab	-	6.5 - 9.0	6.5 - 9.0	7.9	-	8.0	-	8.0	-	8.0	-	8.1	-	8.0	-
Specific conductivity	µS/cm	-	-	-	-	1,050	-	-	-	-	-	-	-	-	-
Hardness, as $CaCO_3$	mg/L	-	-	333	-	277	-	418	-	-	-	637	-	641	-
Total alkalinity, as $CaCO_3$	mg/L	20[a]	-	-	-	-	-	-	-	-	-	-	-	-	-
Total suspended solids	mg/L	-	-	2.2	-	2.9	-	<1.0	-	1.9	-	3.8	-	6.8	-
Conductivity	µS/cm	-	-	1380	-	-	-	1280	-	1680	-	1810	-	1450	-
Hardness, as $CaCO_3$ (Dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Major Ions															
Bromide	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride	mg/L	150	600	107	107	75	75	121	121	119	119	**153**[Mn]	**153**[Mn]	138	138
Fluoride	mg/L	-	0.40 - 2.2[b]	<0.1	<0.1	-	-	0.10	0.10	0.10	0.10	0.11	0.11	0.11	0.11
Magnesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate	mg/L	128 - 429[b, c]	-	30	30	31	31	32	32	-	-	39	39	36	36
Nutrients and Biological Indicators															
Nitrate	mg-N/L	3.0	33	**4.8**[Mn]	**4.8**[Mn]	**8.2**[Mn]	-	**6.9**[Mn]	**6.9**[Mn]	**7.2**[Mn]	**7.2**[Mn]	**7.7**[Mn]	**7.7**[Mn]	**9.8**[Mn]	**9.8**[Mn]
Nitrite	mg-N/L	0.020 - 0.20[d]	0.060 - 0.60[d]	0.080	0.080	0.15	-	-	-	0.059	0.059	0.061	0.061	0.15	0.15
Total ammonia	mg-N/L	0.11 - 2.0[e]	0.74 - 26[f]	**31**[Mn, Mx]	-	**18**[Mn, Mx]	-	0.17	-	**37**[Mn, Mx]	-	**40**[Mn, Mx]	-	**11**[Mn, Mx]	-
Total Kjeldahl Nitrogen	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total phosphorus	mg-P/L	-	-	0.033	-	-	-	0.19	-	-	-	0.040	-	0.040	-
Dissolved phosphorus	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Orthophosphate	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Biochemical oxygen demand	mg/L	-	-	10	-	-	-	<4.0	-	25	-	33	-	37	-
Chemical oxygen demand	mg/L	-	-	130	-	70	-	98	-	106	-	142	-	130	-
Total Metals															
Aluminum	mg/L	-	-	0.21	-	0.50	-	0.051	-	-	-	0.11	-	0.31	-
Antimony	mg/L	0.0090	-	<0.0008	<0.0008	0.00030	0.00030	0.00040	0.00040	-	-	0.00040	0.00040	0.00060	0.00060
Arsenic	mg/L	-	0.005	0.00086	0.00086	0.00070	0.00070	0.00080	0.00080	-	-	0.0013	0.0013	0.0013	0.0013
Barium	mg/L	1.0	-	0.29	0.29	0.24	0.24	0.19	0.19	-	-	0.31	0.31	0.46	0.46
Beryllium	mg/L	0.00013	-	<0.0001	<0.0001	-	-	<0.0001	<0.0001	-	-	<0.0001	<0.0001	<0.0001	<0.0001
Bismuth	mg/L	-	-	<0.001	-	-	-	<0.0001	-	-	-	<0.0001	-	<0.0001	-
Boron	mg/L	1.2	-	**2.4**[Mn]	**2.4**[Mn]	**1.8**[Mn]	**1.8**[Mn]	**3.1**[Mn]	**3.1**[Mn]	-	-	**3.6**[Mn]	**3.6**[Mn]	**2.8**[Mn]	**2.8**[Mn]
Cadmium	mg/L	-	-	0.000089	0.000089	0.000040	0.000040	0.000050	0.000050	-	-	0.000030	0.000030	0.000060	0.000060
Calcium	mg/L	-	-	105	-	87	-	128	-	-	-	197	-	194	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	0.0010[g]	-	0.0015	0.0015	0.0014	0.0014	0.0014	0.0014	-	-	0.0021	0.0021	0.0016	0.0016
Cobalt	mg/L	0.0040	0.11	0.0017	0.0017	0.0015	0.0015	0.0023	0.0023	-	-	0.0031	0.0031	0.0040	0.0040
Copper	mg/L	-	-	0.0045	0.0045	0.0049	0.0049	0.0035	0.0035	-	-	0.0027	0.0027	0.0058	0.0058
Iron	mg/L	-	1.0	0.64	-	0.81	-	0.21	-	-	-	0.94	-	0.82	-
Lead	mg/L	0.020[b]	0.0030 - 0.42[b]	0.00026	0.00026	0.00020	0.00020	<0.0001	<0.0001	-	-	0.00010	0.00010	0.00010	0.00010
Lithium	mg/L	-	-	<0.005	-	0.0018	-	0.0012	-	-	-	0.0022	-	0.0012	-
Magnesium	mg/L	-	-	17	-	15	-	24	-	-	-	35	-	38	-
Manganese	mg/L	0.77 - 2.6[b]	0.82 - 3.4[b]	1.0	-	0.90	-	0.59	-	-	-	2.6	-	**4.2**[Mn, Mx]	-
Mercury	mg/L	0.000010	-	<0.00001	<0.00001	-	-	<0.00002[DL>Mn]	<0.00002[DL>Mn]	-	-	<0.00002[DL>Mn]	<0.00002[DL>Mn]	<0.00002[DL>Mn]	<0.00002[DL>Mn]
Molybdenum	mg/L	7.6	46	<0.001	<0.001	0.00070	0.00070	0.0011	0.0011	-	-	0.0010	0.0010	0.0029	0.0029
Nickel	mg/L	0.025 - 0.15[b]	-	0.010	0.010	0.0076	0.0076	0.0082	0.0082	-	-	0.0085	0.0085	0.0084	0.0084
Potassium	mg/L	-	-	46	-	38	-	56	-	-	-	88	-	58	-
Rubidium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/L	0.0020	-	0.00016	0.00016	-	-	<0.0005	<0.0005	-	-	<0.0005	<0.0005	<0.0005	<0.0005
Silicon	mg/L	-	-	6.9	-	6.9	-	9.0	-	-	-	12	-	11	-
Silver	mg/L	0.000050 - 0.0015[b]	0.00010 - 0.0030[b]	<0.00002	<0.00002	-	-	<0.00005	<0.00005	-	-	<0.00005	<0.00005	<0.00005	<0.00005
Sodium	mg/L	-	-	93	-	74	-	137	-	-	-	185	-	139	-
Strontium	mg/L	-	-	0.72	-	0.57	-	0.88	-	-	-	1.2	-	1.2	-
Sulphur	mg/L	-	-	-	-	7.0	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	12	-	-	-	16	-	-	-	21	-	32	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	0.00080	-	<0.00005	<0.00005	-	-	<0.00002	<0.00002	-	-	<0.00002	<0.00002	<0.00002	<0.00002
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	<0.005	-	-	-	0.00040	-	-	-	0.00030	-	0.00020	-
Titanium	mg/L	-	-	0.0056	-	0.015	-	<0.005	-	-	-	<0.005	-	0.0080	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	0.0085	-	0.00012	0.00012	0.00010	0.00010	0.00024	0.00024	-	-	0.00021	0.00021	0.00070	0.00070
Vanadium	mg/L	-	-	<0.005	-	0.0010	-	<0.001	-	-	-	<0.001	-	0.0010	-
Zinc	mg/L	0.0075 - 0.19[b]	0.033 - 0.34[b]	0.0091	**0.0091**[Mn]	0.0080	**0.0080**[Mn]	0.0050	0.0050	-	-	0.010	**0.010**[Mn]	0.014	**0.014**[Mn]
Zirconium	mg/L	-	-	<0.0005	-	0.00040	-	0.00020	-	-	-	0.00050	-	0.00050	-
Dissolved Metals															
Aluminum	mg/L	0.0074 - 0.050[h]	0.024 - 0.10[h]	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bismuth	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/L	0.000018 - 0.00046[b]	0.000038 - 0.0028[b]	-	-	-	-	-	-	-	-	-	-	-	-
Cesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	mg/L	0.002[i]	0.00020 - 0.00046[i]	-	-	-	-	-	-	-	-	-	-	-	-
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	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thorium-232	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zirconium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table Notes:
BC WQG = British Columbia Approved (updated December 2021) and Working (updated February 2021) Water Quality Guidelines for the protection of freshwater aquatic life (AW-F)
[a] = guideline is a minimum value.
[b] = guideline is hardness dependent.
[c] = for some samples, water hardness was greater than 250 mg/L.
[d] = guideline is chloride dependent.
[e] & [f] = the ammonia guideline is pH and temperature dependent.
[g] = guideline is for chromium VI.
[h] = guideline is pH dependent.
[i] = guideline for dissolved copper is pH, hardness, and dissolved organic carbon dependent.
[Mn] = Exceeds BC WQG long-term chronic (30-day mean)
[Mx] = Exceeds BC WQG short-term acute (maximum)
[DL>Mn] = Detection Limit exceeds BC WQG 30-day mean
[DL>Mx] = Detection Limit exceeds BC WQG maximum
< Indicates parameter was below laboratory equipment detection limit.
- Chemical not analyzed or criteria not defined

Appendix C
Results of Surface Water Analyses
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name		SW-21	SW-21B	SW-21	SW-21B	SW-21	SW-21B	SW-21	SW-21B	SW-21	SW-21B	SW-21	SW-21B
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	2016-10-13	2016-10-13	2017-03-28	2017-03-28	2017-08-24	2017-08-24	2018-03-19	2018-03-19	2018-07-04	2018-07-04	2018-09-10	2018-09-10
Field Measured															
pH	-	6.5 - 9.0	6.5 - 9.0	-	-	-	-	-	-	-	-	7.4	-	7.9	-
Temperature	°C	-	-	-	-	-	-	-	-	-	-	14	-	14	-
Dissolved oxygen	mg/L	8[a]	5[a]	-	-	-	-	-	-	-	-	2.3[Mn, Mx]	-	2.0[Mn, Mx]	-
Conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	774	-	642	-
Oxidation reduction potential	mV	-	-	-	-	-	-	-	-	-	-	445	-	105	-
Conventional Parameters															
pH, lab	-	6.5 - 9.0	6.5 - 9.0	7.9	-	7.8	-	7.9	-	8.3	-	8.4	-	8.5	-
Specific conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hardness, as $CaCO_3$	mg/L	-	-	444	-	114	-	212	-	141	-	255	-	165	-
Total alkalinity, as $CaCO_3$	mg/L	20[a]	-	-	-	-	-	-	-	144	-	399	-	300	-
Total suspended solids	mg/L	-	-	10	-	22	-	15	-	<3.0	-	3.6	-	35	-
Conductivity	µS/cm	-	-	1500	-	373	-	768	-	349	-	954	-	779	-
Hardness, as $CaCO_3$ (Dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Major Ions															
Bromide	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	mg/L	-	-	-	-	-	-	-	-	45	-	64	-	36	-
Chloride	mg/L	150	600	118	118	24	24	54	54	9.6	9.6	69	69	65	65
Fluoride	mg/L	-	0.40 - 2.2[b]	<0.1	<0.1	<0.1	<0.1	0.10	0.10	0.061	0.061	<0.1	<0.1	0.10	0.10
Magnesium	mg/L	-	-	-	-	-	-	-	-	7.1	-	23	-	18	-
Potassium	mg/L	-	-	-	-	-	-	-	-	9.6	-	44	-	36	-
Sodium	mg/L	-	-	-	-	-	-	-	-	15	-	90	-	75	-
Sulphate	mg/L	128 - 429[b, c]	-	45	45	6.2	6.2	12	12	7.2	7.2	7.9	7.9	8.1	8.1
Nutrients and Biological Indicators															
Nitrate	mg-N/L	3.0	33	5.3[Mn]	5.3[Mn]	0.24	0.24	3.2[Mn]	3.2[Mn]	1.6	1.6	5.0[Mn]	5.0[Mn]	1.7	1.7
Nitrite	mg-N/L	0.020 - 0.20[d]	0.060 - 0.60[d]	0.014	0.014	0.013	0.013	0.12	0.12	0.017	0.017	0.22[Mn]	0.22[Mn]	0.18	0.18
Total ammonia	mg-N/L	0.11 - 2.0[e]	0.74 - 26[f]	28[Mn, Mx]	-	5.9[Mn]	-	9.1[Mn, Mx]	-	3.9[Mn, Mx]	-	9.0[Mn]	-	4.2[Mn]	-
Total Kjeldahl Nitrogen	mg-N/L	-	-	-	-	-	-	-	-	4.5	-	12	-	5.9	-
Total phosphorus	mg-P/L	-	-	0.030	-	0.080	-	0.10	-	<0.05	-	0.0034	-	0.15	-
Dissolved phosphorus	mg-P/L	-	-	-	-	-	-	-	-	<0.05	-	<0.05	-	<0.05	-
Orthophosphate	mg-P/L	-	-	-	-	-	-	-	-	-	-	<0.001	-	0.0013	-
Biochemical oxygen demand	mg/L	-	-	15	-	<5.0	-	14	-	<2.0	-	5.4	-	6.4	-
Chemical oxygen demand	mg/L	-	-	104	-	48	-	48	-	22	-	86	-	113	-
Total Metals															
Aluminum	mg/L	-	-	0.30	-	3.5	-	0.52	-	0.45	-	0.13	-	0.59	-
Antimony	mg/L	0.0090	-	0.00060	0.00060	0.00020	0.00020	0.00021	0.00021	<0.0001	<0.0001	0.00024	0.00024	0.00032	0.00032
Arsenic	mg/L	-	0.005	0.0014	0.0014	0.0018	0.0018	0.0012	0.0012	0.00034	0.00034	0.0012	0.0012	0.0037	0.0037
Barium	mg/L	1.0	-	0.55	0.55	0.12	0.12	0.14	0.14	0.077	0.077	0.14	0.14	0.13	0.13
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	<0.0001	<0.0001
Bismuth	mg/L	-	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.00005	-	<0.00005	-	<0.00005	-
Boron	mg/L	1.2	-	1.7[Mn]	1.7[Mn]	0.45	0.45	1.3[Mn]	1.3[Mn]	0.33	0.33	1.5[Mn]	1.5[Mn]	1.3[Mn]	1.3[Mn]
Cadmium	mg/L	-	-	0.00014	0.00014	0.000060	0.000060	0.000055	0.000055	0.000016	0.000016	0.000024	0.000024	0.000030	0.000030
Calcium	mg/L	-	-	135	-	35	-	58	-	39	-	62	-	36	-
Cesium	mg/L	-	-	-	-	-	-	-	-	0.000047	-	0.000090	-	0.000089	-
Chromium	mg/L	0.0010[g]	-	0.0015	0.0015	0.0039	0.0039	0.00099	0.00099	0.00057	0.00057	0.00058	0.00058	0.00096	0.00096
Cobalt	mg/L	0.0040	0.11	0.0037	0.0037	0.0023	0.0023	0.0016	0.0016	0.00051	0.00051	0.0019	0.0019	0.0019	0.0019
Copper	mg/L	-	-	0.0069	0.0069	0.01	0.01	0.0040	0.004	0.0020	0.0020	0.0035	0.0035	0.0041	0.0041
Iron	mg/L	-	1.0	1.2[Mx]	-	4.6[Mx]	-	0.82	-	0.52	-	0.36	-	1.9[Mx]	-
Lead	mg/L	0.020[b]	0.0030 - 0.42[b]	0.00020	0.00020	0.0011	0.0011	0.00021	0.00021	0.00010	0.00010	0.000076	0.000076	0.00041	0.00041
Lithium	mg/L	-	-	0.0010	-	0.0025	-	0.00088	-	<0.001	-	<0.001	-	<0.001	-
Magnesium	mg/L	-	-	26	-	6.8	-	17	-	6.1	-	20	-	19	-
Manganese	mg/L	0.77 - 2.6[b]	0.82 - 3.4[b]	5.5[Mn, Mx]	-	0.79	-	0.56	-	0.51	-	0.21	-	0.30	-
Mercury	mg/L	0.000010	-	<0.00002[DL>Mn]	<0.00002[DL>Mn]	<0.00002[DL>Mn]	<0.00002[DL>Mn]	<0.00001	<0.00001	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005
Molybdenum	mg/L	7.6	46	0.0017	0.0017	0.00040	0.00040	0.0013	0.0013	0.00025	0.00025	0.00095	0.00095	0.0011	0.0011
Nickel	mg/L	0.025 - 0.15[b]	-	0.0073	0.0073	0.0055	0.0055	0.0037	0.0037	0.0011	0.0011	0.0051	0.0051	0.0040	0.0040
Potassium	mg/L	-	-	33	-	8.9	-	27	-	8.3	-	39	-	34	-
Rubidium	mg/L	-	-	-	-	-	-	-	-	0.0048	-	0.024	-	0.020	-
Selenium	mg/L	0.0020	-	<0.0005	<0.0005	<0.0005	<0.0005	0.00054	0.00054	0.00012	0.00012	0.00022	0.00022	0.00039	0.00039
Silicon	mg/L	-	-	7.2	-	7.9	-	6.0	-	3.3	-	3.8	-	5.2	-
Silver	mg/L	0.000050 - 0.0015[b]	0.00010 - 0.0030[b]	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Sodium	mg/L	-	-	91	-	20	-	61	-	14	-	82	-	74	-
Strontium	mg/L	-	-	0.98	-	0.20	-	0.48	-	0.21	-	0.58	-	0.41	-
Sulphur	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	15	-	<1.0	-	4.3	-	2.7	-	4.0	-	3.6	-
Tellurium	mg/L	-	-	-	-	<0.0002	-	<0.0005	-	<0.0002	-	<0.0002	-	<0.0002	-
Thallium	mg/L	0.00080	-	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Thorium-232	mg/L	-	-	-	-	0.00020	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-
Tin	mg/L	-	-	<0.0002	-	<0.0002	-	<0.0002	-	<0.0001	-	0.00010	-	<0.0001	-
Titanium	mg/L	-	-	0.0090	-	0.089	-	0.011	-	0.011	-	<0.0036	-	0.012	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	0.00022	-	<0.0001	-	<0.0001	-
Uranium	mg/L	0.0085	-	0.00063	0.00063	0.00014	0.00014	0.00022	0.00022	0.000082	0.000082	0.00040	0.00040	0.00036	0.00036
Vanadium	mg/L	-	-	0.0010	-	0.0080	-	0.0013	-	0.00099	-	<0.0005	-	0.0021	-
Zinc	mg/L	0.0075 - 0.19[b]	0.033 - 0.34[b]	0.0080	0.0080[Mn]	0.014	0.014[Mn]	0.0070	0.0070	<0.003	<0.003	<0.003	<0.003	0.0046	0.0046
Zirconium	mg/L	-	-	0.00040	-	0.0010	-	0.00028	-	0.00021	-	0.00015	-	0.00020	-
Dissolved Metals															
Aluminum	mg/L	0.0074 - 0.050[h]	0.024 - 0.10[h]	-	-	-	-	-	-	0.019	-	0.034	-	0.035	-
Antimony	mg/L	-	-	-	-	-	-	-	-	<0.0001	<0.0001	0.00020	0.00020	0.00027	0.00027
Arsenic	mg/L	-	-	-	-	-	-	-	-	0.00023	0.00023	0.0011	0.0011	0.0026	0.0026
Barium	mg/L	-	-	-	-	-	-	-	-	0.077	0.077	0.13	0.13	0.12	0.12
Beryllium	mg/L	-	-	-	-	-	-	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Bismuth	mg/L	-	-	-	-	-	-	-	-	<0.00005	-	<0.00005	-	<0.00005	-
Boron	mg/L	-	-	-	-	-	-	-	-	0.35	0.35	1.6	1.6	1.3	1.3
Cadmium	mg/L	0.000018 - 0.00046[b]	0.000038 - 0.0028[b]	-	-	-	-	-	-	0.000012	0.000012	0.000024	0.000024	0.000013	0.000013
Cesium	mg/L	-	-	-	-	-	-	-	-	0.000019	-	0.000076	-	0.000043	-
Chromium	mg/L	-	-	-	-	-	-	-	-	0.00018	0.00018	0.00050	0.00050	0.00042	0.00042
Cobalt	mg/L	-	-	-	-	-	-	-	-	0.00029	0.00029	0.0018	0.0018	0.0016	0.0016
Copper	mg/L	0.002[i]	0.00020 - 0.00046[i]	-	-	-	-	-	-	0.0014[Mn, Mx]	0.0014[Mn, Mx]	0.00343[Mn, Mx]	0.00343[Mn, Mx]	0.00235[Mn, Mx]	0.00235[Mn, Mx]
Iron	mg/L	-	0.35	-	-	-	-	-	-	0.027	-	0.091	-	0.42[Mx]	-
Lead	mg/L	-	-	-	-	-	-	-	-	<0.00005	<0.00005	<0.00005	<0.00005	0.000086	0.000086
Lithium	mg/L	-	-	-	-	-	-	-	-	<0.001	-	<0.001	-	<0.001	-
Manganese	mg/L	-	-	-	-	-	-	-	-	0.30	-	0.19	-	0.22	-
Mercury	mg/L	-	-	-	-	-	-	-	-	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005
Molybdenum	mg/L	-	-	-	-	-	-	-	-	0.00026	0.00026	0.00089	0.00089	0.0013	0.0013
Nickel	mg/L	-	-	-	-	-	-	-	-	0.00082	0.00082	0.0051	0.0051	0.0036	0.0036
Rubidium	mg/L	-	-	-	-	-	-	-	-	0.0049	-	0.025	-	0.020	-
Selenium	mg/L	-	-	-	-	-	-	-	-	0.00014	0.00014	0.00025	0.00025	0.00035	0.00035
Silicon	mg/L	-	-	-	-	-	-	-	-	2.8	-	3.6	-	4.5	-
Silver	mg/L	-	-	-	-	-	-	-	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Strontium	mg/L	-	-	-	-	-	-	-	-	0.22	-	0.59	-	0.39	-
Sulphur	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	-	-	2.6	-	3.5	-	3.4	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	<0.0002	-	<0.0002	-	<0.0002	-
Thallium	mg/L	-	-	-	-	-	-	-	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Thorium-232	mg/L	-	-	-	-	-	-	-	-	<0.0001	-	<0.0001	-	<0.0001	-
Tin	mg/L	-	-	-	-	-	-	-	-	<0.0001	-	0.00010	-	<0.0001	-
Titanium	mg/L	-	-	-	-	-	-	-	-	0.00089	-	0.00098	-	0.0017	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	<0.0001	-	<0.0001	-	<0.0001	-
Uranium	mg/L	-	-	-	-	-	-	-	-	0.000085	0.000085	0.00042	0.00042	0.00034	0.00034
Vanadium	mg/L	-	-	-	-	-	-	-	-	<0.0005	-	<0.0005	-	0.00060	-
Zinc	mg/L	-	-	-	-	-	-	-	-	<0.001	<0.001	0.0013	0.0013	<0.001	<0.001
Zirconium	mg/L	-	-	-	-	-	-	-	-	0.000069	-	0.00011	-	0.00020	-

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[g] = guideline is for chromium VI.
[h] = guideline is pH dependent.
[i] = guideline for dissolved copper is pH, hardness, and dissolved organic carbon dependent.
[Mn] = Exceeds BC WQG long-term chronic (30-day mean)
[Mx] = Exceeds BC WQG short-term acute (maximum)
[DL>Mn] = Detection Limit exceeds BC WQG 30-day mean
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< Indicates parameter was below laboratory equipment detection limit.
- Chemical not analyzed or criteria not defined

Appendix C
Results of Surface Water Analyses
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name		SW-21	SW-21B	SW-21	SW-21B	SW-21	SW-21B	SW-21	SW-21B	SW-21	SW-21B	SW-21	SW-21B
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	2019-04-11	2019-04-11	2019-07-17	2019-07-17	2019-10-10	2019-10-10	2020-04-30	2020-04-30	2020-09-01	2020-09-01	2020-10-07	2020-10-07
Field Measured															
pH	-	6.5 - 9.0	6.5 - 9.0	7.4	-	7.8	-	7.8	-	7.6	-	7.4	-	7.3	-
Temperature	°C	-	-	5.6	-	15	-	5.1	-	9.0	-	14	-	11	-
Dissolved oxygen	mg/L	8[a]	5[a]	**2.0**[Mn, Mx]	-	**2.4**[Mn, Mx]	-	**5.8**[Mn]	-	**6.6**[Mn]	-	**4.5**[Mn, Mx]	-	**3.9**[Mn, Mx]	-
Conductivity	µS/cm	-	-	582	-	544	-	390	-	756	-	622	-	457	-
Oxidation reduction potential	mV	-	-	434	-	147	-	163	-	365	-	273	-	239	-
Conventional Parameters															
pH, lab	-	6.5 - 9.0	6.5 - 9.0	8.1	-	8.4	-	8.4	-	8.2	-	8.2	-	7.8	-
Specific conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hardness, as $CaCO_3$	mg/L	-	-	288	-	199	-	217	-	356	-	268	-	218	-
Total alkalinity, as $CaCO_3$	mg/L	20[a]	-	393	-	297	-	289	-	473	-	368	-	306	-
Total suspended solids	mg/L	-	-	-	-	9.8	-	4.6	-	3.6	-	<3.0	-	5.5	-
Conductivity	µS/cm	-	-	909	-	705	-	638	-	1030	-	785	-	660	-
Hardness, as $CaCO_3$ (Dissolved)	mg/L	-	-	-	-	-	-	-	-	335	-	284	-	240	-
Major Ions															
Bromide	mg/L	-	-	0.37	-	0.32	-	-	-	0.34	-	<0.25	-	-	-
Calcium	mg/L	-	-	88	-	55	-	63	-	104	-	90	-	74	-
Chloride	mg/L	150	600	43	43	39	39	28	28	43	43	31	31	22	22
Fluoride	mg/L	-	0.40 - 2.2[b]	0.10	0.10	0.13	0.13	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.13	0.13
Magnesium	mg/L	-	-	17	-	15	-	14	-	18	-	15	-	14	-
Potassium	mg/L	-	-	31	-	24	-	19	-	33	-	21	-	19	-
Sodium	mg/L	-	-	60	-	50	-	38	-	60	-	41	-	33	-
Sulphate	mg/L	128 - 429[b, c]	-	10	10	4.5	4.5	4.7	4.7	5.0	5.0	4.3	4.3	2.9	2.9
Nutrients and Biological Indicators															
Nitrate	mg-N/L	3.0	33	**5.2**[Mn]	**5.2**[Mn]	**3.1**[Mn]	**3.1**[Mn]	2.6	2.6	**4.7**[Mn]	**4.7**[Mn]	2.9	2.9	**3.3**[Mn]	**3.3**[Mn]
Nitrite	mg-N/L	0.020 - 0.20[d]	0.060 - 0.60[d]	0.081	0.081	**0.23**[Mn]	**0.23**[Mn]	0.026	0.026	0.10	0.10	0.096	0.096	0.093	0.093
Total ammonia	mg-N/L	0.11 - 2.0[e]	0.74 - 26[f]	**15**[Mn]	-	**4.0**[Mn]	-	**5.6**[Mn]	-	**24**[Mn, Mx]	-	**10**[Mn]	-	0.096	-
Total Kjeldahl Nitrogen	mg-N/L	-	-	16	-	6.3	-	7.1	-	22	-	13	-	11	-
Total phosphorus	mg-P/L	-	-	0.023	-	0.055	-	0.031	-	<0.05	-	<0.05	-	0.055	-
Dissolved phosphorus	mg-P/L	-	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-
Orthophosphate	mg-P/L	-	-	0.0011	-	<0.001	-	<0.001	-	<0.001	-	0.0030	-	0.0027	-
Biochemical oxygen demand	mg/L	-	-	-	-	7.9	-	2.4	-	4.6	-	5.8	-	4.7	-
Chemical oxygen demand	mg/L	-	-	-	-	51	-	47	-	54	-	56	-	48	-
Total Metals															
Aluminum	mg/L	-	-	0.12	-	0.48	-	0.19	-	0.077	-	0.12	-	0.29	-
Antimony	mg/L	0.0090	-	0.00010	0.00010	0.00021	0.00021	<0.0001	<0.0001	0.00011	0.00011	0.00011	0.00011	0.00012	0.00012
Arsenic	mg/L	-	0.005	0.00058	0.00058	0.0017	0.0017	0.00072	0.00072	0.00072	0.00072	0.00074	0.00074	0.00066	0.00066
Barium	mg/L	1.0	-	0.21	0.21	0.13	0.13	0.15	0.15	0.14	0.14	0.16	0.16	0.12	0.12
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	<0.0001	<0.0001
Bismuth	mg/L	-	-	<0.00005	-	<0.00005	-	<0.00005	-	<0.00005	-	<0.00005	-	<0.00005	-
Boron	mg/L	1.2	-	1.1	1.1	0.97	0.97	0.72	0.72	1.2	1.2	0.81	0.81	0.58	0.58
Cadmium	mg/L	-	-	0.000012	0.000012	0.000021	0.000021	0.000011	0.000011	0.000019	0.000019	0.000017	0.000017	0.000026	0.000026
Calcium	mg/L	-	-	97	-	60	-	66	-	109	-	83	-	68	-
Cesium	mg/L	-	-	0.000078	-	0.000082	-	0.000046	-	0.00010	-	0.000081	-	0.000065	-
Chromium	mg/L	0.0010[g]	-	0.00044	0.00044	0.00070	0.00070	0.00044	0.00044	0.00044	0.00044	0.00042	0.00042	0.00046	0.00046
Cobalt	mg/L	0.0040	0.11	0.0011	0.0011	0.0013	0.0013	0.00064	0.00064	0.0014	0.0014	0.00083	0.00083	0.00061	0.00061
Copper	mg/L	-	-	0.0027	0.0027	0.0027	0.0027	0.0019	0.0019	0.0022	0.0022	0.0021	0.0021	0.0028	0.0028
Iron	mg/L	-	1.0	0.13	-	**1.1**[Mx]	-	0.28	-	0.37	-	0.21	-	0.39	-
Lead	mg/L	0.020[b]	0.0030 - 0.42[b]	<0.00005	<0.00005	0.00019	0.00019	0.000073	0.000073	<0.00005	<0.00005	<0.00005	<0.00005	0.000095	0.000095
Lithium	mg/L	-	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
Magnesium	mg/L	-	-	19	-	16	-	13	-	20	-	15	-	12	-
Manganese	mg/L	0.77 - 2.6[b]	0.82 - 3.4[b]	0.35	-	0.31	-	0.36	-	0.43	-	0.29	-	0.35	-
Mercury	mg/L	0.000010	-	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005
Molybdenum	mg/L	7.6	46	0.00048	0.00048	0.00083	0.00083	0.00044	0.00044	0.00058	0.00058	0.00045	0.00045	0.00035	0.00035
Nickel	mg/L	0.025 - 0.15[b]	-	0.0030	0.0030	0.0029	0.0029	0.0018	0.0018	0.0031	0.0031	0.0022	0.0022	0.0018	0.0018
Potassium	mg/L	-	-	31	-	26	-	18	-	34	-	21	-	16	-
Rubidium	mg/L	-	-	0.018	-	0.017	-	0.011	-	0.022	-	0.014	-	0.010	-
Selenium	mg/L	0.0020	-	0.00013	0.00013	0.00015	0.00015	0.00015	0.00015	0.000070	0.000070	0.00012	0.00012	0.00011	0.00011
Silicon	mg/L	-	-	5.6	-	5.0	-	4.8	-	5.6	-	6.2	-	5.7	-
Silver	mg/L	0.000050 - 0.0015[b]	0.00010 - 0.0030[b]	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Sodium	mg/L	-	-	61	-	53	-	34	-	66	-	42	-	28	-
Strontium	mg/L	-	-	0.57	-	0.45	-	0.42	-	0.65	-	0.50	-	0.40	-
Sulphur	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	4.9	-	2.0	-	2.5	-	2.7	-	2.2	-	1.5	-
Tellurium	mg/L	-	-	<0.0002	-	<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	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Thorium-232	mg/L	-	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-
Tin	mg/L	-	-	<0.0001	-	<0.0001	-	<0.0001	-	0.00018	-	<0.0001	-	<0.0001	-
Titanium	mg/L	-	-	<0.003	-	0.012	-	0.0039	-	0.0017	-	0.0043	-	0.0090	-
Tungsten	mg/L	-	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-
Uranium	mg/L	0.0085	-	0.00030	0.00030	0.00024	0.00024	0.00016	0.00016	0.00021	0.00021	0.00015	0.00015	0.00010	0.00010
Vanadium	mg/L	-	-	<0.0005	-	0.0013	-	0.00055	-	<0.0005	-	<0.0005	-	0.00071	-
Zinc	mg/L	0.0075 - 0.19[b]	0.033 - 0.34[b]	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.0053	0.0053
Zirconium	mg/L	-	-	0.00013	-	0.00045	-	<0.0002	-	<0.0002	-	<0.0002	-	0.00033	-
Dissolved Metals															
Aluminum	mg/L	0.0074 - 0.050[h]	0.024 - 0.10[h]	0.0076	-	0.020	-	0.017	-	0.011	-	0.025	-	0.032	-
Antimony	mg/L	-	-	0.00012	0.00012	0.00017	0.00017	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Arsenic	mg/L	-	-	0.00053	0.00053	0.0013	0.0013	0.00062	0.00062	0.00067	0.00067	0.00071	0.00071	0.00050	0.00050
Barium	mg/L	-	-	0.21	0.21	0.11	0.11	0.14	0.14	0.15	0.15	0.16	0.16	0.13	0.13
Beryllium	mg/L	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Bismuth	mg/L	-	-	<0.00005	-	<0.00005	-	<0.00005	-	<0.00005	-	<0.00005	-	<0.00005	-
Boron	mg/L	-	-	0.93	0.93	0.90	0.90	0.67	0.67	1.2	1.2	0.72	0.72	0.52	0.52
Cadmium	mg/L	0.000018 - 0.00046[b]	0.000038 - 0.0028[b]	0.000013	0.000013	0.000011	0.000011	0.0000072	0.0000072	0.000017	0.000017	0.000014	0.000014	0.000021	0.000021
Cesium	mg/L	-	-	0.000083	-	0.000048	-	0.000036	-	0.00011	-	0.000072	-	0.000058	-
Chromium	mg/L	-	-	0.00031	0.00031	0.00028	0.00028	0.00026	0.00026	0.00037	0.00037	0.00030	0.00030	0.00030	0.00030
Cobalt	mg/L	-	-	0.0010	0.0010	0.00091	0.00091	0.00062	0.00062	0.0012	0.0012	0.00075	0.00075	0.00058	0.00058
Copper	mg/L	0.002[i]	0.00020 - 0.00046[i]	**0.00224**[Mn, Mx]	**0.00224**[Mn, Mx]	**0.00174**[Mn, Mx]	**0.00174**[Mn, Mx]	**0.00151**[Mn, Mx]	**0.00151**[Mn, Mx]	**0.00189**[Mn, Mx]	**0.00189**[Mn, Mx]	**0.0018**[Mn, Mx]	**0.0018**[Mn, Mx]	**0.00232**[Mn, Mx]	**0.00232**[Mn, Mx]
Iron	mg/L	-	0.35	0.024	-	0.11	-	0.048	-	0.11	-	0.068	-	0.088	-
Lead	mg/L	-	-	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Lithium	mg/L	-	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
Manganese	mg/L	-	-	0.41	-	0.19	-	0.34	-	0.40	-	0.28	-	0.34	-
Mercury	mg/L	-	-	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005
Molybdenum	mg/L	-	-	0.00047	0.00047	0.00085	0.00085	0.00049	0.00049	0.00055	0.00055	0.00039	0.00039	0.00033	0.00033
Nickel	mg/L	-	-	0.0030	0.0030	0.0023	0.0023	0.0017	0.0017	0.0030	0.0030	0.0021	0.0021	0.0015	0.0015
Rubidium	mg/L	-	-	0.020	-	0.016	-	0.012	-	0.021	-	0.014	-	0.011	-
Selenium	mg/L	-	-	0.00019	0.00019	0.00015	0.00015	0.00015	0.00015	0.00015	0.00015	0.000097	0.000097	0.00015	0.00015
Silicon	mg/L	-	-	5.0	-	4.6	-	4.5	-	5.4	-	5.9	-	5.1	-
Silver	mg/L	-	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Strontium	mg/L	-	-	0.59	-	0.41	-	0.42	-	0.61	-	0.50	-	0.46	-
Sulphur	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	4.3	-	2.2	-	2.5	-	2.7	-	1.9	-	1.4	-
Tellurium	mg/L	-	-	<0.0002	-	<0.0002	-	<0.0002	-	<0.0002	-	<0.0002	-	<0.0002	-
Thallium	mg/L	-	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Thorium-232	mg/L	-	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-
Tin	mg/L	-	-	<0.0001	-	<0.0001	-	<0.0001	-	0.00017	-	<0.0001	-	<0.0001	-
Titanium	mg/L	-	-	<0.0003	-	0.00068	-	<0.0009	-	0.00033	-	0.0011	-	0.0017	-
Tungsten	mg/L	-	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-
Uranium	mg/L	-	-	0.00031	0.00031	0.00022	0.00022	0.00017	0.00017	0.00018	0.00018	0.00014	0.00014	0.000094	0.000094
Vanadium	mg/L	-	-	<0.0005	-	<0.0005	-	<0.0005	-	<0.0005	-	<0.0005	-	<0.0005	-
Zinc	mg/L	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.0022	0.0022	0.0024	0.0024
Zirconium	mg/L	-	-	0.000095	-	<0.0002	-	<0.0002	-	<0.0002	-	<0.0002	-	<0.0002	-

Table Notes:
BC WQG = British Columbia Approved (updated December 2021) and Working (updated February 2021) Water Quality Guidelines for the protection of freshwater aquatic life (AW-F)
[a] = guideline is a minimum value.
[b] = guideline is hardness dependent.
[c] = for some samples, water hardness was greater than 250 mg/L.
[d] = guideline is chloride dependent.
[e] & [f] = the ammonia guideline is pH and temperature dependent.
[g] = guideline is for chromium VI.
[h] = guideline is pH dependent.
[i] = guideline for dissolved copper is pH, hardness, and dissolved organic carbon dependent.
[Mn] = Exceeds BC WQG long-term chronic (30-day mean)
[Mx] = Exceeds BC WQG short-term acute (maximum)
[DL>Mn] = Detection Limit exceeds BC WQG 30-day mean
[DL>Mx] = Detection Limit exceeds BC WQG maximum
< Indicates parameter was below laboratory equipment detection limit.
- Chemical not analyzed or criteria not defined

Appendix C
Results of Surface Water Analyses
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name		SW-21	SW-21	SW-21	SW-22	SW-22B	SW-23	SW-23B	SW-23	SW-23B
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	2021-04-12	2021-07-07	2021-10-07	2016-03-22	2016-03-22	2017-03-28	2017-03-28	2017-08-24	2017-08-24
Field Measured												
pH	-	6.5 - 9.0	6.5 - 9.0	7.6	7.9	7.3	-	-	-	-	-	-
Temperature	°C	-	-	5.5	17	8.2	-	-	-	-	-	-
Dissolved oxygen	mg/L	8[a]	5[a]	13	3.3[Mn, Mx]	9.3	-	-	-	-	-	-
Conductivity	µS/cm	-	-	426	547	385	-	-	-	-	-	-
Oxidation reduction potential	mV	-	-	198	305	262	-	-	-	-	-	-
Conventional Parameters												
pH, lab	-	6.5 - 9.0	6.5 - 9.0	8.2	8.5	8.5	8.1	-	7.1	-	7.5	-
Specific conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-
Hardness, as $CaCO_3$	mg/L	-	-	224	249	208	590	-	27	-	46	-
Total alkalinity, as $CaCO_3$	mg/L	20[a]	-	304	322	265	-	-	-	-	-	-
Total suspended solids	mg/L	-	-	9.1	7.8	<3.0	2.8	-	5.4	-	7.5	-
Conductivity	µS/cm	-	-	662	669	553	1840	-	71.6	-	100	-
Hardness, as $CaCO_3$ (Dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-
Major Ions												
Bromide	mg/L	-	-	-	<0.25	-	-	-	-	-	-	-
Calcium	mg/L	-	-	69	73	58	-	-	-	-	-	-
Chloride	mg/L	150	600	20	28	13	167[Mn]	167[Mn]	3.6	3.6	1.3	1.3
Fluoride	mg/L	-	0.40 - 2.2[b]	<0.1	<0.25	0.091	0.11	0.11	<0.1	<0.1	<0.1	<0.1
Magnesium	mg/L	-	-	12	15	11	-	-	-	-	-	-
Potassium	mg/L	-	-	18	24	13	-	-	-	-	-	-
Sodium	mg/L	-	-	31	46	20	-	-	-	-	-	-
Sulphate	mg/L	128 - 429[b, c]	-	8.3	2.0	6.0	27	27	1.6	1.6	2.1	2.1
Nutrients and Biological Indicators												
Nitrate	mg-N/L	3.0	33	3.6[Mn]	3.7[Mn]	2.1	9.2[Mn]	9.2[Mn]	0.070	0.070	0.082	0.082
Nitrite	mg-N/L	0.020 - 0.20[d]	0.060 - 0.60[d]	0.041	0.015	0.068	0.029	0.029	<0.01	<0.01	<0.01	<0.01
Total ammonia	mg-N/L	0.11 - 2.0[e]	0.74 - 26[f]	11[Mn]	0.28	5.1[Mn]	39[Mn, Mx]	-	0.16	-	<0.03	-
Total Kjeldahl Nitrogen	mg-N/L	-	-	9.8	1.5	6.1	-	-	-	-	-	-
Total phosphorus	mg-P/L	-	-	0.023	0.034	0.020	0.050	-	<0.05	-	<0.05	-
Dissolved phosphorus	mg-P/L	-	-	<0.05	<0.05	<0.05	-	-	-	-	-	-
Orthophosphate	mg-P/L	-	-	0.0018	0.0056	0.0033	-	-	-	-	-	-
Biochemical oxygen demand	mg/L	-	-	2.9	<2.0	<2.0	48	-	<4.0	-	<4.0	-
Chemical oxygen demand	mg/L	-	-	32	51	32	139	-	<20	-	<20	-
Total Metals												
Aluminum	mg/L	-	-	0.53	0.21	0.27	0.14	-	0.85	-	0.31	-
Antimony	mg/L	0.0090	-	<0.0001	0.00016	<0.0001	0.00040	0.00040	<0.0001	<0.0001	<0.0002	<0.0002
Arsenic	mg/L	-	0.005	0.00054	0.00094	0.00053	0.0012	0.0012	<0.0005	<0.0005	<0.0005	<0.0005
Barium	mg/L	1.0	-	0.14	0.12	0.11	0.31	0.31	0.018	0.018	0.016	0.016
Beryllium	mg/L	0.00013	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Bismuth	mg/L	-	-	<0.00005	<0.00005	<0.00005	<0.0001	-	<0.0001	-	<0.0001	-
Boron	mg/L	1.2	-	0.70	1.1	0.45	3.7[Mn]	3.7[Mn]	0.030	0.030	0.022	0.022
Cadmium	mg/L	-	-	0.000014	0.000011	0.000012	0.000040	0.000040	<0.00001	<0.00001	0.000011	0.000011
Calcium	mg/L	-	-	70	77	65	179	-	8.7	-	17	-
Cesium	mg/L	-	-	0.000087	0.000035	0.000060	-	-	-	-	-	-
Chromium	mg/L	0.0010[g]	-	0.00066	<0.0005	<0.0005	0.002	0.002	0.00090	0.00090	<0.0005	<0.0005
Cobalt	mg/L	0.0040	0.11	0.00066	0.00080	0.00043	0.0033	0.0033	0.00040	0.00040	0.00018	0.00018
Copper	mg/L	-	-	0.0024	0.0021	0.0020	0.0028	0.0028	0.0025	0.0025	0.0014	0.0014
Iron	mg/L	-	1.0	0.83	0.61	0.50	0.97	-	0.93	-	0.48	-
Lead	mg/L	0.020[b]	0.0030 - 0.42[b]	0.00011	0.000070	0.000083	<0.0001	<0.0001	0.00020	0.00020	<0.0002	<0.0002
Lithium	mg/L	-	-	0.0011	<0.001	<0.001	0.0020	-	0.00050	-	0.00020	-
Magnesium	mg/L	-	-	12	14	11	35	-	1.2	-	0.99	-
Manganese	mg/L	0.77 - 2.6[b]	0.82 - 3.4[b]	0.27	0.38	0.31	2.6[Mn]	-	0.087	-	0.028	-
Mercury	mg/L	0.000010	-	<0.000005	<0.000005	<0.000005	<0.00002[DL>Mn]	<0.00002[DL>Mn]	<0.00002[DL>Mn]	<0.00002[DL>Mn]	<0.00001	<0.00001
Molybdenum	mg/L	7.6	46	0.00018	0.00065	0.00018	0.0010	0.0010	0.00070	0.00070	0.00098	0.00098
Nickel	mg/L	0.025 - 0.15[b]	-	0.0020	0.0021	0.0013	0.0092	0.0092	0.0011	0.0011	0.00041	0.00041
Potassium	mg/L	-	-	17	21	13	87	-	1.2	-	0.89	-
Rubidium	mg/L	-	-	0.011	0.012	0.0089	-	-	-	-	-	-
Selenium	mg/L	0.0020	-	0.000050	0.00014	0.000069	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Silicon	mg/L	-	-	5.3	4.8	5.3	11	-	3.9	-	3.5	-
Silver	mg/L	0.000050 - 0.0015[b]	0.00010 - 0.030[b]	<0.00001	<0.00001	<0.00001	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Sodium	mg/L	-	-	31	42	21	178	-	2.9	-	1.8	-
Strontium	mg/L	-	-	0.41	0.47	0.39	1.1	-	0.030	-	0.044	-
Sulphur	mg/L	-	-	3.1	1.2	2.6	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	16	-	<1.0	-	<3.0	-
Tellurium	mg/L	-	-	<0.0002	<0.0002	<0.0002	-	-	<0.0002	-	<0.0005	-
Thallium	mg/L	0.00080	-	<0.00001	<0.00001	<0.00001	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
Thorium-232	mg/L	-	-	<0.0001	<0.0001	<0.0001	-	-	<0.0001	-	<0.0001	-
Tin	mg/L	-	-	<0.0001	<0.0001	<0.0001	0.00020	-	<0.0002	-	<0.0002	-
Titanium	mg/L	-	-	0.014	<0.0054	0.0082	0.0060	-	0.026	-	0.0086	-
Tungsten	mg/L	-	-	<0.0001	<0.0001	<0.0001	-	-	-	-	-	-
Uranium	mg/L	0.0085	-	0.00012	0.00017	0.00010	0.00020	0.00020	0.00018	0.00018	0.00013	0.00013
Vanadium	mg/L	-	-	0.0011	0.00059	0.00075	0.0010	-	0.0020	-	0.0012	-
Zinc	mg/L	0.0075 - 0.19[b]	0.033 - 0.34[b]	<0.003	<0.003	<0.003	0.0090	0.0090[Mn]	0.0040	0.0040	<0.004	<0.004
Zirconium	mg/L	-	-	<0.0006	<0.0002	0.00025	0.00060	-	0.00040	-	<0.0001	-
Dissolved Metals												
Aluminum	mg/L	0.0074 - 0.050[h]	0.024 - 0.10[h]	0.011	0.013	0.047	-	-	-	-	-	-
Antimony	mg/L	-	-	<0.0001	0.00016	<0.0001	-	-	-	-	-	-
Arsenic	mg/L	-	-	0.00032	0.00086	0.00038	-	-	-	-	-	-
Barium	mg/L	-	-	0.13	0.15	0.10	-	-	-	-	-	-
Beryllium	mg/L	-	-	<0.00002	<0.0001	<0.0001	-	-	-	-	-	-
Bismuth	mg/L	-	-	<0.00005	<0.00005	<0.00005	-	-	-	-	-	-
Boron	mg/L	-	-	0.63	0.91	0.42	-	-	-	-	-	-
Cadmium	mg/L	0.000018 - 0.00046[b]	0.000038 - 0.0028[b]	0.0000058	0.0000082	0.000011	-	-	-	-	-	-
Cesium	mg/L	-	-	0.000058	0.000024	0.000047	-	-	-	-	-	-
Chromium	mg/L	-	-	<0.0005	<0.0005	<0.0005	-	-	-	-	-	-
Cobalt	mg/L	-	-	0.00050	0.00074	0.00035	-	-	-	-	-	-
Copper	mg/L	0.002[i]	0.00020 - 0.00046[i]	0.00166[Mn, Mx]	0.00192[Mn, Mx]	0.00188[Mn, Mx]	-	-	-	-	-	-
Iron	mg/L	-	0.35	0.036	0.098	0.14	-	-	-	-	-	-
Lead	mg/L	-	-	<0.00005	<0.00005	<0.00005	-	-	-	-	-	-
Lithium	mg/L	-	-	<0.001	<0.001	<0.001	-	-	-	-	-	-
Manganese	mg/L	-	-	0.25	0.43	0.28	-	-	-	-	-	-
Mercury	mg/L	-	-	-	<0.000005	<0.000005	-	-	-	-	-	-
Molybdenum	mg/L	-	-	0.00016	0.00070	0.00021	-	-	-	-	-	-
Nickel	mg/L	-	-	0.0016	0.0020	0.0011	-	-	-	-	-	-
Rubidium	mg/L	-	-	0.011	0.013	0.0085	-	-	-	-	-	-
Selenium	mg/L	-	-	0.000091	0.00015	0.000084	-	-	-	-	-	-
Silicon	mg/L	-	-	4.6	4.8	4.6	-	-	-	-	-	-
Silver	mg/L	-	-	<0.00001	<0.00001	<0.00001	-	-	-	-	-	-
Strontium	mg/L	-	-	0.42	0.51	0.36	-	-	-	-	-	-
Sulphur	mg/L	-	-	2.9	1.3	2.5	-	-	-	-	-	-
Sulphur (colloidal)	mg/L	-	-	-	-	-	-	-	-	-	-	-
Tellurium	mg/L	-	-	<0.0002	<0.0002	<0.0002	-	-	-	-	-	-
Thallium	mg/L	-	-	<0.00001	<0.00001	<0.00001	-	-	-	-	-	-
Thorium-232	mg/L	-	-	<0.0001	<0.0001	<0.0001	-	-	-	-	-	-
Tin	mg/L	-	-	<0.0001	<0.0001	<0.0001	-	-	-	-	-	-
Titanium	mg/L	-	-	0.00038	0.00050	0.0025	-	-	-	-	-	-
Tungsten	mg/L	-	-	<0.0001	<0.0001	<0.0001	-	-	-	-	-	-
Uranium	mg/L	-	-	0.00010	0.00017	0.000092	-	-	-	-	-	-
Vanadium	mg/L	-	-	<0.0005	<0.0005	<0.0005	-	-	-	-	-	-
Zinc	mg/L	-	-	<0.001	0.0017	0.0017	-	-	-	-	-	-
Zirconium	mg/L	-	-	<0.0003	<0.0002	<0.0002	-	-	-	-	-	-

Table Notes:
BC WQG = British Columbia Approved (updated December 2021) and Working (updated February 2021) Water Quality Guidelines for the protection of freshwater aquatic life (AW-F)
[a] = guideline is a minimum value.
[b] = guideline is hardness dependent.
[c] = for some samples, water hardness was greater than 250 mg/L.
[d] = guideline is chloride dependent.
[e] & [f] = the ammonia guideline is pH and temperature dependent.
[g] = guideline is for chromium VI.
[h] = guideline is pH dependent.
[i] = guideline for dissolved copper is pH, hardness, and dissolved organic carbon dependent.
[Mn] = Exceeds BC WQG long-term chronic (30-day mean)
[Mx] = Exceeds BC WQG short-term acute (maximum)
[DL>Mn] = Detection Limit exceeds BC WQG 30-day mean
[DL>Mx] = Detection Limit exceeds BC WQG maximum
< Indicates parameter was below laboratory equipment detection limit.
- Chemical not analyzed or criteria not defined

2 - Groundwater Data

Appendix C
Results of Groundwater Analyses - BH96-2
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Location	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2
			Laboratory ID	BH96-2_1996-06-	BH96-2_1996-10-	BH96-2_1997-06-	BH96-2_1997-12-	BH96-2_1998-05-	BH96-2_1998-09-
			Sample Date	1996-06-01	1996-10-01	1997-06-01	1997-12-04	1998-05-04	1998-09-24
			QA/QC						
Anions + Nutrients									
Alkalinity, Total as CaCO3		ug/L		-	-	-	-	-	-
Bromide (Br)		ug/L		-	-	-	-	-	-
Chloride (Cl)	250000	ug/L		3100	1200	1500	1500	1900	600
Fluoride (F)	1.5	mg/L		-	-	-	-	-	-
Nitrate (as N)	10000	ug/L		-	135	85	468	314	116
Nitrite (as N)	1000	ug/L		-	39	10	57	13	20
Nitrogen, Nitrate-Nitrite	10000	ug/L		-	-	-	-	-	-
Ammonia (as N)		ug/L		< 100	110	140	40	70	161
Total Kjeldahl Nitrogen		ug/L		-	-	-	-	-	-
Sulfate (SO4)	500000	ug/L		10300	3700	7000	13000	9000	2000
Total Phosphorus, Colourmetric		ug/L		-	-	-	-	-	-
Phosphorus, Dissolved		ug/L		-	-	-	-	-	-
Phosphorus, Total		ug/L		-	-	-	-	-	-
Field + Physical									
Dissolved Oxygen, field measured		mg/L		-	-	-	-	-	-
Conductivity, field measured		uS/cm		-	-	-	-	-	-
Oxidation Reduction Potential, field measured		mV		-	-	-	-	-	-
pH, field measured		pH units		-	-	-	-	-	-
pH, lab		-		-	8.05	7.97	7.54	7.91	8.12
Depth to Water		m		-	-	-	-	-	-
Temperature, field measured		deg c		-	-	-	-	-	-
Conductivity		uS/cm		-	384	372	392	396	376
Total Dissolved Solids		mg/L		-	-	-	-	-	-
Total Suspended Solids		mg/L		60000	9450	4200	5010	88	123
Hardness, Calcium Carbonate (Dissolved)		mg/L		-	90	77.8	75.7	81.3	96.4
Hardness, Calcium Carbonate (Total)		mg/L		-	90	77.8	75.7	81.3	96.4
Biochemical Oxygen Demand		mg/L		-	-	-	-	< 5	< 5
Chemical Oxygen Demand		mg/L		-	-	-	-	< 20	41
pH, lab		-		-	8.05	7.97	7.54	7.91	8.12
Metals, Dissolved									
Aluminum	9500	ug/L		5000	1090	4540	244	203	25
Antimony	6	ug/L		**22**	-	***< 200***	1	0.6	0.2
Arsenic	10	ug/L		< 1	5.1	< 200	3	3.8	3.8
Barium	1000	ug/L		< 100	30	40	30	30	30
Beryllium	8	ug/L		< 1	< 5	< 5	< 5	< 5	< 5
Bismuth		ug/L		-	-	-	-	-	-
Boron	5000	ug/L		-	300	-	-	-	-
Cadmium	5	ug/L		< 1	< 0.2	< 2	< 2	< 0.2	0.2
Calcium		ug/L		21000	18200	14600	13800	13700	15700
Chromium	50	ug/L		< 20	2	< 10	< 1	< 1	< 1
Cobalt	1	ug/L		***< 20***	***< 20***	***< 10***	***< 10***	< 1	***< 10***
Copper	1500	ug/L		10	2	< 10	2	2	4
Iron	6500	ug/L		**7000**	200	530	180	180	-
Lead	10	ug/L		< 1	< 1	< 10	< 1	< 1	< 1
Lithium	8	ug/L		-	**110**	-	-	-	-
Magnesium		ug/L		11500	10800	10000	10000	11400	13900
Manganese	1500	ug/L		280	134	116	44	58	5
Mercury	1	ug/L		-	< 0.05	< 0.05	0.01	< 0.01	< 0.01
Molybdenum	250	ug/L		< 10	< 30	< 30	< 30	< 30	< 30
Nickel	80	ug/L		< 10	< 20	< 20	< 20	< 20	< 50
Potassium		ug/L		5000	-	-	-	-	-
Selenium	10	ug/L		-	< 0.5	< 10	< 0.5	< 0.5	< 0.5
Silicon		ug/L		-	-	-	-	-	-
Silver	20	ug/L		< 10	< 0.1	< 1	< 0.1	< 0.1	< 0.1
Sodium	200000	ug/L		52000	61000	-	-	-	-
Strontium	2500	ug/L		-	-	-	-	-	-
Sulphur (S)		ug/L		-	-	-	-	-	-
Sulphur (Colloidal)		ug/L		-	-	-	-	-	-
Tellurium		ug/L		-	-	-	-	-	-
Thallium		ug/L		-	-	-	< 1	< 0.1	< 0.1
Thorium-232		ug/L		-	-	-	-	-	-
Tin	2500	ug/L		-	-	-	-	-	-
Titanium		ug/L		20	-	-	< 10	< 10	< 10
Uranium	20	ug/L		-	-	-	0.3	6.05	4.61
Vanadium	20	ug/L		10	***< 30***	-	***< 30***	***< 30***	***< 30***
Zinc	3000	ug/L		20	< 5	6	7	< 5	< 5
Zirconium		ug/L		-	-	-	-	-	-
Cesium		ug/L		-	-	-	-	-	-
Rubidium		ug/L		-	-	-	-	-	-
Tungsten	3	ug/L		-	-	-	-	-	-
Phosphorus, IPC-MS		ug/L		-	-	-	-	-	-
Metals, Total									
Aluminum		ug/L		-	-	-	-	-	-
Antimony		ug/L		-	-	-	-	-	-
Arsenic		ug/L		-	-	-	-	-	-
Barium		ug/L		-	-	-	-	-	-
Beryllium		ug/L		-	-	-	-	-	-
Bismuth		ug/L		-	-	-	-	-	-
Boron		ug/L		-	-	-	-	-	-
Cadmium		ug/L		-	-	-	-	-	-
Calcium		ug/L		-	-	-	-	-	-
Chromium		ug/L		-	-	-	-	-	-
Cobalt		ug/L		-	-	-	-	-	-
Copper		ug/L		-	-	-	-	-	-
Iron		ug/L		-	-	-	-	-	-
Lead		ug/L		-	-	-	-	-	-
Lithium		ug/L		-	-	-	-	-	-
Magnesium		ug/L		-	-	-	-	-	-
Manganese		ug/L		-	-	-	-	-	-
Mercury		ug/L		-	-	-	-	-	-
Molybdenum		ug/L		-	-	-	-	-	-
Nickel		ug/L		-	-	-	-	-	-
Potassium		ug/L		-	-	-	-	-	-
Selenium		ug/L		-	-	-	-	-	-
Silicon		ug/L		-	-	-	-	-	-
Silver		ug/L		-	-	-	-	-	-
Sodium		ug/L		-	-	-	-	-	-
Strontium		ug/L		-	-	-	-	-	-
Sulphur (S)		ug/L		-	-	-	-	-	-
Sulphur (Colloidal)		ug/L		-	-	-	-	-	-
Tellurium		ug/L		-	-	-	-	-	-
Thallium		ug/L		-	-	-	-	-	-
Thorium-232		ug/L		-	-	-	-	-	-
Tin		ug/L		-	-	-	-	-	-
Titanium		ug/L		-	-	-	-	-	-
Uranium		ug/L		-	-	-	-	-	-
Vanadium		ug/L		-	-	-	-	-	-
Zinc		ug/L		-	-	-	-	-	-
Zirconium		ug/L		-	-	-	-	-	-
Tungsten		ug/L		-	-	-	-	-	-
Rubidium		ug/L		-	-	-	-	-	-
Cesium		ug/L		-	-	-	-	-	-
Phosphorus, ICP-MS		ug/L		-	-	-	-	-	-

Table Notes:

Standards from the Contaminated Sites Regulation (CSR) for the protection of drinking water (DW), updated April 2022.

QA/QC = Quality Assurance/Quality Control; FDA/FD = Field Duplicate Available/Field

< or ND Indicates parameter was below laboratory equipment detection limit

- Chemical not analyzed or criteria not defined.

Result exceeds applicable CSR standard **744**

Detection limit exceeds applicable CSR standard ***< 2***

Appendix C
Results of Groundwater Analyses - BH96-2
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Location	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2
			Laboratory ID	BH96-2_1999-01-	BH96-2_1999-04-	BH96-2_1999-11-	BH96-2_2000-03-	BH96-2_2000-08-	BH96-2_2000-12-
			Sample Date	1999-01-27	1999-04-01	1999-11-01	2000-03-17	2000-08-15	2000-12-19
			QA/QC						
Anions + Nutrients									
Alkalinity, Total as CaCO3		ug/L		-	-	-	-	-	-
Bromide (Br)		ug/L		-	-	-	-	-	-
Chloride (Cl)	250000	ug/L		1100	5200	1200	1500	900	900
Fluoride (F)	1.5	mg/L		-	-	-	0.13	0.1	0.09
Nitrate (as N)	10000	ug/L		660	200	370	-	250	150
Nitrite (as N)	1000	ug/L		< 5	< 2	< 2	-	< 2	30
Nitrogen, Nitrate-Nitrite	10000	ug/L		-	-	-	-	-	-
Ammonia (as N)		ug/L		12	70	-	40	30	50
Total Kjeldahl Nitrogen		ug/L		-	-	-	-	-	-
Sulfate (SO4)	500000	ug/L		11900	10200	11800	8600	8800	7400
Total Phosphorus, Colourmetric		ug/L		-	-	-	-	-	-
Phosphorus, Dissolved		ug/L		-	-	-	130	100	230
Phosphorus, Total		ug/L		-	-	-	-	-	-
Field + Physical									
Dissolved Oxygen, field measured		mg/L		-	-	-	-	-	-
Conductivity, field measured		uS/cm		-	-	-	-	-	-
Oxidation Reduction Potential, field measured		mV		-	-	-	-	-	-
pH, field measured		pH units		-	-	-	-	-	-
pH, lab		-		-	-	-	7.96	7.97	-
Depth to Water		m		-	-	-	-	-	-
Temperature, field measured		deg c		-	-	-	-	-	-
Conductivity		uS/cm		-	385	-	309	-	-
Total Dissolved Solids		mg/L		-	-	-	-	-	-
Total Suspended Solids		mg/L		-	-	-	-	-	-
Hardness, Calcium Carbonate (Dissolved)		mg/L		81.6	70	72	60	54	67
Hardness, Calcium Carbonate (Total)		mg/L		81.6	70	72	60	54	67
Biochemical Oxygen Demand		mg/L		-	< 10	< 10	< 10	< 10	< 10
Chemical Oxygen Demand		mg/L		11	32	-	< 25	< 25	< 25
pH, lab		-		-	-	-	7.96	7.97	-
Metals, Dissolved									
Aluminum	9500	ug/L		180	220	240	55	78	95
Antimony	6	ug/L		**27**	< 1	< 1	< 1	< 1	< 1
Arsenic	10	ug/L		< 40	3	2	2	2	3
Barium	1000	ug/L		27	20	23	20	16	22
Beryllium	8	ug/L		< 1	< 1	< 1	< 1	< 1	< 10
Bismuth		ug/L		-	-	-	-	-	-
Boron	5000	ug/L		169	190	150	150	180	140
Cadmium	5	ug/L		< 0.1	< 0.2	0.3	0.3	< 0.2	< 0.2
Calcium		ug/L		14200	12500	11700	10700	10900	10900
Chromium	50	ug/L		4	< 1	< 1	< 1	< 1	< 1
Cobalt	1	ug/L		***< 3***	< 1	< 1	< 1	< 1	< 1
Copper	1500	ug/L		15	2	8	1	1	< 1
Iron	6500	ug/L		98	160	180	50	80	120
Lead	10	ug/L		***< 20***	< 1	3	< 1	< 1	< 1
Lithium	8	ug/L		-	-	-	-	-	-
Magnesium		ug/L		11200	9370	10300	7940	6430	9580
Manganese	1500	ug/L		10	48	8	4	15	13
Mercury	1	ug/L		0.11	< 0.05	< 0.05	< 0.02	< 0.02	< 0.02
Molybdenum	250	ug/L		5	8	7	8	8	7
Nickel	80	ug/L		< 8	2	< 1	< 1	< 1	< 1
Potassium		ug/L		10800	8300	9070	7930	6860	8830
Selenium	10	ug/L		< 1	< 2	< 2	< 2	< 2	< 2
Silicon		ug/L		-	-	-	4610	9080	7790
Silver	20	ug/L		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Sodium	200000	ug/L		59200	48700	52400	41300	34500	51700
Strontium	2500	ug/L		-	-	-	120	130	130
Sulphur (S)		ug/L		-	-	-	-	-	-
Sulphur (Colloidal)		ug/L		-	-	-	-	-	-
Tellurium		ug/L		-	-	-	-	-	-
Thallium		ug/L		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Thorium-232		ug/L		-	-	-	-	-	-
Tin	2500	ug/L		-	-	-	< 1	< 1	< 1
Titanium		ug/L		< 3	9	7	< 1	3	3
Uranium	20	ug/L		-	4.6	3.6	3.3	2.9	3.1
Vanadium	20	ug/L		< 3	11	1	2	1	1
Zinc	3000	ug/L		< 2	< 5	5	< 5	< 5	< 5
Zirconium		ug/L		-	-	-	< 10	< 10	< 10
Cesium		ug/L		-	-	-	-	-	-
Rubidium		ug/L		-	-	-	-	-	-
Tungsten	3	ug/L		-	-	-	-	-	-
Phosphorus, IPC-MS		ug/L		-	-	-	-	-	-
Metals, Total									
Aluminum		ug/L		-	-	-	-	-	-
Antimony		ug/L		-	-	-	-	-	-
Arsenic		ug/L		-	-	-	-	-	-
Barium		ug/L		-	-	-	-	-	-
Beryllium		ug/L		-	-	-	-	-	-
Bismuth		ug/L		-	-	-	-	-	-
Boron		ug/L		-	-	-	-	-	-
Cadmium		ug/L		-	-	-	-	-	-
Calcium		ug/L		-	-	-	-	-	-
Chromium		ug/L		-	-	-	-	-	-
Cobalt		ug/L		-	-	-	-	-	-
Copper		ug/L		-	-	-	-	-	-
Iron		ug/L		-	-	-	-	-	-
Lead		ug/L		-	-	-	-	-	-
Lithium		ug/L		-	-	-	-	-	-
Magnesium		ug/L		-	-	-	-	-	-
Manganese		ug/L		-	-	-	-	-	-
Mercury		ug/L		-	-	-	-	-	-
Molybdenum		ug/L		-	-	-	-	-	-
Nickel		ug/L		-	-	-	-	-	-
Potassium		ug/L		-	-	-	-	-	-
Selenium		ug/L		-	-	-	-	-	-
Silicon		ug/L		-	-	-	-	-	-
Silver		ug/L		-	-	-	-	-	-
Sodium		ug/L		-	-	-	-	-	-
Strontium		ug/L		-	-	-	-	-	-
Sulphur (S)		ug/L		-	-	-	-	-	-
Sulphur (Colloidal)		ug/L		-	-	-	-	-	-
Tellurium		ug/L		-	-	-	-	-	-
Thallium		ug/L		-	-	-	-	-	-
Thorium-232		ug/L		-	-	-	-	-	-
Tin		ug/L		-	-	-	-	-	-
Titanium		ug/L		-	-	-	-	-	-
Uranium		ug/L		-	-	-	-	-	-
Vanadium		ug/L		-	-	-	-	-	-
Zinc		ug/L		-	-	-	-	-	-
Zirconium		ug/L		-	-	-	-	-	-
Tungsten		ug/L		-	-	-	-	-	-
Rubidium		ug/L		-	-	-	-	-	-
Cesium		ug/L		-	-	-	-	-	-
Phosphorus, ICP-MS		ug/L		-	-	-	-	-	-

Table Notes:
Standards from the Contaminated Sites Regulation (CSR) for the protection of drinking water (DW), updated April 2022.
QA/QC = Quality Assurance/Quality Control; FDA/FD = Field Duplicate Available/Field
< or ND Indicates parameter was below laboratory equipment detection limit
- Chemical not analyzed or criteria not defined.
Result exceeds applicable CSR standard **744**
Detection limit exceeds applicable CSR standard ***< 2***

Appendix C
Results of Groundwater Analyses - BH96-2
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Location	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2
			Laboratory ID	BH96-2_2001-05-	BH96-2_2001-12-	BH96-2_2002-04-	BH96-2_2002-06-	BH96-2_2003-01-	BH96-2_2003-03-
			Sample Date	2001-05-07	2001-12-01	2002-04-01	2002-06-01	2003-01-01	2003-03-01
			QA/QC						FDA
Anions + Nutrients									
Alkalinity, Total as CaCO3		ug/L		-	-	-	-	-	-
Bromide (Br)		ug/L		-	-	-	-	-	-
Chloride (Cl)	250000	ug/L		900	1300	1100	5000	800	700
Fluoride (F)	1.5	mg/L		0.09	0.08	0.11	< 0.05	0.13	0.13
Nitrate (as N)	10000	ug/L		160	160	180	< 50	150	490
Nitrite (as N)	1000	ug/L		4	4	180	9	8	6
Nitrogen, Nitrate-Nitrite	10000	ug/L		-	-	-	-	-	-
Ammonia (as N)		ug/L		40	30	157	70	140	120
Total Kjeldahl Nitrogen		ug/L		-	-	-	-	-	-
Sulfate (SO4)	500000	ug/L		7000	7100	6200	11000	6200	9800
Total Phosphorus, Colourmetric		ug/L		-	-	-	-	-	-
Phosphorus, Dissolved		ug/L		180	190	190	200	180	170
Phosphorus, Total		ug/L		-	-	-	-	-	-
Field + Physical									
Dissolved Oxygen, field measured		mg/L		-	-	-	-	-	-
Conductivity, field measured		uS/cm		-	-	-	-	-	-
Oxidation Reduction Potential, field measured		mV		-	-	-	-	-	-
pH, field measured		pH units		-	-	-	-	-	-
pH, lab		-		7.99	7.75	6.7	7.99	7.99	7.91
Depth to Water		m		-	-	-	-	-	-
Temperature, field measured		deg c		-	-	-	-	-	-
Conductivity		uS/cm		359	357	279	368	356	359
Total Dissolved Solids		mg/L		-	-	-	-	-	-
Total Suspended Solids		mg/L		-	-	-	-	-	-
Hardness, Calcium Carbonate (Dissolved)		mg/L		73	70	68	68	69	85
Hardness, Calcium Carbonate (Total)		mg/L		73	70	68	68	69	85
Biochemical Oxygen Demand		mg/L		< 10	< 10	< 10	< 10	< 10	< 10
Chemical Oxygen Demand		mg/L		< 25	30	< 25	< 25	68	216
pH, lab		-		7.99	7.75	6.7	7.99	7.99	7.91
Metals, Dissolved									
Aluminum	9500	ug/L		290	85	110	310	190	670
Antimony	6	ug/L		< 1	< 1	< 0.1	< 0.1	< 0.1	< 0.1
Arsenic	10	ug/L		2	3	3	2	3	2
Barium	1000	ug/L		25	19	21	23	21	31
Beryllium	8	ug/L		< 10	< 1	< 1	< 1	< 1	< 1
Bismuth		ug/L		-	-	-	-	-	-
Boron	5000	ug/L		190	140	170	200	150	180
Cadmium	5	ug/L		0.5	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Calcium		ug/L		11000	10700	10200	10800	11200	13100
Chromium	50	ug/L		< 1	< 1	< 1	< 1	< 1	< 1
Cobalt	1	ug/L		< 1	< 1	< 1	< 1	< 1	< 1
Copper	1500	ug/L		2	1	< 1	2	1	3
Iron	6500	ug/L		200	90	120	280	140	370
Lead	10	ug/L		< 1	< 1	< 1	< 1	< 1	< 1
Lithium	8	ug/L		1	-	-	1	1	2
Magnesium		ug/L		10900	10400	10200	9980	9900	12700
Manganese	1500	ug/L		42	17	14	6	58	72
Mercury	1	ug/L		< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Molybdenum	250	ug/L		6	7	6	4.3	4.2	7
Nickel	80	ug/L		1	2	1	2	< 1	4
Potassium		ug/L		8670	9190	8100	8860	9320	9930
Selenium	10	ug/L		< 2	< 2	< 2	< 2	< 2	< 2
Silicon		ug/L		7430	7780	7560	7540	7060	-
Silver	20	ug/L		< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1
Sodium	200000	ug/L		52000	51600	50900	52300	54200	55100
Strontium	2500	ug/L		130	130	120	120	120	140
Sulphur (S)		ug/L		-	-	-	-	-	-
Sulphur (Colloidal)		ug/L		-	-	-	-	-	-
Tellurium		ug/L		-	-	-	-	-	-
Thallium		ug/L		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Thorium-232		ug/L		-	-	-	-	-	-
Tin	2500	ug/L		< 1	< 1	< 1	< 1	< 1	< 1
Titanium		ug/L		8	4	3	100	8	19
Uranium	20	ug/L		2.5	2.7	2	2.9	2.5	2.3
Vanadium	20	ug/L		2	1	1	3	2	2
Zinc	3000	ug/L		5	< 5	9	< 5	< 5	8
Zirconium		ug/L		< 10	< 10	< 10	< 10	< 10	< 10
Cesium		ug/L		-	-	-	-	-	-
Rubidium		ug/L		-	-	-	-	-	-
Tungsten	3	ug/L		-	-	-	-	-	-
Phosphorus, IPC-MS		ug/L		-	-	-	-	-	-
Metals, Total									
Aluminum		ug/L		-	-	-	-	-	-
Antimony		ug/L		-	-	-	-	-	-
Arsenic		ug/L		-	-	-	-	-	-
Barium		ug/L		-	-	-	-	-	-
Beryllium		ug/L		-	-	-	-	-	-
Bismuth		ug/L		-	-	-	-	-	-
Boron		ug/L		-	-	-	-	-	-
Cadmium		ug/L		-	-	-	-	-	-
Calcium		ug/L		-	-	-	-	-	-
Chromium		ug/L		-	-	-	-	-	-
Cobalt		ug/L		-	-	-	-	-	-
Copper		ug/L		-	-	-	-	-	-
Iron		ug/L		-	-	-	-	-	-
Lead		ug/L		-	-	-	-	-	-
Lithium		ug/L		-	-	-	-	-	-
Magnesium		ug/L		-	-	-	-	-	-
Manganese		ug/L		-	-	-	-	-	-
Mercury		ug/L		-	-	-	-	-	-
Molybdenum		ug/L		-	-	-	-	-	-
Nickel		ug/L		-	-	-	-	-	-
Potassium		ug/L		-	-	-	-	-	-
Selenium		ug/L		-	-	-	-	-	-
Silicon		ug/L		-	-	-	-	-	-
Silver		ug/L		-	-	-	-	-	-
Sodium		ug/L		-	-	-	-	-	-
Strontium		ug/L		-	-	-	-	-	-
Sulphur (S)		ug/L		-	-	-	-	-	-
Sulphur (Colloidal)		ug/L		-	-	-	-	-	-
Tellurium		ug/L		-	-	-	-	-	-
Thallium		ug/L		-	-	-	-	-	-
Thorium-232		ug/L		-	-	-	-	-	-
Tin		ug/L		-	-	-	-	-	-
Titanium		ug/L		-	-	-	-	-	-
Uranium		ug/L		-	-	-	-	-	-
Vanadium		ug/L		-	-	-	-	-	-
Zinc		ug/L		-	-	-	-	-	-
Zirconium		ug/L		-	-	-	-	-	-
Tungsten		ug/L		-	-	-	-	-	-
Rubidium		ug/L		-	-	-	-	-	-
Cesium		ug/L		-	-	-	-	-	-
Phosphorus, ICP-MS		ug/L		-	-	-	-	-	-

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Result exceeds applicable CSR standard **744**
Detection limit exceeds applicable CSR standard ***< 2***

Appendix C
Results of Groundwater Analyses - BH96-2
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Location	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2
			Laboratory ID	BH96-2_2003-03-	BH96-2_2003-08-	BH96-2_2004-05-	BH96-2_2004-10-	BH96-2_2005-06-	BH96-2_2005-11-
			Sample Date	2003-03-01	2003-08-01	2004-05-14	2004-10-18	2005-06-01	2005-11-01
			QA/QC	FD					
Anions + Nutrients									
Alkalinity, Total as CaCO3		ug/L		-	-	-	-	-	-
Bromide (Br)		ug/L		-	-	-	-	-	-
Chloride (Cl)	250000	ug/L		1900	1100	1600	700	1300	800
Fluoride (F)	1.5	mg/L		-	0.11	0.16	-	< 0.05	-
Nitrate (as N)	10000	ug/L		420	610	220	58	240	123
Nitrite (as N)	1000	ug/L		11	2	3	3	3	7
Nitrogen, Nitrate-Nitrite	10000	ug/L		-	-	-	-	-	-
Ammonia (as N)		ug/L		136	70	40	120	120	51
Total Kjeldahl Nitrogen		ug/L		-	-	-	-	-	-
Sulfate (SO4)	500000	ug/L		9600	10200	5800	3200	4800	3200
Total Phosphorus, Colourmetric		ug/L		-	-	-	-	-	-
Phosphorus, Dissolved		ug/L		-	230	<150	<100	110	100
Phosphorus, Total		ug/L		-	-	-	-	-	-
Field + Physical									
Dissolved Oxygen, field measured		mg/L		-	-	-	-	-	-
Conductivity, field measured		uS/cm		-	-	-	-	-	-
Oxidation Reduction Potential, field measured		mV		-	-	-	-	-	-
pH, field measured		pH units		-	-	-	-	-	-
pH, lab		-		8.1	8.26	7.72	8.1	7.79	8.1
Depth to Water		m		-	-	-	-	-	-
Temperature, field measured		deg c		-	-	-	-	-	-
Conductivity		uS/cm		414	390	387	401	389	398
Total Dissolved Solids		mg/L		-	-	-	-	-	-
Total Suspended Solids		mg/L		-	-	-	-	-	784
Hardness, Calcium Carbonate (Dissolved)		mg/L		-	89	77	108	85.6	110
Hardness, Calcium Carbonate (Total)		mg/L		-	89	77	108	85.6	110
Biochemical Oxygen Demand		mg/L		< 6	< 10	< 10	< 10	4.8	-
Chemical Oxygen Demand		mg/L		23	26	< 25	< 10	130	16
pH, lab		-		8.1	8.26	7.72	8.1	7.79	8.1
Metals, Dissolved									
Aluminum	9500	ug/L		-	150	32	4.6	80	11.4
Antimony	6	ug/L		-	< 1	< 1	0.137	0.2	0.175
Arsenic	10	ug/L		-	2	1	4.3	2.5	4.4
Barium	1000	ug/L		-	29	22	26.2	20	22.8
Beryllium	8	ug/L		-	< 1	< 1	< 0.02	< 0.2	0.02
Bismuth		ug/L		-	< 1	< 1	< 0.02	< 0.2	0.02
Boron	5000	ug/L		-	190	190	152	170	148
Cadmium	5	ug/L		-	< 0.2	< 0.2	0.03	0.07	0.02
Calcium		ug/L		-	14200	12200	17300	12800	18100
Chromium	50	ug/L		-	< 1	< 1	< 0.2	0.5	0.2
Cobalt	1	ug/L		-	< 1	< 1	0.042	< 0.2	0.018
Copper	1500	ug/L		-	1	2	0.24	0.7	0.22
Iron	6500	ug/L		-	190	< 50	< 5	40	5
Lead	10	ug/L		-	< 1	< 1	< 0.01	< 0.2	0.01
Lithium	8	ug/L		-	1	1	1.32	1.6	1.32
Magnesium		ug/L		-	13100	11200	15800	13000	16200
Manganese	1500	ug/L		-	10	< 1	17.2	42	5.67
Mercury	1	ug/L		-	< 0.02	***< 20***	< 0.05	***< 20***	0.05
Molybdenum	250	ug/L		-	5.5	5.2	3.65	3.8	3.4
Nickel	80	ug/L		-	1	1	0.37	1	0.24
Potassium		ug/L		-	11100	9200	11000	9190	11000
Selenium	10	ug/L		-	< 1	< 1	< 0.2	< 0.2	0.2
Silicon		ug/L		-	9200	8400	-	9630	-
Silver	20	ug/L		-	< 0.1	< 0.25	< 0.02	< 0.05	0.02
Sodium	200000	ug/L		-	61100	55300	46900	51000	48800
Strontium	2500	ug/L		-	160	130	168	143	165
Sulphur (S)		ug/L		-	-	-	-	-	-
Sulphur (Colloidal)		ug/L		-	-	-	-	-	-
Tellurium		ug/L		-	-	-	-	-	-
Thallium		ug/L		-	< 0.1	< 0.1	0.006	< 0.02	0.007
Thorium-232		ug/L		-	-	-	-	-	-
Tin	2500	ug/L		-	< 1	< 1	< 0.01	< 0.2	-
Titanium		ug/L		-	4	< 1	< 3	1.9	3
Uranium	20	ug/L		-	2.7	1.9	2.71	2.2	2.52
Vanadium	20	ug/L		-	1	< 1	0.59	0.7	0.75
Zinc	3000	ug/L		-	< 5	< 5	< 0.1	1	0.1
Zirconium		ug/L		-	< 10	< 10	< 5	< 2	5
Cesium		ug/L		-	-	-	-	-	-
Rubidium		ug/L		-	-	-	-	-	-
Tungsten	3	ug/L		-	-	-	-	-	-
Phosphorus, IPC-MS		ug/L		-	-	-	-	-	-
Metals, Total									
Aluminum		ug/L		-	-	-	-	-	-
Antimony		ug/L		-	-	-	-	-	-
Arsenic		ug/L		-	-	-	-	-	-
Barium		ug/L		-	-	-	-	-	-
Beryllium		ug/L		-	-	-	-	-	-
Bismuth		ug/L		-	-	-	-	-	-
Boron		ug/L		-	-	-	-	-	-
Cadmium		ug/L		-	-	-	-	-	-
Calcium		ug/L		-	-	-	-	-	-
Chromium		ug/L		-	-	-	-	-	-
Cobalt		ug/L		-	-	-	-	-	-
Copper		ug/L		-	-	-	-	-	-
Iron		ug/L		-	-	-	-	-	-
Lead		ug/L		-	-	-	-	-	-
Lithium		ug/L		-	-	-	-	-	-
Magnesium		ug/L		-	-	-	-	-	-
Manganese		ug/L		-	-	-	-	-	-
Mercury		ug/L		-	-	-	-	-	-
Molybdenum		ug/L		-	-	-	-	-	-
Nickel		ug/L		-	-	-	-	-	-
Potassium		ug/L		-	-	-	-	-	-
Selenium		ug/L		-	-	-	-	-	-
Silicon		ug/L		-	-	-	-	-	-
Silver		ug/L		-	-	-	-	-	-
Sodium		ug/L		-	-	-	-	-	-
Strontium		ug/L		-	-	-	-	-	-
Sulphur (S)		ug/L		-	-	-	-	-	-
Sulphur (Colloidal)		ug/L		-	-	-	-	-	-
Tellurium		ug/L		-	-	-	-	-	-
Thallium		ug/L		-	-	-	-	-	-
Thorium-232		ug/L		-	-	-	-	-	-
Tin		ug/L		-	-	-	-	-	-
Titanium		ug/L		-	-	-	-	-	-
Uranium		ug/L		-	-	-	-	-	-
Vanadium		ug/L		-	-	-	-	-	-
Zinc		ug/L		-	-	-	-	-	-
Zirconium		ug/L		-	-	-	-	-	-
Tungsten		ug/L		-	-	-	-	-	-
Rubidium		ug/L		-	-	-	-	-	-
Cesium		ug/L		-	-	-	-	-	-
Phosphorus, ICP-MS		ug/L		-	-	-	-	-	-

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< or ND Indicates parameter was below laboratory equipment detection limit
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Result exceeds applicable CSR standard **744**
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Appendix C
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Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Location	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2
			Laboratory ID	BH96-2_2006-06-	BH96-2_2007-01-	BH96-2_2007-06-	BH96-2_2008-05-	BH96-2_2008-10-	BH96-2_2008-10-
			Sample Date	2006-06-01	2007-01-02	2007-06-18	2008-05-27	2008-10-10	2008-10-10
			QA/QC					FDA	FD
Anions + Nutrients									
Alkalinity, Total as CaCO3		ug/L		-	-	-	-	-	-
Bromide (Br)		ug/L		-	-	-	-	-	-
Chloride (Cl)	250000	ug/L		1240	2200	1920	3200	2000	2000
Fluoride (F)	1.5	mg/L		0.14	0.09	0.16	0.16	-	-
Nitrate (as N)	10000	ug/L		210	370	0.16	180	-	-
Nitrite (as N)	1000	ug/L		10	10	< 2	< 10	13	16
Nitrogen, Nitrate-Nitrite	10000	ug/L		-	-	-	-	-	-
Ammonia (as N)		ug/L		-	-	-	< 30	30	90
Total Kjeldahl Nitrogen		ug/L		-	-	-	-	-	-
Sulfate (SO4)	500000	ug/L		-	7290	6080	5000	3900	3700
Total Phosphorus, Colourmetric		ug/L		-	-	-	-	-	-
Phosphorus, Dissolved		ug/L		<150	<150	<150	-	69	67
Phosphorus, Total		ug/L		-	-	-	-	-	-
Field + Physical									
Dissolved Oxygen, field measured		mg/L		-	-	-	-	-	-
Conductivity, field measured		uS/cm		-	-	-	-	-	-
Oxidation Reduction Potential, field measured		mV		-	-	-	-	-	-
pH, field measured		pH units		-	-	-	-	-	-
pH, lab		-		7.83	7.82	7.86	8	8.3	8.4
Depth to Water		m		-	-	-	-	-	-
Temperature, field measured		deg c		-	-	-	-	-	-
Conductivity		uS/cm		394	402	391	381	386.5	386.5
Total Dissolved Solids		mg/L		-	-	-	-	-	-
Total Suspended Solids		mg/L		-	-	-	-	-	-
Hardness, Calcium Carbonate (Dissolved)		mg/L		78	73	72	87.8	85.8	93.5
Hardness, Calcium Carbonate (Total)		mg/L		78	73	72	87.8	85.8	93.5
Biochemical Oxygen Demand		mg/L		< 10	< 10	< 10	< 6	< 10	< 10
Chemical Oxygen Demand		mg/L		39	< 20	52	< 30	< 10	15
pH, lab		-		7.83	7.82	7.86	8	8.3	8.4
Metals, Dissolved									
Aluminum	9500	ug/L		10	13	12	23	28.8	30.8
Antimony	6	ug/L		< 1	< 1	< 1	< 0.6	0.23	0.19
Arsenic	10	ug/L		2	1	2	2.3	2.9	2.98
Barium	1000	ug/L		19	20	21	39	18.8	18.2
Beryllium	8	ug/L		< 1	< 1	< 1	< 0.4	< 0.01	< 0.01
Bismuth		ug/L		< 1	< 1	< 1	-	< 0.005	< 0.005
Boron	5000	ug/L		150	150	150	162	165	155
Cadmium	5	ug/L		< 0.2	< 0.2	< 0.2	0.06	0.037	0.053
Calcium		ug/L		12800	12200	11600	11900	11600	13000
Chromium	50	ug/L		< 1	< 1	< 1	< 1	< 0.1	< 0.1
Cobalt	1	ug/L		< 1	< 1	< 1	0.1	0.038	0.044
Copper	1500	ug/L		< 1	1	< 1	9.5	0.7	0.68
Iron	6500	ug/L		< 50	< 50	< 50	60	26	29
Lead	10	ug/L		< 1	< 1	< 1	0.2	0.032	0.035
Lithium	8	ug/L		1	2	< 5	1.3	1.3	1.4
Magnesium		ug/L		11200	10200	10400	10200	9910	11600
Manganese	1500	ug/L		26	16	33	15.1	0.97	2.05
Mercury	1	ug/L		***< 20***	< 0.2	< 0.02	< 0.06	-	-
Molybdenum	250	ug/L		4.4	5.2	6.2	6.2	5.2	5.02
Nickel	80	ug/L		< 1	< 1	< 1	1	0.048	0.42
Potassium		ug/L		9100	8700	9600	-	9080	9600
Selenium	10	ug/L		< 1	< 1	< 1	1.1	0.1	0.06
Silicon		ug/L		3500	3200	3200	-	3090	3470
Silver	20	ug/L		< 0.25	< 0.25	< 0.25	< 0.08	< 0.005	< 0.005
Sodium	200000	ug/L		52400	51900	55000	49300	52400	50900
Strontium	2500	ug/L		140	130	130	-	136	148
Sulphur (S)		ug/L		-	-	-	-	-	-
Sulphur (Colloidal)		ug/L		-	-	-	-	-	-
Tellurium		ug/L		-	-	-	-	-	-
Thallium		ug/L		< 0.1	< 0.1	< 0.1	< 0.1	0.005	0.005
Thorium-232		ug/L		-	-	-	-	-	-
Tin	2500	ug/L		< 1	< 1	< 1	-	0.02	0.02
Titanium		ug/L		< 1	< 1	< 1	< 20	0.6	0.7
Uranium	20	ug/L		2.3	2.7	2.5	2.6	2.53	2.52
Vanadium	20	ug/L		< 1	< 1	< 1	< 2	0.7	0.7
Zinc	3000	ug/L		< 5	< 5	< 5	14	0.4	0.4
Zirconium		ug/L		< 10	< 10	< 10	-	-	-
Cesium		ug/L		-	-	-	-	-	-
Rubidium		ug/L		-	-	-	-	-	-
Tungsten	3	ug/L		-	-	-	-	-	-
Phosphorus, IPC-MS		ug/L		-	-	-	-	-	-
Metals, Total									
Aluminum		ug/L		-	-	-	-	-	-
Antimony		ug/L		-	-	-	-	-	-
Arsenic		ug/L		-	-	-	-	-	-
Barium		ug/L		-	-	-	-	-	-
Beryllium		ug/L		-	-	-	-	-	-
Bismuth		ug/L		-	-	-	-	-	-
Boron		ug/L		-	-	-	-	-	-
Cadmium		ug/L		-	-	-	-	-	-
Calcium		ug/L		-	-	-	-	-	-
Chromium		ug/L		-	-	-	-	-	-
Cobalt		ug/L		-	-	-	-	-	-
Copper		ug/L		-	-	-	-	-	-
Iron		ug/L		-	-	-	-	-	-
Lead		ug/L		-	-	-	-	-	-
Lithium		ug/L		-	-	-	-	-	-
Magnesium		ug/L		-	-	-	-	-	-
Manganese		ug/L		-	-	-	-	-	-
Mercury		ug/L		-	-	-	-	-	-
Molybdenum		ug/L		-	-	-	-	-	-
Nickel		ug/L		-	-	-	-	-	-
Potassium		ug/L		-	-	-	-	-	-
Selenium		ug/L		-	-	-	-	-	-
Silicon		ug/L		-	-	-	-	-	-
Silver		ug/L		-	-	-	-	-	-
Sodium		ug/L		-	-	-	-	-	-
Strontium		ug/L		-	-	-	-	-	-
Sulphur (S)		ug/L		-	-	-	-	-	-
Sulphur (Colloidal)		ug/L		-	-	-	-	-	-
Tellurium		ug/L		-	-	-	-	-	-
Thallium		ug/L		-	-	-	-	-	-
Thorium-232		ug/L		-	-	-	-	-	-
Tin		ug/L		-	-	-	-	-	-
Titanium		ug/L		-	-	-	-	-	-
Uranium		ug/L		-	-	-	-	-	-
Vanadium		ug/L		-	-	-	-	-	-
Zinc		ug/L		-	-	-	-	-	-
Zirconium		ug/L		-	-	-	-	-	-
Tungsten		ug/L		-	-	-	-	-	-
Rubidium		ug/L		-	-	-	-	-	-
Cesium		ug/L		-	-	-	-	-	-
Phosphorus, ICP-MS		ug/L		-	-	-	-	-	-

Table Notes:

Standards from the Contaminated Sites Regulation (CSR) for the protection of drinking water (DW), updated April 2022.

QA/QC = Quality Assurance/Quality Control; FDA/FD = Field Duplicate Available/Field

< or ND Indicates parameter was below laboratory equipment detection limit

- Chemical not analyzed or criteria not defined.

Result exceeds applicable CSR standard **744**

Detection limit exceeds applicable CSR standard ***< 2***

Appendix C
Results of Groundwater Analyses - BH96-2
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Location	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2
			Laboratory ID	BH96-2_2009-06-	BH96-2_2009-08-	BH96-2_2010-02-	BH96-2_2010-06-	BH96-2_2010-10-	BH96-2_2011-02-
			Sample Date	2009-06-15	2009-08-26	2010-02-22	2010-06-15	2010-10-25	2011-02-15
			QA/QC						
Anions + Nutrients									
Alkalinity, Total as CaCO3		ug/L		-	-	-	-	-	-
Bromide (Br)		ug/L		-	-	-	-	-	-
Chloride (Cl)	250000	ug/L		2800	2800	3600	3800	2000	2600
Fluoride (F)	1.5	mg/L		0.21	0.21	0.17	0.16	0.14	0.13
Nitrate (as N)	10000	ug/L		200	200	230	260	160	8000
Nitrite (as N)	1000	ug/L		ND	ND	ND	ND	ND	< 10
Nitrogen, Nitrate-Nitrite	10000	ug/L		-	-	-	-	-	-
Ammonia (as N)		ug/L		30	30	30	3300	50	< 30
Total Kjeldahl Nitrogen		ug/L		-	-	-	-	-	-
Sulfate (SO4)	500000	ug/L		4200	4200	6300	4500	4800	5700
Total Phosphorus, Colourmetric		ug/L		-	-	-	-	-	-
Phosphorus, Dissolved		ug/L		-	-	-	-	-	79
Phosphorus, Total		ug/L		-	-	-	-	-	-
Field + Physical									
Dissolved Oxygen, field measured		mg/L		-	-	-	-	-	-
Conductivity, field measured		uS/cm		-	-	-	-	-	-
Oxidation Reduction Potential, field measured		mV		-	-	-	-	-	-
pH, field measured		pH units		-	-	-	-	-	-
pH, lab		-		7.8	7.8	7.4	7.7	8.2	8
Depth to Water		m		-	-	-	-	-	-
Temperature, field measured		deg c		-	-	-	-	-	-
Conductivity		uS/cm		383	383	371	390	392	391
Total Dissolved Solids		mg/L		-	-	-	-	-	-
Total Suspended Solids		mg/L		-	-	-	-	-	-
Hardness, Calcium Carbonate (Dissolved)		mg/L		92.2	92.2	74.9	70	76.3	81.7
Hardness, Calcium Carbonate (Total)		mg/L		92.2	92.2	74.9	70	76.3	81.7
Biochemical Oxygen Demand		mg/L		ND	ND	< 4	< 4	< 4	< 4
Chemical Oxygen Demand		mg/L		ND	-	< 30	< 30	< 30	36
pH, lab		-		7.8	7.8	7.4	7.7	8.2	8
Metals, Dissolved									
Aluminum	9500	ug/L		3	3	20	25	25	22
Antimony	6	ug/L		ND	ND	ND	ND	ND	< 0.5
Arsenic	10	ug/L		2.3	2.3	1.8	1.7	1.7	1.7
Barium	1000	ug/L		75	75	23	83	52	19
Beryllium	8	ug/L		ND	ND	ND	ND	ND	< 0.1
Bismuth		ug/L		ND	ND	ND	ND	ND	< 1
Boron	5000	ug/L		169	169	175	188	201	190
Cadmium	5	ug/L		0.07	0.07	0.17	0.33	0.1	0.11
Calcium		ug/L		14400	14400	13100	-	-	13200
Chromium	50	ug/L		ND	ND	ND	ND	2	< 1
Cobalt	1	ug/L		ND	ND	ND	ND	ND	< 0.5
Copper	1500	ug/L		5.3	5.3	4.3	4.7	14.8	1.8
Iron	6500	ug/L		8	8	ND	21	36	13
Lead	10	ug/L		ND	ND	0.2	ND	1.9	< 0.2
Lithium	8	ug/L		ND	ND	ND	ND	ND	< 5
Magnesium		ug/L		12000	12000	10600	10400	9970	11800
Manganese	1500	ug/L		ND	ND	10	ND	6	4
Mercury	1	ug/L		ND	ND	ND	ND	ND	< 0.01
Molybdenum	250	ug/L		6	6	7	6	6	6
Nickel	80	ug/L		ND	ND	ND	ND	3	< 1
Potassium		ug/L		10300	10300	9950	10100	9850	11300
Selenium	10	ug/L		0.1	0.1	ND	ND	ND	< 0.1
Silicon		ug/L		3930	3930	3910	3920	3610	4190
Silver	20	ug/L		ND	ND	ND	ND	ND	< 0.005
Sodium	200000	ug/L		52900	52900	56600	52800	56800	63700
Strontium	2500	ug/L		160	160	147	142	141	156
Sulphur (S)		ug/L		-	-	-	-	-	-
Sulphur (Colloidal)		ug/L		-	-	-	-	-	-
Tellurium		ug/L		-	-	-	-	-	-
Thallium		ug/L		ND	ND	ND	ND	ND	< 0.05
Thorium-232		ug/L		-	-	-	-	-	-
Tin	2500	ug/L		ND	ND	ND	ND	ND	< 5
Titanium		ug/L		ND	ND	ND	ND	ND	< 5
Uranium	20	ug/L		2.6	2.6	2.8	2.7	2.4	< 0.1
Vanadium	20	ug/L		ND	ND	ND	ND	ND	< 5
Zinc	3000	ug/L		39	39	17	23	26	< 5
Zirconium		ug/L		ND	ND	ND	ND	ND	< 0.5
Cesium		ug/L		-	-	-	-	-	-
Rubidium		ug/L		-	-	-	-	-	-
Tungsten	3	ug/L		-	-	-	-	-	-
Phosphorus, IPC-MS		ug/L		-	-	-	-	-	-
Metals, Total									
Aluminum		ug/L		-	-	-	-	-	-
Antimony		ug/L		-	-	-	-	-	-
Arsenic		ug/L		-	-	-	-	-	-
Barium		ug/L		-	-	-	-	-	-
Beryllium		ug/L		-	-	-	-	-	-
Bismuth		ug/L		-	-	-	-	-	-
Boron		ug/L		-	-	-	-	-	-
Cadmium		ug/L		-	-	-	-	-	-
Calcium		ug/L		-	-	-	-	-	-
Chromium		ug/L		-	-	-	-	-	-
Cobalt		ug/L		-	-	-	-	-	-
Copper		ug/L		-	-	-	-	-	-
Iron		ug/L		-	-	-	-	-	-
Lead		ug/L		-	-	-	-	-	-
Lithium		ug/L		-	-	-	-	-	-
Magnesium		ug/L		-	-	-	-	-	-
Manganese		ug/L		-	-	-	-	-	-
Mercury		ug/L		-	-	-	-	-	-
Molybdenum		ug/L		-	-	-	-	-	-
Nickel		ug/L		-	-	-	-	-	-
Potassium		ug/L		-	-	-	-	-	-
Selenium		ug/L		-	-	-	-	-	-
Silicon		ug/L		-	-	-	-	-	-
Silver		ug/L		-	-	-	-	-	-
Sodium		ug/L		-	-	-	-	-	-
Strontium		ug/L		-	-	-	-	-	-
Sulphur (S)		ug/L		-	-	-	-	-	-
Sulphur (Colloidal)		ug/L		-	-	-	-	-	-
Tellurium		ug/L		-	-	-	-	-	-
Thallium		ug/L		-	-	-	-	-	-
Thorium-232		ug/L		-	-	-	-	-	-
Tin		ug/L		-	-	-	-	-	-
Titanium		ug/L		-	-	-	-	-	-
Uranium		ug/L		-	-	-	-	-	-
Vanadium		ug/L		-	-	-	-	-	-
Zinc		ug/L		-	-	-	-	-	-
Zirconium		ug/L		-	-	-	-	-	-
Tungsten		ug/L		-	-	-	-	-	-
Rubidium		ug/L		-	-	-	-	-	-
Cesium		ug/L		-	-	-	-	-	-
Phosphorus, ICP-MS		ug/L		-	-	-	-	-	-

Table Notes:
Standards from the Contaminated Sites Regulation (CSR) for the protection of drinking water (DW), updated April 2022.
QA/QC = Quality Assurance/Quality Control; FDA/FD = Field Duplicate Available/Field
< or ND Indicates parameter was below laboratory equipment detection limit
- Chemical not analyzed or criteria not defined.
Result exceeds applicable CSR standard **744**
Detection limit exceeds applicable CSR standard ***< 2***

Appendix C
Results of Groundwater Analyses - BH96-2
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Location	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2
			Laboratory ID	BH96-2_2012-02-	BH96-2_2012-05-	BH96-2_2013-01-	BH96-2_2013-04-	BH96-2_2013-06-	BH96-2_2013-10-
			Sample Date	2012-02-22	2012-05-08	2013-01-04	2013-04-15	2013-06-06	2013-10-22
			QA/QC						
Anions + Nutrients									
Alkalinity, Total as CaCO3		ug/L		-	-	-	-	-	-
Bromide (Br)		ug/L		-	-	-	-	-	-
Chloride (Cl)	250000	ug/L		3200	2000	3300	2500	3400	2900
Fluoride (F)	1.5	mg/L		0.16	0.16	0.15	0.15	0.14	0.14
Nitrate (as N)	10000	ug/L		290	200	130	120	< 100	4530
Nitrite (as N)	1000	ug/L		< 10	< 10	-	12	< 10	< 10
Nitrogen, Nitrate-Nitrite	10000	ug/L		-	-	-	-	-	-
Ammonia (as N)		ug/L		60	50	120	100	70	80
Total Kjeldahl Nitrogen		ug/L		-	-	-	-	-	-
Sulfate (SO4)	500000	ug/L		4360	4080	4570	4950	6020	4970
Total Phosphorus, Colourmetric		ug/L		-	-	-	-	-	-
Phosphorus, Dissolved		ug/L		88	54	44	59	69	101
Phosphorus, Total		ug/L		-	-	-	-	-	-
Field + Physical									
Dissolved Oxygen, field measured		mg/L		-	-	-	-	-	-
Conductivity, field measured		uS/cm		-	-	-	-	-	-
Oxidation Reduction Potential, field measured		mV		-	-	-	-	-	-
pH, field measured		pH units		-	-	-	-	-	-
pH, lab		-		7.9	7.8	8.1	8	8	8
Depth to Water		m		-	-	-	-	-	-
Temperature, field measured		deg c		-	-	-	-	-	-
Conductivity		uS/cm		383	390	382	377	377	391
Total Dissolved Solids		mg/L		-	-	-	-	-	-
Total Suspended Solids		mg/L		-	-	34	-	46	17
Hardness, Calcium Carbonate (Dissolved)		mg/L		70.1	82	74.7	76.9	76.5	73.3
Hardness, Calcium Carbonate (Total)		mg/L		70.1	82	74.7	76.9	76.5	73.3
Biochemical Oxygen Demand		mg/L		< 4	< 4	ND	ND	4.6	< 4
Chemical Oxygen Demand		mg/L		< 30	< 30	38	ND	< 20	< 20
pH, lab		-		7.9	7.8	8.1	8	8	8
Metals, Dissolved									
Aluminum	9500	ug/L		19	6.1	4.2	6.8	21	15
Antimony	6	ug/L		< 0.5	< 0.5	1.8	0.159	< 0.5	< 0.5
Arsenic	10	ug/L		1.8	2.74	2.86	2.28	2.39	2.09
Barium	1000	ug/L		16	47.3	16.9	16.9	16.9	15.6
Beryllium	8	ug/L		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Bismuth		ug/L		< 1	< 1	< 1	< 1	< 1	< 1
Boron	5000	ug/L		170	158	144	186	163	149
Cadmium	5	ug/L		0.2	0.069	0.051	0.132	0.24	0.194
Calcium		ug/L		11300	13000	13100	12300	12800	13400
Chromium	50	ug/L		< 1	< 1	< 1	< 1	< 1	< 1
Cobalt	1	ug/L		< 0.5	< 0.5	< 0.5	0.048	< 0.5	< 0.5
Copper	1500	ug/L		1.7	8.52	0.28	0.28	0.7	1.31
Iron	6500	ug/L		10	22.9	< 5	< 5	13.6	5.9
Lead	10	ug/L		< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Lithium	8	ug/L		< 5	< 5	< 5	1.56	< 5	< 5
Magnesium		ug/L		9460	12200	12000	10500	11100	11000
Manganese	1500	ug/L		5	32.2	54.7	24.6	16	3.9
Mercury	1	ug/L		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Molybdenum	250	ug/L		6	4.9	4.6	5.91	5.3	5
Nickel	80	ug/L		< 1	< 1	< 1	0.66	< 1	1.2
Potassium		ug/L		9390	10000	9880	9880	10000	10100
Selenium	10	ug/L		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Silicon		ug/L		3530	3650	3540	3790	3820	3910
Silver	20	ug/L		< 0.005	< 0.005	< 0.02	< 0.02	< 0.02	< 0.02
Sodium	200000	ug/L		53200	51100	49000	54500	54600	57100
Strontium	2500	ug/L		135	159	159	149	155	144
Sulphur (S)		ug/L		-	-	-	-	-	-
Sulphur (Colloidal)		ug/L		-	-	-	-	-	-
Tellurium		ug/L		-	-	-	-	-	-
Thallium		ug/L		< 0.05	< 0.05	< 0.05	0.003	< 0.05	< 0.05
Thorium-232		ug/L		-	-	-	-	-	-
Tin	2500	ug/L		< 5	< 5	< 5	< 5	< 5	< 5
Titanium		ug/L		< 5	< 5	< 5	< 5	< 5	< 5
Uranium	20	ug/L		< 0.1	2.18	2.16	2.44	2.27	1.93
Vanadium	20	ug/L		< 5	< 5	< 5	0.74	< 5	< 5
Zinc	3000	ug/L		< 5	7	< 5	1.6	< 5	< 5
Zirconium		ug/L		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Cesium		ug/L		-	-	-	-	-	-
Rubidium		ug/L		-	-	-	-	-	-
Tungsten	3	ug/L		-	-	-	-	-	-
Phosphorus, IPC-MS		ug/L		-	-	-	-	-	-
Metals, Total									
Aluminum		ug/L		-	-	-	-	-	-
Antimony		ug/L		-	-	-	-	-	-
Arsenic		ug/L		-	-	-	-	-	-
Barium		ug/L		-	-	-	-	-	-
Beryllium		ug/L		-	-	-	-	-	-
Bismuth		ug/L		-	-	-	-	-	-
Boron		ug/L		-	-	-	-	-	-
Cadmium		ug/L		-	-	-	-	-	-
Calcium		ug/L		-	-	-	-	-	-
Chromium		ug/L		-	-	-	-	-	-
Cobalt		ug/L		-	-	-	-	-	-
Copper		ug/L		-	-	-	-	-	-
Iron		ug/L		-	-	-	-	-	-
Lead		ug/L		-	-	-	-	-	-
Lithium		ug/L		-	-	-	-	-	-
Magnesium		ug/L		-	-	-	-	-	-
Manganese		ug/L		-	-	-	-	-	-
Mercury		ug/L		-	-	-	-	-	-
Molybdenum		ug/L		-	-	-	-	-	-
Nickel		ug/L		-	-	-	-	-	-
Potassium		ug/L		-	-	-	-	-	-
Selenium		ug/L		-	-	-	-	-	-
Silicon		ug/L		-	-	-	-	-	-
Silver		ug/L		-	-	-	-	-	-
Sodium		ug/L		-	-	-	-	-	-
Strontium		ug/L		-	-	-	-	-	-
Sulphur (S)		ug/L		-	-	-	-	-	-
Sulphur (Colloidal)		ug/L		-	-	-	-	-	-
Tellurium		ug/L		-	-	-	-	-	-
Thallium		ug/L		-	-	-	-	-	-
Thorium-232		ug/L		-	-	-	-	-	-
Tin		ug/L		-	-	-	-	-	-
Titanium		ug/L		-	-	-	-	-	-
Uranium		ug/L		-	-	-	-	-	-
Vanadium		ug/L		-	-	-	-	-	-
Zinc		ug/L		-	-	-	-	-	-
Zirconium		ug/L		-	-	-	-	-	-
Tungsten		ug/L		-	-	-	-	-	-
Rubidium		ug/L		-	-	-	-	-	-
Cesium		ug/L		-	-	-	-	-	-
Phosphorus, ICP-MS		ug/L		-	-	-	-	-	-

Table Notes:
Standards from the Contaminated Sites Regulation (CSR) for the protection of drinking water (DW), updated April 2022.
QA/QC = Quality Assurance/Quality Control; FDA/FD = Field Duplicate Available/Field
< or ND Indicates parameter was below laboratory equipment detection limit
- Chemical not analyzed or criteria not defined.
Result exceeds applicable CSR standard **744**
Detection limit exceeds applicable CSR standard ***< 2***

Appendix C
Results of Groundwater Analyses - BH96-2
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Location	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2
			Laboratory ID	BH96-2_2014-05-	BH96-2_2014-10-	BH96-2_2015-03-	BH96-2_2015-08-	BH96-2_2015-11-	BH96-2_2016-03-
			Sample Date	2014-05-06	2014-10-29	2015-03-28	2015-08-29	2015-11-29	2016-03-22
			QA/QC						
Anions + Nutrients									
Alkalinity, Total as CaCO3		ug/L		-	-	-	-	-	-
Bromide (Br)		ug/L		-	-	-	-	-	-
Chloride (Cl)	250000	ug/L		4900	3500	6100	3400	4000	4200
Fluoride (F)	1.5	mg/L		0.14	0.15	0.16	0.15	0.15	0.16
Nitrate (as N)	10000	ug/L		552	496	800	620	960	530
Nitrite (as N)	1000	ug/L		< 10	< 10	ND	27	< 10	14
Nitrogen, Nitrate-Nitrite	10000	ug/L		-	-	-	-	-	-
Ammonia (as N)		ug/L		< 30	< 30	ND	68	70	47
Total Kjeldahl Nitrogen		ug/L		-	-	-	-	-	-
Sulfate (SO4)	500000	ug/L		4010	4020	4600	4400	-	4500
Total Phosphorus, Colourmetric		ug/L		-	-	-	-	-	-
Phosphorus, Dissolved		ug/L		73	63	190	100	-	80
Phosphorus, Total		ug/L		-	-	-	-	-	-
Field + Physical									
Dissolved Oxygen, field measured		mg/L		-	-	-	-	-	-
Conductivity, field measured		uS/cm		-	-	-	-	-	-
Oxidation Reduction Potential, field measured		mV		-	-	-	-	-	-
pH, field measured		pH units		-	-	-	-	-	-
pH, lab		-		7.9	7.9	8.1	8	8	7.2
Depth to Water		m		-	-	-	-	-	-
Temperature, field measured		deg c		-	-	-	-	-	-
Conductivity		uS/cm		378	392	377	386	361	373
Total Dissolved Solids		mg/L		-	-	-	-	-	-
Total Suspended Solids		mg/L		32	16	14	24	12	28
Hardness, Calcium Carbonate (Dissolved)		mg/L		89.6	75.9	131	82.7	-	75
Hardness, Calcium Carbonate (Total)		mg/L		89.6	75.9	131	82.7	-	75
Biochemical Oxygen Demand		mg/L		< 4	< 4	ND	< 0.0001	4.1	< 4.0
Chemical Oxygen Demand		mg/L		< 20	< 20	ND	< 20	< 20	< 20
pH, lab		-		7.9	7.9	8.1	8	8	7.2
Metals, Dissolved									
Aluminum	9500	ug/L		24.4	13.2	12	7	-	10
Antimony	6	ug/L		< 0.5	< 0.5	0.1	0.2	-	0.1
Arsenic	10	ug/L		1.83	2.19	1.9	2.4	-	2.4
Barium	1000	ug/L		16.5	17.3	19	19	-	19
Beryllium	8	ug/L		< 0.1	< 0.1	ND	< 0.1	-	< 0.1
Bismuth		ug/L		< 1	< 1	ND	< 0.1	-	< 0.1
Boron	5000	ug/L		152	181	130	190	-	167
Cadmium	5	ug/L		0.25	0.168	0.78	0.36	-	2.02
Calcium		ug/L		13300	12300	22500	13500	-	16400
Chromium	50	ug/L		< 1	< 1	ND	< 0.5	-	< 0.5
Cobalt	1	ug/L		< 0.5	< 0.5	0.1	< 0.05	-	0.06
Copper	1500	ug/L		1.31	0.93	5.4	1.4	-	2
Iron	6500	ug/L		5.1	20	ND	< 10	-	< 10
Lead	10	ug/L		< 0.2	< 0.2	ND	< 0.1	-	< 0.1
Lithium	8	ug/L		< 5	< 5	1.6	1.5	-	1.7
Magnesium		ug/L		11000	11000	18000	11100	-	13800
Manganese	1500	ug/L		3.3	15.1	21.2	3.8	-	48.2
Mercury	1	ug/L		< 0.01	< 0.01	ND	< 0.02	-	< 0.02
Molybdenum	250	ug/L		5.2	5.1	3.7	5.7	-	5.6
Nickel	80	ug/L		1.2	ND	1.7	0.6	-	1.3
Potassium		ug/L		9110	9730	8000	11100	-	10400
Selenium	10	ug/L		< 0.1	< 0.1	ND	< 0.5	-	< 0.5
Silicon		ug/L		3650	3960	4500	4100	-	4500
Silver	20	ug/L		< 0.02	< 0.02	0.14	< 0.05	-	< 0.05
Sodium	200000	ug/L		50100	53300	24900	56800	-	53500
Strontium	2500	ug/L		154	149	198	160	-	166
Sulphur (S)		ug/L		-	-	-	-	-	-
Sulphur (Colloidal)		ug/L		-	-	ND	< 1000	-	2000
Tellurium		ug/L		-	-	-	-	-	-
Thallium		ug/L		< 0.05	< 0.05	ND	< 0.02	-	< 0.02
Thorium-232		ug/L		-	-	-	-	-	-
Tin	2500	ug/L		< 5	< 5	ND	< 0.1	-	< 0.2
Titanium		ug/L		< 5	< 5	ND	< 0.2	-	< 5
Uranium	20	ug/L		2.16	2.33	1.64	< 5	-	2.22
Vanadium	20	ug/L		< 5	< 5	ND	2.31	-	< 1
Zinc	3000	ug/L		< 5	< 5	5	< 1	-	9
Zirconium		ug/L		< 0.5	< 0.5	ND	4	-	< 0.1
Cesium		ug/L		-	-	-	-	-	-
Rubidium		ug/L		-	-	-	-	-	-
Tungsten	3	ug/L		-	-	-	-	-	-
Phosphorus, IPC-MS		ug/L		-	-	-	-	-	-
Metals, Total									
Aluminum		ug/L		-	-	-	-	-	-
Antimony		ug/L		-	-	-	-	-	-
Arsenic		ug/L		-	-	-	-	-	-
Barium		ug/L		-	-	-	-	-	-
Beryllium		ug/L		-	-	-	-	-	-
Bismuth		ug/L		-	-	-	-	-	-
Boron		ug/L		-	-	-	-	-	-
Cadmium		ug/L		-	-	-	-	-	-
Calcium		ug/L		-	-	-	-	-	-
Chromium		ug/L		-	-	-	-	-	-
Cobalt		ug/L		-	-	-	-	-	-
Copper		ug/L		-	-	-	-	-	-
Iron		ug/L		-	-	-	-	-	-
Lead		ug/L		-	-	-	-	-	-
Lithium		ug/L		-	-	-	-	-	-
Magnesium		ug/L		-	-	-	-	-	-
Manganese		ug/L		-	-	-	-	-	-
Mercury		ug/L		-	-	-	-	-	-
Molybdenum		ug/L		-	-	-	-	-	-
Nickel		ug/L		-	-	-	-	-	-
Potassium		ug/L		-	-	-	-	-	-
Selenium		ug/L		-	-	-	-	-	-
Silicon		ug/L		-	-	-	-	-	-
Silver		ug/L		-	-	-	-	-	-
Sodium		ug/L		-	-	-	-	-	-
Strontium		ug/L		-	-	-	-	-	-
Sulphur (S)		ug/L		-	-	-	-	-	-
Sulphur (Colloidal)		ug/L		-	-	-	-	-	-
Tellurium		ug/L		-	-	-	-	-	-
Thallium		ug/L		-	-	-	-	-	-
Thorium-232		ug/L		-	-	-	-	-	-
Tin		ug/L		-	-	-	-	-	-
Titanium		ug/L		-	-	-	-	-	-
Uranium		ug/L		-	-	-	-	-	-
Vanadium		ug/L		-	-	-	-	-	-
Zinc		ug/L		-	-	-	-	-	-
Zirconium		ug/L		-	-	-	-	-	-
Tungsten		ug/L		-	-	-	-	-	-
Rubidium		ug/L		-	-	-	-	-	-
Cesium		ug/L		-	-	-	-	-	-
Phosphorus, ICP-MS		ug/L		-	-	-	-	-	-

Table Notes:
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QA/QC = Quality Assurance/Quality Control; FDA/FD = Field Duplicate Available/Field
< or ND Indicates parameter was below laboratory equipment detection limit
- Chemical not analyzed or criteria not defined.
Result exceeds applicable CSR standard **744**
Detection limit exceeds applicable CSR standard ***< 2***

Appendix C
Results of Groundwater Analyses - BH96-2
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Location	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2	BH96-2
			Laboratory ID	BH96-2_2016-07-	BH96-2_2016-10-	BH96-2_2017-03-	BH96-2_2017-08-	L2070518-1	L2124909-8
			Sample Date	2016-07-25	2016-10-13	2017-03-28	2017-08-24	2018-03-19	2018-07-04
			QA/QC						
Anions + Nutrients									
Alkalinity, Total as CaCO3		ug/L		-	-	-	-	179000	194000
Bromide (Br)		ug/L		-	-	-	-	-	-
Chloride (Cl)	250000	ug/L		3400	3200	6200	4900	4470	3360
Fluoride (F)	1.5	mg/L		0.15	0.15	0.16	0.15	0.172	0.165
Nitrate (as N)	10000	ug/L		310	260	130	650	762	581
Nitrite (as N)	1000	ug/L		< 10	< 10	< 10	< 10	6.8	2.4
Nitrogen, Nitrate-Nitrite	10000	ug/L		-	-	-	-	-	-
Ammonia (as N)		ug/L		230	43	< 30	< 30	27.6	47.3
Total Kjeldahl Nitrogen		ug/L		-	-	-	-	379	396
Sulfate (SO4)	500000	ug/L		4200	3900	3100	4200	3280	3650
Total Phosphorus, Colourmetric		ug/L		-	-	-	-	-	-
Phosphorus, Dissolved		ug/L		50	50	<50	62	61	59
Phosphorus, Total		ug/L		-	-	-	-	112	90
Field + Physical									
Dissolved Oxygen, field measured		mg/L		-	-	-	-	-	4.4
Conductivity, field measured		uS/cm		-	-	-	-	-	355
Oxidation Reduction Potential, field measured		mV		-	-	-	-	-	386.4
pH, field measured		pH units		-	-	-	-	-	7.82
pH, lab		-		8	8.1	8.1	8.2	-	8.28
Depth to Water		m		-	-	-	-	-	9.37
Temperature, field measured		deg c		-	-	-	-	-	7.7
Conductivity		uS/cm		384	387	365	373	345	365
Total Dissolved Solids		mg/L		-	-	-	-	195	-
Total Suspended Solids		mg/L		11	15	20	17	15.4	-
Hardness, Calcium Carbonate (Dissolved)		mg/L		103	90.2	120	102	133	105
Hardness, Calcium Carbonate (Total)		mg/L		103	90.2	120	102	133	105
Biochemical Oxygen Demand		mg/L		< 4.0	< 4.0	< 4.0	< 4.0	-	-
Chemical Oxygen Demand		mg/L		< 20	< 20	< 20	< 20	< 20	< 20
pH, lab		-		8	8.1	8.1	8.2	-	8.28
Metals, Dissolved									
Aluminum	9500	ug/L		9	8	19	10.6	15.3	14.1
Antimony	6	ug/L		0.2	0.3	0.1	< 0.20	0.11	0.11
Arsenic	10	ug/L		3.3	2.4	2	2.22	2.47	2.58
Barium	1000	ug/L		19	21	21	18.6	22.7	20.2
Beryllium	8	ug/L		< 0.1	< 0.1	< 0.1	< 0.10	< 0.10	< 0.10
Bismuth		ug/L		< 0.1	< 0.1	< 0.1	< 0.10	< 0.050	< 0.050
Boron	5000	ug/L		159	178	152	127	116	139
Cadmium	5	ug/L		0.29	0.28	0.28	0.18	0.61	0.392
Calcium		ug/L		15600	15300	20600	17100	20600	17200
Chromium	50	ug/L		< 0.5	< 0.5	< 0.5	< 0.50	< 0.10	< 0.10
Cobalt	1	ug/L		0.09	< 0.05	0.06	< 0.10	< 0.10	< 0.10
Copper	1500	ug/L		0.9	0.7	0.9	1.16	1.18	2.24
Iron	6500	ug/L		14	< 10	< 10	< 10	< 10	17
Lead	10	ug/L		< 0.1	< 0.1	< 0.1	< 0.20	< 0.050	< 0.050
Lithium	8	ug/L		1.8	1.6	1.9	1.55	1.3	1.7
Magnesium		ug/L		15700	12600	16700	14300	19900	15200
Manganese	1500	ug/L		88.2	1.6	2.5	1.96	2.28	30.3
Mercury	1	ug/L		< 0.02	< 0.02	< 0.02	< 0.010	< 0.0050	< 0.0050
Molybdenum	250	ug/L		5.2	5.4	3.8	4.29	3.81	4.19
Nickel	80	ug/L		0.7	0.6	0.6	< 0.40	0.77	0.63
Potassium		ug/L		12200	10000	8220	9230	8980	10200
Selenium	10	ug/L		< 0.5	< 0.5	< 0.5	< 0.50	< 0.050	< 0.050
Silicon		ug/L		4200	4100	4500	4600	4630	4070
Silver	20	ug/L		< 0.05	< 0.05	< 0.05	< 0.050	< 0.010	< 0.010
Sodium	200000	ug/L		58700	50100	30500	41200	29000	43400
Strontium	2500	ug/L		173	166	194	173	205	186
Sulphur (S)		ug/L		-	-	-	-	-	-
Sulphur (Colloidal)		ug/L		< 1000	< 1000	< 1000	< 3000	770	1250
Tellurium		ug/L		-	-	< 0.2	< 0.50	< 0.20	< 0.20
Thallium		ug/L		< 0.02	< 0.02	< 0.02	< 0.020	< 0.010	< 0.010
Thorium-232		ug/L		-	-	< 0.1	< 0.10	< 0.10	< 0.10
Tin	2500	ug/L		< 0.2	< 0.2	< 0.2	0.22	< 0.10	1.03
Titanium		ug/L		< 5	< 5	< 5	< 5.0	< 0.30	0.32
Uranium	20	ug/L		2.13	2.29	1.91	1.96	0.966	2.06
Vanadium	20	ug/L		< 1	< 1	< 1	< 1.0	0.54	< 0.50
Zinc	3000	ug/L		5	< 4	< 4	< 4.0	4.2	7.3
Zirconium		ug/L		< 0.1	< 0.1	< 0.1	< 0.10	< 0.060	< 0.060
Cesium		ug/L		-	-	-	-	< 0.010	< 0.010
Rubidium		ug/L		-	-	-	-	0.53	0.55
Tungsten	3	ug/L		-	-	-	-	0.11	0.1
Phosphorus, IPC-MS		ug/L		-	-	-	-	-	-
Metals, Total									
Aluminum		ug/L		-	-	-	-	529	411
Antimony		ug/L		-	-	-	-	0.17	0.16
Arsenic		ug/L		-	-	-	-	2.65	2.73
Barium		ug/L		-	-	-	-	23.9	23.2
Beryllium		ug/L		-	-	-	-	< 0.10	< 0.10
Bismuth		ug/L		-	-	-	-	< 0.050	< 0.050
Boron		ug/L		-	-	-	-	119	148
Cadmium		ug/L		-	-	-	-	1.55	1.21
Calcium		ug/L		-	-	-	-	25000	17200
Chromium		ug/L		-	-	-	-	1.05	0.57
Cobalt		ug/L		-	-	-	-	0.34	0.35
Copper		ug/L		-	-	-	-	4.57	5.02
Iron		ug/L		-	-	-	-	796	659
Lead		ug/L		-	-	-	-	0.387	0.381
Lithium		ug/L		-	-	-	-	1.7	2
Magnesium		ug/L		-	-	-	-	17500	15600
Manganese		ug/L		-	-	-	-	67.4	77
Mercury		ug/L		-	-	-	-	< 0.0050	< 0.0050
Molybdenum		ug/L		-	-	-	-	3.64	4.23
Nickel		ug/L		-	-	-	-	1.94	1.79
Potassium		ug/L		-	-	-	-	8190	9700
Selenium		ug/L		-	-	-	-	0.057	< 0.050
Silicon		ug/L		-	-	-	-	5700	4860
Silver		ug/L		-	-	-	-	0.01	< 0.010
Sodium		ug/L		-	-	-	-	26000	44000
Strontium		ug/L		-	-	-	-	209	181
Sulphur (S)		ug/L		-	-	-	-	-	-
Sulphur (Colloidal)		ug/L		-	-	-	-	740	1390
Tellurium		ug/L		-	-	-	-	< 0.20	< 0.20
Thallium		ug/L		-	-	-	-	< 0.010	< 0.010
Thorium-232		ug/L		-	-	-	-	< 0.10	< 0.10
Tin		ug/L		-	-	-	-	0.22	0.73
Titanium		ug/L		-	-	-	-	15.5	11.7
Uranium		ug/L		-	-	-	-	1.84	2.02
Vanadium		ug/L		-	-	-	-	2.08	1.58
Zinc		ug/L		-	-	-	-	21.4	19.3
Zirconium		ug/L		-	-	-	-	0.116	0.082
Tungsten		ug/L		-	-	-	-	0.11	< 0.10
Rubidium		ug/L		-	-	-	-	0.8	0.71
Cesium		ug/L		-	-	-	-	0.053	0.04
Phosphorus, ICP-MS		ug/L		-	-	-	-	-	-

Table Notes:

Standards from the Contaminated Sites Regulation (CSR) for the protection of drinking water (DW), updated April 2022.

QA/QC = Quality Assurance/Quality Control; FDA/FD = Field Duplicate Available/Field

< or ND Indicates parameter was below laboratory equipment detection limit

- Chemical not analyzed or criteria not defined.

Result exceeds applicable CSR standard **744**

Detection limit exceeds applicable CSR standard ***< 2***

Appendix C
Results of Groundwater Analyses - BH96-2
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Location	BH96-2	BH96-2	BH96-2	DUP	BH96-2	DUP
			Laboratory ID	L2163155-1	L2257784-5	L2313873-1	L2313873-2	L2325523-1	L2325523-2
			Sample Date	2018-09-10	2019-04-11	2019-07-17	2019-07-17	2019-08-08	2019-08-08
			QA/QC			FDA	FD	FDA	FD
Anions + Nutrients									
Alkalinity, Total as CaCO3		ug/L		190000	200000	201000	206000	236000	238000
Bromide (Br)		ug/L		-	< 50	< 50	< 50	< 50	< 50
Chloride (Cl)	250000	ug/L		2660	770	1500	1110	1390	1440
Fluoride (F)	1.5	mg/L		0.17	0.172	0.166	0.168	0.145	0.146
Nitrate (as N)	10000	ug/L		508	34.5	213	150	139	172
Nitrite (as N)	1000	ug/L		< 1.0	7	5.3	15.3	21.1	14.7
Nitrogen, Nitrate-Nitrite	10000	ug/L		-	41.5	-	-	-	-
Ammonia (as N)		ug/L		5.5	162	96.7	132	92.6	97.9
Total Kjeldahl Nitrogen		ug/L		277	271	251	195	172	248
Sulfate (SO4)	500000	ug/L		4340	2200	3500	3100	2990	3180
Total Phosphorus, Colourmetric		ug/L		-	-	-	-	-	-
Phosphorus, Dissolved		ug/L		72	<50	<50	<50	<50	<50
Phosphorus, Total		ug/L		96.2	97	171	182	197	159
Field + Physical									
Dissolved Oxygen, field measured		mg/L		4	2.5	6.7	-	1.5	-
Conductivity, field measured		uS/cm		256.7	258.9	255.3	-	285.2	-
Oxidation Reduction Potential, field measured		mV		213.5	374.4	263.1	-	382.7	-
pH, field measured		pH units		7.64	7.92	9.06	-	7.68	-
pH, lab		-		8.38	8.35	8.57	8.56	8.48	8.5
Depth to Water		m		9.51	9.58	9.12	-	9.16	-
Temperature, field measured		deg c		8	9.4	7.9	-	11.9	-
Conductivity		uS/cm		360	377	378	384	379	379
Total Dissolved Solids		mg/L		229	-	262	326	247	257
Total Suspended Solids		mg/L		-	-	-	-	-	-
Hardness, Calcium Carbonate (Dissolved)		mg/L		79.6	94.9	85.4	-	-	-
Hardness, Calcium Carbonate (Total)		mg/L		79.6	94.9	85.4	94.4	92.5	92.2
Biochemical Oxygen Demand		mg/L		-	-	-	-	-	-
Chemical Oxygen Demand		mg/L		< 20	-	< 20	-	< 20	-
pH, lab		-		8.38	8.35	8.57	8.56	8.48	8.5
Metals, Dissolved									
Aluminum	9500	ug/L		26.6	5.4	25.6	21.3	16.4	27.9
Antimony	6	ug/L		0.12	< 0.10	0.18	0.23	0.13	0.13
Arsenic	10	ug/L		2.12	4.31	2.72	2.99	3.33	3.39
Barium	1000	ug/L		19.4	19.7	18.4	19.4	18.6	18.8
Beryllium	8	ug/L		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Bismuth		ug/L		< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Boron	5000	ug/L		139	149	160	159	157	156
Cadmium	5	ug/L		0.342	0.0198	0.105	0.142	0.0402	0.0445
Calcium		ug/L		13500	14900	13300	14100	14300	14300
Chromium	50	ug/L		0.11	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Cobalt	1	ug/L		< 0.10	0.12	< 0.10	< 0.10	0.11	< 0.10
Copper	1500	ug/L		1.17	0.35	0.46	0.45	0.62	0.61
Iron	6500	ug/L		22	16	13	< 10	12	25
Lead	10	ug/L		< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Lithium	8	ug/L		1.6	1.5	1.5	1.5	1.7	1.7
Magnesium		ug/L		11100	14000	12700	14400	13800	13700
Manganese	1500	ug/L		1.84	85.3	1.66	10.6	61.9	62
Mercury	1	ug/L		0.0157	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050
Molybdenum	250	ug/L		4.94	4.42	4.82	4.67	4.65	4.71
Nickel	80	ug/L		< 0.50	< 0.50	< 0.50	0.55	0.73	0.59
Potassium		ug/L		9750	10700	10200	10600	10900	10800
Selenium	10	ug/L		< 0.050	< 0.050	< 0.050	0.054	< 0.050	< 0.050
Silicon		ug/L		3940	4080	4050	4140	3950	3940
Silver	20	ug/L		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Sodium	200000	ug/L		49100	46200	50200	48500	51800	50800
Strontium	2500	ug/L		143	190	160	171	179	180
Sulphur (S)		ug/L		-	-	-	-	-	-
Sulphur (Colloidal)		ug/L		1460	850	1290	1250	1450	1340
Tellurium		ug/L		< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Thallium		ug/L		< 0.010	< 0.010	< 0.010	0.012	< 0.010	< 0.010
Thorium-232		ug/L		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Tin	2500	ug/L		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Titanium		ug/L		1.21	< 0.30	1	< 0.90	0.73	1.33
Uranium	20	ug/L		1.92	1.95	2.11	2.29	2.09	2.05
Vanadium	20	ug/L		0.58	< 0.50	1.19	1.39	1.3	1.12
Zinc	3000	ug/L		2.3	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zirconium		ug/L		0.115	< 0.060	< 0.20	< 0.20	< 0.20	< 0.20
Cesium		ug/L		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Rubidium		ug/L		0.45	0.41	0.34	0.37	0.42	0.39
Tungsten	3	ug/L		0.11	0.13	0.12	0.13	0.12	0.12
Phosphorus, IPC-MS		ug/L		-	-	-	-	-	-
Metals, Total									
Aluminum		ug/L		292	2590	4160	5080	7120	7120
Antimony		ug/L		0.16	0.28	0.33	0.36	0.5	0.47
Arsenic		ug/L		2.39	5.62	5.44	6.5	7.06	6.65
Barium		ug/L		23.7	40.5	50.1	53.9	69.8	66.9
Beryllium		ug/L		< 0.10	< 0.10	< 0.10	0.11	0.14	0.15
Bismuth		ug/L		< 0.050	< 0.050	< 0.050	< 0.050	0.05	0.051
Boron		ug/L		147	157	150	143	168	173
Cadmium		ug/L		0.812	0.943	1.49	1.66	2.34	2.07
Calcium		ug/L		13500	15700	15200	16300	15500	15500
Chromium		ug/L		0.34	3.01	5.58	7.05	8.77	8.6
Cobalt		ug/L		0.19	1.81	3.22	3.85	5.07	4.85
Copper		ug/L		2.93	8.7	15.6	17.7	24.9	23.9
Iron		ug/L		332	3500	6550	7990	10100	9640
Lead		ug/L		0.256	1.35	3.22	3.89	4.41	4.05
Lithium		ug/L		1.9	3.3	5.1	5.8	6.8	6.9
Magnesium		ug/L		11400	16900	14700	16600	16500	16500
Manganese		ug/L		29.8	169	245	270	408	372
Mercury		ug/L		< 0.0050	< 0.0050	< 0.050	< 0.050	0.019	0.019
Molybdenum		ug/L		4.81	4.24	4.34	4.19	4.89	4.84
Nickel		ug/L		1.13	4.69	8.16	9.92	12.9	12.2
Potassium		ug/L		10100	12300	11300	11700	11000	11200
Selenium		ug/L		0.072	< 0.050	0.065	0.09	0.084	0.071
Silicon		ug/L		4290	7660	10500	11900	15000	15200
Silver		ug/L		< 0.010	0.033	0.074	0.092	0.133	0.113
Sodium		ug/L		50900	48300	48300	47100	49700	50700
Strontium		ug/L		152	209	176	194	202	191
Sulphur (S)		ug/L		-	-	-	-	-	-
Sulphur (Colloidal)		ug/L		1440	1000	1000	780	1220	1110
Tellurium		ug/L		< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Thallium		ug/L		< 0.010	0.019	0.036	0.042	0.057	0.05
Thorium-232		ug/L		< 0.10	< 0.10	0.17	0.21	0.26	0.26
Tin		ug/L		0.11	0.46	0.46	0.5	0.79	0.72
Titanium		ug/L		6.97	57	102	126	166	162
Uranium		ug/L		1.98	2.12	2.38	2.55	2.5	2.42
Vanadium		ug/L		1.19	7.41	10.9	13.3	17.7	17.2
Zinc		ug/L		10.5	24.8	37.9	44.8	56.5	54.6
Zirconium		ug/L		0.095	0.196	< 0.20	< 0.20	0.69	0.88
Tungsten		ug/L		< 0.10	0.13	0.14	0.13	0.18	0.16
Rubidium		ug/L		0.59	1.55	2.17	2.53	3.75	3.76
Cesium		ug/L		0.023	0.237	0.41	0.474	0.745	0.728
Phosphorus, ICP-MS		ug/L		-	-	-	-	-	-

Table Notes:

Standards from the Contaminated Sites Regulation (CSR) for the protection of drinking water (DW), updated April 2022.

QA/QC = Quality Assurance/Quality Control; FDA/FD = Field Duplicate Available/Field

< or ND Indicates parameter was below laboratory equipment detection limit

- Chemical not analyzed or criteria not defined.

Result exceeds applicable CSR standard **744**

Detection limit exceeds applicable CSR standard ***< 2***

Appendix C
Results of Groundwater Analyses - BH96-2
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Location	BH96-2	DUP	BH-96-2	DUP	BH-96-2	DUP
			Laboratory ID	L2379806-1	L2379806-2	L2364065-1	L2364065-2	VA20A5787-001	VA20A5787-002
			Sample Date	2019-11-06	2019-11-06	2019-10-10	2019-10-10	2020-04-30	2020-04-30
			QA/QC	FDA	FD	FDA	FD	FDA	FD
Anions + Nutrients									
Alkalinity, Total as CaCO3		ug/L		219000	259000	216000	231000	231000	232000
Bromide (Br)		ug/L		< 50	< 50	-	-	< 50	< 50
Chloride (Cl)	250000	ug/L		1560	1510	1330	840	560	570
Fluoride (F)	1.5	mg/L		0.146	0.143	0.15	0.152	0.179	0.176
Nitrate (as N)	10000	ug/L		71.9	57.9	139	70.5	36.1	40.4
Nitrite (as N)	1000	ug/L		8.2	7.3	5.5	12.6	17.6	22.6
Nitrogen, Nitrate-Nitrite	10000	ug/L		-	-	-	-	-	-
Ammonia (as N)		ug/L		147	154	78.7	30.8	245	239
Total Kjeldahl Nitrogen		ug/L		509	478	172	106	1460	1440
Sulfate (SO4)	500000	ug/L		3080	3040	2750	2070	2180	2220
Total Phosphorus, Colourmetric		ug/L		-	-	-	-	1480	1540
Phosphorus, Dissolved		ug/L		<50	<50	60	<50	-	-
Phosphorus, Total		ug/L		115	105	97.4	39.6	-	-
Field + Physical									
Dissolved Oxygen, field measured		mg/L		4.1	-	-	-	6.9	-
Conductivity, field measured		uS/cm		338	-	-	-	278.2	-
Oxidation Reduction Potential, field measured		mV		415.8	-	-	-	324.0	-
pH, field measured		pH units		7.05	-	-	-	8.0	-
pH, lab		-		8.26	8.27	8.49	8.47	8.28	8.26
Depth to Water		m		9.17	-	-	-	9.08	-
Temperature, field measured		deg c		7.9	-	-	-	8.4	-
Conductivity		uS/cm		387	383	376	381	393	394
Total Dissolved Solids		mg/L		249	239	211	255	604	596
Total Suspended Solids		mg/L		-	-	-	-	-	-
Hardness, Calcium Carbonate (Dissolved)		mg/L		-	-	-	-	107	108
Hardness, Calcium Carbonate (Total)		mg/L		79.7	79.5	89.2	102	253	221
Biochemical Oxygen Demand		mg/L		-	-	-	-	-	-
Chemical Oxygen Demand		mg/L		< 20	< 20	-	-	33	53
pH, lab		-		8.26	8.27	8.49	8.47	8.28	8.26
Metals, Dissolved									
Aluminum	9500	ug/L		25.5	23.9	11.2	17.8	7.0	7.7
Antimony	6	ug/L		0.11	0.11	0.11	< 0.10	0.15	0.16
Arsenic	10	ug/L		3.35	3.36	3.39	4.38	5.16	5.20
Barium	1000	ug/L		18.2	18.1	17.8	20.5	23.8	28.1
Beryllium	8	ug/L		< 0.10	< 0.10	< 0.10	< 0.10	< 0.100	< 0.100
Bismuth		ug/L		< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Boron	5000	ug/L		161	163	160	155	131	128
Cadmium	5	ug/L		0.842	0.841	0.173	0.0417	0.0113	0.0093
Calcium		ug/L		12300	12100	14200	15500	16100	15800
Chromium	50	ug/L		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Cobalt	1	ug/L		< 0.10	< 0.10	< 0.10	0.11	0.13	0.14
Copper	1500	ug/L		7.06	7.03	0.61	0.35	0.42	5.04
Iron	6500	ug/L		15	18	10	77	< 10	< 10
Lead	10	ug/L		< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	0.112
Lithium	8	ug/L		1.5	1.6	1.6	1.6	1.7	1.7
Magnesium		ug/L		11900	12000	13100	15500	16400	16700
Manganese	1500	ug/L		110	115	45.3	90.6	97.6	96.7
Mercury	1	ug/L		< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050
Molybdenum	250	ug/L		4.64	4.72	5.17	4.56	3.89	3.89
Nickel	80	ug/L		1.01	1.03	0.62	5.12	< 0.50	< 0.50
Potassium		ug/L		10900	11300	11200	11500	11600	11200
Selenium	10	ug/L		< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Silicon		ug/L		4130	4180	4420	4640	4000	4050
Silver	20	ug/L		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Sodium	200000	ug/L		55100	56300	56000	52200	44400	45800
Strontium	2500	ug/L		148	149	164	183	201	200
Sulphur (S)		ug/L		-	-	-	-	-	-
Sulphur (Colloidal)		ug/L		1340	1380	1300	910	< 500	< 500
Tellurium		ug/L		< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Thallium		ug/L		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Thorium-232		ug/L		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Tin	2500	ug/L		3.95	3.83	< 0.10	< 0.10	< 0.10	< 0.10
Titanium		ug/L		0.69	0.96	0.46	< 0.90	< 0.30	< 0.30
Uranium	20	ug/L		1.94	1.92	1.94	1.93	2.01	2.06
Vanadium	20	ug/L		< 0.50	0.51	0.54	0.5	1.19	1.22
Zinc	3000	ug/L		7.3	6.8	< 1.0	< 1.0	< 1.0	2.6
Zirconium		ug/L		< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Cesium		ug/L		0.052	0.045	< 0.010	< 0.010	< 0.010	< 0.010
Rubidium		ug/L		0.54	0.54	0.37	0.42	0.41	0.42
Tungsten	3	ug/L		0.18	0.18	0.15	0.14	0.13	0.13
Phosphorus, IPC-MS		ug/L		-	-	-	-	< 50	< 50
Metals, Total									
Aluminum		ug/L		2230	2030	1390	6060	52200	36900
Antimony		ug/L		0.24	0.22	0.18	0.39	0.46	0.43
Arsenic		ug/L		4.84	4.82	3.91	6.74	18.3	17.0
Barium		ug/L		34.4	32	26.7	63.2	338	263
Beryllium		ug/L		< 0.10	< 0.10	< 0.10	0.12	1.12	0.970
Bismuth		ug/L		< 0.050	< 0.050	< 0.050	< 0.050	0.431	0.223
Boron		ug/L		183	184	177	167	158	154
Cadmium		ug/L		1.46	1.43	0.67	2.04	3.33	2.91
Calcium		ug/L		14900	14700	13900	17000	33300	32400
Chromium		ug/L		2.71	2.52	1.71	7.09	60.7	40.4
Cobalt		ug/L		1.91	1.71	1.11	4.04	38.6	28.6
Copper		ug/L		14.4	13.5	6	20.2	128	101
Iron		ug/L		2960	2610	1990	8140	76900	51400
Lead		ug/L		1.39	1.26	0.879	3.34	24.3	19.8
Lithium		ug/L		3.6	3.4	2.8	6.4	47.9	31.6
Magnesium		ug/L		13400	13400	12500	16200	41300	33900
Manganese		ug/L		336	306	155	344	2270	1780
Mercury		ug/L		0.0067	0.008	0.005	0.0163	0.0974	0.0986
Molybdenum		ug/L		5.12	4.79	4.48	3.76	1.18	1.23
Nickel		ug/L		4.78	4.24	2.89	10.3	85.5	60.6
Potassium		ug/L		11900	12100	10300	11100	15800	15600
Selenium		ug/L		0.05	< 0.050	0.055	0.097	0.310	0.197
Silicon		ug/L		7060	6850	5960	12200	67000	47700
Silver		ug/L		0.029	0.025	0.018	0.082	0.553	0.289
Sodium		ug/L		53800	54200	48900	46000	50700	54000
Strontium		ug/L		186	177	170	190	313	304
Sulphur (S)		ug/L		-	-	-	-	-	-
Sulphur (Colloidal)		ug/L		1130	960	1120	910	960	600
Tellurium		ug/L		< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Thallium		ug/L		0.01	< 0.010	0.011	0.041	0.204	0.148
Thorium-232		ug/L		< 0.10	< 0.10	< 0.10	0.19	2.28	1.55
Tin		ug/L		2.76	2.48	0.23	0.59	0.80	0.44
Titanium		ug/L		64	56.9	37.4	126	278	272
Uranium		ug/L		2.12	2.05	1.86	2.06	3.88	3.78
Vanadium		ug/L		5.56	5.03	3.81	14.5	107	78.8
Zinc		ug/L		24	22.6	13.5	47.3	263	199
Zirconium		ug/L		0.5	0.45	< 0.20	< 0.20	< 1.20	< 0.20
Tungsten		ug/L		0.21	0.2	0.13	0.12	< 0.10	< 0.10
Rubidium		ug/L		1.46	1.4	0.98	2.97	19.9	13.5
Cesium		ug/L		0.294	0.26	0.134	0.534	4.46	2.73
Phosphorus, ICP-MS		ug/L		-	-	-	-	1340	1360

Table Notes:

Standards from the Contaminated Sites Regulation (CSR) for the protection of drinking water (DW), updated April 2022.

QA/QC = Quality Assurance/Quality Control; FDA/FD = Field Duplicate Available/Field

< or ND Indicates parameter was below laboratory equipment detection limit

- Chemical not analyzed or criteria not defined.

Result exceeds applicable CSR standard **744**

Detection limit exceeds applicable CSR standard ***< 2***

Appendix C
Results of Groundwater Analyses - BH96-2
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Location	BH-96-2	BH-96-2	BH96-2	BH96-2	BH96-2
			Laboratory ID	VA20B4492-001	VA20B7660-001	VA21A6868-001	VA21B3852-001	VA21C2228-001
			Sample Date	2020-09-01	2020-10-07	2021-04-12	2021-07-06	2021-10-06
			QA/QC					
Anions + Nutrients								
Alkalinity, Total as CaCO3		ug/L		204000	215000	209000	215000	238000
Bromide (Br)		ug/L		< 50	-	-	< 50	-
Chloride (Cl)	250000	ug/L		1380	590	630	850	760
Fluoride (F)	1.5	mg/L		0.145	0.148	0.159	0.124	0.154
Nitrate (as N)	10000	ug/L		629	182	110	659	424
Nitrite (as N)	1000	ug/L		2.2	2.5	6.7	3.2	3.5
Nitrogen, Nitrate-Nitrite	10000	ug/L		-	-	-	-	-
Ammonia (as N)		ug/L		21.3	160	132	41.2	62.2
Total Kjeldahl Nitrogen		ug/L		552	494	187	169	175
Sulfate (SO4)	500000	ug/L		5090	2220	2630	6450	4610
Total Phosphorus, Colourmetric		ug/L		261	611	-	-	-
Phosphorus, Dissolved		ug/L		-	-	<50	<50	<50
Phosphorus, Total		ug/L		-	-	93.6	186	51.3
Field + Physical								
Dissolved Oxygen, field measured		mg/L		3.5	4.2	6	3.6	4
Conductivity, field measured		uS/cm		385.0	225.3	267.7	397	398
Oxidation Reduction Potential, field measured		mV		364.3	302.5	176.1	234.9	268.6
pH, field measured		pH units		7.6	7.7	8.07	8.06	8.08
pH, lab		-		8.27	8.25	8.28	8.39	8.55
Depth to Water		m		10.63	9.13	9.12	9.21	9.25
Temperature, field measured		deg c		7.8	8.1	8	8.2	7.9
Conductivity		uS/cm		390	392	398	408	425
Total Dissolved Solids		mg/L		274	405	238	309	232
Total Suspended Solids		mg/L		-	-	-	-	-
Hardness, Calcium Carbonate (Dissolved)		mg/L		96.1	110	105	98.7	106
Hardness, Calcium Carbonate (Total)		mg/L		105	165	-	97.6	109
Biochemical Oxygen Demand		mg/L		-	-	-	-	-
Chemical Oxygen Demand		mg/L		< 20	53	< 20	< 20	< 20
pH, lab		-		8.27	8.25	8.28	8.39	8.55
Metals, Dissolved								
Aluminum	9500	ug/L		43.2	8.2	9.3	11.0	3.9
Antimony	6	ug/L		0.28	0.19	0.11	0.18	0.14
Arsenic	10	ug/L		3.26	4.37	5.20	3.50	4.73
Barium	1000	ug/L		22.4	22.2	22.1	19.6	20.6
Beryllium	8	ug/L		< 0.100	< 0.100	< 0.1	< 0.1	< 0.1
Bismuth		ug/L		< 0.050	< 0.050	< 0.05	< 0.05	< 0.05
Boron	5000	ug/L		168	130	148	151	154
Cadmium	5	ug/L		0.0556	0.0247	0.0223	0.0286	0.0341
Calcium		ug/L		15400	15800	16700	15000	16200
Chromium	50	ug/L		< 0.10	< 0.10	< 0.1	< 0.5	< 0.5
Cobalt	1	ug/L		< 0.10	< 0.10	< 0.1	< 0.1	< 0.1
Copper	1500	ug/L		1.78	1.16	0.34	0.46	1.46
Iron	6500	ug/L		40	11	< 10	37	< 10
Lead	10	ug/L		< 0.050	< 0.050	< 0.05	< 0.05	< 0.05
Lithium	8	ug/L		2.0	1.7	1.7	1.6	1.8
Magnesium		ug/L		14000	17200	15400	14600	15900
Manganese	1500	ug/L		14.2	44.7	46.8	6.48	24.1
Mercury	1	ug/L		< 0.0050	< 0.0050	< 0.005	< 0.005	< 0.005
Molybdenum	250	ug/L		3.80	4.20	3.88	8.15	3.88
Nickel	80	ug/L		< 0.50	< 0.50	< 0.5	< 0.5	< 0.5
Potassium		ug/L		11300	12300	11800	12100	11600
Selenium	10	ug/L		0.268	0.110	0.077	0.217	0.163
Silicon		ug/L		4420	4070	4400	4440	4400
Silver	20	ug/L		< 0.010	< 0.010	< 0.01	< 0.01	< 0.01
Sodium	200000	ug/L		49200	50800	44000	50800	46100
Strontium	2500	ug/L		199	214	204	201	199
Sulphur (S)		ug/L		-	-	710	2230	1850
Sulphur (Colloidal)		ug/L		1520	940	-	-	-
Tellurium		ug/L		< 0.20	< 0.20	< 0.2	< 0.2	< 0.2
Thallium		ug/L		< 0.010	< 0.010	< 0.01	< 0.01	< 0.01
Thorium-232		ug/L		< 0.10	< 0.10	< 0.1	< 0.1	< 0.1
Tin	2500	ug/L		< 0.10	< 0.10	< 0.1	< 0.1	< 0.1
Titanium		ug/L		0.79	< 0.30	< 0.3	< 0.6	< 0.3
Uranium	20	ug/L		1.66	1.68	1.77	1.69	1.72
Vanadium	20	ug/L		1.28	0.66	< 0.5	0.60	< 0.5
Zinc	3000	ug/L		1.7	2.1	< 1	2.9	1.8
Zirconium		ug/L		< 0.20	< 0.20	< 0.2	< 0.2	< 0.2
Cesium		ug/L		< 0.010	< 0.010	< 0.01	< 0.01	< 0.01
Rubidium		ug/L		0.43	0.42	0.37	0.35	0.40
Tungsten	3	ug/L		< 0.10	< 0.10	< 0.1	< 0.1	< 0.1
Phosphorus, IPC-MS		ug/L		< 50	< 50	-	-	-
Metals, Total								
Aluminum		ug/L		5470	19600	-	1410	493
Antimony		ug/L		0.47	0.53	-	0.22	0.17
Arsenic		ug/L		5.60	12.9	-	3.65	4.52
Barium		ug/L		64.6	133	-	42.5	23.1
Beryllium		ug/L		0.155	0.426	-	< 0.1	< 0.1
Bismuth		ug/L		< 0.050	0.120	-	< 0.05	< 0.05
Boron		ug/L		187	160	-	165	140
Cadmium		ug/L		0.578	0.433	-	0.179	0.141
Calcium		ug/L		17900	25200	-	16100	16200
Chromium		ug/L		6.00	22.3	-	0.96	0.62
Cobalt		ug/L		6.05	14.5	-	2.71	0.49
Copper		ug/L		15.1	36.0	-	4.95	1.46
Iron		ug/L		7020	27400	-	968	638
Lead		ug/L		3.22	7.71	-	1.34	0.302
Lithium		ug/L		6.7	17.6	-	2.3	2.4
Magnesium		ug/L		14600	24800	-	14200	16600
Manganese		ug/L		436	927	-	242	93.6
Mercury		ug/L		0.0253	< 0.0050	-	0.0088	< 0.005
Molybdenum		ug/L		2.82	2.90	-	2.28	3.39
Nickel		ug/L		9.87	28.9	-	2.69	1.00
Potassium		ug/L		11800	12800	-	10800	11600
Selenium		ug/L		0.390	0.307	-	0.155	0.112
Silicon		ug/L		12500	31800	-	6510	4820
Silver		ug/L		0.060	0.150	-	< 0.01	< 0.01
Sodium		ug/L		47700	45100	-	46300	46300
Strontium		ug/L		189	263	-	202	195
Sulphur (S)		ug/L		-	-	-	2260	1940
Sulphur (Colloidal)		ug/L		1490	940	-	-	-
Tellurium		ug/L		< 0.20	< 0.20	-	< 0.2	< 0.2
Thallium		ug/L		0.028	0.074	-	< 0.01	< 0.01
Thorium-232		ug/L		0.33	1.17	-	< 0.1	< 0.1
Tin		ug/L		0.32	0.29	-	< 0.1	< 0.1
Titanium		ug/L		123	352	-	25.5	12.3
Uranium		ug/L		1.81	2.34	-	1.75	1.80
Vanadium		ug/L		13.4	44.2	-	3.05	1.55
Zinc		ug/L		32.7	88.3	-	15.6	3.4
Zirconium		ug/L		0.24	< 0.20	-	0.50	< 0.2
Tungsten		ug/L		0.11	< 0.10	-	< 0.1	< 0.1
Rubidium		ug/L		2.95	8.25	-	1.07	0.66
Cesium		ug/L		0.488	1.80	-	0.091	0.042
Phosphorus, ICP-MS		ug/L		288	664	-	-	-

Table Notes:

Standards from the Contaminated Sites Regulation (CSR) for the protection of drinking water (DW), updated April 2022.

QA/QC = Quality Assurance/Quality Control; FDA/FD = Field Duplicate Available/Field

< or ND Indicates parameter was below laboratory equipment detection limit

- Chemical not analyzed or criteria not defined.

Result exceeds applicable CSR standard **744**

Detection limit exceeds applicable CSR standard ***< 2***

Appendix C
Results of Groundwater Analyses - BH96-3
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Location	BH96-3	BH96-3	BH96-3	BH96-3	BH96-3
			Laboratory ID	BH96-3_1996-10-01_N	BH96-3_1997-06-01_N	BH96-3_1997-12-04_N	BH96-3_1998-05-04_N	BH96-3_1998-09-24_N
			Sample Date	1996-10-01	1997-06-01	1997-12-04	1998-05-04	1998-09-24
			QA/QC					
Anions + Nutrients								
Chloride (Cl)	250000	ug/L		2300	71200	35400	19300	16100
Fluoride (F)	1.5	mg/L		-	-	-	-	-
Nitrate (as N)	10000	ug/L		< 5	21	9	45	< 5
Nitrite (as N)	1000	ug/L		69	9	56	19	1
Ammonia (as N)		ug/L		820	24800	9730	6450	3990
Sulfate (SO4)	500000	ug/L		16400	1000	3000	11000	8000
Phosphorus, Dissolved		ug/L		-	-	-	-	-
Field + Physical								
Conductivity		uS/cm		136	874	583	470	382
Total Suspended Solids		mg/L		30	1710	1100	368	1970
Hardness, Calcium Carbonate (Dissolved)		mg/L		44.8	248	164	153	153
Hardness, Calcium Carbonate (Total)		mg/L		44.8	248	164	153	153
Biochemical Oxygen Demand		mg/L		-	-	-	-	58
Chemical Oxygen Demand		mg/L		-	-	-	-	251
pH, lab		-		6.54	6.48	6.26	7.38	6.92
Metals, Dissolved								
Aluminum	9500	ug/L		8	80	< 5	< 5	< 5
Antimony	6	ug/L		-	***< 200***	0.3	0.1	< 0.1
Arsenic	10	ug/L		5.4	***< 200***	2.6	2.1	1
Barium	1000	ug/L		20	230	120	100	80
Beryllium	8	ug/L		***< 5***	***< 5***	***< 5***	***< 5***	***< 5***
Bismuth		ug/L		-	-	-	-	-
Boron	5000	ug/L		< 100	-	-	-	-
Cadmium	5	ug/L		< 0.2	< 2	< 0.2	< 0.2	< 0.2
Calcium		ug/L		12600	74100	47400	43500	43100
Chromium	50	ug/L		< 1	< 10	< 1	< 1	< 1
Cobalt	1	ug/L		***< 20***	**10**	***< 10***	***< 10***	***< 10***
Copper	1500	ug/L		1	< 10	< 1	2	< 1
Iron	6500	ug/L		30	**15000**	**7120**	30	1230
Lead	10	ug/L		< 1	< 10	< 1	< 1	< 1
Lithium	8	ug/L		***< 20***	-	-	-	-
Magnesium		ug/L		3240	15400	11000	10800	11000
Manganese	1500	ug/L		**1650**	**13500**	610	**8390**	**7640**
Mercury	1	ug/L		< 0.05	< 0.05	0.04	< 0.01	< 0.01
Molybdenum	250	ug/L		< 30	< 30	< 30	< 30	< 30
Nickel	80	ug/L		< 20	< 20	20	< 20	< 50
Potassium		ug/L		-	-	-	-	-
Selenium	10	ug/L		< 0.5	< 10	< 0.5	< 0.5	< 0.5
Silicon		ug/L		-	-	-	-	-
Silver	20	ug/L		< 0.1	< 1	< 0.1	< 0.1	< 0.1
Sodium	200000	ug/L		5000	-	-	-	-
Strontium	2500	ug/L		-	-	-	-	-
Sulphur (Colloidal)		ug/L		-	-	-	-	-
Thallium		ug/L		-	-	< 0.1	< 0.1	0.1
Tin	2500	ug/L		-	-	-	-	-
Titanium		ug/L		-	-	< 10	< 10	< 10
Uranium	20	ug/L		-	-	1.1	0.09	0.04
Vanadium	20	ug/L		***< 30***	-	***< 30***	***< 30***	***< 30***
Zinc	3000	ug/L		6	< 5	< 5	10	< 5
Zirconium		ug/L		-	-	-	-	-

Table Notes:

Standards from the Contaminated Sites Regulation (CSR) for the protection of drinking water (DW), updated April 2022.
QA/QC = Quality Assurance/Quality Control; FDA/FD = Field Duplicate Available/Field Duplicate
< or ND Indicates parameter was below laboratory equipment detection limit
- Chemical not analyzed or criteria not defined.
Result exceeds applicable CSR standard **744**
Detection limit exceeds applicable CSR standard ***< 2***

Appendix C
Results of Groundwater Analyses - BH96-3
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Location	BH96-3	BH96-3	BH96-3	BH96-3	BH96-3
			Laboratory ID	BH96-3_1999-01-27_N	BH96-3_1999-04-01_N	BH96-3_1999-11-01_N	BH96-3_2000-03-17_N	BH96-3_2000-08-15_N_A
			Sample Date	1999-01-27	1999-04-01	1999-11-01	2000-03-17	2000-08-15
			QA/QC					
Anions + Nutrients								
Chloride (Cl)	250000	ug/L		11000	8100	7500	6800	15200
Fluoride (F)	1.5	mg/L		-	-	-	< 0.05	0.81
Nitrate (as N)	10000	ug/L		30	< 50	< 50	-	< 50
Nitrite (as N)	1000	ug/L		< 34	< 2	2	-	9
Ammonia (as N)		ug/L		1800	1900	-	1700	1400
Sulfate (SO4)	500000	ug/L		7800	8800	19800	16300	3100
Phosphorus, Dissolved		ug/L		-	-	-	110	<10
Field + Physical								
Conductivity		uS/cm		-	218	-	290	-
Total Suspended Solids		mg/L		-	-	-	-	-
Hardness, Calcium Carbonate (Dissolved)		mg/L		156	80	104	92	118
Hardness, Calcium Carbonate (Total)		mg/L		156	80	104	92	118
Biochemical Oxygen Demand		mg/L		-	13	< 10	11	51
Chemical Oxygen Demand		mg/L		165	117	-	111	102
pH, lab		-		-	-	-	6.41	6.58
Metals, Dissolved								
Aluminum	9500	ug/L		110	10	7	110	6
Antimony	6	ug/L		***< 15***	< 1	< 1	< 1	< 1
Arsenic	10	ug/L		***< 40***	2	< 1	**12**	3
Barium	1000	ug/L		62	33	33	680	36
Beryllium	8	ug/L		< 1	< 1	< 1	< 1	< 1
Bismuth		ug/L		-	-	-	-	-
Boron	5000	ug/L		62	50	< 50	130	< 50
Cadmium	5	ug/L		< 0.1	< 0.2	< 0.2	0.3	< 0.2
Calcium		ug/L		44000	22900	28000	26400	35600
Chromium	50	ug/L		3	< 1	< 1	< 1	< 1
Cobalt	1	ug/L		***< 3***	**3**	**2**	**3**	**5**
Copper	1500	ug/L		35	1	< 1	3	2
Iron	6500	ug/L		**8530**	2260	150	2620	**8240**
Lead	10	ug/L		***< 20***	< 1	< 1	< 1	< 1
Lithium	8	ug/L		-	-	-	-	-
Magnesium		ug/L		11300	5520	8290	6430	7130
Manganese	1500	ug/L		**6880**	**3050**	**2890**	**2700**	**5000**
Mercury	1	ug/L		< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
Molybdenum	250	ug/L		< 4	< 1	< 1	2	< 1
Nickel	80	ug/L		14	4	2	4	6
Potassium		ug/L		5900	1370	1720	1380	1570
Selenium	10	ug/L		< 1	< 2	< 2	< 2	< 2
Silicon		ug/L		-	-	-	8360	16300
Silver	20	ug/L		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Sodium	200000	ug/L		18500	8820	10000	11300	7670
Strontium	2500	ug/L		-	-	-	190	26
Sulphur (Colloidal)		ug/L		-	-	-	-	-
Thallium		ug/L		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Tin	2500	ug/L		-	-	-	< 1	< 1
Titanium		ug/L		< 3	< 1	< 1	2	< 1
Uranium	20	ug/L		-	< 0.5	< 0.5	< 0.5	< 0.5
Vanadium	20	ug/L		< 3	< 1	< 1	2	< 1
Zinc	3000	ug/L		26	7	7	350	5
Zirconium		ug/L		-	-	-	< 10	< 10

Table Notes:

Standards from the Contaminated Sites Regulation (CSR) for the protection of drinking water (DW), updated April 2022.
QA/QC = Quality Assurance/Quality Control; FDA/FD = Field Duplicate Available/Field Duplicate
< or ND Indicates parameter was below laboratory equipment detection limit
- Chemical not analyzed or criteria not defined.
Result exceeds applicable CSR standard **744**
Detection limit exceeds applicable CSR standard ***< 2***

Appendix C
Results of Groundwater Analyses - BH96-3
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Location	BH96-3	BH96-3	BH96-3	BH96-3	BH96-3
			Laboratory ID	BH96-3_2000-08-15_N_B	BH96-3_2000-12-08_N	BH96-3_2001-05-07_N	BH96-3_2001-12-01_N	BH96-3_2002-04-01_N
			Sample Date	2000-08-15	2000-12-08	2001-05-07	2001-12-01	2002-04-01
			QA/QC					
Anions + Nutrients								
Chloride (Cl)	250000	ug/L		900	7700	6300	4700	4700
Fluoride (F)	1.5	mg/L		0.1	< 0.05	< 0.05	< 0.05	< 0.05
Nitrate (as N)	10000	ug/L		250	< 50	< 50	< 50	< 50
Nitrite (as N)	1000	ug/L		< 2	280	8	3	< 50
Ammonia (as N)		ug/L		30	1500	1100	1400	1240
Sulfate (SO4)	500000	ug/L		8800	16500	13500	15100	14900
Phosphorus, Dissolved		ug/L		100	70	420	80	80
Field + Physical								
Conductivity		uS/cm		-	-	359	255	64
Total Suspended Solids		mg/L		-	-	-	-	-
Hardness, Calcium Carbonate (Dissolved)		mg/L		54	139	101	99	92
Hardness, Calcium Carbonate (Total)		mg/L		54	139	101	99	92
Biochemical Oxygen Demand		mg/L		-	29	17	< 0.01	< 0.01
Chemical Oxygen Demand		mg/L		-	47	-	< 10	15
pH, lab		-		7.97	6.58	6.62	6.41	7.34
Metals, Dissolved								
Aluminum	9500	ug/L		78	6	110	8	19
Antimony	6	ug/L		-	< 1	< 1	< 1	< 1
Arsenic	10	ug/L		-	1	5	< 1	1
Barium	1000	ug/L		16	31	33	28	26
Beryllium	8	ug/L		-	< 1	< 1	< 1	< 1
Bismuth		ug/L		-	-	-	-	-
Boron	5000	ug/L		180	< 50	70	< 50	< 50
Cadmium	5	ug/L		< 0.2	< 0.2	0.4	< 0.2	< 0.2
Calcium		ug/L		10900	37800	26800	26700	24400
Chromium	50	ug/L		-	< 1	< 1	< 1	< 1
Cobalt	1	ug/L		-	**2**	**2**	**2**	-
Copper	1500	ug/L		-	< 1	< 1	< 1	< 1
Iron	6500	ug/L		80	110	4760	2220	4610
Lead	10	ug/L		-	< 1	< 1	< 1	< 1
Lithium	8	ug/L		-	-	< 1	-	-
Magnesium		ug/L		6430	10700	8280	7800	7560
Manganese	1500	ug/L		15	**2660**	**2610**	**2770**	**2130**
Mercury	1	ug/L		-	< 0.02	< 0.02	< 0.02	< 0.02
Molybdenum	250	ug/L		-	< 1	< 1	< 1	< 1
Nickel	80	ug/L		-	4	2	3	7
Potassium		ug/L		6860	1510	1460	1670	1500
Selenium	10	ug/L		-	< 2	< 2	< 2	< 2
Silicon		ug/L		9080	15500	13200	13300	12500
Silver	20	ug/L		-	< 0.1	< 0.1	< 0.1	< 0.1
Sodium	200000	ug/L		34500	10200	8960	8750	8590
Strontium	2500	ug/L		130	200	170	170	150
Sulphur (Colloidal)		ug/L		-	-	-	-	-
Thallium		ug/L		-	< 0.1	< 0.1	2	< 1
Tin	2500	ug/L		-	< 1	< 1	1.5	< 0.5
Titanium		ug/L		3	< 1	2	< 1	< 1
Uranium	20	ug/L		2.9	< 0.5	< 0.5	< 1	< 1
Vanadium	20	ug/L		1	< 1	< 1	< 0.5	< 0.5
Zinc	3000	ug/L		-	7	< 5	< 1	< 1
Zirconium		ug/L		-	< 10	< 10	< 5	8

Table Notes:

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- Chemical not analyzed or criteria not defined.
Result exceeds applicable CSR standard **744**
Detection limit exceeds applicable CSR standard ***< 2***

Appendix C
Results of Groundwater Analyses - BH96-3
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Location	BH96-3	BH96-3	BH96-3	BH96-3	BH96-3
			Laboratory ID	BH96-3_2002-06-01_N	BH96-3_2003-01-01_N	BH96-3_2003-03-01_N	BH96-3_2003-03-01_FD	BH96-3_2003-08-03_N
			Sample Date	2002-06-01	2003-01-01	2003-03-01	2003-03-01	2003-08-03
			QA/QC			FDA	FD	
Anions + Nutrients								
Chloride (Cl)	250000	ug/L		700	9400	9600	8900	55600
Fluoride (F)	1.5	mg/L		0.17	< 0.05	< 0.05	-	**4.1**
Nitrate (as N)	10000	ug/L		< 50	< 50	270	< 20	< 50
Nitrite (as N)	1000	ug/L		< 50	6	27	6	< 2
Ammonia (as N)		ug/L		940	1000	1100	765	4600
Sulfate (SO4)	500000	ug/L		4200	5900	10900	9100	1400
Phosphorus, Dissolved		ug/L		160	50	120	-	170
Field + Physical								
Conductivity		uS/cm		255	317	305	320	743
Total Suspended Solids		mg/L		-	-	-	-	-
Hardness, Calcium Carbonate (Dissolved)		mg/L		549	143	127	-	230
Hardness, Calcium Carbonate (Total)		mg/L		549	143	127	-	230
Biochemical Oxygen Demand		mg/L		19	30	28	< 6	308
Chemical Oxygen Demand		mg/L		49	85	137	66	664
pH, lab		-		6.4	6.6	6.44	7.2	6.95
Metals, Dissolved								
Aluminum	9500	ug/L		8	13	16	2.7	40
Antimony	6	ug/L		< 1	< 1	< 1	0.699	< 1
Arsenic	10	ug/L		1	< 1	< 1	**30.2**	6
Barium	1000	ug/L		400	38	32	34.8	120
Beryllium	8	ug/L		< 1	< 1	< 1	< 0.02	< 1
Bismuth		ug/L		-	-	-	-	< 1
Boron	5000	ug/L		2010	< 50	< 50	-	< 50
Cadmium	5	ug/L		< 0.2	< 0.2	< 0.2	0.02	< 0.2
Calcium		ug/L		158000	38800	32500	-	61300
Chromium	50	ug/L		2	1	< 1	< 0.02	< 1
Cobalt	1	ug/L		**4**	< 1	1	**1.74**	**7**
Copper	1500	ug/L		6	< 1	< 1	2.5	< 1
Iron	6500	ug/L		370	4430	490	-	**6750**
Lead	10	ug/L		< 1	< 1	< 1	0.14	< 1
Lithium	8	ug/L		2	1	2	1.35	< 1
Magnesium		ug/L		37400	11300	11000	-	18600
Manganese	1500	ug/L		**3400**	**3800**	**2740**	**3040**	**10300**
Mercury	1	ug/L		< 0.02	< 0.02	< 0.02	-	< 0.02
Molybdenum	250	ug/L		0.9	< 1	3.7	6.37	0.9
Nickel	80	ug/L		8	13	9	3.09	7
Potassium		ug/L		71000	1730	1750	-	3700
Selenium	10	ug/L		< 2	< 2	< 2	< 0.2	< 1
Silicon		ug/L		15000	13700	13800	-	15800
Silver	20	ug/L		< 0.1	< 0.1	< 0.1	< 0.2	< 0.1
Sodium	200000	ug/L		120000	10300	11400	-	28900
Strontium	2500	ug/L		1050	180	170	213	440
Sulphur (Colloidal)		ug/L		-	-	-	-	-
Thallium		ug/L		< 1	< 1	< 1	0.002	< 0.1
Tin	2500	ug/L		< 0.5	< 0.5	< 0.5	0.04	< 1
Titanium		ug/L		< 1	< 1	< 1	-	1
Uranium	20	ug/L		< 1	< 1	< 1	0.183	< 0.5
Vanadium	20	ug/L		4	< 0.5	< 0.5	1.04	< 1
Zinc	3000	ug/L		< 1	< 1	11	7.8	13
Zirconium		ug/L		< 10	< 10	< 10	-	< 10

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- Chemical not analyzed or criteria not defined.

Result exceeds applicable CSR standard **744**

Detection limit exceeds applicable CSR standard ***< 2***

Appendix C
Results of Groundwater Analyses - BH96-3
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Location	BH96-3	BH96-3	BH96-3	BH96-3	BH96-3
			Laboratory ID	BH96-3_2003-12-01_N	BH96-3_2004-05-14_N	BH96-3_2004-10-18_N	BH96-3_2005-06-01_N	BH96-3_2005-11-01_N
			Sample Date	2003-12-01	2004-05-14	2004-10-18	2005-06-01	2005-11-01
			QA/QC					
Anions + Nutrients								
Chloride (Cl)	250000	ug/L		63300	43800	35000	24000	24400
Fluoride (F)	1.5	mg/L		0.06	< 0.05	-	< 0.05	-
Nitrate (as N)	10000	ug/L		< 50	< 50	< 2	< 50	9
Nitrite (as N)	1000	ug/L		< 2	< 2	< 2	< 2	9
Ammonia (as N)		ug/L		5800	6970	7170	5810	3890
Sulfate (SO4)	500000	ug/L		1100	2500	26700	10300	15800
Phosphorus, Dissolved		ug/L		3010	<150	<100	50	<100
Field + Physical								
Conductivity		uS/cm		680	760	771	582	656
Total Suspended Solids		mg/L		-	-	337	-	136
Hardness, Calcium Carbonate (Dissolved)		mg/L		241	255	303	202	290
Hardness, Calcium Carbonate (Total)		mg/L		241	255	303	202	290
Biochemical Oxygen Demand		mg/L		-	34	10	25	-
Chemical Oxygen Demand		mg/L		-	61	53	544	125
pH, lab		-		6.2	6.63	6.5	6.59	7.2
Metals, Dissolved								
Aluminum	9500	ug/L		2410	< 5	1	6	0.4
Antimony	6	ug/L		< 1	< 1	0.121	0.3	0.247
Arsenic	10	ug/L		**24**	2	1.5	3	0.7
Barium	1000	ug/L		86	120	143	113	96.5
Beryllium	8	ug/L		< 1	< 1	< 0.02	< 0.2	< 0.02
Bismuth		ug/L		-	< 1	< 0.02	< 0.2	< 0.02
Boron	5000	ug/L		< 50	60	76	60	59
Cadmium	5	ug/L		2.8	< 0.2	0.02	0.13	0.27
Calcium		ug/L		66000	69100	84800	54300	80500
Chromium	50	ug/L		5	< 1	< 0.2	0.4	0.7
Cobalt	1	ug/L		**7**	**5**	**4.78**	**3.2**	**4.7**
Copper	1500	ug/L		75	1	0.46	1.2	2.45
Iron	6500	ug/L		**37200**	< 50	89	1030	16
Lead	10	ug/L		9	< 1	< 0.01	< 0.2	< 0.01
Lithium	8	ug/L		-	2	1.65	1.6	1.83
Magnesium		ug/L		18400	20000	22200	16200	21000
Manganese	1500	ug/L		**10400**	**9130**	**12400**	**8640**	**8070**
Mercury	1	ug/L		< 0.02	***< 20***	0.05	***< 20***	< 0.05
Molybdenum	250	ug/L		1.3	2.2	0.71	1.1	0.53
Nickel	80	ug/L		23	6	5.32	6.5	4.65
Potassium		ug/L		3620	4200	5000	4490	4000
Selenium	10	ug/L		< 1	< 1	**300**	< 0.2	0.3
Silicon		ug/L		20600	15900	-	15600	-
Silver	20	ug/L		< 0.1	< 0.25	< 0.02	< 0.05	< 0.02
Sodium	200000	ug/L		24200	28000	33000	24000	25400
Strontium	2500	ug/L		410	440	481	366	368
Sulphur (Colloidal)		ug/L		-	-	-	-	-
Thallium		ug/L		< 0.1	< 0.1	0.009	< 0.02	0.034
Tin	2500	ug/L		< 1	< 1	-	< 0.2	-
Titanium		ug/L		46	< 1	< 3	0.6	< 3
Uranium	20	ug/L		0.6	2.8	0.644	0.4	0.569
Vanadium	20	ug/L		12	< 1	0.17	0.3	0.24
Zinc	3000	ug/L		140	5	4.8	11	17.5
Zirconium		ug/L		< 10	< 10	< 5	< 2	< 5

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Result exceeds applicable CSR standard **744**
Detection limit exceeds applicable CSR standard ***< 2***

Appendix C
Results of Groundwater Analyses - BH96-3
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Location	BH96-3	BH96-3	BH96-3	BH96-3	BH96-3
			Laboratory ID	BH96-3_2006-06-01_N	BH96-3_2007-01-02_N	BH96-3_2007-06-18_N	BH96-3_2008-05-27_N	BH96-3_2008-10-10_N
			Sample Date	2006-06-01	2007-01-02	2007-06-18	2008-05-27	2008-10-10
			QA/QC					
Anions + Nutrients								
Chloride (Cl)	250000	ug/L		16400	17900	14900	42000	69000
Fluoride (F)	1.5	mg/L		< 0.05	< 0.05	0.06	< 0.1	-
Nitrate (as N)	10000	ug/L		< 100	< 50	< 50	240	-
Nitrite (as N)	1000	ug/L		< 2	12	< 2	16	5
Ammonia (as N)		ug/L		-	-	-	2900	11800
Sulfate (SO4)	500000	ug/L		12800	17800	12400	8100	13000
Phosphorus, Dissolved		ug/L		<150	<150	<150	-	436
Field + Physical								
Conductivity		uS/cm		500	547	451	528	880
Total Suspended Solids		mg/L		-	-	-	-	-
Hardness, Calcium Carbonate (Dissolved)		mg/L		153	174	154	195	390
Hardness, Calcium Carbonate (Total)		mg/L		153	174	154	195	390
Biochemical Oxygen Demand		mg/L		20	47	24.5	32	136
Chemical Oxygen Demand		mg/L		284	351	4370	127	126
pH, lab		-		7.35	6.2	6.47	6.6	6.9
Metals, Dissolved								
Aluminum	9500	ug/L		< 5	< 5	13	< 10	74
Antimony	6	ug/L		< 1	< 1	1	< 0.6	0.3
Arsenic	10	ug/L		2	3	**29**	2	9.1
Barium	1000	ug/L		100	120	120	103	253
Beryllium	8	ug/L		< 1	< 1	< 1	< 0.4	< 0.05
Bismuth		ug/L		< 1	< 1	< 1	-	0.09
Boron	5000	ug/L		80	100	90	66	< 300
Cadmium	5	ug/L		< 0.2	< 0.2	< 0.2	0.16	0.05
Calcium		ug/L		42300	48400	42600	56100	75400
Chromium	50	ug/L		< 1	< 1	1	< 1	< 0.5
Cobalt	1	ug/L		**5**	**3**	**6**	**1.9**	**3.88**
Copper	1500	ug/L		< 1	1	4	**85.9**	3.7
Iron	6500	ug/L		< 50	550	110	250	**12200**
Lead	10	ug/L		< 1	< 1	< 1	0.2	0.56
Lithium	8	ug/L		< 1	< 1	< 5	0.9	< 3
Magnesium		ug/L		11600	12900	11600	11400	19900
Manganese	1500	ug/L		**7780**	**8970**	**7600**	**7390**	**14900**
Mercury	1	ug/L		***< 20***	< 0.02	< 0.02	< 0.06	-
Molybdenum	250	ug/L		< 0.5	0.8	3.7	0.7	1.4
Nickel	80	ug/L		4	2	5	4	8.1
Potassium		ug/L		4000	4300	4300	-	6830
Selenium	10	ug/L		< 1	< 1	< 1	-	< 0.2
Silicon		ug/L		4900	5200	5100	-	6220
Silver	20	ug/L		< 0.25	< 0.25	< 0.25	0.08	< 0.03
Sodium	200000	ug/L		17600	17800	16000	14100	42100
Strontium	2500	ug/L		320	340	320	-	540
Sulphur (Colloidal)		ug/L		-	-	-	-	-
Thallium		ug/L		< 0.1	< 0.1	< 0.1	0.1	< 0.01
Tin	2500	ug/L		< 1	< 1	< 1	-	0.13
Titanium		ug/L		< 1	< 1	< 1	< 20	8
Uranium	20	ug/L		< 0.5	< 0.5	0.7	0.3	0.8
Vanadium	20	ug/L		< 1	< 1	< 1	< 2	1
Zinc	3000	ug/L		10	6	11	30	4.6
Zirconium		ug/L		< 10	< 10	< 10	-	-

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Result exceeds applicable CSR standard **744**
Detection limit exceeds applicable CSR standard ***< 2***

Appendix C
Results of Groundwater Analyses - BH96-3
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Location	BH96-3	BH96-3	BH96-3	BH96-3	BH96-3
			Laboratory ID	BH96-3_2009-08-26_N	BH96-3_2010-02-22_N	BH96-3_2010-06-15_N	BH96-3_2010-10-25_N	BH96-3_2011-02-15_N
			Sample Date	2009-08-26	2010-02-22	2010-06-15	2010-10-25	2011-02-15
			QA/QC					
Anions + Nutrients								
Chloride (Cl)	250000	ug/L		53000	39000	41300	35000	28700
Fluoride (F)	1.5	mg/L		< 0.1	< 0.1	0.14	0.05	< 0.1
Nitrate (as N)	10000	ug/L		80	ND	< 100	270	< 100
Nitrite (as N)	1000	ug/L		80	ND	< 10	26	< 10
Ammonia (as N)		ug/L		10100	8600	9600	8070	8000
Sulfate (SO4)	500000	ug/L		8800	9300	11200	21000	16300
Phosphorus, Dissolved		ug/L		-	-	-	-	22
Field + Physical								
Conductivity		uS/cm		815	617	734	840	686
Total Suspended Solids		mg/L		-	-	-	-	-
Hardness, Calcium Carbonate (Dissolved)		mg/L		367	288	246	327	277
Hardness, Calcium Carbonate (Total)		mg/L		367	288	246	327	277
Biochemical Oxygen Demand		mg/L		79	21	50	21	51
Chemical Oxygen Demand		mg/L		317	346	227	181	550
pH, lab		-		6.6	6.5	6.3	7.3	6.5
Metals, Dissolved								
Aluminum	9500	ug/L		6	13	ND	12	8
Antimony	6	ug/L		ND	ND	ND	ND	< 0.5
Arsenic	10	ug/L		3.9	1.9	1.1	1	4.2
Barium	1000	ug/L		355	193	226	237	202
Beryllium	8	ug/L		ND	ND	ND	ND	< 0.1
Bismuth		ug/L		ND	ND	ND	ND	< 1
Boron	5000	ug/L		137	142	175	311	139
Cadmium	5	ug/L		0.85	0.3	0.06	1.13	0.01
Calcium		ug/L		84700	93700	67900	95900	77800
Chromium	50	ug/L		ND	ND	ND	2	< 1
Cobalt	1	ug/L		**3.6**	**4.1**	**3.3**	**3.2**	< 0.5
Copper	1500	ug/L		**149**	67.9	8	55.7	1.5
Iron	6500	ug/L		6110	3330	26	66	**13600**
Lead	10	ug/L		0.2	0.4	ND	1	< 0.2
Lithium	8	ug/L		ND	ND	ND	ND	< 5
Magnesium		ug/L		21100	23100	16800	22100	20000
Manganese	1500	ug/L		**14100**	**14500**	**12900**	**16600**	**13500**
Mercury	1	ug/L		ND	0.12	ND	ND	< 0.01
Molybdenum	250	ug/L		1	ND	ND	ND	< 1
Nickel	80	ug/L		5	5	3	8	4
Potassium		ug/L		7130	6860	6630	8640	6080
Selenium	10	ug/L		ND	0.2	ND	0.2	0.1
Silicon		ug/L		6750	7500	5800	8420	8080
Silver	20	ug/L		ND	ND	ND	ND	< 0.005
Sodium	200000	ug/L		32700	29100	25100	34400	26200
Strontium	2500	ug/L		566	534	508	575	513
Sulphur (Colloidal)		ug/L		-	-	-	-	-
Thallium		ug/L		ND	ND	ND	ND	< 0.05
Tin	2500	ug/L		ND	ND	ND	ND	< 5
Titanium		ug/L		ND	ND	ND	ND	< 5
Uranium	20	ug/L		0.8	0.5	0.5	0.4	0.5
Vanadium	20	ug/L		ND	ND	ND	ND	< 5
Zinc	3000	ug/L		91	75	21	476	11
Zirconium		ug/L		ND	ND	ND	ND	< 0.5

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Result exceeds applicable CSR standard **744**

Detection limit exceeds applicable CSR standard ***< 2***

Appendix C
Results of Groundwater Analyses - BH96-3
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Location	BH96-3	BH96-3	BH96-3	BH96-3	BH96-3
			Laboratory ID	BH96-3_2012-02-22_N	BH96-3_2012-05-08_N	BH96-3_2013-01-04_N	BH96-3_2013-04-15_N	BH96-3_2013-06-06_N
			Sample Date	2012-02-22	2012-05-08	2013-01-04	2013-04-15	2013-06-06
			QA/QC					
Anions + Nutrients								
Chloride (Cl)	250000	ug/L		19700	16000	18500	12000	13600
Fluoride (F)	1.5	mg/L		< 0.1	< 0.1	ND	0.057	< 0.1
Nitrate (as N)	10000	ug/L		< 100	< 100	ND	120	198
Nitrite (as N)	1000	ug/L		< 10	< 10	ND	83	16
Ammonia (as N)		ug/L		6100	6500	7040	7270	7260
Sulfate (SO4)	500000	ug/L		5520	13400	31100	27900	33000
Phosphorus, Dissolved		ug/L		13	12	36	59	<10
Field + Physical								
Conductivity		uS/cm		574	475	609	572	539
Total Suspended Solids		mg/L		-	-	360	-	980
Hardness, Calcium Carbonate (Dissolved)		mg/L		194	187	230	226	220
Hardness, Calcium Carbonate (Total)		mg/L		194	187	230	226	220
Biochemical Oxygen Demand		mg/L		130	105	49	< 4	50
Chemical Oxygen Demand		mg/L		546	434	158	809	290
pH, lab		-		6.5	6.2	6.6	6.5	6.5
Metals, Dissolved								
Aluminum	9500	ug/L		6	7	< 3	6.8	< 3
Antimony	6	ug/L		< 0.5	4.48	2.3	0.159	< 0.5
Arsenic	10	ug/L		2.7	0.99	1.73	2.28	**15.9**
Barium	1000	ug/L		194	128	141	16.9	188
Beryllium	8	ug/L		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Bismuth		ug/L		< 1	< 1	< 1	< 1	< 1
Boron	5000	ug/L		165	167	112	186	89
Cadmium	5	ug/L		0.16	0.128	0.08	0.132	0.01
Calcium		ug/L		54300	46300	65800	12300	56400
Chromium	50	ug/L		< 1	< 1	< 1	< 1	< 1
Cobalt	1	ug/L		< 0.5	< 0.5	**7.8**	0.048	**2.85**
Copper	1500	ug/L		1.7	28.5	4.94	0.28	0.25
Iron	6500	ug/L		6020	287	3500	< 5	**14700**
Lead	10	ug/L		< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Lithium	8	ug/L		< 5	5.2	< 5	1.56	< 5
Magnesium		ug/L		13300	11800	16700	10500	15100
Manganese	1500	ug/L		**11400**	**7910**	**11400**	24.6	**9740**
Mercury	1	ug/L		< 0.01	< 0.01	0.013	< 0.01	< 0.01
Molybdenum	250	ug/L		< 1	1.1	< 1	5.91	1.8
Nickel	80	ug/L		5	3	6	0.66	5
Potassium		ug/L		4700	4170	5180	9880	4930
Selenium	10	ug/L		< 0.1	< 0.1	< 0.1	< 0.1	0.11
Silicon		ug/L		6480	5770	7320	3790	7160
Silver	20	ug/L		< 0.005	< 0.005	< 0.02	< 0.02	< 0.02
Sodium	200000	ug/L		18300	16400	19800	54500	18700
Strontium	2500	ug/L		400	357	452	149	419
Sulphur (Colloidal)		ug/L		-	-	-	-	-
Thallium		ug/L		< 0.05	< 0.05	< 0.05	0.003	< 5
Tin	2500	ug/L		< 5	< 5	< 5	< 5	< 5
Titanium		ug/L		< 5	< 5	< 5	< 5	< 5
Uranium	20	ug/L		0.4	0.34	0.79	2.44	0.72
Vanadium	20	ug/L		ND	ND	< 5	0.74	< 5
Zinc	3000	ug/L		28	17.1	16	1.6	10.4
Zirconium		ug/L		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5

Table Notes:
Standards from the Contaminated Sites Regulation (CSR) for the protection of drinking water (DW), updated April 2022.
QA/QC = Quality Assurance/Quality Control; FDA/FD = Field Duplicate Available/Field Duplicate
< or ND Indicates parameter was below laboratory equipment detection limit
- Chemical not analyzed or criteria not defined.
Result exceeds applicable CSR standard **744**
Detection limit exceeds applicable CSR standard ***< 2***

Appendix C
Results of Groundwater Analyses - BH96-3
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Location	BH96-3	BH96-3	BH96-3	BH96-3	BH96-3	BH96-3
			Laboratory ID	BH96-3_2013-10-22_N	BH96-3_2014-05-06_N	BH96-3_2014-10-29_N	BH96-3_2015-03-28_N	BH96-3_2015-08-29_N	BH96-3_2015-11-29_N
			Sample Date	2013-10-22	2014-05-06	2014-10-29	2015-03-28	2015-08-29	2015-11-29
			QA/QC						
Anions + Nutrients									
Chloride (Cl)	250000	ug/L		16000	37400	33900	22000	80800	99400
Fluoride (F)	1.5	mg/L		< 0.1	< 0.1	< 0.1	ND	< 0.10	0.12
Nitrate (as N)	10000	ug/L		860	< 20	22	540	280	60
Nitrite (as N)	1000	ug/L		< 10	< 10	ND	ND	< 10	< 10
Ammonia (as N)		ug/L		8050	< 30	11100	-	7620	660
Sulfate (SO4)	500000	ug/L		26900	36300	ND	20500	37000	35000
Phosphorus, Dissolved		ug/L		24	632	76		<20	<20
Field + Physical									
Conductivity		uS/cm		675	862	774	592	767	644
Total Suspended Solids		mg/L		1560	2000	540	180	5500	22000
Hardness, Calcium Carbonate (Dissolved)		mg/L		269	373	295	249	503	254
Hardness, Calcium Carbonate (Total)		mg/L		269	373	295	249	503	254
Biochemical Oxygen Demand		mg/L		46	220	130	9.9	< 0.0001	380
Chemical Oxygen Demand		mg/L		324	416	248	250	>1500	363
pH, lab		-		6.5	6.7	6.5	6.7	6.5	6.6
Metals, Dissolved									
Aluminum	9500	ug/L		5.3	< 3	16	ND	< 5	5
Antimony	6	ug/L		< 0.5	< 0.5	< 0.5	0.1	1.1	0.4
Arsenic	10	ug/L		2.8	**34**	8.64	3.6	4.5	3.2
Barium	1000	ug/L		180	224	144	114	238	261
Beryllium	8	ug/L		< 0.1	< 0.1	< 0.1	ND	< 0.1	< 0.1
Bismuth		ug/L		< 1	< 1	< 1	ND	< 0.1	< 0.1
Boron	5000	ug/L		122	99	128	98	229	83
Cadmium	5	ug/L		0.033	0.015	0.055	0.03	0.3	0.24
Calcium		ug/L		80900	88900	81500	67800	84900	80100
Chromium	50	ug/L		< 1	< 1	< 1	ND	< 0.5	< 0.5
Cobalt	1	ug/L		**9.19**	**9.94**	**2.18**	0.79	**8.98**	**5.39**
Copper	1500	ug/L		1.05	0.62	3.52	0.5	0.9	3
Iron	6500	ug/L		6250	**17600**	**12500**	**9950**	475	73
Lead	10	ug/L		< 0.2	< 0.2	0.55	ND	< 0.1	0.2
Lithium	8	ug/L		< 5	< 5	< 5	1.2	1.4	0.8
Magnesium		ug/L		19800	26100	21800	16800	19700	13200
Manganese	1500	ug/L		**13800**	**15700**	**12200**	**9100**	**16400**	**5790**
Mercury	1	ug/L		< 0.01	< 0.01	< 0.01	ND	< 0.02	< 0.02
Molybdenum	250	ug/L		2.1	2.1	< 1	0.5	2.8	1.1
Nickel	80	ug/L		6.7	6.7	7.5	2.6	9.4	4.9
Potassium		ug/L		6890	5800	5980	4270	8280	7130
Selenium	10	ug/L		< 0.1	0.13	0.14	ND	< 0.5	< 0.5
Silicon		ug/L		8570	9770	8460	8700	8000	5400
Silver	20	ug/L		< 0.02	< 0.02	< 0.02	0.06	< 0.05	< 0.05
Sodium	200000	ug/L		23500	26200	26800	19500	20700	14800
Strontium	2500	ug/L		517	572	585	424	596	576
Sulphur (Colloidal)		ug/L		-	8400	ND	4000	3000	11000
Thallium		ug/L		< 5	< 5	< 5	ND	< 0.02	< 0.02
Tin	2500	ug/L		< 5	< 5	< 5	ND	< 0.1	< 0.2
Titanium		ug/L		< 5	< 5	< 5	ND	< 0.2	< 5
Uranium	20	ug/L		1.2	1.17	0.23	0.15	< 5	0.15
Vanadium	20	ug/L		< 5	< 5	< 5	ND	1.41	< 1
Zinc	3000	ug/L		14.1	6.7	9.5	7	< 1	63
Zirconium		ug/L		< 0.5	< 0.5	< 0.5	ND	55	< 0.1

Table Notes:

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QA/QC = Quality Assurance/Quality Control; FDA/FD = Field Duplicate Available/Field Duplicate
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- Chemical not analyzed or criteria not defined.
Result exceeds applicable CSR standard **744**
Detection limit exceeds applicable CSR standard ***< 2***

Appendix C
Results of Groundwater Analyses - MW21-01
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Location: MW21-01 Laboratory ID: VA21C2228-002 Sample Date: 2021-10-06 QA/QC
Anions + Nutrients			
Alkalinity, Total as CaCO3		ug/L	155000
Chloride (Cl)	250000	ug/L	4850
Fluoride (F)	1.5	mg/L	0.04
Nitrate (as N)	10000	ug/L	1220
Nitrite (as N)	1000	ug/L	< 1
Ammonia (as N)		ug/L	8.7
Total Kjeldahl Nitrogen		ug/L	191
Sulfate (SO4)	500000	ug/L	8100
Phosphorus, Dissolved		ug/L	<50
Phosphorus, Total		ug/L	384
Field + Physical			
Dissolved Oxygen, field measured		mg/L	8.9
Conductivity, field measured		uS/cm	252
Oxidation Reduction Potential, field measured		mV	242.9
pH, field measured		pH units	7.69
pH, lab		pH	8.35
Temperature, field measured		deg c	8.1
Conductivity		uS/cm	322
Total Dissolved Solids		mg/L	197
Hardness, Calcium Carbonate		mg/L	162
Hardness, Calcium Carbonate (Dissolved)		mg/L	143
Chemical Oxygen Demand		mg/L	24
Depth to Water		mbtoc	21.39
Metals, Dissolved			
Aluminum	9500	ug/L	15.8
Antimony	6	ug/L	0.11
Arsenic	10	ug/L	0.42
Barium	1000	ug/L	63.3
Beryllium	8	ug/L	< 0.1
Bismuth		ug/L	< 0.05
Boron	5000	ug/L	13
Cadmium	5	ug/L	0.0204
Calcium		ug/L	46800
Chromium	50	ug/L	< 0.5
Cobalt	1	ug/L	0.23
Copper	1500	ug/L	1.80
Iron	6500	ug/L	23
Lead	10	ug/L	< 0.05
Lithium	8	ug/L	4.0
Magnesium		ug/L	6400
Manganese	1500	ug/L	52.6
Mercury	1	ug/L	< 0.005
Molybdenum	250	ug/L	2.24
Nickel	80	ug/L	< 0.5
Potassium		ug/L	2290
Selenium	10	ug/L	< 0.05
Silicon		ug/L	5140
Silver	20	ug/L	< 0.01
Sodium	200000	ug/L	6930
Strontium	2500	ug/L	220
Sulphur (S)		ug/L	3260
Tellurium		ug/L	< 0.2
Thallium		ug/L	< 0.01
Thorium-232		ug/L	< 0.1
Tin	2500	ug/L	0.17
Titanium		ug/L	< 0.3
Uranium	20	ug/L	0.599
Vanadium	20	ug/L	< 0.5
Zinc	3000	ug/L	1.4
Zirconium		ug/L	< 0.2
Cesium		ug/L	0.013
Rubidium		ug/L	1.20
Tungsten	3	ug/L	0.18
Metals, Total			
Aluminum		ug/L	5960
Antimony		ug/L	0.24
Arsenic		ug/L	3.18
Barium		ug/L	156
Beryllium		ug/L	0.235
Bismuth		ug/L	< 0.05
Boron		ug/L	< 10
Cadmium		ug/L	0.223
Calcium		ug/L	50200
Chromium		ug/L	11.6
Cobalt		ug/L	6.14
Copper		ug/L	24.6
Iron		ug/L	11400
Lead		ug/L	4.43
Lithium		ug/L	8.7
Magnesium		ug/L	8990
Manganese		ug/L	788
Mercury		ug/L	0.0088
Molybdenum		ug/L	1.67
Nickel		ug/L	7.79
Potassium		ug/L	2930
Selenium		ug/L	< 0.05
Silicon		ug/L	12200
Silver		ug/L	0.062
Sodium		ug/L	7470
Strontium		ug/L	238
Sulphur (S)		ug/L	2650
Tellurium		ug/L	< 0.2
Thallium		ug/L	0.041
Thorium-232		ug/L	0.65
Tin		ug/L	0.97
Titanium		ug/L	134
Uranium		ug/L	0.968
Vanadium		ug/L	14.3
Zinc		ug/L	37.2
Zirconium		ug/L	0.27
Tungsten		ug/L	0.32
Rubidium		ug/L	4.58
Cesium		ug/L	0.572

Table Notes:

Standards from the Contaminated Sites Regulation (CSR) for the protection of drinking water (DW), updated April 2022.

QA/QC = Quality Assurance/Quality Control; FDA/FD = Field Duplicate Available/Field

< or ND Indicates parameter was below laboratory equipment detection limit

- Chemical not analyzed or criteria not defined.

Result exceeds applicable CSR standard **744**

Detection limit exceeds applicable CSR standard ***< 2***

Appendix C
Results of Groundwater Analyses - MW21-02
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Location: MW21-02 Laboratory ID: VA21C2228-003 Sample Date: 2021-10-06 QA/QC
Anions + Nutrients			
Alkalinity, Total as CaCO3		ug/L	262000
Chloride (Cl)	250000	ug/L	< 500
Fluoride (F)	1.5	mg/L	0.251
Nitrate (as N)	10000	ug/L	< 5
Nitrite (as N)	1000	ug/L	< 1
Ammonia (as N)		ug/L	202
Total Kjeldahl Nitrogen		ug/L	286
Sulfate (SO4)	500000	ug/L	5120
Phosphorus, Dissolved		ug/L	<50
Phosphorus, Total		ug/L	414
Field + Physical			
Dissolved Oxygen, field measured		mg/L	3.9
Conductivity, field measured		uS/cm	408
Oxidation Reduction Potential, field measured		mV	263.2
pH, field measured		pH units	8.16
pH, lab		pH	8.49
Temperature, field measured		deg c	7
Conductivity		uS/cm	458
Total Dissolved Solids		mg/L	292
Hardness, Calcium Carbonate		mg/L	197
Hardness, Calcium Carbonate (Dissolved)		mg/L	161
Chemical Oxygen Demand		mg/L	33
Depth to Water		mbtoc	9.32
Metals, Dissolved			
Aluminum	9500	ug/L	19.3
Antimony	6	ug/L	< 0.1
Arsenic	10	ug/L	5.78
Barium	1000	ug/L	41.0
Beryllium	8	ug/L	< 0.1
Bismuth		ug/L	< 0.05
Boron	5000	ug/L	163
Cadmium	5	ug/L	0.0138
Calcium		ug/L	24100
Chromium	50	ug/L	< 0.5
Cobalt	1	ug/L	0.29
Copper	1500	ug/L	0.55
Iron	6500	ug/L	20
Lead	10	ug/L	< 0.05
Lithium	8	ug/L	3.3
Magnesium		ug/L	24400
Manganese	1500	ug/L	133
Mercury	1	ug/L	< 0.005
Molybdenum	250	ug/L	8.36
Nickel	80	ug/L	0.93
Potassium		ug/L	11500
Selenium	10	ug/L	0.193
Silicon		ug/L	4820
Silver	20	ug/L	< 0.01
Sodium	200000	ug/L	34000
Strontium	2500	ug/L	244
Sulphur (S)		ug/L	2530
Tellurium		ug/L	< 0.2
Thallium		ug/L	0.016
Thorium-232		ug/L	< 0.1
Tin	2500	ug/L	< 0.1
Titanium		ug/L	0.32
Uranium	20	ug/L	3.64
Vanadium	20	ug/L	< 0.5
Zinc	3000	ug/L	< 1
Zirconium		ug/L	< 0.2
Cesium		ug/L	< 0.01
Rubidium		ug/L	0.59
Tungsten	3	ug/L	0.10
Metals, Total			
Aluminum		ug/L	7510
Antimony		ug/L	0.21
Arsenic		ug/L	7.41
Barium		ug/L	115
Beryllium		ug/L	0.247
Bismuth		ug/L	< 0.05
Boron		ug/L	146
Cadmium		ug/L	0.741
Calcium		ug/L	31800
Chromium		ug/L	8.06
Cobalt		ug/L	7.70
Copper		ug/L	31.5
Iron		ug/L	9800
Lead		ug/L	5.84
Lithium		ug/L	9.7
Magnesium		ug/L	28500
Manganese		ug/L	566
Mercury		ug/L	0.0287
Molybdenum		ug/L	3.05
Nickel		ug/L	13.6
Potassium		ug/L	12000
Selenium		ug/L	0.228
Silicon		ug/L	14300
Silver		ug/L	0.041
Sodium		ug/L	33800
Strontium		ug/L	273
Sulphur (S)		ug/L	2110
Tellurium		ug/L	< 0.2
Thallium		ug/L	0.091
Thorium-232		ug/L	0.39
Tin		ug/L	< 0.1
Titanium		ug/L	113
Uranium		ug/L	4.31
Vanadium		ug/L	18.1
Zinc		ug/L	44.3
Zirconium		ug/L	< 0.6
Tungsten		ug/L	< 0.1
Rubidium		ug/L	3.67
Cesium		ug/L	0.582

Table Notes:
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< or ND Indicates parameter was below laboratory equipment detection limit
- Chemical not analyzed or criteria not defined.
Result exceeds applicable CSR standard **744**
Detection limit exceeds applicable CSR standard ***< 2***

Appendix C
Results of Groundwater Analyses - MW21-03
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	MW21-03
		Location	
		Laboratory ID	VA21C2228-004
		Sample Date	2021-10-06
		QA/QC	
Anions + Nutrients			
Alkalinity, Total as CaCO3		ug/L	186000
Chloride (Cl)	250000	ug/L	920
Fluoride (F)	1.5	mg/L	0.076
Nitrate (as N)	10000	ug/L	5.2
Nitrite (as N)	1000	ug/L	2.2
Ammonia (as N)		ug/L	740
Total Kjeldahl Nitrogen		ug/L	1030
Sulfate (SO4)	500000	ug/L	< 300
Phosphorus, Dissolved		ug/L	<50
Phosphorus, Total		ug/L	758
Field + Physical			
Dissolved Oxygen, field measured		mg/L	2.3
Conductivity, field measured		uS/cm	267
Oxidation Reduction Potential, field measured		mV	157.6
pH, field measured		pH units	6.52
pH, lab		pH	8.14
Temperature, field measured		deg c	8.9
Conductivity		uS/cm	333
Total Dissolved Solids		mg/L	203
Hardness, Calcium Carbonate		mg/L	177
Hardness, Calcium Carbonate (Dissolved)		mg/L	159
Chemical Oxygen Demand		mg/L	130
Depth to Water		mbtoc	1.66
Metals, Dissolved			
Aluminum	9500	ug/L	42.4
Antimony	6	ug/L	< 0.1
Arsenic	10	ug/L	**10.1**
Barium	1000	ug/L	20.0
Beryllium	8	ug/L	< 0.1
Bismuth		ug/L	< 0.05
Boron	5000	ug/L	< 10
Cadmium	5	ug/L	0.0447
Calcium		ug/L	44800
Chromium	50	ug/L	< 0.5
Cobalt	1	ug/L	**3.73**
Copper	1500	ug/L	0.36
Iron	6500	ug/L	**10900**
Lead	10	ug/L	< 0.05
Lithium	8	ug/L	< 1
Magnesium		ug/L	11500
Manganese	1500	ug/L	**4820**
Mercury	1	ug/L	< 0.005
Molybdenum	250	ug/L	0.309
Nickel	80	ug/L	1.09
Potassium		ug/L	1330
Selenium	10	ug/L	0.072
Silicon		ug/L	7670
Silver	20	ug/L	< 0.01
Sodium	200000	ug/L	3400
Strontium	2500	ug/L	186
Sulphur (S)		ug/L	< 500
Tellurium		ug/L	< 0.2
Thallium		ug/L	< 0.01
Thorium-232		ug/L	< 0.1
Tin	2500	ug/L	< 0.1
Titanium		ug/L	2.57
Uranium	20	ug/L	0.020
Vanadium	20	ug/L	1.72
Zinc	3000	ug/L	2.9
Zirconium		ug/L	< 0.2
Cesium		ug/L	< 0.01
Rubidium		ug/L	0.98
Tungsten	3	ug/L	< 0.1
Metals, Total			
Aluminum		ug/L	22400
Antimony		ug/L	0.32
Arsenic		ug/L	13.8
Barium		ug/L	183
Beryllium		ug/L	0.508
Bismuth		ug/L	< 0.1
Boron		ug/L	< 20
Cadmium		ug/L	0.978
Calcium		ug/L	44100
Chromium		ug/L	21.8
Cobalt		ug/L	16.3
Copper		ug/L	59.4
Iron		ug/L	31200
Lead		ug/L	11.3
Lithium		ug/L	15.9
Magnesium		ug/L	16200
Manganese		ug/L	4860
Mercury		ug/L	0.0198
Molybdenum		ug/L	0.463
Nickel		ug/L	26.0
Potassium		ug/L	2880
Selenium		ug/L	0.131
Silicon		ug/L	31900
Silver		ug/L	0.118
Sodium		ug/L	3820
Strontium		ug/L	192
Sulphur (S)		ug/L	< 1000
Tellurium		ug/L	< 0.4
Thallium		ug/L	0.088
Thorium-232		ug/L	0.34
Tin		ug/L	0.20
Titanium		ug/L	329
Uranium		ug/L	0.444
Vanadium		ug/L	49.8
Zinc		ug/L	106
Zirconium		ug/L	< 2
Tungsten		ug/L	< 0.2
Rubidium		ug/L	10.6
Cesium		ug/L	1.59

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- Chemical not analyzed or criteria not defined.
Result exceeds applicable CSR standard **744**
Detection limit exceeds applicable CSR standard ***< 2***

Appendix C
Results of Groundwater Analyses - Goodwin Well
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	CSR DW	Location / Laboratory ID / Sample Date / QA/QC	Unit	Goodwin Well GOODWIN 1996-06-01	Goodwin Well GOODWIN 1998-05-01	Goodwin Well GOODWIN 2000-08-15	Goodwin Well GOODWIN 2001-12-01	Goodwin Well GOODWIN 2003-12-01	Goodwin Well GOODWIN 2008-05-27	Goodwin Well GOODWIN 2009-08-26	Goodwin Well GOODWIN 2010-06-15	Goodwin Well GOODWIN 2010-10-25	Goodwin Well GOODWIN 2010-11-24	Goodwin Well GOODWIN 2012-05-24	Goodwin Well GOODWIN 2016-07-25	Goodwin Well GOODWIN 2017-08-24
Anions + Nutrients																
Chloride (Cl)	250000		ug/L	27000	28200	31800	28900	28700	28800	8000	-	-	24000	-	32700	31100
Fluoride (F)	1.5		mg/L	-	-	0.6	0.6	0.69	0.79	0.56	-	-	0.73	-	0.63	0.59
Nitrate (as N)	10000		ug/L	-	7	< 50	< 50	< 50	< 100	< 100	-	-	< 100	-	< 10	34
Nitrite (as N)	1000		ug/L	-	16	< 2	< 2	< 2	< 10	< 10	-	-	< 10	-	< 10	< 10
Nitrogen, Nitrate-Nitrite	10000		ug/L	< 50	23	< 50	< 50	< 50	-	-	-	-	-	-	-	-
Ammonia (as N)			ug/L	< 100	52	70	60	< 10	< 30	ND	-	-	40	-	41	< 30
Sulfate (SO4)	500000		ug/L	35000	35000	37500	34100	32300	26400	-	-	-	33000	-	32000	31700
Phosphorus, Dissolved			ug/L	-	-	<10	90	430	-	-	-	-	-	-	<20	<50
Bacteriological																
Total Coliform			mpn/100ml	-	-	-	-	-	-	-	< 1.1	>23.1	>23.1	>23.0	-	-
Escherichia coli			mpn/100ml	-	-	-	-	-	-	-	< 1.1	< 1.1	< 1.1	< 1.1	-	-
Field + Physical																
Conductivity			uS/cm	-	475	-	427	413	415	439	-	-	466	-	449	447
Total Suspended Solids			mg/L	7	34	-	-	-	-	-	-	-	-	-	< 1.0	1.4
Hardness, Calcium Carbonate (Dissolved)			mg/L	-	51.1	37	49	44	39.6	70.9	-	-	59	-	70.5	65.4
Hardness, Calcium Carbonate (Total)			mg/L	-	51.1	37	49	44	39.6	70.9	-	-	59	-	70.5	65.4
Biochemical Oxygen Demand			mg/L	-	-	< 10	< 10	< 10	< 6	ND	-	-	-	-	< 4.0	< 4.0
Chemical Oxygen Demand			mg/L	-	-	< 25	< 25	< 25	< 30	ND	-	-	< 30	-	< 20	< 20
pH, lab			-	-	8.06	8.3	8.22	8.15	8.9	8.2	-	-	8.4	-	8.3	8.4
Metals, Dissolved																
Aluminum	9500		ug/L	200	111	25	20	59	14	24	-	-	14	-	< 5	7.4
Antimony	6		ug/L	< 1	< 0.1	< 1	< 1	< 1	< 0.6	ND	-	-	< 0.5	-	< 0.1	< 0.20
Arsenic	10		ug/L	< 1	2.7	2	2	2	2.4	2.3	-	-	2	-	2	2.11
Barium	1000		ug/L	< 100	30	16	20	23	16	73	-	-	28	-	25	22.9
Beryllium	8		ug/L	< 1	< 5	< 1	< 1	< 1	< 0.4	ND	-	-	< 0.1	-	< 0.1	< 0.10
Bismuth			ug/L	-	-	-	-	-	-	-	-	-	-	-	< 0.1	< 0.10
Boron	5000		ug/L	-	-	170	170	100	227	146	-	-	-	-	155	121
Cadmium	5		ug/L	< 1	< 0.2	< 0.2	< 0.2	< 0.2	< 0.02	ND	-	-	0.04	-	0.03	0.01
Calcium			ug/L	14000	12600	9800	11800	11000	7400	16500	-	-	14300	-	17200	16000
Chromium	50		ug/L	< 20	< 1	< 1	< 1	< 1	1	ND	-	-	< 1	-	< 0.5	< 0.50
Cobalt	1		ug/L	***< 20***	***< 10***	***< 10***	***< 10***	< 1	< 0.1	ND	-	-	< 0.5	-	< 0.05	< 0.10
Copper	1500		ug/L	< 10	4	4	2	6	18.9	5.3	-	-	1.5	-	2	19.4
Iron	6500		ug/L	< 100	60	< 50	< 50	140	< 40	ND	-	-	10	-	< 10	< 10
Lead	10		ug/L	2	< 1	< 1	< 1	< 1	0.7	ND	-	-	0.3	-	< 0.1	< 0.20
Lithium	8		ug/L	-	-	-	-	-	-	-	-	-	-	-	1.3	1.2
Magnesium			ug/L	5000	4800	3000	4800	4010	7610	5860	-	-	5750	-	6720	6190
Manganese	1500		ug/L	50	40	40	43	8	15.6	102	-	-	132	-	41.2	1.78
Mercury	1		ug/L	-	< 0.01	< 0.02	< 0.03	< 0.02	< 0.06	ND	-	-	< 0.02	-	< 0.02	< 0.010
Molybdenum	250		ug/L	20	< 30	19	16	14	20.6	17	-	-	23	-	19.2	16.1
Nickel	80		ug/L	< 10	< 50	< 1	< 2	< 1	< 1	ND	-	-	< 1	-	< 0.2	< 0.40
Potassium			ug/L	< 5000	-	1720	2510	1970	-	2780	-	-	2910	-	3000	2670
Selenium	10		ug/L	-	< 0.5	< 2	< 3	< 1	< 1	ND	-	-	< 0.1	-	< 0.5	< 0.50
Silicon			ug/L	-	-	9860	8200	6750	-	4120	-	-	4190	-	4300	4400
Silver	20		ug/L	< 10	< 0.1	< 0.1	< 0.2	< 0.1	< 0.08	ND	-	-	< 0.02	-	< 0.05	< 0.050
Sodium	200000		ug/L	91000	-	48100	75900	61500	69400	71900	-	-	86000	-	87200	72600
Strontium	2500		ug/L	-	-	88	95	84	-	116	-	-	116	-	122	120
Sulphur (Colloidal)			ug/L	-	-	-	-	-	-	-	-	-	-	-	12000	11200
Tellurium			ug/L	-	-	< 1	< 1	< 1	-	-	-	-	-	-	-	< 0.50
Thallium			ug/L	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	ND	-	-	< 0.05	-	< 0.02	< 0.020
Thorium-232			ug/L	-	-	< 0.5	< 0.5	< 0.5	-	-	-	-	-	-	-	< 0.10
Tin	2500		ug/L	-	-	< 1	< 1	< 1	-	ND	-	-	< 5	-	< 0.2	0.32
Titanium			ug/L	< 10	< 10	< 1	< 1	2	-	ND	-	-	< 5	-	< 5	< 5.0
Uranium	20		ug/L	-	0.09	0.7	0.9	0.8	0.6	1.1	-	-	1	-	0.94	1.12
Vanadium	20		ug/L	< 10	***< 30***	< 1	< 1	< 1	< 2	ND	-	-	< 5	-	< 1	< 1.0
Zinc	3000		ug/L	< 10	< 5	< 5	< 5	9	10	18	-	-	< 5	-	< 4	14.5
Zirconium			ug/L	-	-	< 10	< 10	< 10	-	ND	-	-	< 0.5	-	< 0.1	< 0.10

Table Notes:

Standards from the Contaminated Sites Regulation (CSR) for the protection of drinking water (DW), updated April 2022.

QA/QC = Quality Assurance/Quality Control; FDA/FD = Field Duplicate Available/Field Duplicate

< or ND Indicates parameter was below laboratory equipment detection limit

- Chemical not analyzed or criteria not defined.

Result exceeds applicable CSR standard **744**

Detection limit exceeds applicable CSR standard ***< 2***

Appendix C
Results of Groundwater Analyses - Reinhardt Well
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Location: Reinhardt Well	Reinhardt Well	Reinhardt Well	Reinhardt Well	Reinhardt Well	Reinhardt Well	Reinhardt Well	Reinhardt Well	Reinhardt Well	Reinhardt Well	Reinhardt Well
			Laboratory ID: REINHARDT	REINHARDT	REINHARDT	REINHARDT	REINHARDT	REINHARDT	REINHARDT	REINHARDT	REINHARDT	REINHARDT	REINHARDT
			Sample Date: 1996-06-01	1998-05-01	2000-08-15	2003-12-01	2008-05-27	2009-08-26	2010-06-15	2010-10-25	2012-05-24	2016-07-25	2017-08-24
			QA/QC										
Anions + Nutrients													
Chloride (Cl)	250000	ug/L	12200	9400	9200	9200	6600	5800	-	-	-	10600	15000
Fluoride (F)	1.5	mg/L	-	-	< 0.05	0.06	< 0.1	ND	-	-	-	< 0.10	< 0.10
Nitrate (as N)	10000	ug/L	-	77	50	70	< 100	ND	-	-	-	51	46
Nitrite (as N)	1000	ug/L	-	77	< 2	< 2	< 10	ND	-	-	-	< 10	< 10
Nitrogen, Nitrate-Nitrite	10000	ug/L	70	15	50	70	-	-	-	-	-	-	-
Ammonia (as N)		ug/L	< 100	< 5	20	20	< 30	ND	-	-	-	< 30	< 30
Sulfate (SO4)	500000	ug/L	2600	2000	3100	2700	2800	-	-	-	-	3200	2900
Phosphorus, Dissolved		ug/L	-	-	<10	380	-	-	-	-	-	<20	<50
Bacteriological													
Total Coliform		mpn/100ml	-	-	-	-	-	-	< 1.1	< 1.1	< 1.1	-	-
Escherichia coli		mpn/100ml	-	-	-	-	-	-	< 1.1	< 1.1	< 1.1	-	-
Field + Physical													
Conductivity		uS/cm	-	181	-	161	156	156	-	-	-	180	181
Total Suspended Solids		mg/L	< 5	< 1	-	-	-	-	-	-	-	< 1.0	< 1.0
Hardness, Calcium Carbonate (Dissolved)		mg/L	-	83.3	65	70	63.6	61.7	-	-	-	86.6	77
Hardness, Calcium Carbonate (Total)		mg/L	-	83.3	65	70	63.6	61.7	-	-	-	86.6	77
Biochemical Oxygen Demand		mg/L	-	-	< 10	< 10	< 6	ND	-	-	-	< 4.0	< 4.0
Chemical Oxygen Demand		mg/L	-	-	< 25	< 25	< 30	ND	-	-	-	< 20	< 20
pH, lab		-	-	7.69	7.81	7.65	8.1	7.7	-	-	-	7.9	8.1
Metals, Dissolved													
Aluminum	9500	ug/L	< 100	< 5	6	9	< 10	ND	-	-	-	< 5	< 5.0
Antimony	6	ug/L	< 1	< 0.1	< 1	< 1	< 0.6	ND	-	-	-	0.1	< 0.20
Arsenic	10	ug/L	< 1	0.4	< 1	< 1	< 1	0.5	-	-	-	< 0.5	0.53
Barium	1000	ug/L	< 100	20	14	24	19	85	-	-	-	22	21.1
Beryllium	8	ug/L	< 1	***< 5***	< 1	< 1	< 0.4	ND	-	-	-	< 0.1	< 0.10
Bismuth		ug/L	-	-	-	-	-	-	-	-	-	< 0.1	< 0.10
Boron	5000	ug/L	-	-	< 50	< 50	4	ND	-	-	-	7	14.8
Cadmium	5	ug/L	< 0.2	< 1	< 0.2	< 0.2	< 0.02	ND	-	-	-	0.05	< 0.010
Calcium		ug/L	33000	29800	23600	24800	24200	29200	-	-	-	30900	27500
Chromium	50	ug/L	< 20	< 1	< 1	< 1	2	ND	-	-	-	0.8	0.67
Cobalt	1	ug/L	***< 20***	***< 10***	< 1	< 1	< 0.1	ND	-	-	-	< 0.05	< 0.10
Copper	1500	ug/L	< 10	6	2	9	4	6	-	-	-	4.8	3.53
Iron	6500	ug/L	< 100	< 30	< 50	< 50	60	ND	-	-	-	< 10	< 10
Lead	10	ug/L	< 1	< 1	< 1	< 1	0.2	ND	-	-	-	0.2	< 0.20
Lithium	8	ug/L	-	-	-	-	-	-	-	-	-	0.7	0.62
Magnesium		ug/L	2300	2100	1360	1820	1980	2080	-	-	-	2300	2010
Manganese	1500	ug/L	< 100	< 5	6	< 1	5	ND	-	-	-	0.5	0.3
Mercury	1	ug/L	-	< 0.01	< 0.02	< 0.02	< 0.06	ND	-	-	-	< 0.02	< 0.010
Molybdenum	250	ug/L	< 10	< 30	< 1	< 0.5	0.5	ND	-	-	-	0.5	0.45
Nickel	80	ug/L	< 10	< 50	< 1	< 1	< 1	ND	-	-	-	< 0.2	< 0.40
Potassium		ug/L	< 5000	-	610	800	-	1020	-	-	-	1180	1010
Selenium	10	ug/L	-	< 0.5	< 2	< 1	< 1	ND	-	-	-	< 0.5	< 0.50
Silicon		ug/L	-	-	11400	8580	-	5410	-	-	-	5000	5200
Silver	20	ug/L	< 10	< 0.1	< 0.1	< 0.1	< 0.08	ND	-	-	-	< 0.05	< 0.050
Sodium	200000	ug/L	1000	-	1570	2250	2770	3180	-	-	-	4060	3490
Strontium	2500	ug/L	-	-	80	76	-	90	-	-	-	90	83.3
Sulphur (Colloidal)		ug/L	-	-	-	-	-	-	-	-	-	< 1000	< 3000
Tellurium		ug/L	-	-	< 1	< 1	-	-	-	-	-	-	< 0.50
Thallium		ug/L	-	< 0.1	< 0.1	< 0.1	< 0.1	ND	-	-	-	< 0.02	< 0.020
Thorium-232		ug/L	-	-	< 0.5	< 0.5	-	-	-	-	-	-	< 0.10
Tin	2500	ug/L	-	-	< 1	< 1	-	ND	-	-	-	< 0.2	< 0.20
Titanium		ug/L	< 10	< 10	< 1	1	< 20	ND	-	-	-	< 5	< 5.0
Uranium	20	ug/L	-	1.07	< 0.5	< 0.5	< 0.1	0.1	-	-	-	0.11	0.099
Vanadium	20	ug/L	< 10	***< 30***	< 1	< 1	< 2	ND	-	-	-	< 1	< 1.0
Zinc	3000	ug/L	40	31	44	34	15	43	-	-	-	32	24.2
Zirconium		ug/L	-	-	< 10	< 10	-	ND	-	-	-	< 0.1	< 0.10

Table Notes:

Standards from the Contaminated Sites Regulation (CSR) for the protection of drinking water (DW), updated April 2022.

QA/QC = Quality Assurance/Quality Control; FDA/FD = Field Duplicate Available/Field

< or ND Indicates parameter was below laboratory equipment detection limit

- Chemical not analyzed or criteria not defined.

Result exceeds applicable CSR standard **744**

Detection limit exceeds applicable CSR standard ***< 2***

3 - QAQC Data

Appendix C
QA/QC Results of Field Duplicates
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Sample Name Sample Date	Units	RDL	SW-21 2021-04-12	SW-21 FD 2021-04-12	RPD (%)	DF (unitless)
Anions + Nutrients						
Alkalinity, Total as CaCO3	mg/L	1	304	306	1	n/c
Ammonia (as N)	mg/L	0.005	10.5	10.7	2	n/c
Chloride (Cl)	mg/L	0.5	20.4	20.4	0	n/c
Dissolved Phosphorus	mg/L	0.05	< 0.05	< 0.05	n/c	0
Fluoride (F)	mg/L	0.02	< 0.1	< 0.1	n/c	0
Nitrate (as N)	mg/L	0.005	3.60	3.61	0	n/c
Nitrite (as N)	mg/L	0.001	0.0410	0.038	8	n/c
Phosphorus, Total Orthophosphate	mg/L	0.001	0.0018	0.002	n/c	0.2
Sulfate (SO4)	mg/L	0.3	8.3	8.32	0	n/c
Total Kjeldahl Nitrogen	mg/L	0.05	9.76	9.66	1	n/c
Total Phosphorus	mg/L	0.002	0.0233	0.0243	4	n/c
Physical						
Biochemical Oxygen Demand	mg/L	2	2.9	3.3	n/c	0.2
Chemical Oxygen Demand	mg/L	20	32	28	n/c	0.2
Conductivity	uS/cm	2	662	658	1	n/c
Hardness, Calcium Carbonate	mg/L	0.6	224	225	0	n/c
pH, lab	-	0.1	8.19	8.16	0	n/c
Total Suspended Solids	mg/L	3	9.1	6.3	n/c	0.93
Metals, Dissolved						
Aluminum	mg/L	0.001	0.0114	0.0111	3	n/c
Antimony	mg/L	0.0001	< 0.0001	< 0.0001	n/c	0
Arsenic	mg/L	0.0001	0.00032	0.00032	n/c	0
Barium	mg/L	0.0001	0.129	0.131	2	n/c
Beryllium	mg/L	0.00002	< 0.00002	< 0.00002	n/c	0
Bismuth	mg/L	0.00005	< 0.00005	< 0.00005	n/c	0
Boron	mg/L	0.01	0.634	0.644	2	n/c
Cadmium	mg/L	0.000005	0.0000058	0.0000062	n/c	0.08
Calcium	mg/L	0.05	69.0	70.7	2	n/c
Cesium	mg/L	0.00001	0.000058	0.000059	2	n/c
Chromium	mg/L	0.0005	< 0.0005	< 0.0005	n/c	0
Cobalt	mg/L	0.0001	0.00050	0.00050	n/c	0
Copper	mg/L	0.0002	0.00166	0.00166	0	n/c
Iron	mg/L	0.01	0.036	0.039	n/c	0.3
Lead	mg/L	0.00005	< 0.00005	< 0.00005	n/c	0
Lithium	mg/L	0.001	< 0.001	< 0.001	n/c	0
Magnesium	mg/L	0.005	12.0	11.8	2	n/c
Manganese	mg/L	0.0001	0.251	0.250	0	n/c
Molybdenum	mg/L	0.00005	0.000163	0.000227	n/c	1.28
Nickel	mg/L	0.0005	0.00163	0.00162	n/c	0.02
Potassium	mg/L	0.05	18.1	18.2	1	n/c
Rubidium	mg/L	0.0002	0.0109	0.0112	3	n/c
Selenium	mg/L	0.00005	0.000091	0.000054	n/c	0.74
Silicon	mg/L	0.05	4.63	4.60	1	n/c
Silver	mg/L	0.00001	< 0.00001	< 0.00001	n/c	0
Sodium	mg/L	0.05	31.1	31.2	0	n/c
Strontium	mg/L	0.0002	0.424	0.419	1	n/c
Sulphur (S)	mg/L	0.5	2.87	2.99	4	n/c
Tellurium	mg/L	0.0002	< 0.0002	< 0.0002	n/c	0
Thallium	mg/L	0.00001	< 0.00001	< 0.00001	n/c	0
Thorium-232	mg/L	0.0001	< 0.0001	< 0.0001	n/c	0
Tin	mg/L	0.0001	< 0.0001	< 0.0001	n/c	0
Titanium	mg/L	0.0003	0.00038	0.00048	n/c	0.33
Tungsten	mg/L	0.0001	< 0.0001	< 0.0001	n/c	0
Uranium	mg/L	0.00001	0.000101	0.000100	1	n/c
Vanadium	mg/L	0.0005	< 0.0005	< 0.0005	n/c	0
Zinc	mg/L	0.001	< 0.001	< 0.001	n/c	0
Zirconium	mg/L	0.0003	< 0.0003	< 0.0003	n/c	0
Metals, Total						
Aluminum	mg/L	0.003	0.529	0.445	17	n/c
Antimony	mg/L	0.0001	< 0.0001	< 0.0001	n/c	0
Arsenic	mg/L	0.0001	0.00054	0.00052	4	n/c
Barium	mg/L	0.0001	0.139	0.147	6	n/c
Beryllium	mg/L	0.0001	< 0.0001	< 0.0001	n/c	0
Bismuth	mg/L	0.00005	< 0.00005	< 0.00005	n/c	0
Boron	mg/L	0.01	0.696	0.669	4	n/c
Cadmium	mg/L	0.000005	0.0000137	0.0000106	n/c	0.62
Calcium	mg/L	0.05	69.8	72.7	4	n/c
Cesium	mg/L	0.00001	0.000087	0.000077	12	n/c
Chromium	mg/L	0.0001	0.00066	0.00063	5	n/c
Cobalt	mg/L	0.0001	0.00066	0.00065	2	n/c
Copper	mg/L	0.0005	0.00239	0.00252	5	n/c
Iron	mg/L	0.01	0.826	0.781	6	n/c
Lead	mg/L	0.00005	0.000114	0.000125	n/c	0.22
Lithium	mg/L	0.001	0.0011	< 0.001	n/c	0.1
Magnesium	mg/L	0.005	12.0	12.6	5	n/c
Manganese	mg/L	0.0001	0.270	0.279	3	n/c
Mercury	mg/L	0.000005	< 0.000005	< 0.000005	n/c	0
Molybdenum	mg/L	0.00005	0.000184	0.000266	**36**	n/c
Nickel	mg/L	0.0005	0.00195	0.00194	n/c	0.02
Potassium	mg/L	0.05	17.0	18.5	8	n/c
Rubidium	mg/L	0.0002	0.0112	0.0116	4	n/c
Selenium	mg/L	0.00005	0.000050	0.000073	n/c	0.46
Silicon	mg/L	0.1	5.27	5.38	2	n/c
Silver	mg/L	0.00001	< 0.00001	< 0.00001	n/c	0
Sodium	mg/L	0.05	30.9	32.5	5	n/c
Strontium	mg/L	0.0002	0.407	0.429	5	n/c
Sulphur (S)	mg/L	0.5	3.13	3.27	4	n/c
Tellurium	mg/L	0.0002	< 0.0002	< 0.0002	n/c	0
Thallium	mg/L	0.00001	< 0.00001	< 0.00001	n/c	0
Thorium-232	mg/L	0.0001	< 0.0001	< 0.0001	n/c	0
Tin	mg/L	0.0001	< 0.0001	< 0.0001	n/c	0
Titanium	mg/L	0.0003	0.0135	0.0114	17	n/c
Tungsten	mg/L	0.0001	< 0.0001	< 0.0001	n/c	0
Uranium	mg/L	0.00001	0.000115	0.000111	4	n/c
Vanadium	mg/L	0.0005	0.00112	0.00089	n/c	0.46
Zinc	mg/L	0.003	< 0.003	< 0.003	n/c	0
Zirconium	mg/L	0.0002	< 0.0006	0.00028	n/c	1.6

Notes:
RPD = Relative percent difference; the difference between two values divided by the mean of the two values.
RPD is calculated when the mean concentration is greater than five times the laboratory report detection limit.
DF = Difference factor; the absolute difference between two values divided by the laboratory report detection limit.
DF is calculated when the mean concentration is less than five times the laboratory report detection limit.
FDA = field duplicate available, FD = field duplicate, QA/QC = quality assurance/quality control
RDL = Report Detection Limit indicates the minimum concentration that could be measured by laboratory instrumentation for a specific sample.
< Indicates parameter was below the laboratory RDL; n/c = Not Calculated
RPD or DF exceeds Golder's data quality objectives **20**

Appendix C
QA/QC Results of Field Duplicates
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Sample Name Sample Collection Date	Units	RDL	SW-6 2021-07-06	SW-6 FD 2021-07-06	RPD (%)	DF (unitless)
Anions + Nutrients						
Alkalinity, Total as CaCO3	mg/L	1	48.3	48.1	0	n/c
Ammonia (as N)	mg/L	0.005	< 0.005	0.0085	n/c	0.7
Chloride (Cl)	mg/L	0.5	< 0.5	< 0.5	n/c	0
Dissolved Phosphorus	mg/L	0.05	< 0.05	< 0.05	n/c	0
Fluoride (F)	mg/L	0.02	< 0.02	< 0.02	n/c	0
Nitrate (as N)	mg/L	0.005	0.0373	0.0224	50	n/c
Nitrite (as N)	mg/L	0.001	< 0.001	< 0.001	n/c	0
Phosphorus, Total Orthophosphate	mg/L	0.001	0.0015	0.0014	n/c	0.1
Sulfate (SO4)	mg/L	0.3	1.18	1.19	n/c	0.033
Total Kjeldahl Nitrogen	mg/L	0.05	< 0.05	0.109	n/c	1.18
Total Phosphorus	mg/L	0.002	0.004	0.0035	n/c	0.25
Physical						
Biochemical Oxygen Demand	mg/L	2	< 2	< 2	n/c	0
Chemical Oxygen Demand	mg/L	20	< 20	< 20	n/c	0
Conductivity	uS/cm	2	93.3	94.6	1	n/c
Hardness, Calcium Carbonate	mg/L	0.6	47.8	46.7	2	n/c
pH, lab	-	0.1	7.85	7.83	0	n/c
Total Suspended Solids	mg/L	3	5.3	3.7	n/c	0.53
Metals, Dissolved						
Aluminum	mg/L	0.001	0.0333	0.0354	6	n/c
Antimony	mg/L	0.0001	< 0.0001	< 0.0001	n/c	0
Arsenic	mg/L	0.0001	0.00014	0.00013	n/c	0.1
Barium	mg/L	0.0001	0.0140	0.0137	2	n/c
Beryllium	mg/L	0.0001	< 0.0001	< 0.0001	n/c	0
Bismuth	mg/L	0.00005	< 0.00005	< 0.00005	n/c	0
Boron	mg/L	0.01	< 0.01	< 0.01	n/c	0
Cadmium	mg/L	0.000005	< 0.000005	< 0.000005	n/c	0
Calcium	mg/L	0.05	17.0	16.2	5	n/c
Cesium	mg/L	0.00001	< 0.00001	< 0.00001	n/c	0
Chromium	mg/L	0.0005	< 0.0005	< 0.0005	n/c	0
Cobalt	mg/L	0.0001	< 0.0001	< 0.0001	n/c	0
Copper	mg/L	0.0002	0.00062	0.00063	n/c	0.05
Iron	mg/L	0.01	0.052	0.048	8	n/c
Lead	mg/L	0.00005	< 0.00005	< 0.00005	n/c	0
Lithium	mg/L	0.001	< 0.001	< 0.001	n/c	0
Magnesium	mg/L	0.005	0.532	0.540	1	n/c
Manganese	mg/L	0.0001	0.00663	0.00620	7	n/c
Mercury	mg/L	0.000005	< 0.000005	< 0.000005	n/c	0
Molybdenum	mg/L	0.00005	0.000458	0.000461	1	n/c
Nickel	mg/L	0.0005	< 0.0005	< 0.0005	n/c	0
Potassium	mg/L	0.05	0.701	0.667	5	n/c
Rubidium	mg/L	0.0002	0.00100	0.00104	4	n/c
Selenium	mg/L	0.00005	< 0.00005	< 0.00005	n/c	0
Silicon	mg/L	0.05	2.52	2.51	0	n/c
Silver	mg/L	0.00001	< 0.00001	< 0.00001	n/c	0
Sodium	mg/L	0.05	0.858	0.853	1	n/c
Strontium	mg/L	0.0002	0.0401	0.0412	3	n/c
Sulphur (S)	mg/L	0.5	< 0.5	< 0.5	n/c	0
Tellurium	mg/L	0.0002	< 0.0002	< 0.0002	n/c	0
Thallium	mg/L	0.00001	< 0.00001	< 0.00001	n/c	0
Thorium-232	mg/L	0.0001	< 0.0001	< 0.0001	n/c	0
Tin	mg/L	0.0001	< 0.0001	< 0.0001	n/c	0
Titanium	mg/L	0.0003	0.00058	0.00087	n/c	0.97
Tungsten	mg/L	0.0001	< 0.0001	< 0.0001	n/c	0
Uranium	mg/L	0.00001	0.000050	0.000050	n/c	0
Vanadium	mg/L	0.0005	0.00052	0.00054	n/c	0.04
Zinc	mg/L	0.001	0.0089	0.0024	115	n/c
Zirconium	mg/L	0.0002	< 0.0002	< 0.0002	n/c	0
Metals, Total						
Aluminum	mg/L	0.003	0.0901	0.0940	4	n/c
Antimony	mg/L	0.0001	< 0.0001	< 0.0001	n/c	0
Arsenic	mg/L	0.0001	0.00016	0.00014	n/c	0.2
Barium	mg/L	0.0001	0.0150	0.0161	7	n/c
Beryllium	mg/L	0.0001	< 0.0001	< 0.0001	n/c	0
Bismuth	mg/L	0.00005	< 0.00005	< 0.00005	n/c	0
Boron	mg/L	0.01	< 0.01	< 0.01	n/c	0
Cadmium	mg/L	0.000005	< 0.000005	0.0000052	n/c	0.04
Calcium	mg/L	0.05	18.2	17.7	3	n/c
Cesium	mg/L	0.00001	< 0.00001	< 0.00001	n/c	0
Chromium	mg/L	0.0005	< 0.0005	< 0.0005	n/c	0
Cobalt	mg/L	0.0001	< 0.0001	< 0.0001	n/c	0
Copper	mg/L	0.0005	0.00072	0.00076	n/c	0.08
Iron	mg/L	0.01	0.107	0.112	5	n/c
Lead	mg/L	0.00005	< 0.00005	< 0.00005	n/c	0
Lithium	mg/L	0.001	< 0.001	< 0.001	n/c	0
Magnesium	mg/L	0.005	0.578	0.618	7	n/c
Manganese	mg/L	0.0001	0.00856	0.00881	3	n/c
Mercury	mg/L	0.000005	< 0.000005	< 0.000005	n/c	0
Molybdenum	mg/L	0.00005	0.000462	0.000488	5	n/c
Nickel	mg/L	0.0005	< 0.0005	< 0.0005	n/c	0
Potassium	mg/L	0.05	0.693	0.724	4	n/c
Rubidium	mg/L	0.0002	0.00099	0.00111	11	n/c
Selenium	mg/L	0.00005	< 0.00005	0.000060	n/c	0.2
Silicon	mg/L	0.1	2.64	2.74	4	n/c
Silver	mg/L	0.00001	< 0.00001	< 0.00001	n/c	0
Sodium	mg/L	0.05	0.859	0.922	7	n/c
Strontium	mg/L	0.0002	0.0389	0.0408	5	n/c
Sulphur (S)	mg/L	0.5	< 0.5	< 0.5	n/c	0
Tellurium	mg/L	0.0002	< 0.0002	< 0.0002	n/c	0
Thallium	mg/L	0.00001	< 0.00001	< 0.00001	n/c	0
Thorium-232	mg/L	0.0001	< 0.0001	< 0.0001	n/c	0
Tin	mg/L	0.0001	< 0.0001	< 0.0001	n/c	0
Titanium	mg/L	0.0003	0.00239	0.00250	4	n/c
Tungsten	mg/L	0.0001	< 0.0001	< 0.0001	n/c	0
Uranium	mg/L	0.00001	0.000051	0.000058	13	n/c
Vanadium	mg/L	0.0005	0.00065	0.00077	n/c	0.24
Zinc	mg/L	0.003	< 0.003	< 0.003	n/c	0
Zirconium	mg/L	0.0002	< 0.0002	< 0.0002	n/c	0

Notes:
RPD = Relative percent difference; the difference between two values divided by the mean of the two values.
RPD is calculated when the mean concentration is greater than five times the laboratory report detection limit.
DF = Difference factor; the absolute difference between two values divided by the laboratory report detection limit.
DF is calculated when the mean concentration is less than five times the laboratory report detection limit.
FDA = field duplicate available, FD = field duplicate, QA/QC = quality assurance/quality control
RDL = Report Detection Limit indicates the minimum concentration that could be measured by laboratory instrumentation for a specific sample.
< Indicates parameter was below the laboratory RDL; n/c = Not Calculated
RPD or DF exceeds Golder's data quality objectives 20

Appendix C
QA/QC Results of Field Duplicates
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Sample Name Sample Collection Date	Units	RDL	SW-21 2021-10-07	SW-21 FD 2021-10-07	RPD (%)	DF (unitless)
Anions + Nutrients						
Alkalinity, Total as CaCO3	mg/L	1	265	283	7	n/c
Ammonia (as N)	mg/L	0.005	5.05	4.59	10	n/c
Chloride (Cl)	mg/L	0.5	13.4	14.4	7	n/c
Dissolved Phosphorus	mg/L	0.05	< 0.05	< 0.05	n/c	0
Fluoride (F)	mg/L	0.02	0.091	0.097	n/c	0.3
Nitrate (as N)	mg/L	0.005	2.13	2.33	9	n/c
Nitrite (as N)	mg/L	0.001	0.0676	0.0734	8	n/c
Phosphorus, Total Orthophosphate	mg/L	0.001	0.0033	0.0035	n/c	0.2
Sulfate (SO4)	mg/L	0.3	6.03	6.41	6	n/c
Total Kjeldahl Nitrogen	mg/L	0.05	6.05	5.45	10	n/c
Total Phosphorus	mg/L	0.002	0.02	0.02	0	n/c
Physical						
Biochemical Oxygen Demand	mg/L	2	< 2	< 2	n/c	0
Chemical Oxygen Demand	mg/L	20	32	40	n/c	0.4
Conductivity	uS/cm	2	553	580	5	n/c
Hardness, Calcium Carbonate	mg/L	0.6	208	218	5	n/c
pH, lab	-	0.1	8.47	8.48	0	n/c
Total Suspended Solids	mg/L	3	< 3	< 3	n/c	0
Metals, Dissolved						
Aluminum	mg/L	0.001	0.0473	0.0554	16	n/c
Antimony	mg/L	0.0001	< 0.0001	< 0.0001	n/c	0
Arsenic	mg/L	0.0001	0.00038	0.00040	n/c	0.2
Barium	mg/L	0.0001	0.102	0.108	6	n/c
Beryllium	mg/L	0.0001	< 0.0001	< 0.0001	n/c	0
Bismuth	mg/L	0.00005	< 0.00005	< 0.00005	n/c	0
Boron	mg/L	0.01	0.421	0.427	1	n/c
Cadmium	mg/L	0.000005	0.0000112	0.0000239	n/c	**2.54**
Calcium	mg/L	0.05	58.4	60.4	3	n/c
Cesium	mg/L	0.00001	0.000047	0.000044	n/c	0.3
Chromium	mg/L	0.0005	< 0.0005	< 0.0005	n/c	0
Cobalt	mg/L	0.0001	0.00035	0.00036	n/c	0.1
Copper	mg/L	0.0002	0.00188	0.00172	9	n/c
Iron	mg/L	0.01	0.137	0.144	5	n/c
Lead	mg/L	0.00005	< 0.00005	< 0.00005	n/c	0
Lithium	mg/L	0.001	< 0.001	< 0.001	n/c	0
Magnesium	mg/L	0.005	10.9	11.6	6	n/c
Manganese	mg/L	0.0001	0.284	0.301	6	n/c
Mercury	mg/L	0.000005	< 0.000005	< 0.000005	n/c	0
Molybdenum	mg/L	0.00005	0.000208	0.000194	n/c	0.28
Nickel	mg/L	0.0005	0.00109	0.00114	n/c	0.1
Potassium	mg/L	0.05	12.6	13.7	8	n/c
Rubidium	mg/L	0.0002	0.00852	0.00882	3	n/c
Selenium	mg/L	0.00005	0.000084	0.000082	n/c	0.04
Silicon	mg/L	0.05	4.64	4.62	0	n/c
Silver	mg/L	0.00001	< 0.00001	< 0.00001	n/c	0
Sodium	mg/L	0.05	20.1	21.4	6	n/c
Strontium	mg/L	0.0002	0.362	0.365	1	n/c
Sulphur (S)	mg/L	0.5	2.45	2.39	n/c	0.12
Tellurium	mg/L	0.0002	< 0.0002	< 0.0002	n/c	0
Thallium	mg/L	0.00001	< 0.00001	< 0.00001	n/c	0
Thorium-232	mg/L	0.0001	< 0.0001	< 0.0001	n/c	0
Tin	mg/L	0.0001	< 0.0001	< 0.0001	n/c	0
Titanium	mg/L	0.0003	0.00252	0.00302	18	n/c
Tungsten	mg/L	0.0001	< 0.0001	< 0.0001	n/c	0
Uranium	mg/L	0.00001	0.000092	0.000094	2	n/c
Vanadium	mg/L	0.0005	< 0.0005	< 0.0005	n/c	0
Zinc	mg/L	0.001	0.0017	0.0017	n/c	0
Zirconium	mg/L	0.0002	< 0.0002	0.00021	n/c	0.05
Metals, Total						
Aluminum	mg/L	0.003	0.265	0.251	5	n/c
Antimony	mg/L	0.0001	< 0.0001	< 0.0001	n/c	0
Arsenic	mg/L	0.0001	0.00053	0.00054	2	n/c
Barium	mg/L	0.0001	0.112	0.119	6	n/c
Beryllium	mg/L	0.0001	< 0.0001	< 0.0001	n/c	0
Bismuth	mg/L	0.00005	< 0.00005	< 0.00005	n/c	0
Boron	mg/L	0.01	0.445	0.459	3	n/c
Cadmium	mg/L	0.000005	0.0000123	0.0000115	n/c	0.16
Calcium	mg/L	0.05	65.0	68.0	5	n/c
Cesium	mg/L	0.00001	0.000060	0.000062	3	n/c
Chromium	mg/L	0.0005	< 0.0005	< 0.0005	n/c	0
Cobalt	mg/L	0.0001	0.00043	0.00045	n/c	0.2
Copper	mg/L	0.0005	0.00202	0.00206	n/c	0.08
Iron	mg/L	0.01	0.497	0.490	1	n/c
Lead	mg/L	0.00005	0.000083	0.000082	n/c	0.02
Lithium	mg/L	0.001	< 0.001	< 0.001	n/c	0
Magnesium	mg/L	0.005	11.2	11.8	5	n/c
Manganese	mg/L	0.0001	0.312	0.308	1	n/c
Mercury	mg/L	0.000005	< 0.000005	< 0.000005	n/c	0
Molybdenum	mg/L	0.00005	0.000180	0.000192	n/c	0.24
Nickel	mg/L	0.0005	0.00126	0.00138	n/c	0.24
Potassium	mg/L	0.05	13.2	13.8	4	n/c
Rubidium	mg/L	0.0002	0.00890	0.00911	2	n/c
Selenium	mg/L	0.00005	0.000069	0.000088	n/c	0.38
Silicon	mg/L	0.1	5.29	5.32	1	n/c
Silver	mg/L	0.00001	< 0.00001	< 0.00001	n/c	0
Sodium	mg/L	0.05	21.1	22.4	6	n/c
Strontium	mg/L	0.0002	0.386	0.398	3	n/c
Sulphur (S)	mg/L	0.5	2.58	2.66	3	n/c
Tellurium	mg/L	0.0002	< 0.0002	< 0.0002	n/c	0
Thallium	mg/L	0.00001	< 0.00001	< 0.00001	n/c	0
Thorium-232	mg/L	0.0001	< 0.0001	< 0.0001	n/c	0
Tin	mg/L	0.0001	< 0.0001	< 0.0001	n/c	0
Titanium	mg/L	0.0003	0.00822	0.00792	4	n/c
Tungsten	mg/L	0.0001	< 0.0001	< 0.0001	n/c	0
Uranium	mg/L	0.00001	0.000100	0.000104	4	n/c
Vanadium	mg/L	0.0005	0.00075	0.00072	n/c	0.06
Zinc	mg/L	0.003	< 0.003	< 0.003	n/c	0
Zirconium	mg/L	0.0002	0.00025	0.00032	n/c	0.35

Notes:
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DF = Difference factor; the absolute difference between two values divided by the laboratory report detection limit.
DF is calculated when the mean concentration is less than five times the laboratory report detection limit.
FDA = field duplicate available, FD = field duplicate, QA/QC = quality assurance/quality control
RDL = Report Detection Limit indicates the minimum concentration that could be measured by laboratory instrumentation for a specific sample.
< Indicates parameter was below the laboratory RDL; n/c = Not Calculated
RPD or DF exceeds Golder's data quality objectives **20**

Appendix C
QA/QC Results of Field Blanks
Closed Thornhill Landfill
Regional District of Kitimat Stikine

Parameter	RDL	X5 RDL	Sample Name / Sample Date / Unit	FIELD BLANK 2019-08-08	FIELD BLANK 2019-11-06	FIELD BLANK 2020-10-07
Anions + Nutrients						
Alkalinity, Total as CaCO3	1000	5000	ug/L	< 1000	< 1000	< 1000
Bromide (Br)	50	250	ug/L	< 50	-	-
Chloride (Cl)	500	2500	ug/L	< 500	-	< 500
Fluoride (F)	0.02	0.1	mg/L	< 0.020	-	< 0.020
Nitrate (as N)	5	25	ug/L	< 5.0	-	< 5.0
Nitrite (as N)	1	5	ug/L	< 1.0	-	< 1.0
Ammonia (as N)	5	25	ug/L	< 5.0	< 5.0	8.1
Total Kjeldahl Nitrogen	50	250	ug/L	< 50	-	< 50
Sulfate (SO4)	300	1500	ug/L	< 300	-	< 300
Total Phosphorus, Colourmetric	2	10	ug/L	-	-	< 2.0
Phosphorus, Dissolved	50	250	ug/L	<50	-	-
Phosphorus, Total	2	10	ug/L	<2.0	5.9	-
Field + Physical						
Conductivity	2	10	uS/cm	< 2.0	< 2.0	< 2.0
Total Dissolved Solids	10	50	mg/L	< 10	-	< 10
Hardness, Calcium Carbonate (Dissolved)	0.6	3	mg/L	-	-	< 0.60
Hardness, Calcium Carbonate (Total)	0.5	2.5	mg/L	< 0.50	-	< 0.60
Chemical Oxygen Demand	20	100	mg/L	-	-	< 20
pH, lab	0.1	0.5	-	5.46	5.41	5.54
Metals, Dissolved						
Aluminum	1	5	ug/L	< 1.0	-	< 1.0
Antimony	0.1	0.5	ug/L	< 0.10	-	< 0.10
Arsenic	0.1	0.5	ug/L	< 0.10	-	< 0.10
Barium	0.1	0.5	ug/L	< 0.10	-	< 0.10
Beryllium	0.1	0.5	ug/L	< 0.10	-	< 0.100
Bismuth	0.05	0.25	ug/L	< 0.050	-	< 0.050
Boron	10	50	ug/L	< 10	-	< 10
Cadmium	0.005	0.025	ug/L	< 0.0050	-	< 0.0050
Calcium	50	250	ug/L	< 50	-	< 50
Chromium	0.1	0.5	ug/L	< 0.10	-	< 0.10
Cobalt	0.1	0.5	ug/L	< 0.10	-	< 0.10
Copper	0.2	1	ug/L	< 0.20	-	< 0.20
Iron	10	50	ug/L	< 10	-	< 10
Lead	0.05	0.25	ug/L	< 0.050	-	< 0.050
Lithium	1	5	ug/L	< 1.0	-	< 1.0
Magnesium	5	25	ug/L	< 5.0	-	< 5.0
Manganese	0.1	0.5	ug/L	< 0.10	-	< 0.10
Mercury	0.005	0.025	ug/L	< 0.0050	-	< 0.0050
Molybdenum	0.05	0.25	ug/L	< 0.050	-	< 0.050
Nickel	0.5	2.5	ug/L	< 0.50	-	< 0.50
Potassium	50	250	ug/L	< 50	-	< 50
Selenium	0.05	0.25	ug/L	< 0.050	-	< 0.050
Silicon	50	250	ug/L	< 50	-	< 50
Silver	0.01	0.05	ug/L	< 0.010	-	< 0.010
Sodium	50	250	ug/L	< 50	-	< 50
Strontium	0.2	1	ug/L	< 0.20	-	< 0.20
Sulphur (Colloidal)	500	2500	ug/L	< 500	-	< 500
Tellurium	0.2	1	ug/L	< 0.20	-	< 0.20
Thallium	0.01	0.05	ug/L	< 0.010	-	< 0.010
Thorium-232	0.1	0.5	ug/L	< 0.10	-	< 0.10
Tin	0.1	0.5	ug/L	< 0.10	-	< 0.10
Titanium	0.3	1.5	ug/L	< 0.30	-	< 0.30
Uranium	0.01	0.05	ug/L	< 0.010	-	< 0.010
Vanadium	0.5	2.5	ug/L	< 0.50	-	< 0.50
Zinc	1	5	ug/L	< 1.0	-	< 1.0
Zirconium	0.2	1	ug/L	< 0.20	-	< 0.20
Cesium	0.01	0.05	ug/L	< 0.010	-	< 0.010
Rubidium	0.2	1	ug/L	< 0.20	-	< 0.20
Tungsten	0.1	0.5	ug/L	< 0.10	-	< 0.10
Phosphorus, IPC-MS	50	250	ug/L	-	-	< 50
Metals, Total						
Aluminum	3	15	ug/L	< 3.0	-	< 3.0
Antimony	0.1	0.5	ug/L	< 0.10	-	< 0.10
Arsenic	0.1	0.5	ug/L	< 0.10	-	< 0.10
Barium	0.1	0.5	ug/L	< 0.10	-	< 0.10
Beryllium	0.1	0.5	ug/L	< 0.10	-	< 0.100
Bismuth	0.05	0.25	ug/L	< 0.050	-	< 0.050
Boron	10	50	ug/L	< 10	-	< 10
Cadmium	0.005	0.025	ug/L	< 0.0050	-	< 0.0050
Calcium	50	250	ug/L	< 50	-	< 50
Chromium	0.1	0.5	ug/L	< 0.10	-	< 0.10
Cobalt	0.1	0.5	ug/L	< 0.10	-	< 0.10
Copper	0.5	2.5	ug/L	< 0.50	-	< 0.50
Iron	10	50	ug/L	< 10	-	< 10
Lead	0.05	0.25	ug/L	< 0.050	-	< 0.050
Lithium	1	5	ug/L	< 1.0	-	< 1.0
Magnesium	5	25	ug/L	< 5.0	-	< 5.0
Manganese	0.1	0.5	ug/L	< 0.10	-	< 0.10
Mercury	0.005	0.025	ug/L	< 0.0050	-	< 0.0050
Molybdenum	0.05	0.25	ug/L	< 0.050	-	< 0.050
Nickel	0.5	2.5	ug/L	< 0.50	-	< 0.50
Potassium	50	250	ug/L	< 50	-	< 50
Selenium	0.05	0.25	ug/L	< 0.050	-	< 0.050
Silicon	100	500	ug/L	< 100	-	< 100
Silver	0.01	0.05	ug/L	< 0.010	-	< 0.010
Sodium	50	250	ug/L	< 50	-	< 50
Strontium	0.2	1	ug/L	< 0.20	-	< 0.20
Sulphur (Colloidal)	500	2500	ug/L	< 500	-	< 500
Tellurium	0.2	1	ug/L	< 0.20	-	< 0.20
Thallium	0.01	0.05	ug/L	< 0.010	-	< 0.010
Thorium-232	0.1	0.5	ug/L	< 0.10	-	< 0.10
Tin	0.1	0.5	ug/L	< 0.10	-	< 0.10
Titanium	0.3	1.5	ug/L	< 0.30	-	< 0.30
Uranium	0.01	0.05	ug/L	< 0.010	-	< 0.010
Vanadium	0.5	2.5	ug/L	< 0.50	-	< 0.50
Zinc	3	15	ug/L	< 3.0	-	< 3.0
Zirconium	0.2	1	ug/L	< 0.20	-	< 0.20
Tungsten	0.1	0.5	ug/L	< 0.10	-	< 0.10
Rubidium	0.2	1	ug/L	< 0.20	-	< 0.20
Cesium	0.01	0.05	ug/L	< 0.010	-	< 0.010
Phosphorus, ICP-MS	50	250	ug/L	-	-	< 50

Notes:
RDL = Report Detection Limit indicates the minimum concentration that could be measured by laboratory instrumentation for a specific sample.
< Indicates parameter was below the laboratory RDL
Result exceeds Golder's data quality objectives (x5 RDL) **20**

APPENDIX D

Laboratory Reports

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **VA21A6868**	Page	: 1 of 5
Client	: **Regional District of Kitimat-Stikine**	Laboratory	: Vancouver - Environmental
Contact	: H Shinton	Account Manager	: Amber Springer
Address	: # 300 - 4545 Lazelle Avenue Terrace BC Canada V8G 4E1	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: Thornhill Groundwater	Date Samples Received	: 14-Apr-2021 10:35
PO	: ----	Date Analysis Commenced	: 15-Apr-2021
C-O-C number	: ----	Issue Date	: 21-Apr-2021 17:25
Sampler	: H. Shinton		
Site	:		
Quote number	: Q62338		
No. of samples received	: 2		
No. of samples analysed	: 2		

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.

Signatories	*Position*	*Laboratory Department*
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
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, Burnaby, British Columbia
Monica Ko	Lab Assistant	Metals, Burnaby, British Columbia
Shaneel Dayal	Analyst	Metals, Burnaby, British Columbia
Tracy Harley	Supervisor - Water Quality Instrumentation	Inorganics, Burnaby, British Columbia
Woochan Song	Lab 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).

Unit	*Description*
-	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.

Qualifiers

Qualifier	*Description*
RRV	*Reported result verified by repeat analysis.*

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID: BH-96-2	Field Blank	----	----	----
					Client sampling date / time: 12-Apr-2021 11:48	12-Apr-2021 11:57	----	----	----
					VA21A6868-001	VA21A6868-002	--------	--------	--------
					Result	Result	----	----	----
Physical Tests									
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	209	<1.0	----	----	----
conductivity	----	E100	2.0	µS/cm	398	<2.0	----	----	----
hardness (as CaCO3), dissolved	----	EC100	0.60	mg/L	105	<0.60	----	----	----
pH	----	E108	0.10	pH units	8.28	5.19	----	----	----
solids, total dissolved [TDS]	----	E162	10	mg/L	238	<10	----	----	----
Anions and Nutrients									
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.132	<0.0050	----	----	----
chloride	16887-00-6	E235.Cl	0.50	mg/L	0.63	<0.50	----	----	----
fluoride	16984-48-8	E235.F	0.020	mg/L	0.159	<0.020	----	----	----
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	0.187	<0.050	----	----	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.110	<0.0050	----	----	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	0.0067	<0.0010	----	----	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0936	<0.0020	----	----	----
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	2.63	<0.30	----	----	----
Dissolved Metals									
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0093	0.0012 RRV	----	----	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00011	<0.00010	----	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00520	<0.00010	----	----	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0221	<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	0.148	<0.010	----	----	----
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.0000223	<0.0000050	----	----	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L	16.7	<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	0.00034	<0.00020	----	----	----
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	<0.000050	----	----	----

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	BH-96-2	Field Blank	----	----	----
					Client sampling date / time	12-Apr-2021 11:48	12-Apr-2021 11:57	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA21A6868-001	VA21A6868-002	--------	--------	--------
						Result	Result	----	----	----
Dissolved Metals										
lithium, dissolved	7439-93-2	E421	0.0010	mg/L		0.0017	<0.0010	----	----	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L		15.4	0.0332 RRV	----	----	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L		0.0468	0.00028 RRV	----	----	----
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L		<0.0000050	<0.0000050	----	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		0.00388	<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		11.8	<0.050	----	----	----
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L		0.00037	<0.00020	----	----	----
selenium, dissolved	7782-49-2	E421	0.000050	mg/L		0.000077	<0.000050	----	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L		4.40	<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		44.0	0.112 RRV	----	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		0.204	0.00045 RRV	----	----	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L		0.71	<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	----	----	----
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L		<0.00010	<0.00010	----	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L		0.00177	<0.000010	----	----	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		<0.00050	<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		<0.00020	<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		<20	<20	----	----	----

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA21A6868**	Page	: 1 of 12
Client	: **Regional District of Kitimat-Stikine**	Laboratory	: Vancouver - Environmental
Contact	: H Shinton	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	: 14-Apr-2021 10:35
PO	: ----	Issue Date	: 21-Apr-2021 17:25
C-O-C number	: ----		
Sampler	: H. Shinton		
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 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

- No Quality Control Sample Frequency Outliers occur.

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								
Dissolved Metals	QC-MRG2-1799340 01	----	calcium, dissolved	7440-70-2	E421	0.323 B mg/L	0.05 mg/L	Blank result exceeds permitted value
Dissolved Metals	QC-MRG2-1799340 01	----	magnesium, dissolved	7439-95-4	E421	0.0087 B mg/L	0.005 mg/L	Blank result exceeds permitted value

Result Qualifiers

Qualifier	*Description*
B	*Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.*

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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
BH-96-2	E559	12-Apr-2021	----	----	----		18-Apr-2021	28 days	5 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
Field Blank	E559	12-Apr-2021	----	----	----		18-Apr-2021	28 days	5 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
BH-96-2	E298	12-Apr-2021	20-Apr-2021	28 days	8 days	✓	20-Apr-2021	19 days	0 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
Field Blank	E298	12-Apr-2021	20-Apr-2021	28 days	8 days	✓	20-Apr-2021	19 days	0 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
BH-96-2	E235.Cl	12-Apr-2021	----	----	----		15-Apr-2021	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
Field Blank	E235.Cl	12-Apr-2021	----	----	----		15-Apr-2021	28 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
BH-96-2	E235.F	12-Apr-2021	----	----	----		15-Apr-2021	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	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
Field Blank	E235.F	12-Apr-2021	----	----	----		15-Apr-2021	28 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
BH-96-2	E235.NO3-L	12-Apr-2021	----	----	----		15-Apr-2021	3 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
Field Blank	E235.NO3-L	12-Apr-2021	----	----	----		15-Apr-2021	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
BH-96-2	E235.NO2-L	12-Apr-2021	----	----	----		15-Apr-2021	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
Field Blank	E235.NO2-L	12-Apr-2021	----	----	----		15-Apr-2021	3 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
BH-96-2	E235.SO4	12-Apr-2021	----	----	----		15-Apr-2021	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
Field Blank	E235.SO4	12-Apr-2021	----	----	----		15-Apr-2021	28 days	3 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
BH-96-2	E318	12-Apr-2021	20-Apr-2021	28 days	8 days	✓	21-Apr-2021	19 days	0 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
Field Blank	E318	12-Apr-2021	20-Apr-2021	28 days	8 days	✓	21-Apr-2021	20 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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid)										
BH-96-2	E372-U	12-Apr-2021	20-Apr-2021	28 days	8 days	✓	20-Apr-2021	19 days	0 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid)										
Field Blank	E372-U	12-Apr-2021	20-Apr-2021	28 days	8 days	✓	20-Apr-2021	20 days	0 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE dissolved (nitric acid)										
BH-96-2	E421.Cr-L	12-Apr-2021	16-Apr-2021	180 days	3 days	✓	16-Apr-2021	176 days	0 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE dissolved (nitric acid)										
Field Blank	E421.Cr-L	12-Apr-2021	16-Apr-2021	180 days	3 days	✓	16-Apr-2021	176 days	0 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
BH-96-2	E509	12-Apr-2021	15-Apr-2021	28 days	3 days	✓	15-Apr-2021	24 days	0 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
Field Blank	E509	12-Apr-2021	15-Apr-2021	28 days	3 days	✓	15-Apr-2021	24 days	0 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid)										
BH-96-2	E421	12-Apr-2021	16-Apr-2021	180 days	3 days	✓	16-Apr-2021	176 days	0 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid)										
Field Blank	E421	12-Apr-2021	16-Apr-2021	180 days	3 days	✓	16-Apr-2021	176 days	0 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
BH-96-2	E290	12-Apr-2021	----	----	----		15-Apr-2021	14 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	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Alkalinity Species by Titration										
HDPE Field Blank	E290	12-Apr-2021	----	----	----		15-Apr-2021	14 days	3 days	✓
Physical Tests : Conductivity in Water										
HDPE BH-96-2	E100	12-Apr-2021	----	----	----		15-Apr-2021	28 days	3 days	✓
Physical Tests : Conductivity in Water										
HDPE Field Blank	E100	12-Apr-2021	----	----	----		15-Apr-2021	28 days	3 days	✓
Physical Tests : pH by Meter										
HDPE BH-96-2	E108	12-Apr-2021	----	----	----		15-Apr-2021	0.25 hrs	75 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE Field Blank	E108	12-Apr-2021	----	----	----		15-Apr-2021	0.25 hrs	75 hrs	× EHTR-FM
Physical Tests : TDS by Gravimetry										
HDPE BH-96-2	E162	12-Apr-2021	----	----	----		15-Apr-2021	7 days	3 days	✓
Physical Tests : TDS by Gravimetry										
HDPE Field Blank	E162	12-Apr-2021	----	----	----		16-Apr-2021	7 days	4 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			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	179006	1	3	33.3	5.0	✓
Ammonia by Fluorescence	E298	181663	1	16	6.2	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	180825	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	178998	1	8	12.5	5.0	✓
Conductivity in Water	E100	179008	1	9	11.1	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	179934	1	10	10.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	179579	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	179935	1	16	6.2	5.0	✓
Fluoride in Water by IC	E235.F	179002	1	4	25.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	179001	1	12	8.3	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	179000	1	10	10.0	5.0	✓
pH by Meter	E108	179007	1	9	11.1	5.0	✓
Sulfate in Water by IC	E235.SO4	179004	1	5	20.0	5.0	✓
TDS by Gravimetry	E162	179695	2	40	5.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	181661	1	8	12.5	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	181662	1	12	8.3	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	179006	1	3	33.3	5.0	✓
Ammonia by Fluorescence	E298	181663	1	16	6.2	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	180825	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	178998	1	8	12.5	5.0	✓
Conductivity in Water	E100	179008	1	9	11.1	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	179934	1	10	10.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	179579	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	179935	1	16	6.2	5.0	✓
Fluoride in Water by IC	E235.F	179002	1	4	25.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	179001	1	12	8.3	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	179000	1	10	10.0	5.0	✓
pH by Meter	E108	179007	1	9	11.1	5.0	✓
Sulfate in Water by IC	E235.SO4	179004	1	5	20.0	5.0	✓
TDS by Gravimetry	E162	179695	2	40	5.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	181661	1	8	12.5	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	181662	1	12	8.3	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	179006	1	3	33.3	5.0	✓
Ammonia by Fluorescence	E298	181663	1	16	6.2	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	180825	1	20	5.0	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Method Blanks (MB) - Continued							
Chloride in Water by IC	E235.Cl	178998	1	8	12.5	5.0	✓
Conductivity in Water	E100	179008	1	9	11.1	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	179934	1	10	10.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	179579	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	179935	2	16	12.5	5.0	✓
Fluoride in Water by IC	E235.F	179002	1	4	25.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	179001	1	12	8.3	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	179000	1	10	10.0	5.0	✓
Sulfate in Water by IC	E235.SO4	179004	1	5	20.0	5.0	✓
TDS by Gravimetry	E162	179695	2	40	5.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	181661	1	8	12.5	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	181662	1	12	8.3	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	181663	1	16	6.2	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	180825	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	178998	1	8	12.5	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	179934	1	10	10.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	179579	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	179935	1	16	6.2	5.0	✓
Fluoride in Water by IC	E235.F	179002	1	4	25.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	179001	1	12	8.3	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	179000	1	10	10.0	5.0	✓
Sulfate in Water by IC	E235.SO4	179004	1	5	20.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	181661	1	8	12.5	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	181662	1	12	8.3	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 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).

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
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 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
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.
Dissolved Hardness (Calculated)	EC100 Vancouver - Environmental	Water	APHA 2340B	“Hardness (as CaCO3), dissolved” is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 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.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Vancouver - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
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.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals Water Filtration	EP421 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Mercury Water Filtration	EP509 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **VA21A6868**	Page	: 1 of 13
Client	: Regional District of Kitimat-Stikine	Laboratory	: Vancouver - Environmental
Contact	: H Shinton	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	: 14-Apr-2021 10:35
PO	: ----	Date Analysis Commenced	: 15-Apr-2021
C-O-C number	: ----	Issue Date	: 21-Apr-2021 17:25
Sampler	: H. Shinton		
Site	:		
Quote number	: Q62338		
No. of samples received	: 2		
No. of samples analysed	: 2		

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.

Signatories	*Position*	*Laboratory Department*
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
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, Burnaby, British Columbia
Monica Ko	Lab Assistant	Metals, Burnaby, British Columbia
Shaneel Dayal	Analyst	Metals, Burnaby, British Columbia
Tracy Harley	Supervisor - Water Quality Instrumentation	Inorganics, Burnaby, British Columbia
Woochan Song	Lab Analyst	Metals, Burnaby, British Columbia

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: 179006)											
VA21A6868-001	BH-96-2	alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	209	212	1.33%	20%	----
Physical Tests (QC Lot: 179007)											
VA21A6868-001	BH-96-2	pH	----	E108	0.10	pH units	8.28	8.28	0.0966%	4%	----
Physical Tests (QC Lot: 179008)											
VA21A6868-001	BH-96-2	conductivity	----	E100	2.0	µS/cm	398	397	0.252%	10%	----
Physical Tests (QC Lot: 179695)											
VA21A6671-001	Anonymous	solids, total dissolved [TDS]	----	E162	20	mg/L	738	776	4.96%	20%	----
Physical Tests (QC Lot: 180336)											
KS2101075-001	Anonymous	solids, total dissolved [TDS]	----	E162	20	mg/L	403	425	5.19%	20%	----
Anions and Nutrients (QC Lot: 178998)											
VA21A6863-001	Anonymous	chloride	16887-00-6	E235.Cl	0.50	mg/L	5.63	5.61	0.324%	20%	----
Anions and Nutrients (QC Lot: 179000)											
VA21A6863-001	Anonymous	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: 179001)											
VA21A6868-001	BH-96-2	nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.110	0.115	4.69%	20%	----
Anions and Nutrients (QC Lot: 179002)											
VA21A6868-001	BH-96-2	fluoride	16984-48-8	E235.F	0.020	mg/L	0.159	0.162	0.003	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 179004)											
VA21A6868-001	BH-96-2	sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	2.63	2.60	0.02	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 181661)											
VA21A6867-001	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	1.83	1.80	1.72%	20%	----
Anions and Nutrients (QC Lot: 181662)											
VA21A6867-001	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0200	mg/L	0.168	0.169	0.0017	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 181663)											
VA21A6868-001	BH-96-2	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.132	0.135	2.04%	20%	----
Dissolved Metals (QC Lot: 179579)											
CG2100811-004	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 179934)											
VA21A6868-001	BH-96-2	chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 179935)											
VA21A6868-001	BH-96-2	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0093	0.0079	0.0014	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: 179935) - continued											
VA21A6868-001	BH-96-2	antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00011	0.00011	0.0000003	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00520	0.00529	1.64%	20%	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0221	0.0226	1.90%	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	0.148	0.154	4.05%	20%	----
		cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.0000223	0.0000236	0.0000012	Diff <2x LOR	----
		calcium, dissolved	7440-70-2	E421	0.050	mg/L	16.7	16.6	0.629%	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	0.00034	0.00032	0.00002	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	0.0017	0.0018	0.00008	Diff <2x LOR	----
		magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	15.4	15.9	3.47%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.0468	0.0466	0.242%	20%	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00388	0.00390	0.651%	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	11.8	12.5	5.60%	20%	----
		rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00037	0.00040	0.00002	Diff <2x LOR	----
		selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.000077	0.000062	0.000015	Diff <2x LOR	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	4.40	4.41	0.164%	20%	----
		silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, dissolved	17341-25-2	E421	0.050	mg/L	44.0	44.8	1.91%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.204	0.202	1.18%	20%	----
		sulfur, dissolved	7704-34-9	E421	0.50	mg/L	0.71	0.61	0.10	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	----
		titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	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	0.00177	0.00178	0.470%	20%	----
		vanadium, dissolved	7440-62-2	E421	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*
Dissolved Metals (QC Lot: 179935) - continued											
VA21A6868-001	BH-96-2	zinc, dissolved	7440-66-6	E421	0.0010	mg/L	<0.0010	<0.0010	0	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: 180825)											
KS2101095-001	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: 179006)						
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 179008)						
conductivity	----	E100	1	µS/cm	1.5	----
Physical Tests (QCLot: 179695)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Physical Tests (QCLot: 180336)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Anions and Nutrients (QCLot: 178998)						
chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 179000)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 179001)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 179002)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 179004)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 181661)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 181662)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 181663)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Dissolved Metals (QCLot: 179579)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 179934)						
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	<0.00010	----
Dissolved Metals (QCLot: 179935)						
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	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 179935) - continued						
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	# 0.323	B
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	# 0.0087	B
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	MBRR
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	----
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	MBRR
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
Aggregate Organics (QCLot: 180825)						
chemical oxygen demand [COD]	----	E559	20	mg/L	<20	----

Qualifiers

Qualifier	Description
B	Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.
MBRR	Initial MB for this submission had positive results for flagged analyte (data not shown). Low level samples were repeated with new QC (2nd MB results shown). High level results (>5x initial MB level) and non-detect results were reported and are defensible

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	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 179006)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	98.2	85.0	115	----
Physical Tests (QCLot: 179007)									
pH	----	E108	----	pH units	7 pH units	99.4	98.0	102	----
Physical Tests (QCLot: 179008)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	105	90.0	110	----
Physical Tests (QCLot: 179695)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	106	85.0	115	----
Physical Tests (QCLot: 180336)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	98.4	85.0	115	----
Anions and Nutrients (QCLot: 178998)									
chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 179000)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 179001)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 179002)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 179004)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	103	90.0	110	----
Anions and Nutrients (QCLot: 181661)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	93.2	75.0	125	----
Anions and Nutrients (QCLot: 181662)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	95.1	80.0	120	----
Anions and Nutrients (QCLot: 181663)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	105	85.0	115	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	101	80.0	120	----
Dissolved Metals (QCLot: 179934)									
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	0.25 mg/L	99.3	80.0	120	----
Dissolved Metals (QCLot: 179935)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	104	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	98.5	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	100	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 179935) - continued									
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	104	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	104	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	96.1	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	105	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	100	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	102	80.0	120	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	98.5	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	99.1	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	107	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	98.0	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	101	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	99.7	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	100	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	98.9	80.0	120	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	110	70.0	130	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	107	80.0	120	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	106	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	101	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	104	80.0	120	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	99.1	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	98.2	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	87.5	80.0	120	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	94.6	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	96.3	80.0	120	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	94.7	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	96.7	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	94.0	80.0	120	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	94.7	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	94.4	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	102	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	97.4	80.0	120	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	95.7	80.0	120	----
Aggregate Organics (QCLot: 180825)									
chemical oxygen demand [COD]	----	E559	20	mg/L	750 mg/L	102	85.0	115	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier

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: 178998)										
VA21A6868-002	Field Blank	chloride	16887-00-6	E235.Cl	100.0 mg/L	100 mg/L	100.0	75.0	125	----
Anions and Nutrients (QCLot: 179000)										
VA21A6868-002	Field Blank	nitrite (as N)	14797-65-0	E235.NO2-L	0.498 mg/L	0.5 mg/L	99.6	75.0	125	----
Anions and Nutrients (QCLot: 179001)										
VA21A6868-002	Field Blank	nitrate (as N)	14797-55-8	E235.NO3-L	2.51 mg/L	2.5 mg/L	100	75.0	125	----
Anions and Nutrients (QCLot: 179002)										
VA21A6868-002	Field Blank	fluoride	16984-48-8	E235.F	1.02 mg/L	1 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 179004)										
VA21A6868-002	Field Blank	sulfate (as SO4)	14808-79-8	E235.SO4	105 mg/L	100 mg/L	105	75.0	125	----
Anions and Nutrients (QCLot: 181661)										
VA21A6868-001	BH-96-2	Kjeldahl nitrogen, total [TKN]	----	E318	2.23 mg/L	2.5 mg/L	89.2	70.0	130	----
Anions and Nutrients (QCLot: 181662)										
VA21A6868-001	BH-96-2	phosphorus, total	7723-14-0	E372-U	ND mg/L	0.05 mg/L	ND	70.0	130	----
Anions and Nutrients (QCLot: 181663)										
VA21A6868-002	Field Blank	ammonia, total (as N)	7664-41-7	E298	0.210 mg/L	0.2 mg/L	105	75.0	125	----
Dissolved Metals (QCLot: 179579)										
VA21A6868-001	BH-96-2	mercury, dissolved	7439-97-6	E509	0.0000985 mg/L	0.0001 mg/L	98.5	70.0	130	----
Dissolved Metals (QCLot: 179934)										
VA21A6868-001	BH-96-2	chromium, dissolved	7440-47-3	E421.Cr-L	0.0379 mg/L	0.04 mg/L	94.8	70.0	130	----
Dissolved Metals (QCLot: 179935)										
VA21A6868-001	BH-96-2	aluminum, dissolved	7429-90-5	E421	0.196 mg/L	0.2 mg/L	97.9	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.0193 mg/L	0.02 mg/L	96.7	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.0192 mg/L	0.02 mg/L	96.2	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	0.0389 mg/L	0.04 mg/L	97.2	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.00870 mg/L	0.01 mg/L	87.0	70.0	130	----
		boron, dissolved	7440-42-8	E421	ND mg/L	0.1 mg/L	ND	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.00386 mg/L	0.004 mg/L	96.4	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
Dissolved Metals (QCLot: 179935) - continued										
VA21A6868-001	BH-96-2	calcium, dissolved	7440-70-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		cesium, dissolved	7440-46-2	E421	0.00964 mg/L	0.01 mg/L	96.4	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.0190 mg/L	0.02 mg/L	95.2	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.0183 mg/L	0.02 mg/L	91.6	70.0	130	----
		iron, dissolved	7439-89-6	E421	1.93 mg/L	2 mg/L	96.5	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.0184 mg/L	0.02 mg/L	92.2	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.0916 mg/L	0.1 mg/L	91.6	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	0.0195 mg/L	0.02 mg/L	97.5	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.0370 mg/L	0.04 mg/L	92.5	70.0	130	----
		phosphorus, dissolved	7723-14-0	E421	10.7 mg/L	10 mg/L	107	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	0.0196 mg/L	0.02 mg/L	98.2	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.0403 mg/L	0.04 mg/L	101	70.0	130	----
		silicon, dissolved	7440-21-3	E421	9.23 mg/L	10 mg/L	92.3	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.00346 mg/L	0.004 mg/L	86.4	70.0	130	----
		sodium, dissolved	17341-25-2	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	20.1 mg/L	20 mg/L	100	70.0	130	----
		tellurium, dissolved	13494-80-9	E421	0.0371 mg/L	0.04 mg/L	92.7	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.00361 mg/L	0.004 mg/L	90.3	70.0	130	----
		thorium, dissolved	7440-29-1	E421	0.0190 mg/L	0.02 mg/L	95.0	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.0189 mg/L	0.02 mg/L	94.6	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	0.0185 mg/L	0.02 mg/L	92.4	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.00364 mg/L	0.004 mg/L	91.1	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.0981 mg/L	0.1 mg/L	98.1	70.0	130	----
		zinc, dissolved	7440-66-6	E421	0.378 mg/L	0.4 mg/L	94.6	70.0	130	----
		zirconium, dissolved	7440-67-7	E421	0.0386 mg/L	0.04 mg/L	96.6	70.0	130	----
Aggregate Organics (QCLot: 180825)										
KS2101095-002	Anonymous	chemical oxygen demand [COD]	----	E559	424 mg/L	500 mg/L	84.8	75.0	125	----

Chain of Custody (COC) / Analytical Request Form

ALS Environmental
www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here
(lab use only)

COC Number: 17 -

Page of

Report To	Contact and company name below will appear on the final report
Company:	Regional District of Kitimat-Stikine
Contact:	Hannah Shinton
Phone:	250-615-6100
	Company address below will appear on the final report
Street:	4545 Lazelle Avenue
City/Province:	Terrace/BC
Postal Code:	V8G4E1
Invoice To	Same as Report To ☐ YES ☑ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	Regional District of Kitimat-Stikine
Contact:	Megan Haley

Report Format / Distribution	
Select Report Format:	☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ YES ☐ NO
☑ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	hshinton@rdks.bc.ca; mhaley@rdks.bc.ca
Email 2	nveikle@rdks.bc.ca
Email 3	mglover@rdks.bc.ca
Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	anne-maries@rdks.bc.ca, nveikle@rdks.bc.ca
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): 6868 **ALS Contact:** **Sampler:** H. Shinton

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

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

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

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

Date and Time Required for all E&P TATs:

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

Analysis Request

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

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	F/P			P					P	P	P					SAMPLES ON HOLD	Sample is hazardous (please provide further detail)	NUMBER OF CONTAINERS
					Dissolved metals	[redacted]	dissolved hardness	Ammonia	Chloride	Fluoride	Nitrate	Nitrite	Total Kjeldahl Nitrogen	Total phosphorus	COD	Total Dissolved Solids	Sulphate	Alkalinity	pH, Conductivity			
1	BH-96-2	12-Apr-21	11:48	Water	R		R	R	R	R	R	R	R	R	R	R	R	R	R			
[redacted]																						
2	Field Blank	12-Apr-21	11:57	Water	R		R	R	R	R	R	R	R	R	R	R	R	R	R			

Environmental Division
Vancouver
Work Order Reference
VA21A6868

Telephone : +1 604 253 4188

Terrace Shipping
1 Coolers
____ Carbouys

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

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

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

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
7.8						4	4

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Hannah Shinton	Date: April 13th, 2021	Time:	Received by: Chris	Date: 13 Apr 21	Time: 0925	Received by: ice pack JC	Date: APR 14 2021	Time: 1035am

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY SEPT 2017 FRONT

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

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

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **VA21A6870**	Page	: 1 of 8
Client	: **Regional District of Kitimat-Stikine**	Laboratory	: Vancouver - Environmental
Contact	: H Shinton	Account Manager	: Amber Springer
Address	: # 300 - 4545 Lazelle Avenue Terrace BC Canada V8G 4E1	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: Thornhill Transfer Station Surface Water	Date Samples Received	: 14-Apr-2021 10:35
PO	: ----	Date Analysis Commenced	: 14-Apr-2021
C-O-C number	: ----	Issue Date	: 22-Apr-2021 14:23
Sampler	: H. Shinton		
Site	:		
Quote number	: Q62338		
No. of samples received	: 6		
No. of samples analysed	: 6		

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.

Signatories	*Position*	*Laboratory Department*
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Monica Ko	Lab Assistant	Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Shaneel Dayal	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).

Unit	*Description*
-	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.

Qualifiers

Qualifier	*Description*
DLDS	*Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.*
DLM	*Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).*

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SW-1	SW-3	SW-6	SW-21	DUP
					Client sampling date / time	12-Apr-2021 13:55	12-Apr-2021 14:32	12-Apr-2021 15:08	12-Apr-2021 13:00	12-Apr-2021 12:00
						VA21A6870-001	VA21A6870-002	VA21A6870-003	VA21A6870-004	VA21A6870-005
						Result	Result	Result	Result	Result
Physical Tests										
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		27.5	712	35.0	304	306
conductivity	----	E100	2.0	µS/cm		60.4	1470	81.3	662	658
hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L		29.1	443	36.2	222	225
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L		29.6	486	38.4	224	233
pH	----	E108	0.10	pH units		7.54	6.99	7.60	8.19	8.16
solids, total suspended [TSS]	----	E160-H	3.0	mg/L		<3.0	71.5	<3.0	9.1	6.3
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		<0.0050	36.7	0.0238	10.5	10.7
chloride	16887-00-6	E235.Cl	0.50	mg/L		<0.50	50.9	1.34	20.4	20.4
fluoride	16984-48-8	E235.F	0.020	mg/L		0.025	<0.200 DLDS	0.024	<0.100 DLDS	<0.100 DLDS
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L		0.077	33.1	0.123	9.76	9.66
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		0.0825	0.0928	0.418	3.60	3.61
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		<0.0010	<0.0100 DLDS	0.0034	0.0410	0.0380
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L		<0.0010	<0.0010	0.0011	0.0018	0.0020
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L		0.0029	0.235	0.0051	0.0233	0.0243
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		1.33	8.75	1.67	8.30	8.32
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		0.0547	0.0763	0.222	0.529	0.445
antimony, total	7440-36-0	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
arsenic, total	7440-38-2	E420	0.00010	mg/L		<0.00010	0.00709	0.00014	0.00054	0.00052
barium, total	7440-39-3	E420	0.00010	mg/L		0.0183	0.580	0.0177	0.139	0.147
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	1.57	0.018	0.696	0.669
cadmium, total	7440-43-9	E420	0.0000050	mg/L		<0.0000050	0.0000210	<0.0000050	0.0000137	0.0000106
calcium, total	7440-70-2	E420	0.050	mg/L		10.6	150	13.6	69.8	72.7
cesium, total	7440-46-2	E420	0.000010	mg/L		<0.000010	0.000156	0.000016	0.000087	0.000077
chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L		<0.00010	0.00088	0.00022	0.00066	0.00063
cobalt, total	7440-48-4	E420	0.00010	mg/L		<0.00010	0.00208	0.00012	0.00066	0.00065
copper, total	7440-50-8	E420	0.00050	mg/L		0.00079	0.00056	0.00104	0.00239	0.00252

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SW-1	SW-3	SW-6	SW-21	DUP
					Client sampling date / time	12-Apr-2021 13:55	12-Apr-2021 14:32	12-Apr-2021 15:08	12-Apr-2021 13:00	12-Apr-2021 12:00
						VA21A6870-001	VA21A6870-002	VA21A6870-003	VA21A6870-004	VA21A6870-005
						Result	Result	Result	Result	Result
Total Metals										
iron, total	7439-89-6	E420	0.010	mg/L		0.043	33.5	0.263	0.826	0.781
lead, total	7439-92-1	E420	0.000050	mg/L		<0.000050	<0.000050	0.000053	0.000114	0.000125
lithium, total	7439-93-2	E420	0.0010	mg/L		<0.0010	0.0018	<0.0010	0.0011	<0.0010
magnesium, total	7439-95-4	E420	0.0050	mg/L		0.775	27.2	1.08	12.0	12.6
manganese, total	7439-96-5	E420	0.00010	mg/L		0.00230	4.33	0.0157	0.270	0.279
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		0.000669	0.000235	0.000415	0.000184	0.000266
nickel, total	7440-02-0	E420	0.00050	mg/L		<0.00050	0.00406	<0.00050	0.00195	0.00194
phosphorus, total	7723-14-0	E420	0.050	mg/L		<0.050	0.245	<0.050	<0.050	<0.050
potassium, total	7440-09-7	E420	0.050	mg/L		0.893	47.1	1.22	17.0	18.5
rubidium, total	7440-17-7	E420	0.00020	mg/L		0.00073	0.0330	0.00103	0.0112	0.0116
selenium, total	7782-49-2	E420	0.000050	mg/L		0.000055	0.000066	<0.000050	0.000050	0.000073
silicon, total	7440-21-3	E420	0.10	mg/L		2.88	10.8	3.21	5.27	5.38
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		1.09	71.7	2.33	30.9	32.5
strontium, total	7440-24-6	E420	0.00020	mg/L		0.0392	0.962	0.0427	0.407	0.429
sulfur, total	7704-34-9	E420	0.50	mg/L		<0.50	4.03	<0.50	3.13	3.27
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	0.00011	<0.00010	<0.00010	<0.00010
titanium, total	7440-32-6	E420	0.00030	mg/L		0.00145	0.00274	0.00602	0.0135	0.0114
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		0.000019	0.000060	0.000036	0.000115	0.000111
vanadium, total	7440-62-2	E420	0.00050	mg/L		<0.00050	0.00114	0.00071	0.00112	0.00089
zinc, total	7440-66-6	E420	0.0030	mg/L		<0.0030	0.0268	<0.0030	<0.0030	<0.0030
zirconium, total	7440-67-7	E420	0.00020	mg/L		<0.00020	0.00033	<0.00020	<0.00060 DLM	0.00028
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L		0.0275	0.0014	0.0678	0.0114	0.0111
antimony, dissolved	7440-36-0	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		<0.00010	0.00107	0.00011	0.00032	0.00032

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SW-1	SW-3	SW-6	SW-21	DUP
					Client sampling date / time	12-Apr-2021 13:55	12-Apr-2021 14:32	12-Apr-2021 15:08	12-Apr-2021 13:00	12-Apr-2021 12:00
						VA21A6870-001	VA21A6870-002	VA21A6870-003	VA21A6870-004	VA21A6870-005
						Result	Result	Result	Result	Result
Dissolved Metals										
barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.0186	0.344	0.0160	0.129	0.131
beryllium, dissolved	7440-41-7	E421	0.000020	mg/L		<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
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	1.37	0.022	0.634	0.644
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L		<0.0000050	<0.0000050	<0.0000050	0.0000058	0.0000062
calcium, dissolved	7440-70-2	E421	0.050	mg/L		10.4	136	12.8	69.0	70.7
cesium, dissolved	7440-46-2	E421	0.000010	mg/L		<0.000010	0.000156	<0.000010	0.000058	0.000059
chromium, dissolved	7440-47-3	E421	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L		<0.00010	0.00174	<0.00010	0.00050	0.00050
copper, dissolved	7440-50-8	E421	0.00020	mg/L		0.00069	<0.00020	0.00079	0.00166	0.00166
iron, dissolved	7439-89-6	E421	0.010	mg/L		0.013	0.017	0.093	0.036	0.039
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	0.0016	<0.0010	<0.0010	<0.0010
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L		0.751	25.2	1.04	12.0	11.8
manganese, dissolved	7439-96-5	E421	0.00010	mg/L		0.00088	3.96	0.0128	0.251	0.250
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		0.000670	0.000185	0.000449	0.000163	0.000227
nickel, dissolved	7440-02-0	E421	0.00050	mg/L		<0.00050	0.00369	<0.00050	0.00163	0.00162
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		0.912	43.6	1.23	18.1	18.2
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L		0.00078	0.0307	0.00086	0.0109	0.0112
selenium, dissolved	7782-49-2	E421	0.000050	mg/L		<0.000050	0.000089	<0.000050	0.000091	0.000054
silicon, dissolved	7440-21-3	E421	0.050	mg/L		2.80	9.01	3.02	4.63	4.60
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		1.08	66.6	2.22	31.1	31.2
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		0.0382	0.876	0.0436	0.424	0.419
sulfur, dissolved	7704-34-9	E421	0.50	mg/L		<0.50	3.56	<0.50	2.87	2.99
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	<0.00010	<0.00010	<0.00010	<0.00010
titanium, dissolved	7440-32-6	E421	0.00030	mg/L		0.00036	<0.00030	0.00202	0.00038	0.00048

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SW-1	SW-3	SW-6	SW-21	DUP
					Client sampling date / time	12-Apr-2021 13:55	12-Apr-2021 14:32	12-Apr-2021 15:08	12-Apr-2021 13:00	12-Apr-2021 12:00
						VA21A6870-001	VA21A6870-002	VA21A6870-003	VA21A6870-004	VA21A6870-005
						Result	Result	Result	Result	Result
Dissolved Metals										
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		0.000015	0.000049	0.000032	0.000101	0.000100
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
zinc, dissolved	7440-66-6	E421	0.0010	mg/L		<0.0010	0.0048	<0.0010	<0.0010	<0.0010
zirconium, dissolved	7440-67-7	E421	0.00030	mg/L		<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
dissolved metals filtration location	----	EP421	-	-		Laboratory	Laboratory	Laboratory	Laboratory	Laboratory
Aggregate Organics										
biochemical oxygen demand [BOD]	----	E550	2.0	mg/L		<2.0	6.4	<2.0	2.9	3.3
chemical oxygen demand [COD]	----	E559	20	mg/L		<20	80	<20	32	28

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

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	Travel Blank	----	----	----	----
					Client sampling date / time	[12-Apr-2021]	----	----	----	----
						VA21A6870-006	--------	--------	--------	--------
						Result	----	----	----	----
Physical Tests										
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L		<0.60	----	----	----	----
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		<0.0050	----	----	----	----
chloride	16887-00-6	E235.Cl	0.50	mg/L		<0.50	----	----	----	----
fluoride	16984-48-8	E235.F	0.020	mg/L		<0.020	----	----	----	----
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		<0.0030	----	----	----	----
antimony, total	7440-36-0	E420	0.00010	mg/L		<0.00010	----	----	----	----
arsenic, total	7440-38-2	E420	0.00010	mg/L		<0.00010	----	----	----	----
barium, total	7440-39-3	E420	0.00010	mg/L		<0.00010	----	----	----	----
beryllium, total	7440-41-7	E420	0.000100	mg/L		<0.000100	----	----	----	----
bismuth, total	7440-69-9	E420	0.000050	mg/L		<0.000050	----	----	----	----
boron, total	7440-42-8	E420	0.010	mg/L		<0.010	----	----	----	----
cadmium, total	7440-43-9	E420	0.0000050	mg/L		<0.0000050	----	----	----	----
calcium, total	7440-70-2	E420	0.050	mg/L		<0.050	----	----	----	----
cesium, total	7440-46-2	E420	0.000010	mg/L		<0.000010	----	----	----	----
chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L		<0.00010	----	----	----	----
cobalt, total	7440-48-4	E420	0.00010	mg/L		<0.00010	----	----	----	----
copper, total	7440-50-8	E420	0.00050	mg/L		<0.00050	----	----	----	----
iron, total	7439-89-6	E420	0.010	mg/L		<0.010	----	----	----	----
lead, total	7439-92-1	E420	0.000050	mg/L		<0.000050	----	----	----	----
lithium, total	7439-93-2	E420	0.0010	mg/L		<0.0010	----	----	----	----
magnesium, total	7439-95-4	E420	0.0050	mg/L		<0.0050	----	----	----	----
manganese, total	7439-96-5	E420	0.00010	mg/L		<0.00010	----	----	----	----
mercury, total	7439-97-6	E508	0.0000050	mg/L		<0.0000050	----	----	----	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L		<0.000050	----	----	----	----
nickel, total	7440-02-0	E420	0.00050	mg/L		<0.00050	----	----	----	----
phosphorus, total	7723-14-0	E420	0.050	mg/L		<0.050	----	----	----	----
potassium, total	7440-09-7	E420	0.050	mg/L		<0.050	----	----	----	----
rubidium, total	7440-17-7	E420	0.00020	mg/L		<0.00020	----	----	----	----
selenium, total	7782-49-2	E420	0.000050	mg/L		<0.000050	----	----	----	----
silicon, total	7440-21-3	E420	0.10	mg/L		<0.10	----	----	----	----

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	Travel Blank	----	----	----	----
					Client sampling date / time	[12-Apr-2021]	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA21A6870-006	--------	--------	--------	--------	
					Result	----	----	----	----	
Total Metals										
silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	----	----	----	----	
sodium, total	17341-25-2	E420	0.050	mg/L	<0.050	----	----	----	----	
strontium, total	7440-24-6	E420	0.00020	mg/L	<0.00020	----	----	----	----	
sulfur, total	7704-34-9	E420	0.50	mg/L	<0.50	----	----	----	----	
tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	----	----	----	----	
thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	----	----	----	----	
thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	----	----	----	----	
tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	----	----	----	----	
titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	----	----	----	----	
tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	----	----	----	----	
uranium, total	7440-61-1	E420	0.000010	mg/L	<0.000010	----	----	----	----	
vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	----	----	----	----	
zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	----	----	----	----	
zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	----	----	----	----	
Aggregate Organics										
biochemical oxygen demand [BOD]	----	E550	2.0	mg/L	<2.0	----	----	----	----	
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	: **VA21A6870**	Page	: 1 of 18
Client	: **Regional District of Kitimat-Stikine**	Laboratory	: Vancouver - Environmental
Contact	: H Shinton	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	: 14-Apr-2021 10:35
PO	: ----	Issue Date	: 22-Apr-2021 14:24
C-O-C number	: ----		
Sampler	: H. Shinton		
Site	:		
Quote number	: Q62338		
No. of samples received	: 6		
No. of samples analysed	: 6		

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 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT-48h]										
SW-6	E550	12-Apr-2021	----	----	----		14-Apr-2021	2 days	50 hrs	× EHTL
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT-48h]										
SW-3	E550	12-Apr-2021	----	----	----		14-Apr-2021	2 days	51 hrs	× EHTL
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT-48h]										
SW-1	E550	12-Apr-2021	----	----	----		14-Apr-2021	2 days	52 hrs	× EHTL
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT-48h]										
SW-21	E550	12-Apr-2021	----	----	----		14-Apr-2021	2 days	52 hrs	× EHTL
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT-48h]										
DUP	E550	12-Apr-2021	----	----	----		14-Apr-2021	2 days	53 hrs	× EHTL
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE										
Travel Blank	E550	12-Apr-2021	----	----	----		14-Apr-2021	----	52 hrs	EHTL
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
DUP	E559	12-Apr-2021	----	----	----		18-Apr-2021	28 days	6 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	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
SW-1	E559	12-Apr-2021	----	----	----		18-Apr-2021	28 days	6 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
SW-21	E559	12-Apr-2021	----	----	----		18-Apr-2021	28 days	6 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
SW-3	E559	12-Apr-2021	----	----	----		18-Apr-2021	28 days	6 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
SW-6	E559	12-Apr-2021	----	----	----		18-Apr-2021	28 days	6 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
Travel Blank	E559	12-Apr-2021	----	----	----		18-Apr-2021	28 days	6 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
DUP	E298	12-Apr-2021	20-Apr-2021	----	8 days	✓	20-Apr-2021	28 days	1 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
SW-1	E298	12-Apr-2021	20-Apr-2021	----	8 days	✓	20-Apr-2021	28 days	1 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
SW-21	E298	12-Apr-2021	20-Apr-2021	----	8 days	✓	20-Apr-2021	28 days	1 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
SW-3	E298	12-Apr-2021	20-Apr-2021	----	8 days	✓	20-Apr-2021	28 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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
SW-6	E298	12-Apr-2021	20-Apr-2021	----	8 days	✓	20-Apr-2021	28 days	1 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
Travel Blank	E298	12-Apr-2021	20-Apr-2021	----	8 days	✓	20-Apr-2021	28 days	1 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
DUP	E235.Cl	12-Apr-2021	----	----	----		15-Apr-2021	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
SW-1	E235.Cl	12-Apr-2021	----	----	----		15-Apr-2021	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
SW-21	E235.Cl	12-Apr-2021	----	----	----		15-Apr-2021	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
SW-3	E235.Cl	12-Apr-2021	----	----	----		15-Apr-2021	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
SW-6	E235.Cl	12-Apr-2021	----	----	----		15-Apr-2021	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
Travel Blank	E235.Cl	12-Apr-2021	----	----	----		15-Apr-2021	28 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE										
DUP	E378-U	12-Apr-2021	----	----	----		15-Apr-2021	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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE SW-1	E378-U	12-Apr-2021	----	----	----		15-Apr-2021	3 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE SW-21	E378-U	12-Apr-2021	----	----	----		15-Apr-2021	3 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE SW-3	E378-U	12-Apr-2021	----	----	----		15-Apr-2021	3 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE SW-6	E378-U	12-Apr-2021	----	----	----		15-Apr-2021	3 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE DUP	E235.F	12-Apr-2021	----	----	----		15-Apr-2021	28 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE SW-1	E235.F	12-Apr-2021	----	----	----		15-Apr-2021	28 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE SW-21	E235.F	12-Apr-2021	----	----	----		15-Apr-2021	28 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE SW-3	E235.F	12-Apr-2021	----	----	----		15-Apr-2021	28 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE SW-6	E235.F	12-Apr-2021	----	----	----		15-Apr-2021	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	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
Travel Blank	E235.F	12-Apr-2021	----	----	----		15-Apr-2021	28 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
DUP	E235.NO3-L	12-Apr-2021	----	----	----		15-Apr-2021	3 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
SW-1	E235.NO3-L	12-Apr-2021	----	----	----		15-Apr-2021	3 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
SW-21	E235.NO3-L	12-Apr-2021	----	----	----		15-Apr-2021	3 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
SW-3	E235.NO3-L	12-Apr-2021	----	----	----		15-Apr-2021	3 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
SW-6	E235.NO3-L	12-Apr-2021	----	----	----		15-Apr-2021	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
DUP	E235.NO2-L	12-Apr-2021	----	----	----		15-Apr-2021	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
SW-1	E235.NO2-L	12-Apr-2021	----	----	----		15-Apr-2021	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
SW-21	E235.NO2-L	12-Apr-2021	----	----	----		15-Apr-2021	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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
SW-3	E235.NO2-L	12-Apr-2021	----	----	----		15-Apr-2021	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
SW-6	E235.NO2-L	12-Apr-2021	----	----	----		15-Apr-2021	3 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
DUP	E235.SO4	12-Apr-2021	----	----	----		15-Apr-2021	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
SW-1	E235.SO4	12-Apr-2021	----	----	----		15-Apr-2021	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
SW-21	E235.SO4	12-Apr-2021	----	----	----		15-Apr-2021	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
SW-3	E235.SO4	12-Apr-2021	----	----	----		15-Apr-2021	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
SW-6	E235.SO4	12-Apr-2021	----	----	----		15-Apr-2021	28 days	3 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
DUP	E318	12-Apr-2021	20-Apr-2021	----	8 days	✓	21-Apr-2021	28 days	1 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
SW-1	E318	12-Apr-2021	20-Apr-2021	----	8 days	✓	21-Apr-2021	28 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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
SW-21	E318	12-Apr-2021	20-Apr-2021	----	8 days	✓	21-Apr-2021	28 days	1 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
SW-3	E318	12-Apr-2021	20-Apr-2021	----	8 days	✓	21-Apr-2021	28 days	1 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
SW-6	E318	12-Apr-2021	20-Apr-2021	----	8 days	✓	21-Apr-2021	28 days	1 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid)										
DUP	E372-U	12-Apr-2021	20-Apr-2021	----	8 days	✓	20-Apr-2021	28 days	1 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid)										
SW-1	E372-U	12-Apr-2021	20-Apr-2021	----	8 days	✓	20-Apr-2021	28 days	1 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid)										
SW-21	E372-U	12-Apr-2021	20-Apr-2021	----	8 days	✓	20-Apr-2021	28 days	1 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid)										
SW-3	E372-U	12-Apr-2021	20-Apr-2021	----	8 days	✓	20-Apr-2021	28 days	1 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid)										
SW-6	E372-U	12-Apr-2021	20-Apr-2021	----	8 days	✓	20-Apr-2021	28 days	1 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved)										
DUP	E421	12-Apr-2021	16-Apr-2021	----	5 days	✓	16-Apr-2021	180 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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) SW-1	E421	12-Apr-2021	16-Apr-2021	----	5 days	✓	16-Apr-2021	180 days	1 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) SW-21	E421	12-Apr-2021	16-Apr-2021	----	5 days	✓	16-Apr-2021	180 days	1 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) SW-3	E421	12-Apr-2021	16-Apr-2021	----	5 days	✓	16-Apr-2021	180 days	1 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) SW-6	E421	12-Apr-2021	16-Apr-2021	----	5 days	✓	16-Apr-2021	180 days	1 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE DUP	E290	12-Apr-2021	----	----	----		15-Apr-2021	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE SW-1	E290	12-Apr-2021	----	----	----		15-Apr-2021	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE SW-21	E290	12-Apr-2021	----	----	----		15-Apr-2021	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE SW-3	E290	12-Apr-2021	----	----	----		15-Apr-2021	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE SW-6	E290	12-Apr-2021	----	----	----		15-Apr-2021	14 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	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Conductivity in Water										
HDPE DUP	E100	12-Apr-2021	----	----	----		15-Apr-2021	28 days	3 days	✓
Physical Tests : Conductivity in Water										
HDPE SW-1	E100	12-Apr-2021	----	----	----		15-Apr-2021	28 days	3 days	✓
Physical Tests : Conductivity in Water										
HDPE SW-21	E100	12-Apr-2021	----	----	----		15-Apr-2021	28 days	3 days	✓
Physical Tests : Conductivity in Water										
HDPE SW-3	E100	12-Apr-2021	----	----	----		15-Apr-2021	28 days	3 days	✓
Physical Tests : Conductivity in Water										
HDPE SW-6	E100	12-Apr-2021	----	----	----		15-Apr-2021	28 days	3 days	✓
Physical Tests : pH by Meter										
HDPE SW-6	E108	12-Apr-2021	----	----	----		15-Apr-2021	0.25 hrs	67 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE SW-3	E108	12-Apr-2021	----	----	----		15-Apr-2021	0.25 hrs	68 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE SW-1	E108	12-Apr-2021	----	----	----		15-Apr-2021	0.25 hrs	69 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE SW-21	E108	12-Apr-2021	----	----	----		15-Apr-2021	0.25 hrs	70 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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : pH by Meter										
HDPE DUP	E108	12-Apr-2021	----	----	----		15-Apr-2021	0.25 hrs	71 hrs	× EHTR-FM
Physical Tests : TSS by Gravimetry										
HDPE SW-1	E160-H	12-Apr-2021	----	----	----		15-Apr-2021	7 days	3 days	✓
Physical Tests : TSS by Gravimetry										
HDPE SW-21	E160-H	12-Apr-2021	----	----	----		15-Apr-2021	7 days	3 days	✓
Physical Tests : TSS by Gravimetry										
HDPE SW-3	E160-H	12-Apr-2021	----	----	----		15-Apr-2021	7 days	3 days	✓
Physical Tests : TSS by Gravimetry										
HDPE SW-6	E160-H	12-Apr-2021	----	----	----		15-Apr-2021	7 days	3 days	✓
Physical Tests : TSS by Gravimetry										
HDPE DUP	E160-H	12-Apr-2021	----	----	----		15-Apr-2021	7 days	4 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid) DUP	E420.Cr-L	12-Apr-2021	----	----	----		15-Apr-2021	180 days	4 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid) SW-1	E420.Cr-L	12-Apr-2021	----	----	----		15-Apr-2021	180 days	4 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid) SW-21	E420.Cr-L	12-Apr-2021	----	----	----		15-Apr-2021	180 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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid) SW-3	E420.Cr-L	12-Apr-2021	----	----	----		15-Apr-2021	180 days	4 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid) SW-6	E420.Cr-L	12-Apr-2021	----	----	----		15-Apr-2021	180 days	4 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid) Travel Blank	E420.Cr-L	12-Apr-2021	----	----	----		15-Apr-2021	180 days	4 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) SW-6	E508	12-Apr-2021	----	----	----		15-Apr-2021	28 days	3 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) DUP	E508	12-Apr-2021	----	----	----		15-Apr-2021	28 days	4 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) SW-1	E508	12-Apr-2021	----	----	----		15-Apr-2021	28 days	4 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) SW-21	E508	12-Apr-2021	----	----	----		15-Apr-2021	28 days	4 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) SW-3	E508	12-Apr-2021	----	----	----		15-Apr-2021	28 days	4 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) Travel Blank	E508	12-Apr-2021	----	----	----		15-Apr-2021	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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) DUP	E420	12-Apr-2021	----	----	----		15-Apr-2021	180 days	4 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) SW-1	E420	12-Apr-2021	----	----	----		15-Apr-2021	180 days	4 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) SW-21	E420	12-Apr-2021	----	----	----		15-Apr-2021	180 days	4 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) SW-3	E420	12-Apr-2021	----	----	----		15-Apr-2021	180 days	4 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) SW-6	E420	12-Apr-2021	----	----	----		15-Apr-2021	180 days	4 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) Travel Blank	E420	12-Apr-2021	----	----	----		15-Apr-2021	180 days	4 days	✓

Legend & Qualifier Definitions

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

EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.

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			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	178846	1	19	5.2	5.0	✓
Ammonia by Fluorescence	E298	181663	1	16	6.2	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	178734	1	12	8.3	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	180825	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	178849	1	20	5.0	5.0	✓
Conductivity in Water	E100	178847	1	19	5.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	179936	1	11	9.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	178855	1	13	7.6	5.0	✓
Fluoride in Water by IC	E235.F	178848	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	178851	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	178852	1	19	5.2	5.0	✓
pH by Meter	E108	178845	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	178853	1	19	5.2	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	178684	2	38	5.2	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	181661	1	8	12.5	5.0	✓
Total Mercury in Water by CVAAS	E508	179509	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	178683	3	38	7.8	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	181662	1	13	7.6	5.0	✓
TSS by Gravimetry	E160-H	179368	1	18	5.5	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	178846	1	19	5.2	5.0	✓
Ammonia by Fluorescence	E298	181663	1	16	6.2	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	178734	1	12	8.3	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	180825	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	178849	1	20	5.0	5.0	✓
Conductivity in Water	E100	178847	1	19	5.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	179936	1	11	9.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	178855	1	13	7.6	5.0	✓
Fluoride in Water by IC	E235.F	178848	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	178851	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	178852	1	19	5.2	5.0	✓
pH by Meter	E108	178845	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	178853	1	19	5.2	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	178684	2	38	5.2	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	181661	1	8	12.5	5.0	✓
Total Mercury in Water by CVAAS	E508	179509	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	178683	2	38	5.2	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	181662	1	13	7.6	5.0	✓
TSS by Gravimetry	E160-H	179368	1	18	5.5	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	178846	1	19	5.2	5.0	✓
Ammonia by Fluorescence	E298	181663	1	16	6.2	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	178734	1	12	8.3	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	180825	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	178849	1	20	5.0	5.0	✓
Conductivity in Water	E100	178847	1	19	5.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	179936	1	11	9.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	178855	1	13	7.6	5.0	✓
Fluoride in Water by IC	E235.F	178848	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	178851	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	178852	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	178853	1	19	5.2	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	178684	2	38	5.2	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	181661	1	8	12.5	5.0	✓
Total Mercury in Water by CVAAS	E508	179509	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	178683	2	38	5.2	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	181662	1	13	7.6	5.0	✓
TSS by Gravimetry	E160-H	179368	1	18	5.5	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	181663	1	16	6.2	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	180825	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	178849	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	179936	1	11	9.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	178855	1	13	7.6	5.0	✓
Fluoride in Water by IC	E235.F	178848	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	178851	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	178852	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	178853	1	19	5.2	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	178684	2	38	5.2	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	181661	1	8	12.5	5.0	✓
Total Mercury in Water by CVAAS	E508	179509	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	178683	3	38	7.8	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	181662	1	13	7.6	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 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).

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
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.
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
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 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 CaCO3), dissolved” is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 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.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Hardness (Calculated) from Total Ca/Mg	EC100A Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in CaCO3 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
Preparation for Ammonia	EP298 Vancouver - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
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 HNO3.

QUALITY CONTROL REPORT

Work Order	: **VA21A6870**	Page	: 1 of 22
Client	: Regional District of Kitimat-Stikine	Laboratory	: Vancouver - Environmental
Contact	: H Shinton	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	: 14-Apr-2021 10:35
PO	: ----	Date Analysis Commenced	: 14-Apr-2021
C-O-C number	: ----	Issue Date	: 22-Apr-2021 14:23
Sampler	: H. Shinton		
Site	:		
Quote number	: Q62338		
No. of samples received	: 6		
No. of samples analysed	: 6		

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.

Signatories	*Position*	*Laboratory Department*
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Monica Ko	Lab Assistant	Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Shaneel Dayal	Analyst	Metals, Burnaby, British Columbia

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: 178845)											
VA21A6869-003	Anonymous	pH	----	E108	0.10	pH units	6.36	6.37	0.157%	4%	----
Physical Tests (QC Lot: 178846)											
VA21A6869-003	Anonymous	alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	7.3	7.0	0.3	Diff <2x LOR	----
Physical Tests (QC Lot: 178847)											
VA21A6869-003	Anonymous	conductivity	----	E100	2.0	µS/cm	63.5	63.3	0.315%	10%	----
Physical Tests (QC Lot: 179368)											
FJ2100179-006	Anonymous	solids, total suspended [TSS]	----	E160-H	3.0	mg/L	<3.0	<3.0	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 178848)											
VA21A6869-001	Anonymous	fluoride	16984-48-8	E235.F	0.020	mg/L	0.067	0.067	0.0008	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 178849)											
VA21A6869-001	Anonymous	chloride	16887-00-6	E235.Cl	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 178851)											
VA21A6869-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.0263	0.0222	0.0041	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 178852)											
VA21A6869-001	Anonymous	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: 178853)											
VA21A6869-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	0.50	0.49	0.01	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 178855)											
VA21A6869-001	Anonymous	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: 181661)											
VA21A6867-001	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	1.83	1.80	1.72%	20%	----
Anions and Nutrients (QC Lot: 181662)											
VA21A6867-001	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0200	mg/L	0.168	0.169	0.0017	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 181663)											
VA21A6868-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.132	0.135	2.04%	20%	----
Total Metals (QC Lot: 178683)											
CG2100801-001	Anonymous	aluminum, total	7429-90-5	E420	0.0030	mg/L	1.06	1.07	1.01%	20%	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	0.00021	0.00022	0.00001	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00056	0.00054	0.00002	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.0861	0.0847	1.62%	20%	----
		beryllium, total	7440-41-7	E420	0.020	mg/L	0.071 µg/L	0.000069	0.000001	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: 178683) - continued											
CG2100801-001	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	0.031	0.031	0.00007	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0050	mg/L	0.0822 µg/L	0.0000784	4.60%	20%	----
		calcium, total	7440-70-2	E420	0.050	mg/L	49.2	50.1	1.91%	20%	----
		cesium, total	7440-46-2	E420	0.000010	mg/L	0.000342	0.000341	0.274%	20%	----
		cobalt, total	7440-48-4	E420	0.10	mg/L	0.50 µg/L	0.00050	0.000004	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	0.00271	0.00265	0.00006	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	1.02	1.01	0.207%	20%	----
		lead, total	7439-92-1	E420	0.000050	mg/L	0.000699	0.000711	1.67%	20%	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	0.0259	0.0268	3.15%	20%	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	14.8	14.5	1.83%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.0169	0.0167	1.23%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000835	0.000848	1.49%	20%	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	0.00337	0.00329	0.00008	Diff <2x LOR	----
		phosphorus, total	7723-14-0	E420	0.050	mg/L	0.059	<0.050	0.009	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.050	mg/L	2.39	2.35	1.83%	20%	----
		rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00314	0.00316	0.937%	20%	----
		selenium, total	7782-49-2	E420	0.050	mg/L	2.55 µg/L	0.00270	5.56%	20%	----
		silicon, total	7440-21-3	E420	0.10	mg/L	4.31	4.37	1.30%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	0.000051	0.000052	0.000001	Diff <2x LOR	----
		sodium, total	17341-25-2	E420	0.050	mg/L	18.2	18.0	1.18%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.469	0.462	1.42%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	15.5	15.1	2.33%	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	0.000038	0.000039	0.000001	Diff <2x LOR	----
		thorium, total	7440-29-1	E420	0.00010	mg/L	0.00016	0.00015	0.000004	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	0.0152	0.0161	5.80%	20%	----
		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	0.000604	0.000619	2.54%	20%	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	0.00325	0.00325	0.000008	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	0.0317	0.0307	3.12%	20%	----
Total Metals (QC Lot: 178684)											
CG2100801-001	Anonymous	chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L	0.00141	0.00133	5.81%	20%	----
Total Metals (QC Lot: 179160)											

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: 179160) - continued											
CG2100798-001	Anonymous	manganese, total	7439-96-5	E420	0.00010	mg/L	0.00042	0.00035	0.00007	Diff <2x LOR	----
CG2100798-001	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	0.00025	0.00025	0.0000004	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	0.0338	0.0341	0.900%	20%	----
		beryllium, total	7440-41-7	E420	0.020	mg/L	<0.020 µg/L	<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	0.048	0.051	0.002	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0050	mg/L	0.384 µg/L	0.000361	6.40%	20%	----
		calcium, total	7440-70-2	E420	0.050	mg/L	154	156	1.70%	20%	----
		cesium, total	7440-46-2	E420	0.000010	mg/L	0.000024	0.000024	0.0000004	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.10	mg/L	1.36 µg/L	0.00134	1.01%	20%	----
		copper, total	7440-50-8	E420	0.00050	mg/L	0.00055	0.00052	0.00002	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	0.000102	0.000094	0.000007	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	0.0516	0.0533	3.36%	20%	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	58.5	58.8	0.395%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00492	0.00502	1.96%	20%	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	0.0106	0.0106	0.0982%	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	2.62	2.61	0.382%	20%	----
		rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00240	0.00227	5.89%	20%	----
		selenium, total	7782-49-2	E420	0.050	mg/L	63.8 µg/L	0.0649	1.67%	20%	----
		silicon, total	7440-21-3	E420	0.10	mg/L	3.21	3.26	1.68%	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	14.7	14.7	0.0452%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.871	0.856	1.74%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	90.2	92.5	2.46%	20%	----
		tellurium, total	13494-80-9	E420	0.00020	mg/L	0.00021	<0.00020	0.00001	Diff <2x LOR	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	0.000032	0.000032	0.0000006	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	0.00445	0.00444	0.300%	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: 179160) - continued											
CG2100798-001	Anonymous	vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	0.0168	0.0158	0.0009	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: 179161)											
CG2100798-001	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: 179509)											
VA21A6734-001	Anonymous	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 179936)											
VA21A7061-001	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0689	0.0746	7.95%	20%	----
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00080	0.00080	0.000005	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00071	0.00072	0.00001	Diff <2x LOR	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0338	0.0336	0.718%	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	0.055	0.055	0.00004	Diff <2x LOR	----
		cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.0000057	<0.0000050	0.0000007	Diff <2x LOR	----
		calcium, dissolved	7440-70-2	E421	0.050	mg/L	60.6	60.7	0.190%	20%	----
		cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	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	0.00278	0.00282	1.63%	20%	----
		iron, dissolved	7439-89-6	E421	0.010	mg/L	0.014	0.018	0.004	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	<0.0010	<0.0010	0	Diff <2x LOR	----
		magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	11.8	12.0	1.18%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00046	0.00055	0.00009	Diff <2x LOR	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00506	0.00503	0.637%	20%	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00076	0.00079	0.00002	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	4.33	4.42	2.05%	20%	----
		rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00129	0.00145	0.00016	Diff <2x LOR	----
		selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.000128	0.000095	0.000033	Diff <2x LOR	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, dissolved	17341-25-2	E421	0.050	mg/L	62.7	63.2	0.734%	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*
Dissolved Metals (QC Lot: 179936) - continued											
VA21A7061-001	Anonymous	strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.345	0.346	0.343%	20%	----
		sulfur, dissolved	7704-34-9	E421	0.50	mg/L	17.0	16.4	3.74%	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	0.00121	0.00123	1.98%	20%	----
		titanium, dissolved	7440-32-6	E421	0.00030	mg/L	0.00069	0.00083	0.00014	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	0.00120	0.00120	0.0414%	20%	----
		vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	0.00058	0.00059	0.00001	Diff <2x LOR	----
		zinc, dissolved	7440-66-6	E421	0.0010	mg/L	<0.0010	<0.0010	0	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: 178734)											
VA21A6870-001	SW-1	biochemical oxygen demand [BOD]	----	E550	2.0	mg/L	<2.0	<2.0	0.00%	30%	----
Aggregate Organics (QC Lot: 180825)											
KS2101095-001	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: 178846)						
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 178847)						
conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 179368)						
solids, total suspended [TSS]	----	E160-H	3	mg/L	<3.0	----
Anions and Nutrients (QCLot: 178848)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 178849)						
chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 178851)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 178852)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 178853)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 178855)						
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 181661)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 181662)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 181663)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Total Metals (QCLot: 178683)						
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: 178683) - 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: 178684)						
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	<0.00010	----
Total Metals (QCLot: 179160)						
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	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 179160) - continued						
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: 179161)						
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: 179509)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 179936)						
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	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
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	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 179936) - continued						
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: 178734)						
biochemical oxygen demand [BOD]	----	E550	2	mg/L	<2.0	----
Aggregate Organics (QCLot: 180825)						
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	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 178845)									
pH	----	E108	----	pH units	7 pH units	99.7	98.0	102	----
Physical Tests (QCLot: 178846)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	99.9	85.0	115	----
Physical Tests (QCLot: 178847)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	99.4	90.0	110	----
Physical Tests (QCLot: 179368)									
solids, total suspended [TSS]	----	E160-H	3	mg/L	150 mg/L	93.8	85.0	115	----
Anions and Nutrients (QCLot: 178848)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 178849)									
chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 178851)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 178852)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 178853)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	103	90.0	110	----
Anions and Nutrients (QCLot: 178855)									
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	102	80.0	120	----
Anions and Nutrients (QCLot: 181661)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	93.2	75.0	125	----
Anions and Nutrients (QCLot: 181662)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	95.1	80.0	120	----
Anions and Nutrients (QCLot: 181663)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	105	85.0	115	----
Total Metals (QCLot: 178683)									
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	110	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	106	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	105	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	108	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	97.7	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
Total Metals (QCLot: 178683) - continued									
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	102	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	101	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	108	80.0	120	----
cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	102	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	104	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	105	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	105	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	105	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	103	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	106	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	107	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	103	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	103	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	107	80.0	120	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	112	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	106	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	101	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	103	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	106	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	94.1	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	107	80.0	120	----
thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	99.7	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	97.6	80.0	120	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	102	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	107	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	104	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	99.1	80.0	120	----
Total Metals (QCLot: 178684)									
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	0.25 mg/L	107	80.0	120	----
Total Metals (QCLot: 179160)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	104	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	106	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Total Metals (QCLot: 179160) - continued									
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	105	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	96.8	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	101	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	98.6	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	97.6	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	104	80.0	120	----
cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	98.0	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	103	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	102	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	94.4	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	103	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	104	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	102	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	103	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	105	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	105	80.0	120	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	112	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	102	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	101	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	98.5	80.0	120	----
sodium, total	17341-25-2	E420	0.05	mg/L	50 mg/L	108	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	108	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	88.8	80.0	120	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	106	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	96.6	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	97.7	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	99.1	80.0	120	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	98.2	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	104	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	104	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	107	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	94.2	80.0	120	----
Total Metals (QCLot: 179161)									

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Total Metals (QCLot: 179161) - continued									
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	0.25 mg/L	104	80.0	120	----
Total Metals (QCLot: 179509)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	99.3	80.0	120	----
Dissolved Metals (QCLot: 179936)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	101	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	103	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	103	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	102	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	101	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	93.2	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	100	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	103	80.0	120	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	104	80.0	120	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	102	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	103	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	101	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	105	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	102	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	101	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	104	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	107	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	100	80.0	120	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	113	70.0	130	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	108	80.0	120	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	104	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	98.0	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	104	80.0	120	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	103	80.0	120	----
sodium, dissolved	17341-25-2	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	103	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	96.6	80.0	120	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	102	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	99.4	80.0	120	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	98.6	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 179936) - continued									
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	102	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	95.6	80.0	120	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	97.4	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	99.4	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	97.7	80.0	120	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	100	80.0	120	----
Aggregate Organics (QCLot: 178734)									
biochemical oxygen demand [BOD]	----	E550	2	mg/L	198 mg/L	87.7	85.0	115	----
Aggregate Organics (QCLot: 180825)									
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 >= 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: 178848)										
VA21A6869-002	Anonymous	fluoride	16984-48-8	E235.F	1.04 mg/L	1 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 178849)										
VA21A6869-002	Anonymous	chloride	16887-00-6	E235.Cl	105 mg/L	100 mg/L	105	75.0	125	----
Anions and Nutrients (QCLot: 178851)										
VA21A6869-002	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	2.62 mg/L	2.5 mg/L	105	75.0	125	----
Anions and Nutrients (QCLot: 178852)										
VA21A6869-002	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.517 mg/L	0.5 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 178853)										
VA21A6869-002	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	106 mg/L	100 mg/L	106	75.0	125	----
Anions and Nutrients (QCLot: 178855)										
VA21A6869-002	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0313 mg/L	0.03 mg/L	104	70.0	130	----
Anions and Nutrients (QCLot: 181661)										
VA21A6868-001	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	2.23 mg/L	2.5 mg/L	89.2	70.0	130	----
Anions and Nutrients (QCLot: 181662)										
VA21A6868-001	Anonymous	phosphorus, total	7723-14-0	E372-U	ND mg/L	0.05 mg/L	ND	70.0	130	----
Anions and Nutrients (QCLot: 181663)										
VA21A6868-002	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.210 mg/L	0.2 mg/L	105	75.0	125	----
Total Metals (QCLot: 178683)										
CG2100801-001	Anonymous	aluminum, total	7429-90-5	E420	ND mg/L	0.2 mg/L	ND	70.0	130	----
		antimony, total	7440-36-0	E420	0.0192 mg/L	0.02 mg/L	95.9	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0194 mg/L	0.02 mg/L	97.1	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	0.0396 mg/L	0.04 mg/L	99.1	70.0	130	----
		bismuth, total	7440-69-9	E420	0.00821 mg/L	0.01 mg/L	82.1	70.0	130	----
		boron, total	7440-42-8	E420	0.096 mg/L	0.1 mg/L	95.9	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00370 mg/L	0.004 mg/L	92.4	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	0.0100 mg/L	0.01 mg/L	100	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0187 mg/L	0.02 mg/L	93.3	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: 178683) - continued										
CG2100801-001	Anonymous	copper, total	7440-50-8	E420	0.0184 mg/L	0.02 mg/L	91.9	70.0	130	----
		iron, total	7439-89-6	E420	1.80 mg/L	2 mg/L	90.0	70.0	130	----
		lead, total	7439-92-1	E420	0.0188 mg/L	0.02 mg/L	93.9	70.0	130	----
		lithium, total	7439-93-2	E420	0.0950 mg/L	0.1 mg/L	95.0	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	0.0185 mg/L	0.02 mg/L	92.3	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0197 mg/L	0.02 mg/L	98.6	70.0	130	----
		nickel, total	7440-02-0	E420	0.0362 mg/L	0.04 mg/L	90.6	70.0	130	----
		phosphorus, total	7723-14-0	E420	10.0 mg/L	10 mg/L	100	70.0	130	----
		potassium, total	7440-09-7	E420	3.81 mg/L	4 mg/L	95.2	70.0	130	----
		rubidium, total	7440-17-7	E420	0.0195 mg/L	0.02 mg/L	97.6	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	8.41 mg/L	10 mg/L	84.1	70.0	130	----
		silver, total	7440-22-4	E420	0.00378 mg/L	0.004 mg/L	94.5	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	19.6 mg/L	20 mg/L	98.2	70.0	130	----
		tellurium, total	13494-80-9	E420	0.0392 mg/L	0.04 mg/L	97.9	70.0	130	----
		thallium, total	7440-28-0	E420	0.00373 mg/L	0.004 mg/L	93.2	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	0.0188 mg/L	0.02 mg/L	94.1	70.0	130	----
		titanium, total	7440-32-6	E420	0.0319 mg/L	0.04 mg/L	79.8	70.0	130	----
		tungsten, total	7440-33-7	E420	0.0186 mg/L	0.02 mg/L	92.8	70.0	130	----
		uranium, total	7440-61-1	E420	0.00388 mg/L	0.004 mg/L	96.9	70.0	130	----
		vanadium, total	7440-62-2	E420	0.0964 mg/L	0.1 mg/L	96.4	70.0	130	----
		zinc, total	7440-66-6	E420	0.398 mg/L	0.4 mg/L	99.6	70.0	130	----
Total Metals (QCLot: 178684)										
CG2100801-001	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: 179160)										
CG2100798-001	Anonymous	manganese, total	7439-96-5	E420	0.0196 mg/L	0.02 mg/L	98.0	70.0	130	----
CG2100798-001	Anonymous	aluminum, total	7429-90-5	E420	0.192 mg/L	0.2 mg/L	96.1	70.0	130	----
		antimony, total	7440-36-0	E420	0.0196 mg/L	0.02 mg/L	97.8	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0200 mg/L	0.02 mg/L	100	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	0.0367 mg/L	0.04 mg/L	91.9	70.0	130	----
		bismuth, total	7440-69-9	E420	0.00928 mg/L	0.01 mg/L	92.8	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: 179160) - continued										
CG2100798-001	Anonymous	boron, total	7440-42-8	E420	0.102 mg/L	0.1 mg/L	102	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00365 mg/L	0.004 mg/L	91.2	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	0.0105 mg/L	0.01 mg/L	105	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0184 mg/L	0.02 mg/L	92.2	70.0	130	----
		copper, total	7440-50-8	E420	0.0184 mg/L	0.02 mg/L	92.2	70.0	130	----
		iron, total	7439-89-6	E420	1.92 mg/L	2 mg/L	96.3	70.0	130	----
		lead, total	7439-92-1	E420	0.0192 mg/L	0.02 mg/L	96.0	70.0	130	----
		lithium, total	7439-93-2	E420	0.0827 mg/L	0.1 mg/L	82.7	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0204 mg/L	0.02 mg/L	102	70.0	130	----
		nickel, total	7440-02-0	E420	0.0365 mg/L	0.04 mg/L	91.2	70.0	130	----
		phosphorus, total	7723-14-0	E420	10.3 mg/L	10 mg/L	103	70.0	130	----
		potassium, total	7440-09-7	E420	3.87 mg/L	4 mg/L	96.7	70.0	130	----
		rubidium, total	7440-17-7	E420	0.0200 mg/L	0.02 mg/L	100.0	70.0	130	----
		selenium, total	7782-49-2	E420	ND mg/L	0.04 mg/L	ND	70.0	130	----
		silicon, total	7440-21-3	E420	8.55 mg/L	10 mg/L	85.5	70.0	130	----
		silver, total	7440-22-4	E420	0.00380 mg/L	0.004 mg/L	94.9	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	0.0404 mg/L	0.04 mg/L	101	70.0	130	----
		thallium, total	7440-28-0	E420	0.00382 mg/L	0.004 mg/L	95.4	70.0	130	----
		thorium, total	7440-29-1	E420	0.0213 mg/L	0.02 mg/L	106	70.0	130	----
		tin, total	7440-31-5	E420	0.0189 mg/L	0.02 mg/L	94.5	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	0.0193 mg/L	0.02 mg/L	96.4	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	0.0994 mg/L	0.1 mg/L	99.4	70.0	130	----
		zinc, total	7440-66-6	E420	0.391 mg/L	0.4 mg/L	97.8	70.0	130	----
		zirconium, total	7440-67-7	E420	0.0415 mg/L	0.04 mg/L	104	70.0	130	----
Total Metals (QCLot: 179161)										
CG2100798-001	Anonymous	chromium, total	7440-47-3	E420.Cr-L	0.0392 mg/L	0.04 mg/L	98.0	70.0	130	----
Total Metals (QCLot: 179509)										
VA21A6869-001	Anonymous	mercury, total	7439-97-6	E508	0.0000958 mg/L	0.0001 mg/L	95.8	70.0	130	----
Dissolved Metals (QCLot: 179936)										

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: 179936) - continued										
VA21A7061-001	Anonymous	aluminum, dissolved	7429-90-5	E421	0.216 mg/L	0.2 mg/L	108	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.0199 mg/L	0.02 mg/L	99.3	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.0207 mg/L	0.02 mg/L	103	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	0.0394 mg/L	0.04 mg/L	98.4	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.00865 mg/L	0.01 mg/L	86.5	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.086 mg/L	0.1 mg/L	86.6	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.00384 mg/L	0.004 mg/L	96.1	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	0.0100 mg/L	0.01 mg/L	100	70.0	130	----
		chromium, dissolved	7440-47-3	E421	0.0400 mg/L	0.04 mg/L	100	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.0197 mg/L	0.02 mg/L	98.7	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.0191 mg/L	0.02 mg/L	95.4	70.0	130	----
		iron, dissolved	7439-89-6	E421	1.94 mg/L	2 mg/L	97.1	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.0183 mg/L	0.02 mg/L	91.7	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.0954 mg/L	0.1 mg/L	95.4	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	0.0204 mg/L	0.02 mg/L	102	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	0.0387 mg/L	0.04 mg/L	96.8	70.0	130	----
		phosphorus, dissolved	7723-14-0	E421	11.3 mg/L	10 mg/L	113	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	0.0197 mg/L	0.02 mg/L	98.3	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.0398 mg/L	0.04 mg/L	99.4	70.0	130	----
		silicon, dissolved	7440-21-3	E421	9.41 mg/L	10 mg/L	94.1	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.00325 mg/L	0.004 mg/L	81.3	70.0	130	----
		sodium, dissolved	17341-25-2	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	19.6 mg/L	20 mg/L	98.1	70.0	130	----
		tellurium, dissolved	13494-80-9	E421	0.0395 mg/L	0.04 mg/L	98.8	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.00360 mg/L	0.004 mg/L	90.0	70.0	130	----
		thorium, dissolved	7440-29-1	E421	0.0198 mg/L	0.02 mg/L	99.0	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.0198 mg/L	0.02 mg/L	99.0	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.0397 mg/L	0.04 mg/L	99.2	70.0	130	----
		tungsten, dissolved	7440-33-7	E421	0.0188 mg/L	0.02 mg/L	94.0	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.00369 mg/L	0.004 mg/L	92.3	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.103 mg/L	0.1 mg/L	103	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: 179936) - continued										
VA21A7061-001	Anonymous	zinc, dissolved	7440-66-6	E421	0.382 mg/L	0.4 mg/L	95.6	70.0	130	----
		zirconium, dissolved	7440-67-7	E421	0.0415 mg/L	0.04 mg/L	104	70.0	130	----
Aggregate Organics (QCLot: 180825)										
KS2101095-002	Anonymous	chemical oxygen demand [COD]	----	E559	424 mg/L	500 mg/L	84.8	75.0	125	----

Chain of Custody (COC) / Analytical Request Form

ALS Environmental
www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here
(lab use only)

COC Number: 17
Page

Environmental Division
Vancouver
Work Order Reference
VA21A6870

Telephone : +1 604 253 4188

Report To	Contact and company name below will appear on the final report
Company:	Regional District of Kitimat-Stikine
Contact:	Hannah Shinton
Phone:	250-615-6100
	Company address below will appear on the final report
Street:	4545 Lazelle Avenue
City/Province:	Terrace/BC
Postal Code:	V8G4E1
Invoice To	Same as Report To ☐ YES ☑ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	Regional District of Kitimat-Stikine
Contact:	Megan Haley

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

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

Project Information	
ALS Account # / Quote #:	
Job #:	Thornhill Transfer Station Surface Water
PO / AFE:	
LSD:	

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

ALS Lab Work Order # (lab use only): L870

ALS Contact: | Sampler: H.Shinton

Select Service Level Below - Contact your AM to c

Regular [R] ☑ Standard TAT if received by 3 pm

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

EMERGENCY: 1 Business d | Same Day, W | (Laboratory o

Date and Time Required for all E&P TATs:

For tests that can not be performed according to the service level select

Analysis Re

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

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Total metals	alkilinity (as CaCO3)	Total Hardness	Dissolved Hardness	Ammonia	Fluoride, Chloride	COD and BOD	sulphate	Nitrate and Nitrite	TSS	total Kjeldahl nitrogen	pH, Conductivity	Total phosphorus	ortho-phosphorus	SAMPLES ON HOLD	Sample is hazardous (please provide further detail)	NUMBER OF CONTAINERS
					P				P		P				P		P	P			
1	SW-1	12-Apr-21	1:55	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R			
2	SW-3	12-Apr-21	2:32	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R			
3	SW-6	12-Apr-21	3:08	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R			
4	SW-21	12-Apr-21	1:00	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R			
-	SW-11																				
5	DUP	12-Apr-21	12:00	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R			
-	Field Blank																				
6	Travel Blank	—	—	Water	R				R	R	R										

Terrace Shipping
2 Coolers
____ Carbouys

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

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ | SIF Observations Yes ☐ No ☐

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

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
4.0	3.8			4	4		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Hannah Shinton	Date: April 13th, 2021	Time:	Received by: Chris	Date: 13 Apr 21	Time: 0925	Received by: ice packs JC	Date: APR 14 2021	Time: 1035

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

SEPT 2017 FRONT

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

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

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **VA21B3852**	Page	: 1 of 6
Client	: **Regional District of Kitimat-Stikine**	Laboratory	: Vancouver - Environmental
Contact	: Hannah Shinton	Account Manager	: Amber Springer
Address	: # 300 - 4545 Lazelle Avenue Terrace BC Canada V8G 4E1	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: Thornhill Groundwater	Date Samples Received	: 07-Jul-2021 21:45
PO	: ----	Date Analysis Commenced	: 08-Jul-2021
C-O-C number	: ----	Issue Date	: 19-Jul-2021 12:09
Sampler	: Hannah Shinton		
Site	:		
Quote number	: Q62338		
No. of samples received	: 1		
No. of samples analysed	: 1		

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.

Signatories	*Position*	*Laboratory Department*
Clarie Tejano	Laboratory Assistant	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, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Inorganics, Burnaby, British Columbia
Sristika Chand	Lab 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).

Unit	*Description*
-	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.

Qualifiers

Qualifier	*Description*
DLM	*Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).*
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**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID: BH-96-2	----	----	----	----
					Client sampling date / time: 06-Jul-2021 12:00	----	----	----	----
					VA21B3852-001	--------	--------	--------	--------
					Result	----	----	----	----
Physical Tests									
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	215	----	----	----	----
conductivity	----	E100	2.0	µS/cm	408	----	----	----	----
hardness (as CaCO3), dissolved	----	EC100	0.60	mg/L	97.6	----	----	----	----
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L	98.7	----	----	----	----
pH	----	E108	0.10	pH units	8.39	----	----	----	----
solids, total dissolved [TDS]	----	E162	10	mg/L	309	----	----	----	----
Anions and Nutrients									
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0412	----	----	----	----
bromide	24959-67-9	E235.Br-L	0.050	mg/L	<0.050	----	----	----	----
chloride	16887-00-6	E235.Cl	0.50	mg/L	0.85	----	----	----	----
fluoride	16984-48-8	E235.F	0.020	mg/L	0.124	----	----	----	----
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	0.169	----	----	----	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.659	----	----	----	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	0.0032	----	----	----	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.186	----	----	----	----
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	6.45	----	----	----	----
Total Metals									
aluminum, total	7429-90-5	E420	0.0030	mg/L	1.41	----	----	----	----
antimony, total	7440-36-0	E420	0.00010	mg/L	0.00022	----	----	----	----
arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00365	----	----	----	----
barium, total	7440-39-3	E420	0.00010	mg/L	0.0425	----	----	----	----
beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	----	----	----	----
bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	----	----	----	----
boron, total	7440-42-8	E420	0.010	mg/L	0.165	----	----	----	----
cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.000179	----	----	----	----
calcium, total	7440-70-2	E420	0.050	mg/L	16.1	----	----	----	----
cesium, total	7440-46-2	E420	0.000010	mg/L	0.000091	----	----	----	----
chromium, total	7440-47-3	E420	0.00050	mg/L	0.00096	----	----	----	----
cobalt, total	7440-48-4	E420	0.00010	mg/L	0.00271	----	----	----	----
copper, total	7440-50-8	E420	0.00050	mg/L	0.00495	----	----	----	----
iron, total	7439-89-6	E420	0.010	mg/L	0.968	----	----	----	----

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID: BH-96-2	----	----	----	----
					Client sampling date / time: 06-Jul-2021 12:00	----	----	----	----
					VA21B3852-001	--------	--------	--------	--------
					Result	----	----	----	----
Total Metals									
lead, total	7439-92-1	E420	0.000050	mg/L	0.00134	----	----	----	----
lithium, total	7439-93-2	E420	0.0010	mg/L	0.0023	----	----	----	----
magnesium, total	7439-95-4	E420	0.0050	mg/L	14.2	----	----	----	----
manganese, total	7439-96-5	E420	0.00010	mg/L	0.242	----	----	----	----
mercury, total	7439-97-6	E508	0.0000050	mg/L	0.0000088	----	----	----	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00228	----	----	----	----
nickel, total	7440-02-0	E420	0.00050	mg/L	0.00269	----	----	----	----
phosphorus, total	7723-14-0	E420	0.050	mg/L	0.204	----	----	----	----
potassium, total	7440-09-7	E420	0.050	mg/L	10.8	----	----	----	----
rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00107	----	----	----	----
selenium, total	7782-49-2	E420	0.000050	mg/L	0.000155	----	----	----	----
silicon, total	7440-21-3	E420	0.10	mg/L	6.51	----	----	----	----
silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	----	----	----	----
sodium, total	17341-25-2	E420	0.050	mg/L	46.3	----	----	----	----
strontium, total	7440-24-6	E420	0.00020	mg/L	0.202	----	----	----	----
sulfur, total	7704-34-9	E420	0.50	mg/L	2.26	----	----	----	----
tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	----	----	----	----
thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	----	----	----	----
thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	----	----	----	----
tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	----	----	----	----
titanium, total	7440-32-6	E420	0.00030	mg/L	0.0255	----	----	----	----
tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	----	----	----	----
uranium, total	7440-61-1	E420	0.000010	mg/L	0.00175	----	----	----	----
vanadium, total	7440-62-2	E420	0.00050	mg/L	0.00305	----	----	----	----
zinc, total	7440-66-6	E420	0.0030	mg/L	0.0156	----	----	----	----
zirconium, total	7440-67-7	E420	0.00020	mg/L	0.00050	----	----	----	----
Dissolved Metals									
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0110	----	----	----	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00018	----	----	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00350	----	----	----	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0196	----	----	----	----
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	----	----	----	----

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BH-96-2	----	----	----	----
					Client sampling date / time	06-Jul-2021 12:00	----	----	----	----
						VA21B3852-001	--------	--------	--------	--------
						Result	----	----	----	----
Dissolved Metals										
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L		<0.000050	----	----	----	----
boron, dissolved	7440-42-8	E421	0.010	mg/L		0.151	----	----	----	----
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L		0.0000286	----	----	----	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L		15.0	----	----	----	----
cesium, dissolved	7440-46-2	E421	0.000010	mg/L		<0.000010	----	----	----	----
chromium, dissolved	7440-47-3	E421	0.00050	mg/L		<0.00050	----	----	----	----
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L		<0.00010	----	----	----	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L		0.00046	----	----	----	----
iron, dissolved	7439-89-6	E421	0.010	mg/L		0.037	----	----	----	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L		<0.000050	----	----	----	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L		0.0016	----	----	----	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L		14.6	----	----	----	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L		0.00648	----	----	----	----
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L		<0.0000050	----	----	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		0.00815 DTMF	----	----	----	----
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		12.1	----	----	----	----
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L		0.00035	----	----	----	----
selenium, dissolved	7782-49-2	E421	0.000050	mg/L		0.000217	----	----	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L		4.44	----	----	----	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L		<0.000010	----	----	----	----
sodium, dissolved	17341-25-2	E421	0.050	mg/L		50.8	----	----	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		0.201	----	----	----	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L		2.23	----	----	----	----
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		<0.00060 DLM	----	----	----	----
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L		<0.00010	----	----	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L		0.00169	----	----	----	----

Analytical Results

Sub-Matrix: **Water** (Matrix: **Water**)					Client sample ID	**BH-96-2**	----	----	----	----
					Client sampling date / time	06-Jul-2021 12:00	----	----	----	----
Analyte	*CAS Number*	*Method*	*LOR*	*Unit*		**VA21B3852-001**	--------	--------	--------	--------
						Result	----	----	----	----
Dissolved Metals										
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		0.00060	----	----	----	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L		0.0029	----	----	----	----
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	: **VA21B3852**	Page	: 1 of 9
Client	: **Regional District of Kitimat-Stikine**	Laboratory	: Vancouver - Environmental
Contact	: Hannah Shinton	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	: 07-Jul-2021 21:45
PO	: ----	Issue Date	: 19-Jul-2021 12:09
C-O-C number	: ----		
Sampler	: Hannah Shinton		
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

- 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 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
BH-96-2	E559	06-Jul-2021	----	----	----		14-Jul-2021	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
BH-96-2	E298	06-Jul-2021	14-Jul-2021	----	----		15-Jul-2021	28 days	8 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
BH-96-2	E235.Br-L	06-Jul-2021	----	----	----		09-Jul-2021	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
BH-96-2	E235.Cl	06-Jul-2021	----	----	----		09-Jul-2021	28 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
BH-96-2	E235.F	06-Jul-2021	----	----	----		09-Jul-2021	28 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
BH-96-2	E235.NO3-L	06-Jul-2021	----	----	----		09-Jul-2021	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
BH-96-2	E235.NO2-L	06-Jul-2021	----	----	----		09-Jul-2021	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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
BH-96-2	E235.SO4	06-Jul-2021	----	----	----		09-Jul-2021	28 days	3 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
BH-96-2	E318	06-Jul-2021	14-Jul-2021	----	----		15-Jul-2021	28 days	9 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid)										
BH-96-2	E372-U	06-Jul-2021	14-Jul-2021	----	----		15-Jul-2021	28 days	9 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
BH-96-2	E509	06-Jul-2021	09-Jul-2021	----	----		09-Jul-2021	28 days	3 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid)										
BH-96-2	E421	06-Jul-2021	08-Jul-2021	----	----		09-Jul-2021	180 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
BH-96-2	E290	06-Jul-2021	----	----	----		10-Jul-2021	14 days	4 days	✓
Physical Tests : Conductivity in Water										
HDPE										
BH-96-2	E100	06-Jul-2021	----	----	----		10-Jul-2021	28 days	4 days	✓
Physical Tests : pH by Meter										
HDPE										
BH-96-2	E108	06-Jul-2021	----	----	----		10-Jul-2021	0.25 hrs	95 hrs	× EHTR-FM
Physical Tests : TDS by Gravimetry										
HDPE										
BH-96-2	E162	06-Jul-2021	----	----	----		13-Jul-2021	7 days	7 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	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
BH-96-2	E508	06-Jul-2021	----	----	----		09-Jul-2021	28 days	3 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
BH-96-2	E420	06-Jul-2021	----	----	----		09-Jul-2021	180 days	3 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			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	239530	1	9	11.1	5.0	✓
Ammonia by Fluorescence	E298	243578	1	19	5.2	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	239535	1	9	11.1	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	242930	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	239534	1	9	11.1	5.0	✓
Conductivity in Water	E100	239529	1	14	7.1	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	240094	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	239192	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	239533	1	9	11.1	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	239531	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	239532	1	14	7.1	5.0	✓
pH by Meter	E108	239528	1	14	7.1	5.0	✓
Sulfate in Water by IC	E235.SO4	239536	1	9	11.1	5.0	✓
TDS by Gravimetry	E162	242298	1	20	5.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	243475	1	17	5.8	5.0	✓
Total Mercury in Water by CVAAS	E508	240324	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	239246	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	243476	1	17	5.8	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	239530	1	9	11.1	5.0	✓
Ammonia by Fluorescence	E298	243578	1	19	5.2	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	239535	1	9	11.1	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	242930	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	239534	1	9	11.1	5.0	✓
Conductivity in Water	E100	239529	1	14	7.1	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	240094	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	239192	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	239533	1	9	11.1	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	239531	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	239532	1	14	7.1	5.0	✓
pH by Meter	E108	239528	1	14	7.1	5.0	✓
Sulfate in Water by IC	E235.SO4	239536	1	9	11.1	5.0	✓
TDS by Gravimetry	E162	242298	1	20	5.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	243475	1	17	5.8	5.0	✓
Total Mercury in Water by CVAAS	E508	240324	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	239246	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	243476	1	17	5.8	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Method Blanks (MB)							
Alkalinity Species by Titration	E290	239530	1	9	11.1	5.0	✓
Ammonia by Fluorescence	E298	243578	1	19	5.2	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	239535	1	9	11.1	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	242930	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	239534	1	9	11.1	5.0	✓
Conductivity in Water	E100	239529	1	14	7.1	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	240094	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	239192	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	239533	1	9	11.1	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	239531	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	239532	1	14	7.1	5.0	✓
Sulfate in Water by IC	E235.SO4	239536	1	9	11.1	5.0	✓
TDS by Gravimetry	E162	242298	1	20	5.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	243475	1	17	5.8	5.0	✓
Total Mercury in Water by CVAAS	E508	240324	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	239246	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	243476	1	17	5.8	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	243578	1	19	5.2	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	239535	1	9	11.1	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	242930	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	239534	1	9	11.1	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	240094	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	239192	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	239533	1	9	11.1	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	239531	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	239532	1	14	7.1	5.0	✓
Sulfate in Water by IC	E235.SO4	239536	1	9	11.1	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	243475	1	17	5.8	5.0	✓
Total Mercury in Water by CVAAS	E508	240324	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	239246	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	243476	1	17	5.8	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.
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.
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.
Dissolved Hardness (Calculated)	EC100 Vancouver - Environmental	Water	APHA 2340B	“Hardness (as CaCO3), 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 CaCO3), 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
Preparation for Ammonia	EP298 Vancouver - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
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 HNO3.
Dissolved Mercury Water Filtration	EP509 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **VA21B3852**	Page	: 1 of 18
Client	: Regional District of Kitimat-Stikine	Laboratory	: Vancouver - Environmental
Contact	: Hannah Shinton	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	: 07-Jul-2021 21:45
PO	: ----	Date Analysis Commenced	: 08-Jul-2021
C-O-C number	: ----	Issue Date	: 19-Jul-2021 12:09
Sampler	: Hannah Shinton		
Site	:		
Quote number	: Q62338		
No. of samples received	: 1		
No. of samples analysed	: 1		

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.

Signatories	*Position*	*Laboratory Department*
Clarie Tejano	Laboratory Assistant	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, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Inorganics, Burnaby, British Columbia
Sristika Chand	Lab Analyst	Metals, Burnaby, British Columbia

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: 239528)											
VA21B3973-003	Anonymous	pH	----	E108	0.10	pH units	6.70	6.73	0.432%	4%	----
Physical Tests (QC Lot: 239529)											
VA21B3973-003	Anonymous	conductivity	----	E100	2.0	µS/cm	10.5	10.9	0.4	Diff <2x LOR	----
Physical Tests (QC Lot: 239530)											
VA21B3973-003	Anonymous	alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	4.5	4.8	0.3	Diff <2x LOR	----
Physical Tests (QC Lot: 242298)											
VA21B3842-006	Anonymous	solids, total dissolved [TDS]	----	E162	13	mg/L	65	66	1	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 239531)											
VA21B3852-001	BH-96-2	nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.659	0.661	0.367%	20%	----
Anions and Nutrients (QC Lot: 239532)											
VA21B3852-001	BH-96-2	nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	0.0032	0.0032	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 239533)											
VA21B3852-001	BH-96-2	fluoride	16984-48-8	E235.F	0.020	mg/L	0.124	0.122	0.001	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 239534)											
VA21B3852-001	BH-96-2	chloride	16887-00-6	E235.Cl	0.50	mg/L	0.85	0.85	0.0007	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 239535)											
VA21B3852-001	BH-96-2	bromide	24959-67-9	E235.Br-L	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 239536)											
VA21B3852-001	BH-96-2	sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	6.45	6.40	0.798%	20%	----
Anions and Nutrients (QC Lot: 243475)											
VA21B3838-001	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	1.00	mg/L	80.8	82.0	1.46%	20%	----
Anions and Nutrients (QC Lot: 243476)											
VA21B3852-001	BH-96-2	phosphorus, total	7723-14-0	E372-U	0.0200	mg/L	0.186	0.192	0.0062	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 243578)											
VA21B3838-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.500	mg/L	66.2	67.2	1.48%	20%	----
Total Metals (QC Lot: 239246)											
FJ2100513-001	Anonymous	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0229	0.0192	0.0036	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	0.00055	0.00056	0.00001	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00012	0.00012	0.000004	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.0965	0.0966	0.0362%	20%	----
		beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.000020	<0.000020	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: 239246) - continued											
FJ2100513-001	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	0.0000636	0.0000603	5.34%	20%	----
		calcium, total	7440-70-2	E420	0.050	mg/L	36.6	37.4	2.23%	20%	----
		cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	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	0.00060	0.00060	0.000002	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	0.011	0.011	0.0004	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	0.0026	0.0026	0.00002	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	9.23	9.03	2.23%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.00099	0.00095	0.00004	Diff <2x LOR	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00180	0.00187	4.06%	20%	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	0.00443	0.00442	0.00001	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	0.651	0.650	0.193%	20%	----
		rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00070	0.00065	0.00005	Diff <2x LOR	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	0.00480	0.00485	0.990%	20%	----
		silicon, total	7440-21-3	E420	0.10	mg/L	0.91	0.91	0.004	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	0.248	0.256	0.007	Diff <2x LOR	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.0524	0.0532	1.38%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	4.24	4.43	0.19	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	0.000721	0.000708	1.91%	20%	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	0.0030	0.0031	0.00008	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: 240324)											

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: 240324) - continued											
VA21B3835-007	Anonymous	mercury, total	7439-97-6	E508	0.0000050	mg/L	0.0000056	0.0000059	0.0000003	Diff <2x LOR	----
Dissolved Metals (QC Lot: 239192)											
VA21B3562-001	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0215	0.0228	5.92%	20%	----
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00013	0.00013	0.000002	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.0234	0.0235	0.308%	20%	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.238	0.244	2.23%	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	0.070	0.070	0.0002	Diff <2x LOR	----
		cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
		calcium, dissolved	7440-70-2	E421	0.050	mg/L	136	136	0.0106%	20%	----
		cesium, dissolved	7440-46-2	E421	0.000010	mg/L	0.000024	0.000022	0.000002	Diff <2x LOR	----
		chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	0.00624	0.00630	0.999%	20%	----
		copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00024	0.00023	0.000005	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.010	mg/L	42.8	43.5	1.68%	20%	----
		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	<0.0010	<0.0010	0	Diff <2x LOR	----
		magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	35.2	36.3	3.07%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	10.6	10.9	2.37%	20%	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000725	0.000742	2.39%	20%	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00394	0.00402	0.00007	Diff <2x LOR	----
		phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	0.145	0.142	0.002	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	0.050	mg/L	38.2	38.4	0.377%	20%	----
		rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00488	0.00487	0.276%	20%	----
		selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.000263	0.000276	0.000013	Diff <2x LOR	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	5.64	5.93	4.97%	20%	----
		silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, dissolved	17341-25-2	E421	0.050	mg/L	54.9	55.0	0.0676%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.641	0.639	0.348%	20%	----
		sulfur, dissolved	7704-34-9	E421	0.50	mg/L	44.5	44.7	0.366%	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	----

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: 239192) - continued											
VA21B3562-001	Anonymous	titanium, dissolved	7440-32-6	E421	0.00030	mg/L	0.00068	0.00070	0.00002	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	0.000179	0.000178	0.619%	20%	----
		vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	0.00149	0.00151	0.00002	Diff <2x LOR	----
		zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0024	0.0022	0.0002	Diff <2x LOR	----
		zirconium, dissolved	7440-67-7	E421	0.00030	mg/L	0.00040	0.00040	0.000002	Diff <2x LOR	----
Dissolved Metals (QC Lot: 240094)											
VA21B3807-007	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Aggregate Organics (QC Lot: 242930)											
FJ2100530-010	Anonymous	chemical oxygen demand [COD]	----	E559	20	mg/L	203	212	4.49%	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: 239529)						
conductivity	----	E100	1	µS/cm	1.1	----
Physical Tests (QCLot: 239530)						
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 242298)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Anions and Nutrients (QCLot: 239531)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 239532)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 239533)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 239534)						
chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 239535)						
bromide	24959-67-9	E235.Br-L	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 239536)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 243475)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 243476)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 243578)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Total Metals (QCLot: 239246)						
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: 239246) - continued						
cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
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: 240324)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 239192)						
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	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 239192) - continued						
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	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
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	----
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	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 240094)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Aggregate Organics (QCLot: 242930)						
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	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 239528)									
pH	----	E108	----	pH units	7 pH units	99.6	98.0	102	----
Physical Tests (QCLot: 239529)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	100	90.0	110	----
Physical Tests (QCLot: 239530)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	103	85.0	115	----
Physical Tests (QCLot: 242298)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	97.7	85.0	115	----
Anions and Nutrients (QCLot: 239531)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	103	90.0	110	----
Anions and Nutrients (QCLot: 239532)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 239533)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 239534)									
chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 239535)									
bromide	24959-67-9	E235.Br-L	0.05	mg/L	0.5 mg/L	104	85.0	115	----
Anions and Nutrients (QCLot: 239536)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	104	90.0	110	----
Anions and Nutrients (QCLot: 243475)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	97.4	75.0	125	----
Anions and Nutrients (QCLot: 243476)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	94.4	80.0	120	----
Anions and Nutrients (QCLot: 243578)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	99.2	85.0	115	----
Total Metals (QCLot: 239246)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	95.3	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	98.8	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	93.3	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	102	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	102	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 239246) - continued									
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	92.6	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	90.8	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	93.2	80.0	120	----
cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	97.4	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	92.0	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	92.7	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	90.0	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	92.2	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	91.6	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	87.6	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	91.6	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	91.9	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	91.9	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	91.3	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	90.9	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	95.6	80.0	120	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	95.8	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	96.9	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	90.6	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	96.0	80.0	120	----
sodium, total	17341-25-2	E420	0.05	mg/L	50 mg/L	91.2	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	101	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	95.3	80.0	120	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	94.5	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	94.1	80.0	120	----
thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	91.9	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	91.4	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	91.2	80.0	120	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	93.6	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	91.6	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	92.2	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	92.0	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	93.1	80.0	120	----
Total Metals (QCLot: 240324)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	80.4	80.0	120	----
Dissolved Metals (QCLot: 239192)									

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 239192) - continued									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	96.8	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	96.4	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	95.6	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	92.1	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	99.9	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	94.4	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	89.6	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	93.6	80.0	120	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	95.2	80.0	120	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	96.2	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	96.8	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	95.6	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	100	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	101	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	88.9	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	94.2	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	100.0	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	100	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	95.3	80.0	120	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	102	80.0	120	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	98.4	80.0	120	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	92.6	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	97.5	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	96.2	80.0	120	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	98.2	80.0	120	----
sodium, dissolved	17341-25-2	E421	0.05	mg/L	50 mg/L	98.8	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	102	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	95.8	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	105	80.0	120	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	90.2	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	88.8	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	94.7	80.0	120	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	100	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	100	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	97.8	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	94.8	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: 239192) - continued									
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	97.5	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	98.0	80.0	120	----
Aggregate Organics (QCLot: 242930)									
chemical oxygen demand [COD]	----	E559	20	mg/L	100 mg/L	108	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: 239531)										
VA21B3973-002	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	2.60 mg/L	2.5 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 239532)										
VA21B3973-002	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.517 mg/L	0.5 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 239533)										
VA21B3973-002	Anonymous	fluoride	16984-48-8	E235.F	1.03 mg/L	1 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 239534)										
VA21B3973-002	Anonymous	chloride	16887-00-6	E235.Cl	104 mg/L	100 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 239535)										
VA21B3973-002	Anonymous	bromide	24959-67-9	E235.Br-L	0.534 mg/L	0.5 mg/L	107	75.0	125	----
Anions and Nutrients (QCLot: 239536)										
VA21B3973-002	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	105 mg/L	100 mg/L	105	75.0	125	----
Anions and Nutrients (QCLot: 243475)										
VA21B3852-001	BH-96-2	Kjeldahl nitrogen, total [TKN]	----	E318	2.47 mg/L	2.5 mg/L	98.8	70.0	130	----
Anions and Nutrients (QCLot: 243476)										
VA21B3856-001	Anonymous	phosphorus, total	7723-14-0	E372-U	ND mg/L	0.05 mg/L	ND	70.0	130	----
Anions and Nutrients (QCLot: 243578)										
VA21B3851-007	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.109 mg/L	0.1 mg/L	109	75.0	125	----
Total Metals (QCLot: 239246)										
FJ2100513-002	Anonymous	aluminum, total	7429-90-5	E420	0.190 mg/L	0.2 mg/L	95.0	70.0	130	----
		antimony, total	7440-36-0	E420	0.0186 mg/L	0.02 mg/L	92.9	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0189 mg/L	0.02 mg/L	94.7	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	0.0363 mg/L	0.04 mg/L	90.7	70.0	130	----
		bismuth, total	7440-69-9	E420	0.00966 mg/L	0.01 mg/L	96.6	70.0	130	----
		boron, total	7440-42-8	E420	0.096 mg/L	0.1 mg/L	95.9	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00400 mg/L	0.004 mg/L	100.0	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	0.0101 mg/L	0.01 mg/L	101	70.0	130	----
		chromium, total	7440-47-3	E420	0.0385 mg/L	0.04 mg/L	96.3	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: 239246) - continued										
FJ2100513-002	Anonymous	cobalt, total	7440-48-4	E420	0.0190 mg/L	0.02 mg/L	95.2	70.0	130	----
		copper, total	7440-50-8	E420	0.0189 mg/L	0.02 mg/L	94.3	70.0	130	----
		iron, total	7439-89-6	E420	1.85 mg/L	2 mg/L	92.3	70.0	130	----
		lead, total	7439-92-1	E420	0.0181 mg/L	0.02 mg/L	90.5	70.0	130	----
		lithium, total	7439-93-2	E420	0.0910 mg/L	0.1 mg/L	91.0	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	0.0191 mg/L	0.02 mg/L	95.6	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0177 mg/L	0.02 mg/L	88.6	70.0	130	----
		nickel, total	7440-02-0	E420	0.0381 mg/L	0.04 mg/L	95.4	70.0	130	----
		phosphorus, total	7723-14-0	E420	9.95 mg/L	10 mg/L	99.5	70.0	130	----
		potassium, total	7440-09-7	E420	3.87 mg/L	4 mg/L	96.8	70.0	130	----
		rubidium, total	7440-17-7	E420	0.0198 mg/L	0.02 mg/L	99.3	70.0	130	----
		selenium, total	7782-49-2	E420	0.0392 mg/L	0.04 mg/L	97.9	70.0	130	----
		silicon, total	7440-21-3	E420	9.15 mg/L	10 mg/L	91.5	70.0	130	----
		silver, total	7440-22-4	E420	0.00380 mg/L	0.004 mg/L	94.9	70.0	130	----
		sodium, total	17341-25-2	E420	1.96 mg/L	2 mg/L	98.2	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	20.0 mg/L	20 mg/L	100	70.0	130	----
		tellurium, total	13494-80-9	E420	0.0385 mg/L	0.04 mg/L	96.2	70.0	130	----
		thallium, total	7440-28-0	E420	0.00361 mg/L	0.004 mg/L	90.2	70.0	130	----
		thorium, total	7440-29-1	E420	0.0202 mg/L	0.02 mg/L	101	70.0	130	----
		tin, total	7440-31-5	E420	0.0186 mg/L	0.02 mg/L	93.2	70.0	130	----
		titanium, total	7440-32-6	E420	0.0381 mg/L	0.04 mg/L	95.2	70.0	130	----
		tungsten, total	7440-33-7	E420	0.0184 mg/L	0.02 mg/L	92.2	70.0	130	----
		uranium, total	7440-61-1	E420	0.00368 mg/L	0.004 mg/L	92.0	70.0	130	----
		vanadium, total	7440-62-2	E420	0.0984 mg/L	0.1 mg/L	98.4	70.0	130	----
		zinc, total	7440-66-6	E420	0.383 mg/L	0.4 mg/L	95.8	70.0	130	----
		zirconium, total	7440-67-7	E420	0.0369 mg/L	0.04 mg/L	92.2	70.0	130	----
Total Metals (QCLot: 240324)										
VA21B3835-008	Anonymous	mercury, total	7439-97-6	E508	0.0000979 mg/L	0.0001 mg/L	97.9	70.0	130	----
Dissolved Metals (QCLot: 239192)										
VA21B3562-002	Anonymous	aluminum, dissolved	7429-90-5	E421	0.197 mg/L	0.2 mg/L	98.7	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.0200 mg/L	0.02 mg/L	100	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.0202 mg/L	0.02 mg/L	101	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	0.0375 mg/L	0.04 mg/L	93.7	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: 239192) - continued										
VA21B3562-002	Anonymous	bismuth, dissolved	7440-69-9	E421	0.00927 mg/L	0.01 mg/L	92.7	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.094 mg/L	0.1 mg/L	94.0	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.00372 mg/L	0.004 mg/L	93.1	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	0.0102 mg/L	0.01 mg/L	102	70.0	130	----
		chromium, dissolved	7440-47-3	E421	0.0388 mg/L	0.04 mg/L	97.0	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.0186 mg/L	0.02 mg/L	93.3	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.0181 mg/L	0.02 mg/L	90.7	70.0	130	----
		iron, dissolved	7439-89-6	E421	1.84 mg/L	2 mg/L	92.0	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.0183 mg/L	0.02 mg/L	91.4	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.0896 mg/L	0.1 mg/L	89.6	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	0.0210 mg/L	0.02 mg/L	105	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.0369 mg/L	0.04 mg/L	92.2	70.0	130	----
		phosphorus, dissolved	7723-14-0	E421	11.4 mg/L	10 mg/L	114	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	0.0194 mg/L	0.02 mg/L	97.1	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.0391 mg/L	0.04 mg/L	97.7	70.0	130	----
		silicon, dissolved	7440-21-3	E421	9.17 mg/L	10 mg/L	91.7	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.00370 mg/L	0.004 mg/L	92.4	70.0	130	----
		sodium, dissolved	17341-25-2	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	ND mg/L	20 mg/L	ND	70.0	130	----
		tellurium, dissolved	13494-80-9	E421	0.0396 mg/L	0.04 mg/L	98.9	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.00362 mg/L	0.004 mg/L	90.6	70.0	130	----
		thorium, dissolved	7440-29-1	E421	0.0202 mg/L	0.02 mg/L	101	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.0190 mg/L	0.02 mg/L	94.8	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.0411 mg/L	0.04 mg/L	103	70.0	130	----
		tungsten, dissolved	7440-33-7	E421	0.0198 mg/L	0.02 mg/L	99.1	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.00387 mg/L	0.004 mg/L	96.8	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.103 mg/L	0.1 mg/L	103	70.0	130	----
		zinc, dissolved	7440-66-6	E421	0.373 mg/L	0.4 mg/L	93.2	70.0	130	----
		zirconium, dissolved	7440-67-7	E421	0.0433 mg/L	0.04 mg/L	108	70.0	130	----
Dissolved Metals (QCLot: 240094)										
VA21B3851-001	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000962 mg/L	0.0001 mg/L	96.2	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
Aggregate Organics (QCLot: 242930)										
VA21B3819-001	Anonymous	chemical oxygen demand [COD]	----	E559	99 mg/L	100 mg/L	99.0	75.0	125	----

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number: 17 - Amber

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: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)		Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply	
Contact:	Hannah Shinton	Quality Control (QC) Report with Report ☑ YES ☐ NO		PRIORITY (Business Days): 4 day [P4-20%] ☐	EMERGENCY: 1 Business day [E1 - 100%] ☐
Phone:	250-615-6100	☑ Compare Results to Criteria on Report - provide details below if box checked		3 day [P3-25%] ☐	Same Day, Weekend or Statutory holiday [E2 -200% (Laboratory opening fees may apply)] ☐
	Company address below will appear on the final report	Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX		2 day [P2-50%] ☐	
Street:	4545 Lazelle Avenue	Email 1 or Fax	hshinton@rdks.bc.ca	Date and Time Required for all E&P TATs:	
City/Province:	Terrace/BC	Email 2	nveikle@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		
Invoice To	Same as Report To ☐ YES ☑ NO	**Invoice Distribution**		**Analysis Request**	
	Copy of Invoice with Report ☑ YES ☐ NO	Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX		Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below	
Company:	Regional District of Kitimat-Stikine	Email 1 or Fax	anne-maries@rdks.bc.ca, nveikle@rdks.bc.ca		
Contact:	Nicki Veikle	Email 2			

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: H. Shinton

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Dissolved metals	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
					F/P	P		P					P	P	P							
	BH-96-2	06-July-21	12:00	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			
	[redacted]																					
	[redacted]																					

Terrace Shipping
1 Coolers
Carbouys
Ground ☐
Air ☑

Environmental Division
Vancouver
Work Order Reference
VA21B3852

Telephone: +1 604-253-4188

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Crit... (electronic COC only) ...n list below
Are samples taken from a Regulated DW System? ☐ YES ☑ NO	British Columbia Approved and Working Water Quality Guidelines (MAY, 2015)
Are samples for human consumption/ use? ☐ YES ☑ NO	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

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

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
3.8				8			

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Hannah Shinton	Date: July 7th, 2021	Time:	Received by:	Date: 7 July 21	Time: 1345	Received by:	Date: JUL 07 2021	Time: 1345

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

SEPT 2017 FRONT

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

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

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **VA21B3851**	Page	: 1 of 10
Client	: **Regional District of Kitimat-Stikine**	Laboratory	: Vancouver - Environmental
Contact	: Hannah Shinton	Account Manager	: Amber Springer
Address	: # 300 - 4545 Lazelle Avenue Terrace BC Canada V8G 4E1	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: Thornhill Tranfser Station Surface Water	Date Samples Received	: 07-Jul-2021 21:45
PO	: ----	Date Analysis Commenced	: 08-Jul-2021
C-O-C number	: ----	Issue Date	: 16-Jul-2021 16:15
Sampler	: Hannah Shinton		
Site	:		
Quote number	: Q62338		
No. of samples received	: 7		
No. of samples analysed	: 7		

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.

Signatories	*Position*	*Laboratory Department*
Aaron Yu	Laboratory Analyst	Inorganics, Burnaby, British Columbia
Angelo Salandanan	Lab Assistant	Metals, Burnaby, British Columbia
Clarie Tejano	Laboratory Assistant	Metals, Burnaby, British Columbia
Dee Lee	Analyst	Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Monica Ko	Lab Assistant	Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Sristika Chand	Lab Analyst	Metals, Burnaby, British Columbia
Tracy Harley	Supervisor - Water Quality Instrumentation	Inorganics, 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).

Unit	*Description*
-	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.

Qualifiers

Qualifier	*Description*
DLDS	*Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.*
DLM	*Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).*
DTC	*Dissolved concentration exceeds total. Results were confirmed by re-analysis.*
HTD	*Hold time exceeded for re-analysis or dilution, but initial testing was conducted within hold time.*
RRV	*Reported result verified by repeat analysis.*

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SW-1	SW-3	SW-6	SW-21	Dup
					Client sampling date / time	06-Jul-2021 13:55	06-Jul-2021 12:44	06-Jul-2021 15:00	07-Jul-2021 09:45	06-Jul-2021 12:00
						VA21B3851-001	VA21B3851-002	VA21B3851-003	VA21B3851-004	VA21B3851-005
						Result	Result	Result	Result	Result
Physical Tests										
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		27.5	875	48.3	322	48.1
conductivity	----	E100	2.0	µS/cm		54.6	1720	93.3	669	94.6
hardness (as CaCO3), dissolved	----	EC100	0.60	mg/L		23.2	552	44.6	244	42.7
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L		24.5	583	47.8	249	46.7
pH	----	E108	0.10	pH units		7.57	6.93	7.85	8.48	7.83
solids, total suspended [TSS]	----	E160-H	3.0	mg/L		<3.0	154	5.3	7.8	3.7
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		0.0061	55.0	<0.0050	0.276	0.0085
bromide	24959-67-9	E235.Br-L	0.050	mg/L		<0.050	<1.00 DLDS	<0.050	<0.250 DLDS	<0.050
chloride	16887-00-6	E235.Cl	0.50	mg/L		<0.50	76.3	<0.50	27.8	<0.50
fluoride	16984-48-8	E235.F	0.020	mg/L		0.023	<0.400 DLDS	<0.020	<0.100 DLDS	<0.020
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L		<0.050	59.0	<0.050	1.51	0.109
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		0.0185 HTD	<0.100 DLDS	0.0373 HTD	3.69	0.0224 HTD
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		<0.0010	<0.0200 DLDS	<0.0010	0.0151	<0.0010
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L		<0.0010	<0.0010	0.0015	0.0056	0.0014
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L		0.0022	0.295	0.0040	0.0342	0.0035
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		0.70	<6.00 DLDS	1.18	1.96	1.19
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		0.0544	0.155	0.0901	0.214	0.0940
antimony, total	7440-36-0	E420	0.00010	mg/L		<0.00010	0.00013	<0.00010	0.00016	<0.00010
arsenic, total	7440-38-2	E420	0.00010	mg/L		<0.00010	0.0428	0.00016	0.00094	0.00014
barium, total	7440-39-3	E420	0.00010	mg/L		0.0186	1.01	0.0150	0.123	0.0161
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	1.95	<0.010	1.06	<0.010
cadmium, total	7440-43-9	E420	0.0000050	mg/L		<0.0000050	0.0000126	<0.0000050	0.0000108	0.0000052
calcium, total	7440-70-2	E420	0.050	mg/L		8.78	180	18.2	76.9	17.7
cesium, total	7440-46-2	E420	0.000010	mg/L		<0.000010	0.000210	<0.000010	0.000035	<0.000010
chromium, total	7440-47-3	E420	0.00050	mg/L		<0.00050	0.00144	<0.00050	<0.00050	<0.00050
cobalt, total	7440-48-4	E420	0.00010	mg/L		<0.00010	0.00322	<0.00010	0.00080	<0.00010
copper, total	7440-50-8	E420	0.00050	mg/L		0.00069	<0.00050	0.00072	0.00205	0.00076

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SW-1	SW-3	SW-6	SW-21	Dup
					Client sampling date / time	06-Jul-2021 13:55	06-Jul-2021 12:44	06-Jul-2021 15:00	07-Jul-2021 09:45	06-Jul-2021 12:00
						VA21B3851-001	VA21B3851-002	VA21B3851-003	VA21B3851-004	VA21B3851-005
						Result	Result	Result	Result	Result
Total Metals										
iron, total	7439-89-6	E420	0.010	mg/L		0.044	85.1	0.107	0.611	0.112
lead, total	7439-92-1	E420	0.000050	mg/L		<0.000050	0.000058	<0.000050	0.000070	<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		0.635	32.5	0.578	13.9	0.618
manganese, total	7439-96-5	E420	0.00010	mg/L		0.00318	3.40	0.00856	0.384	0.00881
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		0.000290	0.000308	0.000462	0.000654	0.000488
nickel, total	7440-02-0	E420	0.00050	mg/L		<0.00050	0.00426	<0.00050	0.00212	<0.00050
phosphorus, total	7723-14-0	E420	0.050	mg/L		<0.050	0.675	<0.050	<0.050	<0.050
potassium, total	7440-09-7	E420	0.050	mg/L		0.782	59.0	0.693	21.2	0.724
rubidium, total	7440-17-7	E420	0.00020	mg/L		0.00102	0.0415	0.00099	0.0124	0.00111
selenium, total	7782-49-2	E420	0.000050	mg/L		0.000056	0.000124	<0.000050	0.000136	0.000060
silicon, total	7440-21-3	E420	0.10	mg/L		2.27	13.9	2.64	4.77	2.74
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		0.939	94.4	0.859	42.2	0.922
strontium, total	7440-24-6	E420	0.00020	mg/L		0.0351	1.14	0.0389	0.466	0.0408
sulfur, total	7704-34-9	E420	0.50	mg/L		<0.50	1.17	<0.50	1.20	<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	0.00018	<0.00010	<0.00010	<0.00010
titanium, total	7440-32-6	E420	0.00030	mg/L		0.00131	0.00781	0.00239	<0.00540 DLM	0.00250
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	0.000027	0.000051	0.000171	0.000058
vanadium, total	7440-62-2	E420	0.00050	mg/L		0.00053	0.00428	0.00065	0.00059	0.00077
zinc, total	7440-66-6	E420	0.0030	mg/L		<0.0030	0.0257	<0.0030	<0.0030	<0.0030
zirconium, total	7440-67-7	E420	0.00020	mg/L		<0.00020	0.00069	<0.00020	<0.00020	<0.00020
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L		0.0293	0.0135	0.0333	0.0133	0.0354
antimony, dissolved	7440-36-0	E421	0.00010	mg/L		<0.00010	0.00012	<0.00010	0.00016	<0.00010
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		<0.00010	0.0445	0.00014	0.00086	0.00013
barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.0172	1.00	0.0140	0.148	0.0137

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SW-1	SW-3	SW-6	SW-21	Dup
					Client sampling date / time	06-Jul-2021 13:55	06-Jul-2021 12:44	06-Jul-2021 15:00	07-Jul-2021 09:45	06-Jul-2021 12:00
						VA21B3851-001	VA21B3851-002	VA21B3851-003	VA21B3851-004	VA21B3851-005
						Result	Result	Result	Result	Result
Dissolved Metals										
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	1.73	<0.010	0.913	<0.010
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L		<0.0000050	<0.0000050	<0.0000050	0.0000082	<0.0000050
calcium, dissolved	7440-70-2	E421	0.050	mg/L		8.33	171	17.0	73.3	16.2
cesium, dissolved	7440-46-2	E421	0.000010	mg/L		<0.000010	0.000215	<0.000010	0.000024	<0.000010
chromium, dissolved	7440-47-3	E421	0.00050	mg/L		<0.00050	0.00110	<0.00050	<0.00050	<0.00050
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L		<0.00010	0.00319	<0.00010	0.00074	<0.00010
copper, dissolved	7440-50-8	E421	0.00020	mg/L		0.00067	<0.00020	0.00062	0.00192	0.00063
iron, dissolved	7439-89-6	E421	0.010	mg/L		0.016	89.2	0.052	0.098	0.048
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	0.0018	<0.0010	<0.0010	<0.0010
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L		0.583	30.4	0.532	14.8	0.540
manganese, dissolved	7439-96-5	E421	0.00010	mg/L		0.00236	3.37	0.00663	0.430	0.00620
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		0.000244	0.000340	0.000458	0.000698	0.000461
nickel, dissolved	7440-02-0	E421	0.00050	mg/L		<0.00050	0.00377	<0.00050	0.00202	<0.00050
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L		<0.050	0.055	<0.050	<0.050	<0.050
potassium, dissolved	7440-09-7	E421	0.050	mg/L		0.762	57.9	0.701	23.5	0.667
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L		0.00092	0.0413	0.00100	0.0130	0.00104
selenium, dissolved	7782-49-2	E421	0.000050	mg/L		<0.000050	0.000222	<0.000050	0.000151	<0.000050
silicon, dissolved	7440-21-3	E421	0.050	mg/L		2.13	13.8	2.52	4.76	2.51
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		0.902	90.6	0.858	46.3	0.853
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		0.0374	1.23	0.0401	0.514	0.0412
sulfur, dissolved	7704-34-9	E421	0.50	mg/L		<0.50	1.03	<0.50	1.33	<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	0.00015	<0.00010	<0.00010	<0.00010
titanium, dissolved	7440-32-6	E421	0.00030	mg/L		<0.00030	0.00143	0.00058	0.00050	0.00087
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L		<0.00010	0.00011	<0.00010	<0.00010	<0.00010

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SW-1	SW-3	SW-6	SW-21	Dup
					Client sampling date / time	06-Jul-2021 13:55	06-Jul-2021 12:44	06-Jul-2021 15:00	07-Jul-2021 09:45	06-Jul-2021 12:00
						VA21B3851-001	VA21B3851-002	VA21B3851-003	VA21B3851-004	VA21B3851-005
						Result	Result	Result	Result	Result
Dissolved Metals										
uranium, dissolved	7440-61-1	E421	0.000010	mg/L		0.000017	0.000022	0.000050	0.000174	0.000050
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		<0.00050	0.00270	0.00052	<0.00050	0.00054
zinc, dissolved	7440-66-6	E421	0.0010	mg/L		0.0026	0.0024	0.0089 DTC	0.0017	0.0024
zirconium, dissolved	7440-67-7	E421	0.00020	mg/L		<0.00020	0.00071	<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	8.5	<2.0	<2.0	<2.0
chemical oxygen demand [COD]	----	E559	20	mg/L		<20	156	<20	51	<20

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

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	Field Blank	Travel Blank	----	----	----
					Client sampling date / time	06-Jul-2021 15:30	06-Jul-2021	----	----	----
						VA21B3851-006	VA21B3851-007	--------	--------	--------
						Result	Result	----	----	----
Physical Tests										
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		<1.0	----	----	----	----
conductivity	----	E100	2.0	µS/cm		<2.0	----	----	----	----
hardness (as CaCO3), dissolved	----	EC100	0.60	mg/L		<0.60	----	----	----	----
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L		<0.60	<0.60	----	----	----
pH	----	E108	0.10	pH units		5.23	----	----	----	----
solids, total suspended [TSS]	----	E160-H	3.0	mg/L		<3.0	----	----	----	----
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		<0.0050	<0.0050	----	----	----
bromide	24959-67-9	E235.Br-L	0.050	mg/L		<0.050	<0.050	----	----	----
chloride	16887-00-6	E235.Cl	0.50	mg/L		<0.50	<0.50	----	----	----
fluoride	16984-48-8	E235.F	0.020	mg/L		<0.020	<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		<0.0050	<0.0050	----	----	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		<0.0010	<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		<0.0020	----	----	----	----
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		<0.30	<0.30	----	----	----
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		<0.0030	<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		<0.00010	<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		<0.0000050	<0.0000050	----	----	----
calcium, total	7440-70-2	E420	0.050	mg/L		<0.050	<0.050	----	----	----
cesium, total	7440-46-2	E420	0.000010	mg/L		<0.000010	<0.000010	----	----	----
chromium, total	7440-47-3	E420	0.00050	mg/L		<0.00050	<0.00050	----	----	----
cobalt, total	7440-48-4	E420	0.00010	mg/L		<0.00010	<0.00010	----	----	----
copper, total	7440-50-8	E420	0.00050	mg/L		<0.00050	<0.00050	----	----	----
iron, total	7439-89-6	E420	0.010	mg/L		<0.010	<0.010	----	----	----

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	Field Blank	Travel Blank	----	----	----
					Client sampling date / time	06-Jul-2021 15:30	06-Jul-2021	----	----	----
						VA21B3851-006	VA21B3851-007	--------	--------	--------
						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		<0.0050	<0.0050	----	----	----
manganese, total	7439-96-5	E420	0.00010	mg/L		<0.00010	<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		<0.000050	<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		<0.050	<0.050	----	----	----
rubidium, total	7440-17-7	E420	0.00020	mg/L		<0.00020	<0.00020	----	----	----
selenium, total	7782-49-2	E420	0.000050	mg/L		<0.000050	<0.000050	----	----	----
silicon, total	7440-21-3	E420	0.10	mg/L		<0.10	<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		<0.050	<0.050	----	----	----
strontium, total	7440-24-6	E420	0.00020	mg/L		<0.00020	<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		<0.00030	<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		<0.000010	<0.000010	----	----	----
vanadium, total	7440-62-2	E420	0.00050	mg/L		<0.00050	<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		<0.00020	<0.00020	----	----	----
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L		0.0011 RRV	----	----	----	----
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		<0.00010	----	----	----	----
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L		<0.000100	----	----	----	----

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	Field Blank	Travel Blank	----	----	----
					Client sampling date / time	06-Jul-2021 15:30	06-Jul-2021	----	----	----
						VA21B3851-006	VA21B3851-007	--------	--------	--------
						Result	Result	----	----	----
Dissolved Metals										
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		<0.050	----	----	----	----
cesium, dissolved	7440-46-2	E421	0.000010	mg/L		<0.000010	----	----	----	----
chromium, dissolved	7440-47-3	E421	0.00050	mg/L		<0.00050	----	----	----	----
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L		<0.00010	----	----	----	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L		<0.00020	----	----	----	----
iron, dissolved	7439-89-6	E421	0.010	mg/L		<0.010	----	----	----	----
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		<0.0050	----	----	----	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L		<0.00010	----	----	----	----
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L		<0.0000050	----	----	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		<0.000050	----	----	----	----
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		<0.050	----	----	----	----
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L		<0.00020	----	----	----	----
selenium, dissolved	7782-49-2	E421	0.000050	mg/L		<0.000050	----	----	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L		<0.050	----	----	----	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L		<0.000010	----	----	----	----
sodium, dissolved	17341-25-2	E421	0.050	mg/L		<0.050	----	----	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		<0.00020	----	----	----	----
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		<0.00030	----	----	----	----
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L		<0.00010	----	----	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L		<0.000010	----	----	----	----

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	Field Blank	Travel Blank	----	----	----
					Client sampling date / time	06-Jul-2021 15:30	06-Jul-2021	----	----	----
						VA21B3851-006	VA21B3851-007	--------	--------	--------
						Result	Result	----	----	----
Dissolved Metals										
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		<0.00050	----	----	----	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L		0.0026 RRV	----	----	----	----
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	----	----	----	----
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	: **VA21B3851**	Page	: 1 of 22
Client	: **Regional District of Kitimat-Stikine**	Laboratory	: Vancouver - Environmental
Contact	: Hannah Shinton	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 Tranfser Station Surface Water	Date Samples Received	: 07-Jul-2021 21:45
PO	: ----	Issue Date	: 16-Jul-2021 16:15
C-O-C number	: ----		
Sampler	: Hannah Shinton		
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 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

- No Quality Control Sample Frequency Outliers occur.

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								
Anions and Nutrients	QC-MRG7-2395470 01	----	nitrate (as N)	14797-55-8	E235.NO3-L	0.0066 B mg/L	0.005 mg/L	Blank result exceeds permitted value

Result Qualifiers

Qualifier	Description
B	*Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.*

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 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT 3d]										
Dup	E550	06-Jul-2021	----	----	----		09-Jul-2021	3 days	3 days	✓
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT 3d]										
Field Blank	E550	06-Jul-2021	----	----	----		09-Jul-2021	3 days	3 days	✓
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT 3d]										
SW-1	E550	06-Jul-2021	----	----	----		09-Jul-2021	3 days	3 days	✓
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT 3d]										
SW-21	E550	07-Jul-2021	----	----	----		10-Jul-2021	3 days	3 days	✓
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT 3d]										
SW-3	E550	06-Jul-2021	----	----	----		09-Jul-2021	3 days	3 days	✓
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT 3d]										
SW-6	E550	06-Jul-2021	----	----	----		09-Jul-2021	3 days	3 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
SW-21	E559	07-Jul-2021	----	----	----		14-Jul-2021	28 days	7 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	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
Dup	E559	06-Jul-2021	----	----	----		14-Jul-2021	28 days	8 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
Field Blank	E559	06-Jul-2021	----	----	----		14-Jul-2021	28 days	8 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
SW-1	E559	06-Jul-2021	----	----	----		14-Jul-2021	28 days	8 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
SW-3	E559	06-Jul-2021	----	----	----		14-Jul-2021	28 days	8 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
SW-6	E559	06-Jul-2021	----	----	----		14-Jul-2021	28 days	8 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
Travel Blank	E559	06-Jul-2021	----	----	----		14-Jul-2021	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
SW-21	E298	07-Jul-2021	14-Jul-2021	----	----		14-Jul-2021	28 days	7 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
Dup	E298	06-Jul-2021	14-Jul-2021	----	----		14-Jul-2021	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
Field Blank	E298	06-Jul-2021	14-Jul-2021	----	----		14-Jul-2021	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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
SW-1	E298	06-Jul-2021	14-Jul-2021	----	----		14-Jul-2021	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
SW-3	E298	06-Jul-2021	14-Jul-2021	----	----		14-Jul-2021	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
SW-6	E298	06-Jul-2021	14-Jul-2021	----	----		14-Jul-2021	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
Travel Blank	E298	06-Jul-2021	14-Jul-2021	----	----		15-Jul-2021	28 days	8 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
Field Blank	E235.Br-L	06-Jul-2021	----	----	----		09-Jul-2021	28 days	2 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
SW-21	E235.Br-L	07-Jul-2021	----	----	----		09-Jul-2021	28 days	2 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
Dup	E235.Br-L	06-Jul-2021	----	----	----		09-Jul-2021	28 days	3 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
SW-1	E235.Br-L	06-Jul-2021	----	----	----		09-Jul-2021	28 days	3 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
SW-3	E235.Br-L	06-Jul-2021	----	----	----		09-Jul-2021	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	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE SW-6	E235.Br-L	06-Jul-2021	----	----	----		09-Jul-2021	28 days	3 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE Travel Blank	E235.Br-L	06-Jul-2021	----	----	----		09-Jul-2021	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE Field Blank	E235.Cl	06-Jul-2021	----	----	----		09-Jul-2021	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE SW-21	E235.Cl	07-Jul-2021	----	----	----		09-Jul-2021	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE Dup	E235.Cl	06-Jul-2021	----	----	----		09-Jul-2021	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE SW-1	E235.Cl	06-Jul-2021	----	----	----		09-Jul-2021	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE SW-3	E235.Cl	06-Jul-2021	----	----	----		09-Jul-2021	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE SW-6	E235.Cl	06-Jul-2021	----	----	----		09-Jul-2021	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE Travel Blank	E235.Cl	06-Jul-2021	----	----	----		09-Jul-2021	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	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE SW-21	E378-U	07-Jul-2021	----	----	----		09-Jul-2021	3 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE Dup	E378-U	06-Jul-2021	----	----	----		09-Jul-2021	3 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE Field Blank	E378-U	06-Jul-2021	----	----	----		09-Jul-2021	3 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE SW-1	E378-U	06-Jul-2021	----	----	----		09-Jul-2021	3 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE SW-3	E378-U	06-Jul-2021	----	----	----		09-Jul-2021	3 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE SW-6	E378-U	06-Jul-2021	----	----	----		09-Jul-2021	3 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE Field Blank	E235.F	06-Jul-2021	----	----	----		09-Jul-2021	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE SW-21	E235.F	07-Jul-2021	----	----	----		09-Jul-2021	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE Dup	E235.F	06-Jul-2021	----	----	----		09-Jul-2021	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	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Fluoride in Water by IC										
HDPE SW-1	E235.F	06-Jul-2021	----	----	----		09-Jul-2021	28 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE SW-3	E235.F	06-Jul-2021	----	----	----		09-Jul-2021	28 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE SW-6	E235.F	06-Jul-2021	----	----	----		09-Jul-2021	28 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE Travel Blank	E235.F	06-Jul-2021	----	----	----		09-Jul-2021	28 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE Field Blank	E235.NO3-L	06-Jul-2021	----	----	----		09-Jul-2021	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE SW-21	E235.NO3-L	07-Jul-2021	----	----	----		09-Jul-2021	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE Dup	E235.NO3-L	06-Jul-2021	----	----	----		09-Jul-2021	3 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE SW-1	E235.NO3-L	06-Jul-2021	----	----	----		09-Jul-2021	3 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE SW-3	E235.NO3-L	06-Jul-2021	----	----	----		09-Jul-2021	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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE SW-6	E235.NO3-L	06-Jul-2021	----	----	----		09-Jul-2021	3 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE Travel Blank	E235.NO3-L	06-Jul-2021	----	----	----		09-Jul-2021	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE Field Blank	E235.NO2-L	06-Jul-2021	----	----	----		09-Jul-2021	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE SW-21	E235.NO2-L	07-Jul-2021	----	----	----		09-Jul-2021	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE Dup	E235.NO2-L	06-Jul-2021	----	----	----		09-Jul-2021	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE SW-1	E235.NO2-L	06-Jul-2021	----	----	----		09-Jul-2021	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE SW-3	E235.NO2-L	06-Jul-2021	----	----	----		09-Jul-2021	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE SW-6	E235.NO2-L	06-Jul-2021	----	----	----		09-Jul-2021	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE Travel Blank	E235.NO2-L	06-Jul-2021	----	----	----		09-Jul-2021	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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
Field Blank	E235.SO4	06-Jul-2021	----	----	----		09-Jul-2021	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
SW-21	E235.SO4	07-Jul-2021	----	----	----		09-Jul-2021	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
Dup	E235.SO4	06-Jul-2021	----	----	----		09-Jul-2021	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
SW-1	E235.SO4	06-Jul-2021	----	----	----		09-Jul-2021	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
SW-3	E235.SO4	06-Jul-2021	----	----	----		09-Jul-2021	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
SW-6	E235.SO4	06-Jul-2021	----	----	----		09-Jul-2021	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
Travel Blank	E235.SO4	06-Jul-2021	----	----	----		09-Jul-2021	28 days	3 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
SW-21	E318	07-Jul-2021	14-Jul-2021	----	----		15-Jul-2021	28 days	8 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
Dup	E318	06-Jul-2021	14-Jul-2021	----	----		15-Jul-2021	28 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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
Field Blank	E318	06-Jul-2021	14-Jul-2021	----	----		15-Jul-2021	28 days	9 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
SW-1	E318	06-Jul-2021	14-Jul-2021	----	----		15-Jul-2021	28 days	9 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
SW-3	E318	06-Jul-2021	14-Jul-2021	----	----		15-Jul-2021	28 days	9 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
SW-6	E318	06-Jul-2021	14-Jul-2021	----	----		15-Jul-2021	28 days	9 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid)										
SW-21	E372-U	07-Jul-2021	14-Jul-2021	----	----		15-Jul-2021	28 days	8 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid)										
Dup	E372-U	06-Jul-2021	14-Jul-2021	----	----		15-Jul-2021	28 days	9 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid)										
Field Blank	E372-U	06-Jul-2021	14-Jul-2021	----	----		15-Jul-2021	28 days	9 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid)										
SW-1	E372-U	06-Jul-2021	14-Jul-2021	----	----		15-Jul-2021	28 days	9 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid)										
SW-3	E372-U	06-Jul-2021	14-Jul-2021	----	----		15-Jul-2021	28 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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid)										
SW-6	E372-U	06-Jul-2021	14-Jul-2021	----	----		15-Jul-2021	28 days	9 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
SW-21	E509	07-Jul-2021	09-Jul-2021	----	----		09-Jul-2021	28 days	2 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
Dup	E509	06-Jul-2021	09-Jul-2021	----	----		09-Jul-2021	28 days	3 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
Field Blank	E509	06-Jul-2021	09-Jul-2021	----	----		09-Jul-2021	28 days	3 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
SW-1	E509	06-Jul-2021	09-Jul-2021	----	----		09-Jul-2021	28 days	3 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
SW-3	E509	06-Jul-2021	09-Jul-2021	----	----		09-Jul-2021	28 days	3 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
SW-6	E509	06-Jul-2021	09-Jul-2021	----	----		09-Jul-2021	28 days	3 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid)										
SW-21	E421	07-Jul-2021	08-Jul-2021	----	----		09-Jul-2021	180 days	2 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid)										
Dup	E421	06-Jul-2021	08-Jul-2021	----	----		09-Jul-2021	180 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	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) Field Blank	E421	06-Jul-2021	08-Jul-2021	----	----		09-Jul-2021	180 days	3 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) SW-1	E421	06-Jul-2021	08-Jul-2021	----	----		09-Jul-2021	180 days	3 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) SW-3	E421	06-Jul-2021	08-Jul-2021	----	----		09-Jul-2021	180 days	3 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) SW-6	E421	06-Jul-2021	08-Jul-2021	----	----		09-Jul-2021	180 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE SW-21	E290	07-Jul-2021	----	----	----		09-Jul-2021	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE Dup	E290	06-Jul-2021	----	----	----		09-Jul-2021	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE Field Blank	E290	06-Jul-2021	----	----	----		09-Jul-2021	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE SW-1	E290	06-Jul-2021	----	----	----		09-Jul-2021	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE SW-3	E290	06-Jul-2021	----	----	----		09-Jul-2021	14 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	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Alkalinity Species by Titration										
HDPE SW-6	E290	06-Jul-2021	----	----	----		09-Jul-2021	14 days	3 days	✓
Physical Tests : Conductivity in Water										
HDPE SW-21	E100	07-Jul-2021	----	----	----		09-Jul-2021	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE Dup	E100	06-Jul-2021	----	----	----		09-Jul-2021	28 days	3 days	✓
Physical Tests : Conductivity in Water										
HDPE Field Blank	E100	06-Jul-2021	----	----	----		09-Jul-2021	28 days	3 days	✓
Physical Tests : Conductivity in Water										
HDPE SW-1	E100	06-Jul-2021	----	----	----		09-Jul-2021	28 days	3 days	✓
Physical Tests : Conductivity in Water										
HDPE SW-3	E100	06-Jul-2021	----	----	----		09-Jul-2021	28 days	3 days	✓
Physical Tests : Conductivity in Water										
HDPE SW-6	E100	06-Jul-2021	----	----	----		09-Jul-2021	28 days	3 days	✓
Physical Tests : pH by Meter										
HDPE SW-21	E108	07-Jul-2021	----	----	----		09-Jul-2021	0.25 hrs	56 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE Field Blank	E108	06-Jul-2021	----	----	----		09-Jul-2021	0.25 hrs	74 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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : pH by Meter										
HDPE SW-6	E108	06-Jul-2021	----	----	----		09-Jul-2021	0.25 hrs	74 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE SW-1	E108	06-Jul-2021	----	----	----		09-Jul-2021	0.25 hrs	75 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE Dup	E108	06-Jul-2021	----	----	----		09-Jul-2021	0.25 hrs	77 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE SW-3	E108	06-Jul-2021	----	----	----		09-Jul-2021	0.25 hrs	77 hrs	× EHTR-FM
Physical Tests : TSS by Gravimetry										
HDPE Dup	E160-H	06-Jul-2021	----	----	----		12-Jul-2021	7 days	6 days	✓
Physical Tests : TSS by Gravimetry										
HDPE SW-21	E160-H	07-Jul-2021	----	----	----		13-Jul-2021	7 days	6 days	✓
Physical Tests : TSS by Gravimetry										
HDPE Field Blank	E160-H	06-Jul-2021	----	----	----		13-Jul-2021	7 days	7 days	✓
Physical Tests : TSS by Gravimetry										
HDPE SW-1	E160-H	06-Jul-2021	----	----	----		13-Jul-2021	7 days	7 days	✓
Physical Tests : TSS by Gravimetry										
HDPE SW-3	E160-H	06-Jul-2021	----	----	----		13-Jul-2021	7 days	7 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	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : TSS by Gravimetry										
HDPE SW-6	E160-H	06-Jul-2021	----	----	----		13-Jul-2021	7 days	7 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) SW-21	E508	07-Jul-2021	----	----	----		09-Jul-2021	28 days	2 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) Dup	E508	06-Jul-2021	----	----	----		09-Jul-2021	28 days	3 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) Field Blank	E508	06-Jul-2021	----	----	----		09-Jul-2021	28 days	3 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) SW-1	E508	06-Jul-2021	----	----	----		09-Jul-2021	28 days	3 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) SW-3	E508	06-Jul-2021	----	----	----		09-Jul-2021	28 days	3 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) SW-6	E508	06-Jul-2021	----	----	----		09-Jul-2021	28 days	3 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) Travel Blank	E508	06-Jul-2021	----	----	----		09-Jul-2021	28 days	3 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) SW-21	E420	07-Jul-2021	----	----	----		12-Jul-2021	180 days	5 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	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
Dup	E420	06-Jul-2021	----	----	----		12-Jul-2021	180 days	6 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
Field Blank	E420	06-Jul-2021	----	----	----		12-Jul-2021	180 days	6 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
SW-1	E420	06-Jul-2021	----	----	----		12-Jul-2021	180 days	6 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
SW-3	E420	06-Jul-2021	----	----	----		12-Jul-2021	180 days	6 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
SW-6	E420	06-Jul-2021	----	----	----		12-Jul-2021	180 days	6 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
Travel Blank	E420	06-Jul-2021	----	----	----		12-Jul-2021	180 days	6 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			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	239546	1	15	6.6	5.0	✓
Ammonia by Fluorescence	E298	243242	2	31	6.4	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	239878	2	40	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	239553	2	15	13.3	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	242930	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	239551	2	31	6.4	5.0	✓
Conductivity in Water	E100	239544	1	15	6.6	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	240094	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	239192	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	239554	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	239550	2	21	9.5	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	239548	2	35	5.7	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	239549	2	40	5.0	5.0	✓
pH by Meter	E108	239545	1	15	6.6	5.0	✓
Sulfate in Water by IC	E235.SO4	239547	2	31	6.4	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	243237	1	8	12.5	5.0	✓
Total Mercury in Water by CVAAS	E508	240324	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	239784	2	40	5.0	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	243241	1	12	8.3	5.0	✓
TSS by Gravimetry	E160-H	241860	3	48	6.2	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	239546	1	15	6.6	5.0	✓
Ammonia by Fluorescence	E298	243242	2	31	6.4	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	239878	2	40	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	239553	2	15	13.3	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	242930	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	239551	2	31	6.4	5.0	✓
Conductivity in Water	E100	239544	1	15	6.6	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	240094	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	239192	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	239554	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	239550	2	21	9.5	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	239548	2	35	5.7	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	239549	2	40	5.0	5.0	✓
pH by Meter	E108	239545	1	15	6.6	5.0	✓
Sulfate in Water by IC	E235.SO4	239547	2	31	6.4	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	243237	1	8	12.5	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
Total Mercury in Water by CVAAS	E508	240324	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	239784	2	40	5.0	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	243241	1	12	8.3	5.0	✓
TSS by Gravimetry	E160-H	241860	3	48	6.2	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	239546	1	15	6.6	5.0	✓
Ammonia by Fluorescence	E298	243242	2	31	6.4	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	239878	2	40	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	239553	2	15	13.3	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	242930	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	239551	2	31	6.4	5.0	✓
Conductivity in Water	E100	239544	1	15	6.6	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	240094	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	239192	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	239554	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	239550	2	21	9.5	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	239548	2	35	5.7	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	239549	2	40	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	239547	2	31	6.4	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	243237	1	8	12.5	5.0	✓
Total Mercury in Water by CVAAS	E508	240324	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	239784	2	40	5.0	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	243241	1	12	8.3	5.0	✓
TSS by Gravimetry	E160-H	241860	3	48	6.2	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	243242	2	31	6.4	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	239553	2	15	13.3	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	242930	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	239551	2	31	6.4	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	240094	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	239192	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	239554	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	239550	2	21	9.5	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	239548	2	35	5.7	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	239549	2	40	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	239547	2	31	6.4	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	243237	1	8	12.5	5.0	✓
Total Mercury in Water by CVAAS	E508	240324	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	239784	2	40	5.0	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	243241	1	12	8.3	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.
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.
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.
Chemical Oxygen Demand by Colourimetry	E559 Vancouver - Environmental	Water	APHA 5220 D (mod)	Samples are analyzed using the closed reflux colourimetric method.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Hardness (Calculated)	EC100 Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 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 CaCO3), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in CaCO3 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
Preparation for Ammonia	EP298 Vancouver - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
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 HNO3.
Dissolved Mercury Water Filtration	EP509 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **VA21B3851**	Page	: 1 of 23
Client	: Regional District of Kitimat-Stikine	Laboratory	: Vancouver - Environmental
Contact	: Hannah Shinton	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 Tranfser Station Surface Water	Date Samples Received	: 07-Jul-2021 21:45
PO	: ----	Date Analysis Commenced	: 08-Jul-2021
C-O-C number	: ----	Issue Date	: 16-Jul-2021 16:15
Sampler	: Hannah Shinton		
Site	:		
Quote number	: Q62338		
No. of samples received	: 7		
No. of samples analysed	: 7		

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.

Signatories	*Position*	*Laboratory Department*
Aaron Yu	Laboratory Analyst	Inorganics, Burnaby, British Columbia
Angelo Salandanan	Lab Assistant	Metals, Burnaby, British Columbia
Clarie Tejano	Laboratory Assistant	Metals, Burnaby, British Columbia
Dee Lee	Analyst	Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Monica Ko	Lab Assistant	Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Sristika Chand	Lab Analyst	Metals, Burnaby, British Columbia
Tracy Harley	Supervisor - Water Quality Instrumentation	Inorganics, Burnaby, British Columbia

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: 239544)											
VA21B3735-001	Anonymous	conductivity	----	E100	2.0	µS/cm	1140	1140	0.350%	10%	----
Physical Tests (QC Lot: 239545)											
VA21B3735-001	Anonymous	pH	----	E108	0.10	pH units	8.11	8.10	0.123%	4%	----
Physical Tests (QC Lot: 239546)											
VA21B3735-001	Anonymous	alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	89.0	90.1	1.23%	20%	----
Physical Tests (QC Lot: 241860)											
VA21B3849-002	Anonymous	solids, total suspended [TSS]	----	E160-H	3.0	mg/L	16.7	17.7	1.0	Diff <2x LOR	----
Physical Tests (QC Lot: 242285)											
VA21B3840-001	Anonymous	solids, total suspended [TSS]	----	E160-H	3.0	mg/L	304	271	11.6%	20%	----
Physical Tests (QC Lot: 242753)											
VA21B3851-004	SW-21	solids, total suspended [TSS]	----	E160-H	3.0	mg/L	7.8	7.2	0.6	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 239547)											
VA21B3842-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	4.06	4.05	0.209%	20%	----
Anions and Nutrients (QC Lot: 239548)											
VA21B3842-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 239549)											
VA21B3842-001	Anonymous	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: 239550)											
VA21B3842-001	Anonymous	fluoride	16984-48-8	E235.F	0.020	mg/L	<0.020	<0.020	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 239551)											
VA21B3842-001	Anonymous	chloride	16887-00-6	E235.Cl	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 239553)											
VA21B3842-001	Anonymous	bromide	24959-67-9	E235.Br-L	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 239554)											
VA21B3735-001	Anonymous	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: 239557)											
VA21B3851-007	Travel Blank	nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 239558)											
VA21B3851-007	Travel Blank	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: 239559)											
VA21B3851-007	Travel Blank	fluoride	16984-48-8	E235.F	0.020	mg/L	<0.020	<0.020	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*
Anions and Nutrients (QC Lot: 239560)											
VA21B3851-007	Travel Blank	chloride	16887-00-6	E235.Cl	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 239561)											
VA21B3851-007	Travel Blank	sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	<0.30	<0.30	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 239562)											
VA21B3851-007	Travel Blank	bromide	24959-67-9	E235.Br-L	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 243237)											
VA21B3849-001	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	2.10	2.09	0.725%	20%	----
Anions and Nutrients (QC Lot: 243241)											
VA21B3850-013	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0200	mg/L	0.480	0.437	9.50%	20%	----
Anions and Nutrients (QC Lot: 243242)											
VA21B3850-013	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 243578)											
VA21B3838-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.500	mg/L	66.2	67.2	1.48%	20%	----
Total Metals (QC Lot: 239784)											
VA21B3851-001	SW-1	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0544	0.0549	0.932%	20%	----
		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	0.0186	0.0195	5.09%	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	<0.0000050	<0.0000050	0	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	0.050	mg/L	8.78	9.22	4.80%	20%	----
		cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	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	0.00069	0.00069	0.000003	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	0.044	0.044	0.0006	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	0.635	0.643	1.17%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.00318	0.00330	3.77%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000290	0.000276	0.000013	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	----

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: 239784) - continued											
VA21B3851-001	SW-1	potassium, total	7440-09-7	E420	0.050	mg/L	0.782	0.829	5.78%	20%	----
		rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00102	0.00103	0.00001	Diff <2x LOR	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	0.000056	<0.000050	0.000006	Diff <2x LOR	----
		silicon, total	7440-21-3	E420	0.10	mg/L	2.27	2.27	0.330%	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	0.939	0.997	6.01%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.0351	0.0339	3.47%	20%	----
		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	0.00131	0.00147	0.00016	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	0.000017	0.000016	0.0000001	Diff <2x LOR	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	0.00053	0.00050	0.00003	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: 240324)											
VA21B3835-007	Anonymous	mercury, total	7439-97-6	E508	0.0000050	mg/L	0.0000056	0.0000059	0.0000003	Diff <2x LOR	----
Total Metals (QC Lot: 240447)											
VA21B3851-004	SW-21	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.214	0.179	17.7%	20%	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	0.00016	0.00016	0.000005	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00094	0.00088	0.00006	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.123	0.128	4.12%	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	1.06	1.03	2.76%	20%	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.0000108	0.0000140	0.0000032	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	0.050	mg/L	76.9	76.0	1.22%	20%	----
		cesium, total	7440-46-2	E420	0.000010	mg/L	0.000035	0.000032	0.000002	Diff <2x LOR	----
		chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	0.00080	0.00083	0.00004	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	0.00205	0.00208	0.00003	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	0.611	0.616	0.850%	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: 240447) - continued											
VA21B3851-004	SW-21	lead, total	7439-92-1	E420	0.000050	mg/L	0.000070	0.000069	0.000002	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	13.9	14.5	4.23%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.384	0.396	3.13%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000654	0.000640	2.16%	20%	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	0.00212	0.00215	0.00003	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	21.2	21.8	2.65%	20%	----
		rubidium, total	7440-17-7	E420	0.00020	mg/L	0.0124	0.0128	3.29%	20%	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	0.000136	0.000132	0.000004	Diff <2x LOR	----
		silicon, total	7440-21-3	E420	0.10	mg/L	4.77	4.74	0.686%	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	42.2	42.7	1.25%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.466	0.471	1.08%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	1.20	1.18	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	----
		titanium, total	7440-32-6	E420	0.00540	mg/L	<0.00540	<0.00540	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	0.000171	0.000169	1.02%	20%	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	0.00059	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	----
Dissolved Metals (QC Lot: 239192)											
VA21B3562-001	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0215	0.0228	5.92%	20%	----
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00013	0.00013	0.000002	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.0234	0.0235	0.308%	20%	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.238	0.244	2.23%	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	0.070	0.070	0.0002	Diff <2x LOR	----
		cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
		calcium, dissolved	7440-70-2	E421	0.050	mg/L	136	136	0.0106%	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*
Dissolved Metals (QC Lot: 239192) - continued											
VA21B3562-001	Anonymous	cesium, dissolved	7440-46-2	E421	0.000010	mg/L	0.000024	0.000022	0.000002	Diff <2x LOR	----
		chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	0.00624	0.00630	0.999%	20%	----
		copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00024	0.00023	0.000005	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.010	mg/L	42.8	43.5	1.68%	20%	----
		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	<0.0010	<0.0010	0	Diff <2x LOR	----
		magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	35.2	36.3	3.07%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	10.6	10.9	2.37%	20%	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000725	0.000742	2.39%	20%	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00394	0.00402	0.00007	Diff <2x LOR	----
		phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	0.145	0.142	0.002	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	0.050	mg/L	38.2	38.4	0.377%	20%	----
		rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00488	0.00487	0.276%	20%	----
		selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.000263	0.000276	0.000013	Diff <2x LOR	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	5.64	5.93	4.97%	20%	----
		silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, dissolved	17341-25-2	E421	0.050	mg/L	54.9	55.0	0.0676%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.641	0.639	0.348%	20%	----
		sulfur, dissolved	7704-34-9	E421	0.50	mg/L	44.5	44.7	0.366%	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	0.00030	mg/L	0.00068	0.00070	0.00002	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	0.000179	0.000178	0.619%	20%	----
		vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	0.00149	0.00151	0.00002	Diff <2x LOR	----
		zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0024	0.0022	0.0002	Diff <2x LOR	----
		zirconium, dissolved	7440-67-7	E421	0.00030	mg/L	0.00040	0.00040	0.000002	Diff <2x LOR	----
Dissolved Metals (QC Lot: 240094)											
VA21B3807-007	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Aggregate Organics (QC Lot: 239878)											
VA21B3770-001	Anonymous	biochemical oxygen demand [BOD]	----	E550	2.0	mg/L	<2.0	<2.0	0.0%	30%	----
Aggregate Organics (QC Lot: 240570)											

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*
Aggregate Organics (QC Lot: 240570) - continued											
VA21B4059-002	Anonymous	biochemical oxygen demand [BOD]	----	E550	2.0	mg/L	<2.0	<2.0	0.0%	30%	----
Aggregate Organics (QC Lot: 242930)											
FJ2100530-010	Anonymous	chemical oxygen demand [COD]	----	E559	20	mg/L	203	212	4.49%	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: 239544)						
conductivity	----	E100	1	µS/cm	1.1	----
Physical Tests (QCLot: 239546)						
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 241860)						
solids, total suspended [TSS]	----	E160-H	3	mg/L	<3.0	----
Physical Tests (QCLot: 242285)						
solids, total suspended [TSS]	----	E160-H	3	mg/L	<3.0	----
Physical Tests (QCLot: 242753)						
solids, total suspended [TSS]	----	E160-H	3	mg/L	<3.0	----
Anions and Nutrients (QCLot: 239547)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 239548)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	# 0.0066	B
Anions and Nutrients (QCLot: 239549)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 239550)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 239551)						
chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 239553)						
bromide	24959-67-9	E235.Br-L	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 239554)						
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 239557)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 239558)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 239559)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 239560)						
chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 239561)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 239562)						
bromide	24959-67-9	E235.Br-L	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 243237)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 243241)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 243242)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 243578)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Total Metals (QCLot: 239784)						
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	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
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	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 239784) - continued						
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: 240324)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Total Metals (QCLot: 240447)						
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	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
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	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 240447) - continued						
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	----
Dissolved Metals (QCLot: 239192)						
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	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
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	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 239192) - continued						
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	----
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: 240094)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Aggregate Organics (QCLot: 239878)						
biochemical oxygen demand [BOD]	----	E550	2	mg/L	<2.0	----
Aggregate Organics (QCLot: 240570)						
biochemical oxygen demand [BOD]	----	E550	2	mg/L	<2.0	----
Aggregate Organics (QCLot: 242930)						
chemical oxygen demand [COD]	----	E559	20	mg/L	<20	----

Qualifiers

Qualifier	Description
B	*Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.*

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	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 239544)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	99.4	90.0	110	----
Physical Tests (QCLot: 239545)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 239546)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	101	85.0	115	----
Physical Tests (QCLot: 241860)									
solids, total suspended [TSS]	----	E160-H	3	mg/L	150 mg/L	99.2	85.0	115	----
Physical Tests (QCLot: 242285)									
solids, total suspended [TSS]	----	E160-H	3	mg/L	150 mg/L	89.8	85.0	115	----
Physical Tests (QCLot: 242753)									
solids, total suspended [TSS]	----	E160-H	3	mg/L	150 mg/L	87.0	85.0	115	----
Anions and Nutrients (QCLot: 239547)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 239548)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 239549)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	99.7	90.0	110	----
Anions and Nutrients (QCLot: 239550)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	99.8	90.0	110	----
Anions and Nutrients (QCLot: 239551)									
chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 239553)									
bromide	24959-67-9	E235.Br-L	0.05	mg/L	0.5 mg/L	98.7	85.0	115	----
Anions and Nutrients (QCLot: 239554)									
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	97.4	80.0	120	----
Anions and Nutrients (QCLot: 239557)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 239558)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 239559)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 239560)									

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 239560) - continued									
chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 239561)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 239562)									
bromide	24959-67-9	E235.Br-L	0.05	mg/L	0.5 mg/L	97.7	85.0	115	----
Anions and Nutrients (QCLot: 243237)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	105	75.0	125	----
Anions and Nutrients (QCLot: 243241)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	92.0	80.0	120	----
Anions and Nutrients (QCLot: 243242)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	100	85.0	115	----
Anions and Nutrients (QCLot: 243578)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	99.2	85.0	115	----
Total Metals (QCLot: 239784)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	100	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	108	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	94.6	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	97.5	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	110	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	102	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	110	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	95.6	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	110	80.0	120	----
cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	96.4	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	91.4	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	94.2	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	94.4	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	102	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	100	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	110	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	96.0	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	100	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	95.4	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	106	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	97.9	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 239784) - continued									
rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	101	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	97.0	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	97.5	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	99.6	80.0	120	----
sodium, total	17341-25-2	E420	0.05	mg/L	50 mg/L	95.4	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	98.2	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	95.3	80.0	120	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	95.0	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	105	80.0	120	----
thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	90.5	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	96.1	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	92.6	80.0	120	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	99.4	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	101	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	97.1	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	96.5	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	98.4	80.0	120	----
Total Metals (QCLot: 240324)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	80.4	80.0	120	----
Total Metals (QCLot: 240447)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	108	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	107	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	106	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	107	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	104	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	108	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	110	80.0	120	----
cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	98.0	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	102	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	106	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	105	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	103	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	107	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	104	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
Total Metals (QCLot: 240447) - continued									
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	107	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	102	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	101	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	107	80.0	120	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	108	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	103	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	102	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	102	80.0	120	----
sodium, total	17341-25-2	E420	0.05	mg/L	50 mg/L	105	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	99.7	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	90.1	80.0	120	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	96.8	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	104	80.0	120	----
thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	90.9	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	107	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	106	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	106	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	113	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	98.2	80.0	120	----
Dissolved Metals (QCLot: 239192)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	96.8	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	96.4	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	95.6	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	92.1	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	99.9	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	94.4	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	89.6	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	93.6	80.0	120	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	95.2	80.0	120	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	96.2	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	96.8	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	95.6	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	100	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 239192) - continued									
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	101	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	88.9	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	94.2	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	100.0	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	100	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	95.3	80.0	120	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	102	80.0	120	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	98.4	80.0	120	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	92.6	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	97.5	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	96.2	80.0	120	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	98.2	80.0	120	----
sodium, dissolved	17341-25-2	E421	0.05	mg/L	50 mg/L	98.8	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	102	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	95.8	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	105	80.0	120	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	90.2	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	88.8	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	94.7	80.0	120	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	100	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	100	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	97.8	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	94.8	80.0	120	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	97.5	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	98.0	80.0	120	----
Aggregate Organics (QCLot: 239878)									
biochemical oxygen demand [BOD]	----	E550	2	mg/L	198 mg/L	108	85.0	115	----
Aggregate Organics (QCLot: 240570)									
biochemical oxygen demand [BOD]	----	E550	2	mg/L	198 mg/L	101	85.0	115	----
Aggregate Organics (QCLot: 242930)									
chemical oxygen demand [COD]	----	E559	20	mg/L	100 mg/L	108	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: 239547)										
VA21B3842-002	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	101 mg/L	100 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 239548)										
VA21B3842-002	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	2.65 mg/L	2.5 mg/L	106	75.0	125	----
Anions and Nutrients (QCLot: 239549)										
VA21B3842-002	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.505 mg/L	0.5 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 239550)										
VA21B3842-002	Anonymous	fluoride	16984-48-8	E235.F	1.02 mg/L	1 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 239551)										
VA21B3842-002	Anonymous	chloride	16887-00-6	E235.Cl	102 mg/L	100 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 239553)										
VA21B3842-002	Anonymous	bromide	24959-67-9	E235.Br-L	0.500 mg/L	0.5 mg/L	99.9	75.0	125	----
Anions and Nutrients (QCLot: 239554)										
VA21B3735-002	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0310 mg/L	0.03 mg/L	103	70.0	130	----
Anions and Nutrients (QCLot: 239557)										
VA21B3856-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	ND mg/L	12.5 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 239558)										
VA21B3856-001	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	ND mg/L	2.5 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 239559)										
VA21B3856-001	Anonymous	fluoride	16984-48-8	E235.F	5.18 mg/L	5 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 239560)										
VA21B3856-001	Anonymous	chloride	16887-00-6	E235.Cl	509 mg/L	500 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 239561)										
VA21B3856-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	505 mg/L	500 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 239562)										
VA21B3856-001	Anonymous	bromide	24959-67-9	E235.Br-L	2.48 mg/L	2.5 mg/L	99.3	75.0	125	----
Anions and Nutrients (QCLot: 243237)										
VA21B3849-002	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	2.63 mg/L	2.5 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
Anions and Nutrients (QCLot: 243241)										
VA21B3850-014	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0467 mg/L	0.05 mg/L	93.4	70.0	130	----
Anions and Nutrients (QCLot: 243242)										
VA21B3850-014	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.105 mg/L	0.1 mg/L	105	75.0	125	----
Anions and Nutrients (QCLot: 243578)										
VA21B3851-007	Travel Blank	ammonia, total (as N)	7664-41-7	E298	0.109 mg/L	0.1 mg/L	109	75.0	125	----
Total Metals (QCLot: 239784)										
VA21B3851-003	SW-6	aluminum, total	7429-90-5	E420	0.187 mg/L	0.2 mg/L	93.5	70.0	130	----
		antimony, total	7440-36-0	E420	0.0191 mg/L	0.02 mg/L	95.5	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0191 mg/L	0.02 mg/L	95.7	70.0	130	----
		barium, total	7440-39-3	E420	0.0179 mg/L	0.02 mg/L	89.6	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0415 mg/L	0.04 mg/L	104	70.0	130	----
		bismuth, total	7440-69-9	E420	0.00945 mg/L	0.01 mg/L	94.5	70.0	130	----
		boron, total	7440-42-8	E420	0.103 mg/L	0.1 mg/L	103	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00382 mg/L	0.004 mg/L	95.6	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	0.00920 mg/L	0.01 mg/L	92.0	70.0	130	----
		chromium, total	7440-47-3	E420	0.0380 mg/L	0.04 mg/L	94.9	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0200 mg/L	0.02 mg/L	99.8	70.0	130	----
		copper, total	7440-50-8	E420	0.0195 mg/L	0.02 mg/L	97.3	70.0	130	----
		iron, total	7439-89-6	E420	1.90 mg/L	2 mg/L	94.8	70.0	130	----
		lead, total	7439-92-1	E420	0.0189 mg/L	0.02 mg/L	94.4	70.0	130	----
		lithium, total	7439-93-2	E420	0.107 mg/L	0.1 mg/L	107	70.0	130	----
		magnesium, total	7439-95-4	E420	0.943 mg/L	1 mg/L	94.3	70.0	130	----
		manganese, total	7439-96-5	E420	0.0194 mg/L	0.02 mg/L	97.1	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0183 mg/L	0.02 mg/L	91.7	70.0	130	----
		nickel, total	7440-02-0	E420	0.0396 mg/L	0.04 mg/L	99.1	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	4.06 mg/L	4 mg/L	102	70.0	130	----
		rubidium, total	7440-17-7	E420	0.0198 mg/L	0.02 mg/L	99.2	70.0	130	----
		selenium, total	7782-49-2	E420	0.0400 mg/L	0.04 mg/L	100	70.0	130	----
		silicon, total	7440-21-3	E420	9.52 mg/L	10 mg/L	95.2	70.0	130	----
		silver, total	7440-22-4	E420	0.00381 mg/L	0.004 mg/L	95.3	70.0	130	----
		sodium, total	17341-25-2	E420	2.12 mg/L	2 mg/L	106	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	19.5 mg/L	20 mg/L	97.3	70.0	130	----
		tellurium, total	13494-80-9	E420	0.0355 mg/L	0.04 mg/L	88.7	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: 239784) - continued										
VA21B3851-003	SW-6	thallium, total	7440-28-0	E420	0.00362 mg/L	0.004 mg/L	90.4	70.0	130	----
		thorium, total	7440-29-1	E420	0.0196 mg/L	0.02 mg/L	98.1	70.0	130	----
		tin, total	7440-31-5	E420	0.0185 mg/L	0.02 mg/L	92.6	70.0	130	----
		titanium, total	7440-32-6	E420	0.0392 mg/L	0.04 mg/L	98.1	70.0	130	----
		tungsten, total	7440-33-7	E420	0.0181 mg/L	0.02 mg/L	90.6	70.0	130	----
		uranium, total	7440-61-1	E420	0.00397 mg/L	0.004 mg/L	99.2	70.0	130	----
		vanadium, total	7440-62-2	E420	0.100 mg/L	0.1 mg/L	100	70.0	130	----
		zinc, total	7440-66-6	E420	0.399 mg/L	0.4 mg/L	99.8	70.0	130	----
		zirconium, total	7440-67-7	E420	0.0386 mg/L	0.04 mg/L	96.5	70.0	130	----
Total Metals (QCLot: 240324)										
VA21B3835-008	Anonymous	mercury, total	7439-97-6	E508	0.0000979 mg/L	0.0001 mg/L	97.9	70.0	130	----
Total Metals (QCLot: 240447)										
VA21B3851-005	Dup	aluminum, total	7429-90-5	E420	0.175 mg/L	0.2 mg/L	87.7	70.0	130	----
		antimony, total	7440-36-0	E420	0.0193 mg/L	0.02 mg/L	96.5	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0190 mg/L	0.02 mg/L	94.8	70.0	130	----
		barium, total	7440-39-3	E420	0.0186 mg/L	0.02 mg/L	93.2	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0411 mg/L	0.04 mg/L	103	70.0	130	----
		bismuth, total	7440-69-9	E420	0.01000 mg/L	0.01 mg/L	100.0	70.0	130	----
		boron, total	7440-42-8	E420	0.101 mg/L	0.1 mg/L	101	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00396 mg/L	0.004 mg/L	98.9	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	0.0102 mg/L	0.01 mg/L	102	70.0	130	----
		chromium, total	7440-47-3	E420	0.0388 mg/L	0.04 mg/L	97.1	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0193 mg/L	0.02 mg/L	96.5	70.0	130	----
		copper, total	7440-50-8	E420	0.0197 mg/L	0.02 mg/L	98.5	70.0	130	----
		iron, total	7439-89-6	E420	1.94 mg/L	2 mg/L	96.8	70.0	130	----
		lead, total	7439-92-1	E420	0.0199 mg/L	0.02 mg/L	99.6	70.0	130	----
		lithium, total	7439-93-2	E420	0.102 mg/L	0.1 mg/L	102	70.0	130	----
		magnesium, total	7439-95-4	E420	0.885 mg/L	1 mg/L	88.5	70.0	130	----
		manganese, total	7439-96-5	E420	0.0186 mg/L	0.02 mg/L	93.1	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0196 mg/L	0.02 mg/L	98.0	70.0	130	----
		nickel, total	7440-02-0	E420	0.0385 mg/L	0.04 mg/L	96.2	70.0	130	----
		phosphorus, total	7723-14-0	E420	9.51 mg/L	10 mg/L	95.1	70.0	130	----
		potassium, total	7440-09-7	E420	3.97 mg/L	4 mg/L	99.2	70.0	130	----
		rubidium, total	7440-17-7	E420	0.0194 mg/L	0.02 mg/L	97.2	70.0	130	----
		selenium, total	7782-49-2	E420	0.0431 mg/L	0.04 mg/L	108	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: 240447) - continued										
VA21B3851-005	Dup	silicon, total	7440-21-3	E420	9.13 mg/L	10 mg/L	91.3	70.0	130	----
		silver, total	7440-22-4	E420	0.00390 mg/L	0.004 mg/L	97.6	70.0	130	----
		sodium, total	17341-25-2	E420	1.84 mg/L	2 mg/L	92.1	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	21.1 mg/L	20 mg/L	105	70.0	130	----
		tellurium, total	13494-80-9	E420	0.0399 mg/L	0.04 mg/L	99.7	70.0	130	----
		thallium, total	7440-28-0	E420	0.00391 mg/L	0.004 mg/L	97.7	70.0	130	----
		thorium, total	7440-29-1	E420	0.0207 mg/L	0.02 mg/L	104	70.0	130	----
		tin, total	7440-31-5	E420	0.0197 mg/L	0.02 mg/L	98.5	70.0	130	----
		titanium, total	7440-32-6	E420	0.0384 mg/L	0.04 mg/L	96.0	70.0	130	----
		tungsten, total	7440-33-7	E420	0.0195 mg/L	0.02 mg/L	97.4	70.0	130	----
		uranium, total	7440-61-1	E420	0.00407 mg/L	0.004 mg/L	102	70.0	130	----
		vanadium, total	7440-62-2	E420	0.0984 mg/L	0.1 mg/L	98.4	70.0	130	----
		zinc, total	7440-66-6	E420	0.402 mg/L	0.4 mg/L	101	70.0	130	----
		zirconium, total	7440-67-7	E420	0.0409 mg/L	0.04 mg/L	102	70.0	130	----
Dissolved Metals (QCLot: 239192)										
VA21B3562-002	Anonymous	aluminum, dissolved	7429-90-5	E421	0.197 mg/L	0.2 mg/L	98.7	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.0200 mg/L	0.02 mg/L	100	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.0202 mg/L	0.02 mg/L	101	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	0.0375 mg/L	0.04 mg/L	93.7	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.00927 mg/L	0.01 mg/L	92.7	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.094 mg/L	0.1 mg/L	94.0	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.00372 mg/L	0.004 mg/L	93.1	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	0.0102 mg/L	0.01 mg/L	102	70.0	130	----
		chromium, dissolved	7440-47-3	E421	0.0388 mg/L	0.04 mg/L	97.0	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.0186 mg/L	0.02 mg/L	93.3	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.0181 mg/L	0.02 mg/L	90.7	70.0	130	----
		iron, dissolved	7439-89-6	E421	1.84 mg/L	2 mg/L	92.0	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.0183 mg/L	0.02 mg/L	91.4	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.0896 mg/L	0.1 mg/L	89.6	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	0.0210 mg/L	0.02 mg/L	105	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.0369 mg/L	0.04 mg/L	92.2	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
Dissolved Metals (QCLot: 239192) - continued										
VA21B3562-002	Anonymous	phosphorus, dissolved	7723-14-0	E421	11.4 mg/L	10 mg/L	114	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	0.0194 mg/L	0.02 mg/L	97.1	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.0391 mg/L	0.04 mg/L	97.7	70.0	130	----
		silicon, dissolved	7440-21-3	E421	9.17 mg/L	10 mg/L	91.7	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.00370 mg/L	0.004 mg/L	92.4	70.0	130	----
		sodium, dissolved	17341-25-2	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	ND mg/L	20 mg/L	ND	70.0	130	----
		tellurium, dissolved	13494-80-9	E421	0.0396 mg/L	0.04 mg/L	98.9	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.00362 mg/L	0.004 mg/L	90.6	70.0	130	----
		thorium, dissolved	7440-29-1	E421	0.0202 mg/L	0.02 mg/L	101	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.0190 mg/L	0.02 mg/L	94.8	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.0411 mg/L	0.04 mg/L	103	70.0	130	----
		tungsten, dissolved	7440-33-7	E421	0.0198 mg/L	0.02 mg/L	99.1	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.00387 mg/L	0.004 mg/L	96.8	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.103 mg/L	0.1 mg/L	103	70.0	130	----
		zinc, dissolved	7440-66-6	E421	0.373 mg/L	0.4 mg/L	93.2	70.0	130	----
		zirconium, dissolved	7440-67-7	E421	0.0433 mg/L	0.04 mg/L	108	70.0	130	----
Dissolved Metals (QCLot: 240094)										
VA21B3851-001	SW-1	mercury, dissolved	7439-97-6	E509	0.0000962 mg/L	0.0001 mg/L	96.2	70.0	130	----
Aggregate Organics (QCLot: 242930)										
VA21B3819-001	Anonymous	chemical oxygen demand [COD]	----	E559	99 mg/L	100 mg/L	99.0	75.0	125	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 17 -

Page 1 of

Affix ALS barcode label here
(lab use only)

ALS Environmental
www.alsglobal.com

Environmental Division Vancouver
Work Order Reference
VA21B3851

Telephone : +1 604 253 4188

Toll Free: 1 800 668 9878

Report To	Contact and	Report Format / Distribution	Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)
Company:	Regional District	Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)	Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply
Contact:	Hannah Shinton	Quality Control (QC) Report with Report ☑ YES ☐ NO	PRIORITY (Business Days): 4 day [P4-20%] ☐ / 3 day [P3-25%] ☐ / 2 day [P2-50%] ☐
Phone:	250-615-6100	☑ Compare Results to Criteria on Report - provide details below if box checked	EMERGENCY: 1 Business day [E1 - 100%] ☐ / Same Day, Weekend or Statutory holiday [E2 -200% (Laboratory opening fees may apply)] ☐
	Company address	Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX	
Street:	4545 Lazelle Ave	Email 1 or Fax hshinton@rdks.bc.ca	Date and Time Required for all E&P TATs:
City/Province:	Terrace/BC	Email 2 nveikle@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	
Invoice To	Same as Report To ☑ YES ☐ NO	**Invoice Distribution**	**Analysis Request**
	Copy of Invoice with Report ☑ YES ☐ NO	Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX	Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below
Company:	Regional District of Kitimat-Stikine	Email 1 or Fax anne-maries@rdks.bc.ca; nveikle@rdks.bc.ca	
Contact:	Nicki Veikle	Email 2	

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

ALS Lab Work Order # (lab use only): Sampler: H.Shinton

Terrace Shipping ☐ Ground ☑ Air
Coolers 1 # Carbouys

ALS Sample # (lab use only)	Sample Identification and/or Coord (This description will appear on the re	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Dissolved metals	Total metals	Alkilinity (as CaCO3)	Total Hardness	Dissolved Hardness	Ammonia	Fluoride, Chloride	COD and BOD	sulphate	Nitrate and Nitrite	TSS	total Kjeldahl nitrogen	pH, Conductivity	Total phosphorus	ortho-phosphorus	SAMPLES ON HOLD	Sample is hazardous (please provide further detail	NUMBER OF CONTAINERS
					F/P	P				P		P				P		P	P			
	SW-1	6-Jul-21	1:55	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			
	SW-3	6-Jul-21	12:44	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			
	SW-6	6-Jul-21	3:00	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			
	SW-21	7-Jul-21	9:45	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			
	DUP	6-Jul-21	12:00	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			
	Field Blank	6-Jul-21	3:30	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			
	Travel Blank	6-Jul-21	--	Water		R				R	R	R										

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

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐
Ice Packs ☑ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐
Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
2.7				8			

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Hannah Shinton	Date: July 7th 2021	Time:	Received by: Chris	Date: 7 July 21	Time: 1345	Received by:	Date: JUL 07 2021	Time: 9AM

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

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

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

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

COC Number: 17 -

Affix ALS barcode label here (lab use only)

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:	☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)	Regular [R]	☑ Standard TAT if received by 3 pm - business days - no surcharges apply
Contact:	Hannah Shinton	Quality Control (QC) Report with Report	☑ YES ☐ NO	PRIORITY (Business Days): 4 day [P4-20%] ☐	EMERGENCY: 1 Business day [E1 - 100%] ☐
Phone:	250-615-6100	☑ Compare Results to Criteria on Report - provide details below if box checked		3 day [P3-25%] ☐	Same Day, Weekend or Statutory holiday [E2 -200% (Laboratory opening fees may apply)] ☐
	Company address below will appear on the final report	Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX	2 day [P2-50%] ☐	
Street:	4545 Lazelle Avenue	Email 1 or Fax	hshinton@rdks.bc.ca	Date and Time Required for all E&P TATs:	
City/Province:	Terrace/BC	Email 2	nveikle@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		
Invoice To	Same as Report To ☐ YES ☑ NO	**Invoice Distribution**		**Analysis Request**	
	Copy of Invoice with Report ☑ YES ☐ NO	Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX	Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below	
Company:	Regional District of Kitimat-Stikine	Email 1 or Fax	anne-maries@rdks.bc.ca, nveikle@rdks.bc.ca		
Contact:	Nicki Veikle	Email 2			

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: H. Shinton

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Dissolved metals	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
					F/P	P		P					P	P	P							
	BH-96-2	06-July-21	12:00	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			
	[redacted]																					
	[redacted]																					

Terrace Shipping
1 Coolers
Carbouys
Ground ☐
Air ☑

Environmental Division
Vancouver
Work Order Reference
VA21B3852

Telephone : +1 604 253 4188

(electronic COC only)

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Crit... n list below
Are samples taken from a Regulated DW System? ☐ YES ☑ NO	British Columbia Approved and Working Water Quality Guidelines (MAY, 2015)
Are samples for human consumption/ use? ☐ YES ☑ NO	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

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

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
3.8				8			

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Hannah Shinton	Date: July 7th, 2021	Time:	Received by:	Date: 7 July 21	Time: 1345	Received by:	Date: JUL 07 2021	Time: 1345

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

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

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

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **VA21C2228**	Page	: 1 of 6
Client	: **Regional District of Kitimat-Stikine**	Laboratory	: Vancouver - Environmental
Contact	: Hannah Shinton	Account Manager	: Amber Springer
Address	: # 300 - 4545 Lazelle Avenue Terrace BC Canada V8G 4E1	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: Thornhill Groundwater	Date Samples Received	: 07-Oct-2021 21:10
PO	: ----	Date Analysis Commenced	: 09-Oct-2021
C-O-C number	: ----	Issue Date	: 25-Oct-2021 15:58
Sampler	: HS		
Site	:		
Quote number	: Q62338		
No. of samples received	: 5		
No. of samples analysed	: 5		

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.

Signatories	*Position*	*Laboratory Department*
Angelo Salandanan	Lab Assistant	Metals, Burnaby, British Columbia
Caleb Deroche	Lab Analyst	Metals, Burnaby, British Columbia
Dee Lee	Analyst	Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, 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).

Unit	*Description*
-	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.

Qualifiers

Qualifier	*Description*
DLA	*Detection Limit adjusted for required dilution.*
DLM	*Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).*
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**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BH-96-2	MW21-01	MW21-02	MW21-03	Field Blank
					Client sampling date / time	06-Oct-2021 13:53	06-Oct-2021 14:45	06-Oct-2021 13:05	06-Oct-2021 15:38	06-Oct-2021 13:55
						VA21C2228-001	VA21C2228-002	VA21C2228-003	VA21C2228-004	VA21C2228-005
						Result	Result	Result	Result	Result
Physical Tests										
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		238	155	262	186	<1.0
conductivity	----	E100	2.0	µS/cm		425	322	458	333	<2.0
hardness (as CaCO3), dissolved	----	EC100	0.60	mg/L		106	143	161	159	<0.60
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L		109	162	197	177	<0.60
pH	----	E108	0.10	pH units		8.55	8.35	8.49	8.14	5.17
solids, total dissolved [TDS]	----	E162	10	mg/L		232	197	292	203	<10
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		0.0622	0.0087	0.202	0.740	<0.0050
chloride	16887-00-6	E235.Cl	0.50	mg/L		0.76	4.85	<0.50	0.92	<0.50
fluoride	16984-48-8	E235.F	0.020	mg/L		0.154	0.040	0.251	0.076	<0.020
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L		0.175	0.191	0.286	1.03	<0.050
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		0.424	1.22	<0.0050	0.0052	<0.0050
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		0.0035	<0.0010	<0.0010	0.0022	<0.0010
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L		0.0513	0.384	0.414	0.783	<0.0020
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		4.61	8.10	5.12	<0.30	<0.30
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		0.493	5.96	7.51	22.4	<0.0030
antimony, total	7440-36-0	E420	0.00010	mg/L		0.00017	0.00024	0.00021	0.00032	<0.00010
arsenic, total	7440-38-2	E420	0.00010	mg/L		0.00452	0.00318	0.00741	0.0138	<0.00010
barium, total	7440-39-3	E420	0.00010	mg/L		0.0231	0.156	0.115	0.183	<0.00010
beryllium, total	7440-41-7	E420	0.000100	mg/L		<0.000100	0.000235	0.000247	0.000508	<0.000100
bismuth, total	7440-69-9	E420	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000100 DLA	<0.000050
boron, total	7440-42-8	E420	0.010	mg/L		0.140	<0.010	0.146	<0.020 DLA	<0.010
cadmium, total	7440-43-9	E420	0.0000050	mg/L		0.000141	0.000223	0.000741	0.000978	<0.0000050
calcium, total	7440-70-2	E420	0.050	mg/L		16.2	50.2	31.8	44.1	<0.050
cesium, total	7440-46-2	E420	0.000010	mg/L		0.000042	0.000572	0.000582	0.00159	<0.000010
chromium, total	7440-47-3	E420	0.00050	mg/L		0.00062	0.0116	0.00806	0.0218	<0.00050
cobalt, total	7440-48-4	E420	0.00010	mg/L		0.00049	0.00614	0.00770	0.0163	<0.00010
copper, total	7440-50-8	E420	0.00050	mg/L		0.00146	0.0246	0.0315	0.0594	<0.00050
iron, total	7439-89-6	E420	0.010	mg/L		0.638	11.4	9.80	31.2	<0.010

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BH-96-2	MW21-01	MW21-02	MW21-03	Field Blank
					Client sampling date / time	06-Oct-2021 13:53	06-Oct-2021 14:45	06-Oct-2021 13:05	06-Oct-2021 15:38	06-Oct-2021 13:55
						VA21C2228-001	VA21C2228-002	VA21C2228-003	VA21C2228-004	VA21C2228-005
						Result	Result	Result	Result	Result
Total Metals										
lead, total	7439-92-1	E420	0.000050	mg/L		0.000302	0.00443	0.00584	0.0113	<0.000050
lithium, total	7439-93-2	E420	0.0010	mg/L		0.0024	0.0087	0.0097	0.0159	<0.0010
magnesium, total	7439-95-4	E420	0.0050	mg/L		16.6	8.99	28.5	16.2	<0.0050
manganese, total	7439-96-5	E420	0.00010	mg/L		0.0936	0.788	0.566	4.86	<0.00010
mercury, total	7439-97-6	E508	0.0000050	mg/L		<0.0000050	0.0000088	0.0000287	0.0000198	<0.0000050
molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.00339	0.00167	0.00305	0.000463	<0.000050
nickel, total	7440-02-0	E420	0.00050	mg/L		0.00100	0.00779	0.0136	0.0260	<0.00050
phosphorus, total	7723-14-0	E420	0.050	mg/L		<0.050	0.393	0.362	0.758	<0.050
potassium, total	7440-09-7	E420	0.050	mg/L		11.6	2.93	12.0	2.88	<0.050
rubidium, total	7440-17-7	E420	0.00020	mg/L		0.00066	0.00458	0.00367	0.0106	<0.00020
selenium, total	7782-49-2	E420	0.000050	mg/L		0.000112	<0.000050	0.000228	0.000131	<0.000050
silicon, total	7440-21-3	E420	0.10	mg/L		4.82	12.2	14.3	31.9	<0.10
silver, total	7440-22-4	E420	0.000010	mg/L		<0.000010	0.000062	0.000041	0.000118	<0.000010
sodium, total	17341-25-2	E420	0.050	mg/L		46.3	7.47	33.8	3.82	<0.050
strontium, total	7440-24-6	E420	0.00020	mg/L		0.195	0.238	0.273	0.192	<0.00020
sulfur, total	7704-34-9	E420	0.50	mg/L		1.94	2.65	2.11	<1.00 DLA	<0.50
tellurium, total	13494-80-9	E420	0.00020	mg/L		<0.00020	<0.00020	<0.00020	<0.00040 DLA	<0.00020
thallium, total	7440-28-0	E420	0.000010	mg/L		<0.000010	0.000041	0.000091	0.000088	<0.000010
thorium, total	7440-29-1	E420	0.00010	mg/L		<0.00010	0.00065	0.00039	0.00034	<0.00010
tin, total	7440-31-5	E420	0.00010	mg/L		<0.00010	0.00097	<0.00010	0.00020	<0.00010
titanium, total	7440-32-6	E420	0.00030	mg/L		0.0123	0.134	0.113	0.329	<0.00030
tungsten, total	7440-33-7	E420	0.00010	mg/L		<0.00010	0.00032	<0.00010	<0.00020 DLA	<0.00010
uranium, total	7440-61-1	E420	0.000010	mg/L		0.00180	0.000968	0.00431	0.000444	<0.000010
vanadium, total	7440-62-2	E420	0.00050	mg/L		0.00155	0.0143	0.0181	0.0498	<0.00050
zinc, total	7440-66-6	E420	0.0030	mg/L		0.0034	0.0372	0.0443	0.106	<0.0030
zirconium, total	7440-67-7	E420	0.00020	mg/L		<0.00020	0.00027	<0.00060 DLM	<0.00200 DLM	<0.00020
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L		0.0039	0.0158	0.0193	0.0424	<0.0010
antimony, dissolved	7440-36-0	E421	0.00010	mg/L		0.00014	0.00011	<0.00010	<0.00010	<0.00010
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		0.00473	0.00042	0.00578	0.0101	<0.00010
barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.0206	0.0633	0.0410	0.0200	<0.00010

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BH-96-2	MW21-01	MW21-02	MW21-03	Field Blank
					Client sampling date / time	06-Oct-2021 13:53	06-Oct-2021 14:45	06-Oct-2021 13:05	06-Oct-2021 15:38	06-Oct-2021 13:55
						VA21C2228-001	VA21C2228-002	VA21C2228-003	VA21C2228-004	VA21C2228-005
						Result	Result	Result	Result	Result
Dissolved Metals										
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		0.154	0.013	0.163	<0.010	<0.010
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L		0.0000341	0.0000204	0.0000138	0.0000447	<0.0000050
calcium, dissolved	7440-70-2	E421	0.050	mg/L		16.2	46.8	24.1	44.8	<0.050
cesium, dissolved	7440-46-2	E421	0.000010	mg/L		<0.000010	0.000013	<0.000010	<0.000010	<0.000010
chromium, dissolved	7440-47-3	E421	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L		<0.00010	0.00023	0.00029	0.00373	<0.00010
copper, dissolved	7440-50-8	E421	0.00020	mg/L		0.00146	0.00180	0.00055	0.00036	<0.00020
iron, dissolved	7439-89-6	E421	0.010	mg/L		<0.010	0.023	0.020	10.9	<0.010
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		0.0018	0.0040	0.0033	<0.0010	<0.0010
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L		15.9	6.40	24.4	11.5	<0.0050
manganese, dissolved	7439-96-5	E421	0.00010	mg/L		0.0241	0.0526	0.133	4.82	<0.00010
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		0.00388	0.00224	0.00836 DTMF	0.000309	<0.000050
nickel, dissolved	7440-02-0	E421	0.00050	mg/L		<0.00050	<0.00050	0.00093	0.00109	<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		11.6	2.29	11.5	1.33	<0.050
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L		0.00040	0.00120	0.00059	0.00098	<0.00020
selenium, dissolved	7782-49-2	E421	0.000050	mg/L		0.000163	<0.000050	0.000193	0.000072	<0.000050
silicon, dissolved	7440-21-3	E421	0.050	mg/L		4.40	5.14	4.82	7.67	<0.050
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		46.1	6.93	34.0	3.40	<0.050
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		0.199	0.220	0.244	0.186	<0.00020
sulfur, dissolved	7704-34-9	E421	0.50	mg/L		1.85	3.26	2.53	<0.50	<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	0.000016	<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	0.00017	<0.00010	<0.00010	<0.00010
titanium, dissolved	7440-32-6	E421	0.00030	mg/L		<0.00030	<0.00030	0.00032	0.00257	<0.00030

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID: BH-96-2	MW21-01	MW21-02	MW21-03	Field Blank
					Client sampling date / time: 06-Oct-2021 13:53	06-Oct-2021 14:45	06-Oct-2021 13:05	06-Oct-2021 15:38	06-Oct-2021 13:55
					VA21C2228-001	VA21C2228-002	VA21C2228-003	VA21C2228-004	VA21C2228-005
					Result	Result	Result	Result	Result
Dissolved Metals									
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	0.00018	0.00010	<0.00010	<0.00010
uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.00172	0.000599	0.00364	0.000020	<0.000010
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	<0.00050	0.00172	<0.00050
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0018	0.0014	<0.0010	0.0029	<0.0010
zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	<0.00020	<0.00020	<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									
chemical oxygen demand [COD]	----	E559	20	mg/L	<20	24	33	130	<20

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA21C2228**	Page	: 1 of 16
Client	: **Regional District of Kitimat-Stikine**	Laboratory	: Vancouver - Environmental
Contact	: Hannah Shinton	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	: 07-Oct-2021 21:10
PO	: ----	Issue Date	: 25-Oct-2021 15:58
C-O-C number	: ----		
Sampler	: HS		
Site	:		
Quote number	: Q62338		
No. of samples received	: 5		
No. of samples analysed	: 5		

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 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
BH-96-2	E559	06-Oct-2021	----	----	----		23-Oct-2021	28 days	17 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
Field Blank	E559	06-Oct-2021	----	----	----		23-Oct-2021	28 days	17 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
MW21-01	E559	06-Oct-2021	----	----	----		23-Oct-2021	28 days	17 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
MW21-02	E559	06-Oct-2021	----	----	----		23-Oct-2021	28 days	17 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
MW21-03	E559	06-Oct-2021	----	----	----		23-Oct-2021	28 days	17 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
BH-96-2	E298	06-Oct-2021	21-Oct-2021	----	----		22-Oct-2021	28 days	16 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
Field Blank	E298	06-Oct-2021	21-Oct-2021	----	----		22-Oct-2021	28 days	16 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	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) MW21-01	E298	06-Oct-2021	21-Oct-2021	----	----		22-Oct-2021	28 days	16 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) MW21-02	E298	06-Oct-2021	21-Oct-2021	----	----		22-Oct-2021	28 days	16 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) MW21-03	E298	06-Oct-2021	21-Oct-2021	----	----		22-Oct-2021	28 days	16 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE BH-96-2	E235.Cl	06-Oct-2021	----	----	----		10-Oct-2021	28 days	4 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE Field Blank	E235.Cl	06-Oct-2021	----	----	----		10-Oct-2021	28 days	4 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE MW21-01	E235.Cl	06-Oct-2021	----	----	----		10-Oct-2021	28 days	4 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE MW21-02	E235.Cl	06-Oct-2021	----	----	----		10-Oct-2021	28 days	4 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE MW21-03	E235.Cl	06-Oct-2021	----	----	----		10-Oct-2021	28 days	4 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE BH-96-2	E235.F	06-Oct-2021	----	----	----		10-Oct-2021	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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
Field Blank	E235.F	06-Oct-2021	----	----	----		10-Oct-2021	28 days	4 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
MW21-01	E235.F	06-Oct-2021	----	----	----		10-Oct-2021	28 days	4 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
MW21-02	E235.F	06-Oct-2021	----	----	----		10-Oct-2021	28 days	4 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
MW21-03	E235.F	06-Oct-2021	----	----	----		10-Oct-2021	28 days	4 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
BH-96-2	E235.NO3-L	06-Oct-2021	----	----	----		10-Oct-2021	3 days	4 days	× EHT
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
Field Blank	E235.NO3-L	06-Oct-2021	----	----	----		10-Oct-2021	3 days	4 days	× EHT
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
MW21-01	E235.NO3-L	06-Oct-2021	----	----	----		10-Oct-2021	3 days	4 days	× EHT
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
MW21-02	E235.NO3-L	06-Oct-2021	----	----	----		10-Oct-2021	3 days	4 days	× EHT
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
MW21-03	E235.NO3-L	06-Oct-2021	----	----	----		10-Oct-2021	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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
BH-96-2	E235.NO2-L	06-Oct-2021	----	----	----		10-Oct-2021	3 days	4 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
Field Blank	E235.NO2-L	06-Oct-2021	----	----	----		10-Oct-2021	3 days	4 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
MW21-01	E235.NO2-L	06-Oct-2021	----	----	----		10-Oct-2021	3 days	4 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
MW21-02	E235.NO2-L	06-Oct-2021	----	----	----		10-Oct-2021	3 days	4 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
MW21-03	E235.NO2-L	06-Oct-2021	----	----	----		10-Oct-2021	3 days	4 days	× EHT
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
BH-96-2	E235.SO4	06-Oct-2021	----	----	----		10-Oct-2021	28 days	4 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
Field Blank	E235.SO4	06-Oct-2021	----	----	----		10-Oct-2021	28 days	4 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
MW21-01	E235.SO4	06-Oct-2021	----	----	----		10-Oct-2021	28 days	4 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
MW21-02	E235.SO4	06-Oct-2021	----	----	----		10-Oct-2021	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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
MW21-03	E235.SO4	06-Oct-2021	----	----	----		10-Oct-2021	28 days	4 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
BH-96-2	E318	06-Oct-2021	21-Oct-2021	----	----		24-Oct-2021	28 days	18 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
Field Blank	E318	06-Oct-2021	21-Oct-2021	----	----		24-Oct-2021	28 days	18 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
MW21-01	E318	06-Oct-2021	21-Oct-2021	----	----		24-Oct-2021	28 days	18 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
MW21-02	E318	06-Oct-2021	21-Oct-2021	----	----		24-Oct-2021	28 days	18 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
MW21-03	E318	06-Oct-2021	21-Oct-2021	----	----		24-Oct-2021	28 days	18 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid)										
BH-96-2	E372-U	06-Oct-2021	21-Oct-2021	----	----		22-Oct-2021	28 days	16 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid)										
Field Blank	E372-U	06-Oct-2021	21-Oct-2021	----	----		22-Oct-2021	28 days	16 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid)										
MW21-01	E372-U	06-Oct-2021	21-Oct-2021	----	----		22-Oct-2021	28 days	16 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	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid)										
MW21-02	E372-U	06-Oct-2021	21-Oct-2021	----	----		22-Oct-2021	28 days	16 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid)										
MW21-03	E372-U	06-Oct-2021	21-Oct-2021	----	----		22-Oct-2021	28 days	16 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
BH-96-2	E509	06-Oct-2021	20-Oct-2021	----	----		20-Oct-2021	28 days	14 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
Field Blank	E509	06-Oct-2021	20-Oct-2021	----	----		20-Oct-2021	28 days	14 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
MW21-01	E509	06-Oct-2021	20-Oct-2021	----	----		20-Oct-2021	28 days	14 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
MW21-02	E509	06-Oct-2021	20-Oct-2021	----	----		20-Oct-2021	28 days	14 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
MW21-03	E509	06-Oct-2021	20-Oct-2021	----	----		20-Oct-2021	28 days	14 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid)										
BH-96-2	E421	06-Oct-2021	14-Oct-2021	----	----		14-Oct-2021	180 days	9 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid)										
Field Blank	E421	06-Oct-2021	14-Oct-2021	----	----		14-Oct-2021	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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) MW21-01	E421	06-Oct-2021	14-Oct-2021	----	----		14-Oct-2021	180 days	9 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) MW21-02	E421	06-Oct-2021	14-Oct-2021	----	----		14-Oct-2021	180 days	9 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) MW21-03	E421	06-Oct-2021	14-Oct-2021	----	----		14-Oct-2021	180 days	9 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE BH-96-2	E290	06-Oct-2021	----	----	----		12-Oct-2021	14 days	6 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE Field Blank	E290	06-Oct-2021	----	----	----		12-Oct-2021	14 days	6 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE MW21-01	E290	06-Oct-2021	----	----	----		12-Oct-2021	14 days	6 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE MW21-02	E290	06-Oct-2021	----	----	----		12-Oct-2021	14 days	6 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE MW21-03	E290	06-Oct-2021	----	----	----		12-Oct-2021	14 days	6 days	✓
Physical Tests : Conductivity in Water										
HDPE BH-96-2	E100	06-Oct-2021	----	----	----		12-Oct-2021	28 days	6 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	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Conductivity in Water										
HDPE Field Blank	E100	06-Oct-2021	----	----	----		12-Oct-2021	28 days	6 days	✓
Physical Tests : Conductivity in Water										
HDPE MW21-01	E100	06-Oct-2021	----	----	----		12-Oct-2021	28 days	6 days	✓
Physical Tests : Conductivity in Water										
HDPE MW21-02	E100	06-Oct-2021	----	----	----		12-Oct-2021	28 days	6 days	✓
Physical Tests : Conductivity in Water										
HDPE MW21-03	E100	06-Oct-2021	----	----	----		12-Oct-2021	28 days	6 days	✓
Physical Tests : pH by Meter										
HDPE MW21-03	E108	06-Oct-2021	----	----	----		12-Oct-2021	0.25 hrs	134 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE MW21-01	E108	06-Oct-2021	----	----	----		12-Oct-2021	0.25 hrs	135 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE BH-96-2	E108	06-Oct-2021	----	----	----		12-Oct-2021	0.25 hrs	136 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE Field Blank	E108	06-Oct-2021	----	----	----		12-Oct-2021	0.25 hrs	136 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE MW21-02	E108	06-Oct-2021	----	----	----		12-Oct-2021	0.25 hrs	137 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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : TDS by Gravimetry										
HDPE										
BH-96-2	E162	06-Oct-2021	----	----	----		15-Oct-2021	7 days	9 days	× EHT
Physical Tests : TDS by Gravimetry										
HDPE										
Field Blank	E162	06-Oct-2021	----	----	----		15-Oct-2021	7 days	9 days	× EHT
Physical Tests : TDS by Gravimetry										
HDPE										
MW21-01	E162	06-Oct-2021	----	----	----		15-Oct-2021	7 days	9 days	× EHT
Physical Tests : TDS by Gravimetry										
HDPE										
MW21-02	E162	06-Oct-2021	----	----	----		15-Oct-2021	7 days	9 days	× EHT
Physical Tests : TDS by Gravimetry										
HDPE										
MW21-03	E162	06-Oct-2021	----	----	----		15-Oct-2021	7 days	9 days	× EHT
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
BH-96-2	E508	06-Oct-2021	----	----	----		16-Oct-2021	28 days	10 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
Field Blank	E508	06-Oct-2021	----	----	----		16-Oct-2021	28 days	10 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
MW21-01	E508	06-Oct-2021	----	----	----		16-Oct-2021	28 days	10 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
MW21-02	E508	06-Oct-2021	----	----	----		16-Oct-2021	28 days	10 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	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
MW21-03	E508	06-Oct-2021	----	----	----		16-Oct-2021	28 days	10 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
BH-96-2	E420	06-Oct-2021	----	----	----		21-Oct-2021	180 days	15 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
Field Blank	E420	06-Oct-2021	----	----	----		21-Oct-2021	180 days	15 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
MW21-01	E420	06-Oct-2021	----	----	----		21-Oct-2021	180 days	15 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
MW21-02	E420	06-Oct-2021	----	----	----		21-Oct-2021	180 days	15 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
MW21-03	E420	06-Oct-2021	----	----	----		21-Oct-2021	180 days	15 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			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	316095	1	15	6.6	5.0	✓
Ammonia by Fluorescence	E298	325616	1	17	5.8	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	327880	1	19	5.2	5.0	✓
Chloride in Water by IC	E235.Cl	316099	1	18	5.5	5.0	✓
Conductivity in Water	E100	316096	1	13	7.6	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	324977	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	317273	1	18	5.5	5.0	✓
Fluoride in Water by IC	E235.F	316098	1	18	5.5	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	316100	1	13	7.6	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	316101	1	18	5.5	5.0	✓
pH by Meter	E108	316094	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	316102	1	18	5.5	5.0	✓
TDS by Gravimetry	E162	320261	1	20	5.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	325617	1	16	6.2	5.0	✓
Total Mercury in Water by CVAAS	E508	321284	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	324057	2	34	5.8	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	326184	1	19	5.2	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	316095	1	15	6.6	5.0	✓
Ammonia by Fluorescence	E298	325616	1	17	5.8	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	327880	1	19	5.2	5.0	✓
Chloride in Water by IC	E235.Cl	316099	1	18	5.5	5.0	✓
Conductivity in Water	E100	316096	1	13	7.6	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	324977	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	317273	1	18	5.5	5.0	✓
Fluoride in Water by IC	E235.F	316098	1	18	5.5	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	316100	1	13	7.6	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	316101	1	18	5.5	5.0	✓
pH by Meter	E108	316094	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	316102	1	18	5.5	5.0	✓
TDS by Gravimetry	E162	320261	1	20	5.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	325617	1	16	6.2	5.0	✓
Total Mercury in Water by CVAAS	E508	321284	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	324057	2	34	5.8	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	326184	1	19	5.2	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	316095	1	15	6.6	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Method Blanks (MB) - Continued							
Ammonia by Fluorescence	E298	325616	1	17	5.8	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	327880	1	19	5.2	5.0	✓
Chloride in Water by IC	E235.Cl	316099	1	18	5.5	5.0	✓
Conductivity in Water	E100	316096	1	13	7.6	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	324977	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	317273	1	18	5.5	5.0	✓
Fluoride in Water by IC	E235.F	316098	1	18	5.5	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	316100	1	13	7.6	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	316101	1	18	5.5	5.0	✓
Sulfate in Water by IC	E235.SO4	316102	1	18	5.5	5.0	✓
TDS by Gravimetry	E162	320261	1	20	5.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	325617	1	16	6.2	5.0	✓
Total Mercury in Water by CVAAS	E508	321284	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	324057	2	34	5.8	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	326184	1	19	5.2	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	325616	1	17	5.8	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	327880	1	19	5.2	5.0	✓
Chloride in Water by IC	E235.Cl	316099	1	18	5.5	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	324977	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	317273	1	18	5.5	5.0	✓
Fluoride in Water by IC	E235.F	316098	1	18	5.5	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	316100	1	13	7.6	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	316101	1	18	5.5	5.0	✓
Sulfate in Water by IC	E235.SO4	316102	1	18	5.5	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	325617	1	16	6.2	5.0	✓
Total Mercury in Water by CVAAS	E508	321284	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	324057	2	34	5.8	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	326184	1	19	5.2	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.
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 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).

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
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.
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.
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.
Dissolved Hardness (Calculated)	EC100 Vancouver - Environmental	Water	APHA 2340B	“Hardness (as CaCO3), 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 CaCO3), 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
Preparation for Ammonia	EP298	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
	Vancouver - Environmental			
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 HNO3.
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	: **VA21C2228**	Page	: 1 of 22
Client	: Regional District of Kitimat-Stikine	Laboratory	: Vancouver - Environmental
Contact	: Hannah Shinton	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	: 07-Oct-2021 21:10
PO	: ----	Date Analysis Commenced	: 09-Oct-2021
C-O-C number	: ----	Issue Date	: 25-Oct-2021 15:58
Sampler	: HS		
Site	:		
Quote number	: Q62338		
No. of samples received	: 5		
No. of samples analysed	: 5		

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.

Signatories	*Position*	*Laboratory Department*
Angelo Salandanan	Lab Assistant	Metals, Burnaby, British Columbia
Caleb Deroche	Lab Analyst	Metals, Burnaby, British Columbia
Dee Lee	Analyst	Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia

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: 316094)											
VA21C2228-001	BH-96-2	pH	----	E108	0.10	pH units	8.55	8.54	0.117%	4%	----
Physical Tests (QC Lot: 316095)											
VA21C2228-001	BH-96-2	alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	238	235	1.27%	20%	----
Physical Tests (QC Lot: 316096)											
VA21C2228-001	BH-96-2	conductivity	----	E100	2.0	µS/cm	425	418	1.66%	10%	----
Physical Tests (QC Lot: 320261)											
KS2103303-001	Anonymous	solids, total dissolved [TDS]	----	E162	20	mg/L	727	732	0.685%	20%	----
Anions and Nutrients (QC Lot: 316098)											
VA21C2299-007	Anonymous	fluoride	16984-48-8	E235.F	0.400	mg/L	<0.400	<0.400	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 316099)											
VA21C2299-007	Anonymous	chloride	16887-00-6	E235.Cl	10.0	mg/L	51.6	51.6	0.02	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 316100)											
VA21C2299-007	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.100	mg/L	116	116	0.262%	20%	----
Anions and Nutrients (QC Lot: 316101)											
VA21C2299-007	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.0200	mg/L	<0.0200	<0.0200	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 316102)											
VA21C2299-007	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	6.00	mg/L	2450	2440	0.0662%	20%	----
Anions and Nutrients (QC Lot: 325616)											
FJ2101127-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 325617)											
FJ2101127-001	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	0.291	0.313	0.022	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 326184)											
FJ2101127-001	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	<0.0020	0.0020	0.00006	Diff <2x LOR	----
Total Metals (QC Lot: 321284)											
VA21C2226-007	Anonymous	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Total Metals (QC Lot: 324057)											
VA21C2226-003	Anonymous	aluminum, total	7429-90-5	E420	0.0030	mg/L	1.22	1.38	12.9%	20%	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	0.00090	0.00093	0.00002	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00592	0.00595	0.428%	20%	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.0901	0.0904	0.361%	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: 324057) - continued											
VA21C2226-003	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	0.000453	0.000448	1.26%	20%	----
		calcium, total	7440-70-2	E420	0.050	mg/L	55.4	55.4	0.0768%	20%	----
		cesium, total	7440-46-2	E420	0.000010	mg/L	0.000593	0.000601	1.36%	20%	----
		chromium, total	7440-47-3	E420	0.00050	mg/L	0.00109	0.00120	0.00011	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	0.00219	0.00218	0.304%	20%	----
		copper, total	7440-50-8	E420	0.00050	mg/L	0.00732	0.00748	2.06%	20%	----
		iron, total	7439-89-6	E420	0.010	mg/L	2.29	2.46	6.91%	20%	----
		lead, total	7439-92-1	E420	0.000050	mg/L	0.00327	0.00330	1.05%	20%	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	0.0030	0.0030	0.00001	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	10.4	10.5	1.10%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.208	0.209	0.370%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00171	0.00181	5.48%	20%	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	0.00437	0.00443	0.00006	Diff <2x LOR	----
		phosphorus, total	7723-14-0	E420	0.050	mg/L	0.116	0.163	0.047	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.050	mg/L	0.606	0.655	7.79%	20%	----
		rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00056	0.00082	0.00026	Diff <2x LOR	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	0.00124	0.00104	18.3%	20%	----
		silicon, total	7440-21-3	E420	0.10	mg/L	3.07	3.23	4.99%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	0.000037	0.000040	0.000002	Diff <2x LOR	----
		sodium, total	17341-25-2	E420	0.050	mg/L	2.21	2.14	2.89%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.444	0.420	5.45%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	41.1	38.9	5.44%	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	0.000034	0.000037	0.000004	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	0.161	0.182	12.7%	20%	----
		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	0.000224	0.000228	1.63%	20%	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	0.00282	0.00326	0.00044	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	0.0296	0.0301	0.0005	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: 324058)											

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: 324058) - continued											
KS2103329-001	Anonymous	aluminum, total	7429-90-5	E420	0.0100	mg/L	0.0557	0.0564	0.0007	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00514	0.00518	0.610%	20%	----
		barium, total	7440-39-3	E420	0.0200	mg/L	<0.0200	<0.0200	0	Diff <2x LOR	----
		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	0.100	mg/L	<0.100	<0.100	0	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.000200	mg/L	<0.000200	<0.000200	0	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	0.100	mg/L	0.559	0.570	0.011	Diff <2x LOR	----
		cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		chromium, total	7440-47-3	E420	0.00200	mg/L	<0.00200	<0.00200	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	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.030	mg/L	<0.030	<0.030	0	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000500	mg/L	<0.000500	<0.000500	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	<0.100	<0.100	0	Diff <2x LOR	----
		manganese, total	7439-96-5	E420	0.00200	mg/L	<0.00200	<0.00200	0	Diff <2x LOR	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00635	0.00639	0.717%	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	0.057	0.007	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.100	mg/L	0.266	0.276	0.011	Diff <2x LOR	----
		rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00022	0.00024	0.00001	Diff <2x LOR	----
		selenium, total	7782-49-2	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		silicon, total	7440-21-3	E420	0.10	mg/L	17.6	17.8	1.45%	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	2.00	mg/L	75.6	77.1	1.93%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.00173	0.00174	0.000009	Diff <2x LOR	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	3.57	3.60	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	----
		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	0.00200	0.00202	0.928%	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: 324058) - continued											
KS2103329-001	Anonymous	uranium, total	7440-61-1	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	0.00994	0.0103	3.27%	20%	----
		zinc, total	7440-66-6	E420	0.0500	mg/L	<0.0500	<0.0500	0	Diff <2x LOR	----
		zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 317273)											
VA21C1933-001	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0030	mg/L	0.0178	0.0194	0.0015	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	0.00016	0.00018	0.00002	Diff <2x LOR	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0426	0.0431	1.21%	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	0.0000679	0.0000725	6.54%	20%	----
		calcium, dissolved	7440-70-2	E421	0.050	mg/L	21.1	21.3	0.578%	20%	----
		cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	0.00021	0.00021	0.000001	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.0120	0.0123	2.49%	20%	----
		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	<0.0010	<0.0010	0	Diff <2x LOR	----
		magnesium, dissolved	7439-95-4	E421	0.100	mg/L	1.80	1.81	0.385%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.0295	0.0301	1.88%	20%	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000531	0.000530	0.226%	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	0.100	mg/L	1.33	1.33	0.266%	20%	----
		rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00096	0.00107	0.00011	Diff <2x LOR	----
		selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.000137	0.000133	0.000004	Diff <2x LOR	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	1.18	1.18	0.0341%	20%	----
		silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, dissolved	17341-25-2	E421	0.050	mg/L	0.782	0.787	0.667%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.156	0.156	0.220%	20%	----
		sulfur, dissolved	7704-34-9	E421	0.50	mg/L	7.83	7.67	2.05%	20%	----
		tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<0.00020	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*
Dissolved Metals (QC Lot: 317273) - continued											
VA21C1933-001	Anonymous	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	0.00030	mg/L	<0.00030	<0.00030	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	0.000122	0.000119	2.23%	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	0.0069	0.0068	0.00005	Diff <2x LOR	----
		zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 324977)											
VA21C2228-001	BH-96-2	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Aggregate Organics (QC Lot: 327880)											
FJ2101148-001	Anonymous	chemical oxygen demand [COD]	----	E559	20	mg/L	56	54	2	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: 316095)						
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 316096)						
conductivity	----	E100	1	µS/cm	1.2	----
Physical Tests (QCLot: 320261)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Anions and Nutrients (QCLot: 316098)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 316099)						
chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 316100)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 316101)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 316102)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 325616)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 325617)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 326184)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Total Metals (QCLot: 321284)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Total Metals (QCLot: 324057)						
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: 324057) - continued						
cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
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: 324058)						
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: 324058) - 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	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
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	----
Dissolved Metals (QCLot: 317273)						
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 317273) - continued						
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	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
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	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 317273) - continued						
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: 324977)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Aggregate Organics (QCLot: 327880)						
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	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 316094)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 316095)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	100	85.0	115	----
Physical Tests (QCLot: 316096)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	108	90.0	110	----
Physical Tests (QCLot: 320261)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	103	85.0	115	----
Anions and Nutrients (QCLot: 316098)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 316099)									
chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 316100)									
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: 316101)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	99.0	90.0	110	----
Anions and Nutrients (QCLot: 316102)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	103	90.0	110	----
Anions and Nutrients (QCLot: 325616)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	98.9	85.0	115	----
Anions and Nutrients (QCLot: 325617)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	100	75.0	125	----
Anions and Nutrients (QCLot: 326184)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	99.7	80.0	120	----
Total Metals (QCLot: 321284)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	98.2	80.0	120	----
Total Metals (QCLot: 324057)									
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	111	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	102	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	102	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	96.9	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 324057) - continued									
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	87.7	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	99.3	80.0	120	----
cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	107	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	101	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	101	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	99.6	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	102	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	110	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	104	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	104	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	101	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	105	80.0	120	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	100	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	108	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	97.9	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	100	80.0	120	----
sodium, total	17341-25-2	E420	0.05	mg/L	50 mg/L	105	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	108	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	84.3	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	104	80.0	120	----
thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	99.5	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	96.6	80.0	120	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	105	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	104	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	103	80.0	120	----
Total Metals (QCLot: 324058)									
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	96.6	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	98.2	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Total Metals (QCLot: 324058) - continued									
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	98.5	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	99.2	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	97.0	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	86.5	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	94.4	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	99.4	80.0	120	----
cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	94.0	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	96.2	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	98.4	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	97.0	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	95.5	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	100	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	95.1	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	95.3	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	97.2	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	96.7	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	97.4	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	108	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	99.9	80.0	120	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	101	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	98.3	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	95.9	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	98.0	80.0	120	----
sodium, total	17341-25-2	E420	0.05	mg/L	50 mg/L	96.3	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	97.8	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	87.4	80.0	120	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	93.3	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	97.8	80.0	120	----
thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	93.5	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	95.8	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	94.6	80.0	120	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	97.6	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	98.8	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	99.1	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	94.4	80.0	120	----
Dissolved Metals (QCLot: 317273)									

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 317273) - continued									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	100	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	108	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	101	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	104	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	102	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	94.1	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	98.2	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	99.4	80.0	120	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	102	80.0	120	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	99.7	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	100	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	103	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	102	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	99.2	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	99.5	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	98.7	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	105	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	100	80.0	120	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	109	80.0	120	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	105	80.0	120	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	104	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	104	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	97.6	80.0	120	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	102	80.0	120	----
sodium, dissolved	17341-25-2	E421	0.05	mg/L	50 mg/L	106	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	101	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	102	80.0	120	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	103	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	105	80.0	120	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	94.8	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	101	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	96.8	80.0	120	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	99.0	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	99.0	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	102	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	105	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: 317273) - continued									
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	102	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	96.4	80.0	120	----
Aggregate Organics (QCLot: 327880)									
chemical oxygen demand [COD]	----	E559	20	mg/L	100 mg/L	111	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: 316098)										
VA21C2299-009	Anonymous	fluoride	16984-48-8	E235.F	21.2 mg/L	20 mg/L	106	75.0	125	----
Anions and Nutrients (QCLot: 316099)										
VA21C2299-009	Anonymous	chloride	16887-00-6	E235.Cl	2080 mg/L	2000 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 316100)										
VA21C2299-009	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	ND mg/L	50 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 316101)										
VA21C2299-009	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	10.2 mg/L	10 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 316102)										
VA21C2299-009	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	ND mg/L	2000 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 325616)										
FJ2101127-002	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.102 mg/L	0.1 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 325617)										
FJ2101127-002	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	2.62 mg/L	2.5 mg/L	105	70.0	130	----
Anions and Nutrients (QCLot: 326184)										
FJ2101127-002	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0442 mg/L	0.05 mg/L	88.4	70.0	130	----
Total Metals (QCLot: 321284)										
VA21C2226-008	Anonymous	mercury, total	7439-97-6	E508	0.0000949 mg/L	0.0001 mg/L	94.9	70.0	130	----
Total Metals (QCLot: 324057)										
VA21C2226-004	Anonymous	aluminum, total	7429-90-5	E420	ND mg/L	0.2 mg/L	ND	70.0	130	----
		antimony, total	7440-36-0	E420	0.0195 mg/L	0.02 mg/L	97.5	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0195 mg/L	0.02 mg/L	97.3	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	0.0427 mg/L	0.04 mg/L	107	70.0	130	----
		bismuth, total	7440-69-9	E420	0.0101 mg/L	0.01 mg/L	101	70.0	130	----
		boron, total	7440-42-8	E420	0.092 mg/L	0.1 mg/L	92.4	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00390 mg/L	0.004 mg/L	97.6	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	0.0102 mg/L	0.01 mg/L	102	70.0	130	----
		chromium, total	7440-47-3	E420	0.0382 mg/L	0.04 mg/L	95.6	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: 324057) - continued										
VA21C2226-004	Anonymous	cobalt, total	7440-48-4	E420	0.0197 mg/L	0.02 mg/L	98.5	70.0	130	----
		copper, total	7440-50-8	E420	0.0192 mg/L	0.02 mg/L	96.0	70.0	130	----
		iron, total	7439-89-6	E420	2.01 mg/L	2 mg/L	101	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	0.104 mg/L	0.1 mg/L	104	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	0.0190 mg/L	0.02 mg/L	94.9	70.0	130	----
		nickel, total	7440-02-0	E420	0.0384 mg/L	0.04 mg/L	95.9	70.0	130	----
		phosphorus, total	7723-14-0	E420	10.4 mg/L	10 mg/L	104	70.0	130	----
		potassium, total	7440-09-7	E420	3.95 mg/L	4 mg/L	98.8	70.0	130	----
		rubidium, total	7440-17-7	E420	0.0194 mg/L	0.02 mg/L	97.0	70.0	130	----
		selenium, total	7782-49-2	E420	0.0424 mg/L	0.04 mg/L	106	70.0	130	----
		silicon, total	7440-21-3	E420	8.64 mg/L	10 mg/L	86.4	70.0	130	----
		silver, total	7440-22-4	E420	0.00398 mg/L	0.004 mg/L	99.4	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	0.0389 mg/L	0.04 mg/L	97.3	70.0	130	----
		thallium, total	7440-28-0	E420	0.00399 mg/L	0.004 mg/L	99.7	70.0	130	----
		thorium, total	7440-29-1	E420	0.0206 mg/L	0.02 mg/L	103	70.0	130	----
		tin, total	7440-31-5	E420	0.0191 mg/L	0.02 mg/L	95.5	70.0	130	----
		titanium, total	7440-32-6	E420	0.0382 mg/L	0.04 mg/L	95.5	70.0	130	----
		tungsten, total	7440-33-7	E420	0.0206 mg/L	0.02 mg/L	103	70.0	130	----
		uranium, total	7440-61-1	E420	0.00397 mg/L	0.004 mg/L	99.2	70.0	130	----
		vanadium, total	7440-62-2	E420	0.101 mg/L	0.1 mg/L	101	70.0	130	----
		zinc, total	7440-66-6	E420	0.378 mg/L	0.4 mg/L	94.5	70.0	130	----
		zirconium, total	7440-67-7	E420	0.0389 mg/L	0.04 mg/L	97.3	70.0	130	----
Total Metals (QCLot: 324058)										
KS2103330-001	Anonymous	aluminum, total	7429-90-5	E420	0.201 mg/L	0.2 mg/L	100	70.0	130	----
		antimony, total	7440-36-0	E420	0.0194 mg/L	0.02 mg/L	97.1	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0198 mg/L	0.02 mg/L	99.0	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	0.0411 mg/L	0.04 mg/L	103	70.0	130	----
		bismuth, total	7440-69-9	E420	0.00926 mg/L	0.01 mg/L	92.6	70.0	130	----
		boron, total	7440-42-8	E420	0.093 mg/L	0.1 mg/L	93.4	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: 324058) - continued										
KS2103330-001	Anonymous	cadmium, total	7440-43-9	E420	0.00368 mg/L	0.004 mg/L	92.0	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	0.00977 mg/L	0.01 mg/L	97.7	70.0	130	----
		chromium, total	7440-47-3	E420	0.0399 mg/L	0.04 mg/L	99.8	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0190 mg/L	0.02 mg/L	95.1	70.0	130	----
		copper, total	7440-50-8	E420	0.0188 mg/L	0.02 mg/L	93.9	70.0	130	----
		iron, total	7439-89-6	E420	1.92 mg/L	2 mg/L	96.2	70.0	130	----
		lead, total	7439-92-1	E420	0.0187 mg/L	0.02 mg/L	93.3	70.0	130	----
		lithium, total	7439-93-2	E420	0.104 mg/L	0.1 mg/L	104	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	0.0198 mg/L	0.02 mg/L	98.9	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0201 mg/L	0.02 mg/L	100	70.0	130	----
		nickel, total	7440-02-0	E420	0.0380 mg/L	0.04 mg/L	95.0	70.0	130	----
		phosphorus, total	7723-14-0	E420	10.6 mg/L	10 mg/L	106	70.0	130	----
		potassium, total	7440-09-7	E420	4.05 mg/L	4 mg/L	101	70.0	130	----
		rubidium, total	7440-17-7	E420	0.0197 mg/L	0.02 mg/L	98.7	70.0	130	----
		selenium, total	7782-49-2	E420	0.0399 mg/L	0.04 mg/L	99.7	70.0	130	----
		silicon, total	7440-21-3	E420	9.07 mg/L	10 mg/L	90.7	70.0	130	----
		silver, total	7440-22-4	E420	0.00385 mg/L	0.004 mg/L	96.2	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	20.6 mg/L	20 mg/L	103	70.0	130	----
		tellurium, total	13494-80-9	E420	0.0350 mg/L	0.04 mg/L	87.6	70.0	130	----
		thallium, total	7440-28-0	E420	0.00373 mg/L	0.004 mg/L	93.3	70.0	130	----
		thorium, total	7440-29-1	E420	0.0215 mg/L	0.02 mg/L	107	70.0	130	----
		tin, total	7440-31-5	E420	0.0197 mg/L	0.02 mg/L	98.7	70.0	130	----
		titanium, total	7440-32-6	E420	0.0386 mg/L	0.04 mg/L	96.4	70.0	130	----
		tungsten, total	7440-33-7	E420	0.0197 mg/L	0.02 mg/L	98.6	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	0.102 mg/L	0.1 mg/L	102	70.0	130	----
		zinc, total	7440-66-6	E420	0.379 mg/L	0.4 mg/L	94.6	70.0	130	----
		zirconium, total	7440-67-7	E420	0.0396 mg/L	0.04 mg/L	99.1	70.0	130	----
Dissolved Metals (QCLot: 317273)										
VA21C1933-002	Anonymous	aluminum, dissolved	7429-90-5	E421	0.195 mg/L	0.2 mg/L	97.4	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	0.0202 mg/L	0.02 mg/L	101	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: 317273) - continued										
VA21C1933-002	Anonymous	barium, dissolved	7440-39-3	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.0425 mg/L	0.04 mg/L	106	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.00905 mg/L	0.01 mg/L	90.5	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.098 mg/L	0.1 mg/L	97.8	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.00408 mg/L	0.004 mg/L	102	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	0.0103 mg/L	0.01 mg/L	103	70.0	130	----
		chromium, dissolved	7440-47-3	E421	0.0396 mg/L	0.04 mg/L	99.0	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.0203 mg/L	0.02 mg/L	101	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.0203 mg/L	0.02 mg/L	101	70.0	130	----
		iron, dissolved	7439-89-6	E421	1.99 mg/L	2 mg/L	99.6	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.0196 mg/L	0.02 mg/L	98.0	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.103 mg/L	0.1 mg/L	103	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	0.0205 mg/L	0.02 mg/L	102	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.0410 mg/L	0.04 mg/L	103	70.0	130	----
		phosphorus, dissolved	7723-14-0	E421	10.6 mg/L	10 mg/L	106	70.0	130	----
		potassium, dissolved	7440-09-7	E421	3.84 mg/L	4 mg/L	95.9	70.0	130	----
		rubidium, dissolved	7440-17-7	E421	0.0202 mg/L	0.02 mg/L	101	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.0430 mg/L	0.04 mg/L	108	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	0.00407 mg/L	0.004 mg/L	102	70.0	130	----
		sodium, dissolved	17341-25-2	E421	2.08 mg/L	2 mg/L	104	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	20.2 mg/L	20 mg/L	101	70.0	130	----
		tellurium, dissolved	13494-80-9	E421	0.0425 mg/L	0.04 mg/L	106	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.00393 mg/L	0.004 mg/L	98.3	70.0	130	----
		thorium, dissolved	7440-29-1	E421	0.0200 mg/L	0.02 mg/L	100	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.0202 mg/L	0.02 mg/L	101	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.0389 mg/L	0.04 mg/L	97.2	70.0	130	----
		tungsten, dissolved	7440-33-7	E421	0.0196 mg/L	0.02 mg/L	97.8	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.00394 mg/L	0.004 mg/L	98.4	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	0.439 mg/L	0.4 mg/L	110	70.0	130	----
		zirconium, dissolved	7440-67-7	E421	0.0422 mg/L	0.04 mg/L	106	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: 324977)										
VA21C2228-002	MW21-01	mercury, dissolved	7439-97-6	E509	0.000100 mg/L	0.0001 mg/L	100	70.0	130	----
Aggregate Organics (QCLot: 327880)										
FJ2101148-002	Anonymous	chemical oxygen demand [COD]	----	E559	107 mg/L	100 mg/L	107	75.0	125	----

Chain of Custody (COC) / Analytical Request Form

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Company:	Regional District of Kitimat-Stikine
Contact:	Hannah Shinton
Phone:	250-615-6100
	Company address below will appear on the final report
Street:	4545 Lazelle Avenue
City/Province:	Terrace/BC
Postal Code:	V8G4E1
Invoice To	Same as Report To ☐ YES ☑ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	Regional District of Kitimat-Stikine
Contact:	Nicki Veikle

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Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: hshinton@rdks.bc.ca

Email 2: nveikle@rdks.bc.ca

Email 3: eblaney@rdks.bc.ca

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: anne-maries@rdks.bc.ca, nveikle@rdks.bc.ca

Email 2:

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

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

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

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

Date and Time Required for all E&P TATs:

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

Project Information

ALS Account # / Quote #:

Job #: Thornhill Groundwater

PO / AFE:

LSD:

Oil and Gas Required Fields (client use)

AFE/Cost Center: PO#

Minor Code: Routing Code:

Sitioner:

on:

ALS Lab Work Order # (lab use only):

ontact: Sampler: H. Shinton

Environmental Division Vancouver

Work Order Reference

VA21C2228

Telephone : +1 604 253 4188

Analysis Request

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

ALS Sample # (lab use only)	Sample Identification (This	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Dissolved metals	Conductivity	dissolved hardness (as CaCO3)	Ammonia	Chloride	Fluoride	Nitrate & Nitrite	Total Metals	Total Kjeldahl Nitrogen	Total phosphorus	COD	Total Dissolved Solids	Sulphate	Alkalinity	pH	SAMPLES ON HOLD	Sample is hazardous (please provide further detail)	NUMBER OF CONTAINERS
					F/P			P					P	P	P							
	BH-96-2	05-Oct-21	13:53	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			
	MW21-01	06-Oct-21	14:45	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			
	MW21-02	05-Oct-21	13:05	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			
	MW21-03	06-Oct-21	15:38	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]																	
	Field Blank	06-Oct-21	14:55	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			
	[redacted]nk	[redacted]	[redacted]	[redacted]				[redacted]			[redacted]											

Terrace Shipping

#1 Coolers Ground ☐

#____ Carbouys Air ☒

SFX ☐

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

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

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

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

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

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

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

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
6.9							6

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Hannah Shinton	Date: Oct 7, 2021	Time:	Received by: Chris	Date: 7 Oct 21	Time: 1320	Received by:	Date: 10 17	Time: 9:10 p

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

SEPT 2017 FRONT

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

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

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **VA21C2230**	Page	: 1 of 8
Client	: **Regional District of Kitimat-Stikine**	Laboratory	: Vancouver - Environmental
Contact	: Hannah Shinton	Account Manager	: Amber Springer
Address	: # 300 - 4545 Lazelle Avenue Terrace BC Canada V8G 4E1	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: Thornhill Transfer Station Surface Water	Date Samples Received	: 07-Oct-2021 21:10
PO	: ----	Date Analysis Commenced	: 08-Oct-2021
C-O-C number	: ----	Issue Date	: 26-Oct-2021 09:48
Sampler	: HS		
Site	:		
Quote number	: Q62338		
No. of samples received	: 6		
No. of samples analysed	: 6		

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.

Signatories	*Position*	*Laboratory Department*
Annabelle Prasad	Analyst	Metals, Burnaby, British Columbia
Dee Lee	Analyst	Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Owen Cheng		Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Shaneel Dayal	Analyst	Metals, Burnaby, British Columbia
Tracy Harley	Supervisor - Water Quality Instrumentation	Inorganics, 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).

Unit	*Description*
-	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.

Qualifiers

Qualifier	*Description*
DLDS	*Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.*
DLM	*Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).*
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**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SW-1	SW-3	SW-6	SW-21	DUP
					Client sampling date / time	07-Oct-2021 09:59	07-Oct-2021 10:23	07-Oct-2021 10:38	07-Oct-2021 09:25	07-Oct-2021 12:00
						VA21C2230-001	VA21C2230-002	VA21C2230-003	VA21C2230-004	VA21C2230-005
						Result	Result	Result	Result	Result
Physical Tests										
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		29.4	722	46.1	265	283
conductivity	----	E100	2.0	µS/cm		59.1	1470	94.6	553	580
hardness (as CaCO3), dissolved	----	EC100	0.60	mg/L		25.0	460	40.5	191	198
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L		26.8	503	45.2	208	218
pH	----	E108	0.10	pH units		7.66	7.34	7.87	8.47	8.48
solids, total suspended [TSS]	----	E160-H	3.0	mg/L		<3.0	95.9	<3.0	<3.0	<3.0
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		<0.0050	35.1	0.0050	5.05	4.59
chloride	16887-00-6	E235.Cl	0.50	mg/L		<0.50	47.9	0.55	13.4	14.4
fluoride	16984-48-8	E235.F	0.020	mg/L		<0.020	<0.100 DLDS	0.020	0.091	0.097
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L		0.058	39.5	0.080	6.05	5.45
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		0.0635	<0.0250 DLDS	0.0956	2.13	2.33
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		<0.0010	<0.0050 DLDS	<0.0010	0.0676	0.0734
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L		<0.0010	<0.0010	0.0011	0.0033	0.0035
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L		0.0059	0.274	0.0061	0.0200	0.0200
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		0.91	21.6	1.23	6.03	6.41
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		0.122	0.0445	0.105	0.265	0.251
antimony, total	7440-36-0	E420	0.00010	mg/L		<0.00010	0.00015	<0.00010	<0.00010	<0.00010
arsenic, total	7440-38-2	E420	0.00010	mg/L		<0.00010	0.0126	0.00012	0.00053	0.00054
barium, total	7440-39-3	E420	0.00010	mg/L		0.0196	0.674	0.0164	0.112	0.119
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	1.46	<0.010	0.445	0.459
cadmium, total	7440-43-9	E420	0.0000050	mg/L		<0.0000050	0.0000067	<0.0000050	0.0000123	0.0000115
calcium, total	7440-70-2	E420	0.050	mg/L		9.61	156	16.8	65.0	68.0
cesium, total	7440-46-2	E420	0.000010	mg/L		<0.000010	0.000186	<0.000010	0.000060	0.000062
chromium, total	7440-47-3	E420	0.00050	mg/L		<0.00050	0.00107	<0.00050	<0.00050	<0.00050
cobalt, total	7440-48-4	E420	0.00010	mg/L		<0.00010	0.00291	<0.00010	0.00043	0.00045
copper, total	7440-50-8	E420	0.00050	mg/L		0.00096	0.00058	0.00095	0.00202	0.00206

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SW-1	SW-3	SW-6	SW-21	DUP
					Client sampling date / time	07-Oct-2021 09:59	07-Oct-2021 10:23	07-Oct-2021 10:38	07-Oct-2021 09:25	07-Oct-2021 12:00
						VA21C2230-001	VA21C2230-002	VA21C2230-003	VA21C2230-004	VA21C2230-005
						Result	Result	Result	Result	Result
Total Metals										
iron, total	7439-89-6	E420	0.010	mg/L		0.115	52.2	0.128	0.497	0.490
lead, total	7439-92-1	E420	0.000050	mg/L		<0.000050	0.000051	<0.000050	0.000083	0.000082
lithium, total	7439-93-2	E420	0.0010	mg/L		<0.0010	0.0023	<0.0010	<0.0010	<0.0010
magnesium, total	7439-95-4	E420	0.0050	mg/L		0.694	27.6	0.780	11.2	11.8
manganese, total	7439-96-5	E420	0.00010	mg/L		0.00621	4.42	0.00845	0.312	0.308
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		0.000383	0.000260	0.000479	0.000180	0.000192
nickel, total	7440-02-0	E420	0.00050	mg/L		<0.00050	0.00402	<0.00050	0.00126	0.00138
phosphorus, total	7723-14-0	E420	0.050	mg/L		<0.050	0.326	<0.050	<0.050	<0.050
potassium, total	7440-09-7	E420	0.050	mg/L		0.802	46.1	0.847	13.2	13.8
rubidium, total	7440-17-7	E420	0.00020	mg/L		0.00085	0.0363	0.00094	0.00890	0.00911
selenium, total	7782-49-2	E420	0.000050	mg/L		<0.000050	0.000089	0.000065	0.000069	0.000088
silicon, total	7440-21-3	E420	0.10	mg/L		2.75	11.8	3.24	5.29	5.32
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		1.01	70.2	1.16	21.1	22.4
strontium, total	7440-24-6	E420	0.00020	mg/L		0.0392	1.05	0.0426	0.386	0.398
sulfur, total	7704-34-9	E420	0.50	mg/L		<0.50	10.5	<0.50	2.58	2.66
tellurium, total	13494-80-9	E420	0.00020	mg/L		<0.00020	0.00023	<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	<0.00010	<0.00010
titanium, total	7440-32-6	E420	0.00030	mg/L		0.00436	0.00210	<0.00270 DLM	0.00822	0.00792
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		0.000024	0.000034	0.000058	0.000100	0.000104
vanadium, total	7440-62-2	E420	0.00050	mg/L		0.00071	0.00159	0.00062	0.00075	0.00072
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	0.00039	<0.00020	0.00025	0.00032
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L		0.0357	0.0184	0.0477	0.0473	0.0554
antimony, dissolved	7440-36-0	E421	0.00010	mg/L		<0.00010	0.00014	<0.00010	<0.00010	<0.00010
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		<0.00010	0.0120	0.00010	0.00038	0.00040

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SW-1	SW-3	SW-6	SW-21	DUP
					Client sampling date / time	07-Oct-2021 09:59	07-Oct-2021 10:23	07-Oct-2021 10:38	07-Oct-2021 09:25	07-Oct-2021 12:00
						VA21C2230-001	VA21C2230-002	VA21C2230-003	VA21C2230-004	VA21C2230-005
						Result	Result	Result	Result	Result
Dissolved Metals										
barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.0188	0.610	0.0150	0.102	0.108
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	1.40	<0.010	0.421	0.427
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L		<0.0000050	0.0000089	<0.0000050	0.0000112	0.0000239 DTMF
calcium, dissolved	7440-70-2	E421	0.050	mg/L		8.90	141	15.0	58.4	60.4
cesium, dissolved	7440-46-2	E421	0.000010	mg/L		<0.000010	0.000181	<0.000010	0.000047	0.000044
chromium, dissolved	7440-47-3	E421	0.00050	mg/L		<0.00050	0.00093	<0.00050	<0.00050	<0.00050
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L		<0.00010	0.00272	<0.00010	0.00035	0.00036
copper, dissolved	7440-50-8	E421	0.00020	mg/L		0.00081	0.00027	0.00080	0.00188	0.00172
iron, dissolved	7439-89-6	E421	0.010	mg/L		0.018	47.8	0.065	0.137	0.144
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		0.678	26.3	0.733	10.9	11.6
manganese, dissolved	7439-96-5	E421	0.00010	mg/L		0.00260	4.13	0.00652	0.284	0.301
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L		0.0000075	<0.0000050	0.0000066	<0.0000050	<0.0000050
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		0.000416	0.000271	0.000494	0.000208	0.000194
nickel, dissolved	7440-02-0	E421	0.00050	mg/L		<0.00050	0.00390	<0.00050	0.00109	0.00114
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L		<0.050	0.268	<0.050	<0.050	<0.050
potassium, dissolved	7440-09-7	E421	0.050	mg/L		0.809	42.8	0.796	12.6	13.7
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L		0.00087	0.0336	0.00088	0.00852	0.00882
selenium, dissolved	7782-49-2	E421	0.000050	mg/L		<0.000050	0.000140	<0.000050	0.000084	0.000082
silicon, dissolved	7440-21-3	E421	0.050	mg/L		2.55	11.2	2.91	4.64	4.62
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		1.02	66.0	1.12	20.1	21.4
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		0.0375	0.981	0.0415	0.362	0.365
sulfur, dissolved	7704-34-9	E421	0.50	mg/L		<0.50	10.0	<0.50	2.45	2.39
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	0.00011	<0.00010	<0.00010	<0.00010

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID: SW-1	SW-3	SW-6	SW-21	DUP
					Client sampling date / time: 07-Oct-2021 09:59	07-Oct-2021 10:23	07-Oct-2021 10:38	07-Oct-2021 09:25	07-Oct-2021 12:00
					VA21C2230-001	VA21C2230-002	VA21C2230-003	VA21C2230-004	VA21C2230-005
					Result	Result	Result	Result	Result
Dissolved Metals									
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	0.00048	0.00138	0.00116	0.00252	0.00302
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	0.000019	0.000031	0.000052	0.000092	0.000094
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	0.00131	<0.00050	<0.00050	<0.00050
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	<0.0010	0.0017	<0.0010	0.0017	0.0017
zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	<0.00020	0.00036	<0.00020	<0.00020	0.00021
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	2.9	<2.0	<2.0	<2.0
chemical oxygen demand [COD]	----	E559	20	mg/L	<20	111	<20	32	40

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

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	Travel Blank	----	----	----	----
					Client sampling date / time	07-Oct-2021	----	----	----	----
						VA21C2230-006	--------	--------	--------	--------
						Result	----	----	----	----
Physical Tests										
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L		<0.60	----	----	----	----
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		<0.0050	----	----	----	----
chloride	16887-00-6	E235.Cl	0.50	mg/L		<0.50	----	----	----	----
fluoride	16984-48-8	E235.F	0.020	mg/L		<0.020	----	----	----	----
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		<0.0030	----	----	----	----
antimony, total	7440-36-0	E420	0.00010	mg/L		<0.00010	----	----	----	----
arsenic, total	7440-38-2	E420	0.00010	mg/L		<0.00010	----	----	----	----
barium, total	7440-39-3	E420	0.00010	mg/L		<0.00010	----	----	----	----
beryllium, total	7440-41-7	E420	0.000100	mg/L		<0.000100	----	----	----	----
bismuth, total	7440-69-9	E420	0.000050	mg/L		<0.000050	----	----	----	----
boron, total	7440-42-8	E420	0.010	mg/L		<0.010	----	----	----	----
cadmium, total	7440-43-9	E420	0.0000050	mg/L		<0.0000050	----	----	----	----
calcium, total	7440-70-2	E420	0.050	mg/L		<0.050	----	----	----	----
cesium, total	7440-46-2	E420	0.000010	mg/L		<0.000010	----	----	----	----
chromium, total	7440-47-3	E420	0.00050	mg/L		<0.00050	----	----	----	----
cobalt, total	7440-48-4	E420	0.00010	mg/L		<0.00010	----	----	----	----
copper, total	7440-50-8	E420	0.00050	mg/L		<0.00050	----	----	----	----
iron, total	7439-89-6	E420	0.010	mg/L		<0.010	----	----	----	----
lead, total	7439-92-1	E420	0.000050	mg/L		<0.000050	----	----	----	----
lithium, total	7439-93-2	E420	0.0010	mg/L		<0.0010	----	----	----	----
magnesium, total	7439-95-4	E420	0.0050	mg/L		<0.0050	----	----	----	----
manganese, total	7439-96-5	E420	0.00010	mg/L		<0.00010	----	----	----	----
mercury, total	7439-97-6	E508	0.0000050	mg/L		<0.0000050	----	----	----	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L		<0.000050	----	----	----	----
nickel, total	7440-02-0	E420	0.00050	mg/L		<0.00050	----	----	----	----
phosphorus, total	7723-14-0	E420	0.050	mg/L		<0.050	----	----	----	----
potassium, total	7440-09-7	E420	0.050	mg/L		<0.050	----	----	----	----
rubidium, total	7440-17-7	E420	0.00020	mg/L		<0.00020	----	----	----	----
selenium, total	7782-49-2	E420	0.000050	mg/L		<0.000050	----	----	----	----
silicon, total	7440-21-3	E420	0.10	mg/L		<0.10	----	----	----	----

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	Travel Blank	----	----	----	----
					Client sampling date / time	07-Oct-2021	----	----	----	----
						VA21C2230-006	--------	--------	--------	--------
						Result	----	----	----	----
Total Metals										
silver, total	7440-22-4	E420	0.000010	mg/L		<0.000010	----	----	----	----
sodium, total	17341-25-2	E420	0.050	mg/L		<0.050	----	----	----	----
strontium, total	7440-24-6	E420	0.00020	mg/L		<0.00020	----	----	----	----
sulfur, total	7704-34-9	E420	0.50	mg/L		<0.50	----	----	----	----
tellurium, total	13494-80-9	E420	0.00020	mg/L		<0.00020	----	----	----	----
thallium, total	7440-28-0	E420	0.000010	mg/L		<0.000010	----	----	----	----
thorium, total	7440-29-1	E420	0.00010	mg/L		<0.00010	----	----	----	----
tin, total	7440-31-5	E420	0.00010	mg/L		<0.00010	----	----	----	----
titanium, total	7440-32-6	E420	0.00030	mg/L		<0.00030	----	----	----	----
tungsten, total	7440-33-7	E420	0.00010	mg/L		<0.00010	----	----	----	----
uranium, total	7440-61-1	E420	0.000010	mg/L		<0.000010	----	----	----	----
vanadium, total	7440-62-2	E420	0.00050	mg/L		<0.00050	----	----	----	----
zinc, total	7440-66-6	E420	0.0030	mg/L		<0.0030	----	----	----	----
zirconium, total	7440-67-7	E420	0.00020	mg/L		<0.00020	----	----	----	----
Aggregate Organics										
biochemical oxygen demand [BOD]	----	E550	2.0	mg/L		<2.0	----	----	----	----
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	: **VA21C2230**	Page	: 1 of 18
Client	: **Regional District of Kitimat-Stikine**	Laboratory	: Vancouver - Environmental
Contact	: Hannah Shinton	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	: 07-Oct-2021 21:10
PO	: ----	Issue Date	: 26-Oct-2021 09:48
C-O-C number	: ----		
Sampler	: HS		
Site	:		
Quote number	: Q62338		
No. of samples received	: 6		
No. of samples analysed	: 6		

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 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE										
DUP	E550	07-Oct-2021	----	----	----		10-Oct-2021	3 days	3 days	✓
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE										
SW-1	E550	07-Oct-2021	----	----	----		10-Oct-2021	3 days	3 days	✓
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE										
SW-21	E550	07-Oct-2021	----	----	----		10-Oct-2021	3 days	3 days	✓
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE										
SW-3	E550	07-Oct-2021	----	----	----		10-Oct-2021	3 days	3 days	✓
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE										
SW-6	E550	07-Oct-2021	----	----	----		10-Oct-2021	3 days	3 days	✓
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE										
Travel Blank	E550	07-Oct-2021	----	----	----		10-Oct-2021	3 days	3 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
DUP	E559	07-Oct-2021	----	----	----		23-Oct-2021	28 days	16 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	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
SW-1	E559	07-Oct-2021	----	----	----		23-Oct-2021	28 days	16 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
SW-21	E559	07-Oct-2021	----	----	----		23-Oct-2021	28 days	16 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
SW-3	E559	07-Oct-2021	----	----	----		23-Oct-2021	28 days	16 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
SW-6	E559	07-Oct-2021	----	----	----		23-Oct-2021	28 days	16 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
Travel Blank	E559	07-Oct-2021	----	----	----		23-Oct-2021	28 days	16 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
DUP	E298	07-Oct-2021	21-Oct-2021	----	----		21-Oct-2021	28 days	14 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
SW-1	E298	07-Oct-2021	21-Oct-2021	----	----		21-Oct-2021	28 days	14 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
SW-21	E298	07-Oct-2021	21-Oct-2021	----	----		21-Oct-2021	28 days	14 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
SW-3	E298	07-Oct-2021	21-Oct-2021	----	----		21-Oct-2021	28 days	14 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	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) SW-6	E298	07-Oct-2021	21-Oct-2021	----	----		21-Oct-2021	28 days	14 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) Travel Blank	E298	07-Oct-2021	21-Oct-2021	----	----		21-Oct-2021	28 days	15 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE [BOD HT 3d] DUP	E235.Cl	07-Oct-2021	----	----	----		08-Oct-2021	----	1 days	
Anions and Nutrients : Chloride in Water by IC										
HDPE [BOD HT 3d] SW-1	E235.Cl	07-Oct-2021	----	----	----		08-Oct-2021	----	1 days	
Anions and Nutrients : Chloride in Water by IC										
HDPE [BOD HT 3d] SW-21	E235.Cl	07-Oct-2021	----	----	----		08-Oct-2021	----	1 days	
Anions and Nutrients : Chloride in Water by IC										
HDPE [BOD HT 3d] SW-3	E235.Cl	07-Oct-2021	----	----	----		08-Oct-2021	----	1 days	
Anions and Nutrients : Chloride in Water by IC										
HDPE [BOD HT 3d] SW-6	E235.Cl	07-Oct-2021	----	----	----		08-Oct-2021	----	1 days	
Anions and Nutrients : Chloride in Water by IC										
HDPE [BOD HT 3d] Travel Blank	E235.Cl	07-Oct-2021	----	----	----		08-Oct-2021	----	2 days	
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE [BOD HT 3d] DUP	E378-U	07-Oct-2021	----	----	----		08-Oct-2021	----	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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE [BOD HT 3d]										
SW-1	E378-U	07-Oct-2021	----	----	----		08-Oct-2021	----	1 days	
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE [BOD HT 3d]										
SW-21	E378-U	07-Oct-2021	----	----	----		08-Oct-2021	----	1 days	
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE [BOD HT 3d]										
SW-3	E378-U	07-Oct-2021	----	----	----		08-Oct-2021	----	1 days	
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE [BOD HT 3d]										
SW-6	E378-U	07-Oct-2021	----	----	----		08-Oct-2021	----	1 days	
Anions and Nutrients : Fluoride in Water by IC										
HDPE [BOD HT 3d]										
DUP	E235.F	07-Oct-2021	----	----	----		08-Oct-2021	----	1 days	
Anions and Nutrients : Fluoride in Water by IC										
HDPE [BOD HT 3d]										
SW-1	E235.F	07-Oct-2021	----	----	----		08-Oct-2021	----	1 days	
Anions and Nutrients : Fluoride in Water by IC										
HDPE [BOD HT 3d]										
SW-21	E235.F	07-Oct-2021	----	----	----		08-Oct-2021	----	1 days	
Anions and Nutrients : Fluoride in Water by IC										
HDPE [BOD HT 3d]										
SW-3	E235.F	07-Oct-2021	----	----	----		08-Oct-2021	----	1 days	
Anions and Nutrients : Fluoride in Water by IC										
HDPE [BOD HT 3d]										
SW-6	E235.F	07-Oct-2021	----	----	----		08-Oct-2021	----	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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Fluoride in Water by IC										
HDPE [BOD HT 3d]										
Travel Blank	E235.F	07-Oct-2021	----	----	----		08-Oct-2021	----	2 days	
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE [BOD HT 3d]										
DUP	E235.NO3-L	07-Oct-2021	----	----	----		08-Oct-2021	----	1 days	
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE [BOD HT 3d]										
SW-1	E235.NO3-L	07-Oct-2021	----	----	----		08-Oct-2021	----	1 days	
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE [BOD HT 3d]										
SW-21	E235.NO3-L	07-Oct-2021	----	----	----		08-Oct-2021	----	1 days	
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE [BOD HT 3d]										
SW-3	E235.NO3-L	07-Oct-2021	----	----	----		08-Oct-2021	----	1 days	
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE [BOD HT 3d]										
SW-6	E235.NO3-L	07-Oct-2021	----	----	----		08-Oct-2021	----	1 days	
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE [BOD HT 3d]										
DUP	E235.NO2-L	07-Oct-2021	----	----	----		08-Oct-2021	----	1 days	
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE [BOD HT 3d]										
SW-1	E235.NO2-L	07-Oct-2021	----	----	----		08-Oct-2021	----	1 days	
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE [BOD HT 3d]										
SW-21	E235.NO2-L	07-Oct-2021	----	----	----		08-Oct-2021	----	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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE [BOD HT 3d]										
SW-3	E235.NO2-L	07-Oct-2021	----	----	----		08-Oct-2021	----	1 days	
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE [BOD HT 3d]										
SW-6	E235.NO2-L	07-Oct-2021	----	----	----		08-Oct-2021	----	1 days	
Anions and Nutrients : Sulfate in Water by IC										
HDPE [BOD HT 3d]										
DUP	E235.SO4	07-Oct-2021	----	----	----		08-Oct-2021	----	1 days	
Anions and Nutrients : Sulfate in Water by IC										
HDPE [BOD HT 3d]										
SW-1	E235.SO4	07-Oct-2021	----	----	----		08-Oct-2021	----	1 days	
Anions and Nutrients : Sulfate in Water by IC										
HDPE [BOD HT 3d]										
SW-21	E235.SO4	07-Oct-2021	----	----	----		08-Oct-2021	----	1 days	
Anions and Nutrients : Sulfate in Water by IC										
HDPE [BOD HT 3d]										
SW-3	E235.SO4	07-Oct-2021	----	----	----		08-Oct-2021	----	1 days	
Anions and Nutrients : Sulfate in Water by IC										
HDPE [BOD HT 3d]										
SW-6	E235.SO4	07-Oct-2021	----	----	----		08-Oct-2021	----	1 days	
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
DUP	E318	07-Oct-2021	21-Oct-2021	----	----		24-Oct-2021	28 days	17 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
SW-1	E318	07-Oct-2021	21-Oct-2021	----	----		24-Oct-2021	28 days	17 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	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
SW-21	E318	07-Oct-2021	21-Oct-2021	----	----		24-Oct-2021	28 days	17 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
SW-3	E318	07-Oct-2021	21-Oct-2021	----	----		24-Oct-2021	28 days	17 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
SW-6	E318	07-Oct-2021	21-Oct-2021	----	----		24-Oct-2021	28 days	17 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid)										
DUP	E372-U	07-Oct-2021	21-Oct-2021	----	----		22-Oct-2021	28 days	15 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid)										
SW-1	E372-U	07-Oct-2021	21-Oct-2021	----	----		22-Oct-2021	28 days	15 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid)										
SW-21	E372-U	07-Oct-2021	21-Oct-2021	----	----		22-Oct-2021	28 days	15 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid)										
SW-3	E372-U	07-Oct-2021	21-Oct-2021	----	----		22-Oct-2021	28 days	15 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid)										
SW-6	E372-U	07-Oct-2021	21-Oct-2021	----	----		22-Oct-2021	28 days	15 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
DUP	E509	07-Oct-2021	16-Oct-2021	----	----		16-Oct-2021	28 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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
SW-1	E509	07-Oct-2021	16-Oct-2021	----	----		16-Oct-2021	28 days	9 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
SW-21	E509	07-Oct-2021	16-Oct-2021	----	----		16-Oct-2021	28 days	9 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
SW-3	E509	07-Oct-2021	16-Oct-2021	----	----		16-Oct-2021	28 days	9 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
SW-6	E509	07-Oct-2021	16-Oct-2021	----	----		16-Oct-2021	28 days	9 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid)										
DUP	E421	07-Oct-2021	17-Oct-2021	----	----		17-Oct-2021	180 days	10 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid)										
SW-1	E421	07-Oct-2021	17-Oct-2021	----	----		17-Oct-2021	180 days	10 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid)										
SW-21	E421	07-Oct-2021	17-Oct-2021	----	----		17-Oct-2021	180 days	10 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid)										
SW-3	E421	07-Oct-2021	17-Oct-2021	----	----		17-Oct-2021	180 days	10 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid)										
SW-6	E421	07-Oct-2021	17-Oct-2021	----	----		17-Oct-2021	180 days	10 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	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Alkalinity Species by Titration										
HDPE [BOD HT 3d] DUP	E290	07-Oct-2021	----	----	----		09-Oct-2021	----	2 days	
Physical Tests : Alkalinity Species by Titration										
HDPE [BOD HT 3d] SW-1	E290	07-Oct-2021	----	----	----		09-Oct-2021	----	2 days	
Physical Tests : Alkalinity Species by Titration										
HDPE [BOD HT 3d] SW-21	E290	07-Oct-2021	----	----	----		09-Oct-2021	----	2 days	
Physical Tests : Alkalinity Species by Titration										
HDPE [BOD HT 3d] SW-3	E290	07-Oct-2021	----	----	----		09-Oct-2021	----	2 days	
Physical Tests : Alkalinity Species by Titration										
HDPE [BOD HT 3d] SW-6	E290	07-Oct-2021	----	----	----		09-Oct-2021	----	2 days	
Physical Tests : Conductivity in Water										
HDPE [BOD HT 3d] DUP	E100	07-Oct-2021	----	----	----		09-Oct-2021	----	2 days	
Physical Tests : Conductivity in Water										
HDPE [BOD HT 3d] SW-1	E100	07-Oct-2021	----	----	----		09-Oct-2021	----	2 days	
Physical Tests : Conductivity in Water										
HDPE [BOD HT 3d] SW-21	E100	07-Oct-2021	----	----	----		09-Oct-2021	----	2 days	
Physical Tests : Conductivity in Water										
HDPE [BOD HT 3d] SW-3	E100	07-Oct-2021	----	----	----		09-Oct-2021	----	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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Conductivity in Water										
HDPE [BOD HT 3d] SW-6	E100	07-Oct-2021	----	----	----		09-Oct-2021	----	2 days	
Physical Tests : pH by Meter										
HDPE [BOD HT 3d] DUP	E108	07-Oct-2021	----	----	----		09-Oct-2021	----	45 hrs	EHTR-FM
Physical Tests : pH by Meter										
HDPE [BOD HT 3d] SW-3	E108	07-Oct-2021	----	----	----		09-Oct-2021	----	46 hrs	EHTR-FM
Physical Tests : pH by Meter										
HDPE [BOD HT 3d] SW-6	E108	07-Oct-2021	----	----	----		09-Oct-2021	----	46 hrs	EHTR-FM
Physical Tests : pH by Meter										
HDPE [BOD HT 3d] SW-1	E108	07-Oct-2021	----	----	----		09-Oct-2021	----	47 hrs	EHTR-FM
Physical Tests : pH by Meter										
HDPE [BOD HT 3d] SW-21	E108	07-Oct-2021	----	----	----		09-Oct-2021	----	47 hrs	EHTR-FM
Physical Tests : TSS by Gravimetry										
HDPE [BOD HT 3d] DUP	E160-H	07-Oct-2021	----	----	----		09-Oct-2021	----	2 days	
Physical Tests : TSS by Gravimetry										
HDPE [BOD HT 3d] SW-1	E160-H	07-Oct-2021	----	----	----		09-Oct-2021	----	2 days	
Physical Tests : TSS by Gravimetry										
HDPE [BOD HT 3d] SW-21	E160-H	07-Oct-2021	----	----	----		09-Oct-2021	----	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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : TSS by Gravimetry										
HDPE [BOD HT 3d]										
SW-3	E160-H	07-Oct-2021	----	----	----		09-Oct-2021	----	2 days	
Physical Tests : TSS by Gravimetry										
HDPE [BOD HT 3d]										
SW-6	E160-H	07-Oct-2021	----	----	----		09-Oct-2021	----	2 days	
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
DUP	E508	07-Oct-2021	----	----	----		16-Oct-2021	28 days	9 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
SW-1	E508	07-Oct-2021	----	----	----		16-Oct-2021	28 days	9 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
SW-21	E508	07-Oct-2021	----	----	----		16-Oct-2021	28 days	9 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
SW-3	E508	07-Oct-2021	----	----	----		16-Oct-2021	28 days	9 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
SW-6	E508	07-Oct-2021	----	----	----		16-Oct-2021	28 days	9 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
Travel Blank	E508	07-Oct-2021	----	----	----		16-Oct-2021	28 days	9 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
DUP	E420	07-Oct-2021	----	----	----		18-Oct-2021	180 days	11 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	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
SW-1	E420	07-Oct-2021	----	----	----		18-Oct-2021	180 days	11 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
SW-21	E420	07-Oct-2021	----	----	----		18-Oct-2021	180 days	11 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
SW-3	E420	07-Oct-2021	----	----	----		18-Oct-2021	180 days	11 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
SW-6	E420	07-Oct-2021	----	----	----		18-Oct-2021	180 days	11 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
Travel Blank	E420	07-Oct-2021	----	----	----		21-Oct-2021	180 days	15 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			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	315068	1	5	20.0	5.0	✓
Ammonia by Fluorescence	E298	325627	1	20	5.0	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	316234	1	20	5.0	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	327880	1	19	5.2	5.0	✓
Chloride in Water by IC	E235.Cl	315073	1	14	7.1	5.0	✓
Conductivity in Water	E100	315066	1	13	7.6	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	321540	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	321131	1	19	5.2	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	315075	1	5	20.0	5.0	✓
Fluoride in Water by IC	E235.F	315072	1	14	7.1	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	315070	1	13	7.6	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	315071	1	13	7.6	5.0	✓
pH by Meter	E108	315067	1	13	7.6	5.0	✓
Sulfate in Water by IC	E235.SO4	315069	1	13	7.6	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	325626	1	5	20.0	5.0	✓
Total Mercury in Water by CVAAS	E508	321284	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	321183	2	40	5.0	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	325628	1	5	20.0	5.0	✓
TSS by Gravimetry	E160-H	316021	1	18	5.5	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	315068	1	5	20.0	5.0	✓
Ammonia by Fluorescence	E298	325627	1	20	5.0	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	316234	1	20	5.0	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	327880	1	19	5.2	5.0	✓
Chloride in Water by IC	E235.Cl	315073	1	14	7.1	5.0	✓
Conductivity in Water	E100	315066	1	13	7.6	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	321540	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	321131	1	19	5.2	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	315075	1	5	20.0	5.0	✓
Fluoride in Water by IC	E235.F	315072	1	14	7.1	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	315070	1	13	7.6	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	315071	1	13	7.6	5.0	✓
pH by Meter	E108	315067	1	13	7.6	5.0	✓
Sulfate in Water by IC	E235.SO4	315069	1	13	7.6	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	325626	1	5	20.0	5.0	✓
Total Mercury in Water by CVAAS	E508	321284	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	321183	2	40	5.0	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	325628	1	5	20.0	5.0	✓
TSS by Gravimetry	E160-H	316021	1	18	5.5	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	315068	1	5	20.0	5.0	✓
Ammonia by Fluorescence	E298	325627	1	20	5.0	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	316234	1	20	5.0	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	327880	1	19	5.2	5.0	✓
Chloride in Water by IC	E235.Cl	315073	1	14	7.1	5.0	✓
Conductivity in Water	E100	315066	1	13	7.6	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	321540	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	321131	1	19	5.2	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	315075	1	5	20.0	5.0	✓
Fluoride in Water by IC	E235.F	315072	1	14	7.1	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	315070	1	13	7.6	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	315071	1	13	7.6	5.0	✓
Sulfate in Water by IC	E235.SO4	315069	1	13	7.6	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	325626	1	5	20.0	5.0	✓
Total Mercury in Water by CVAAS	E508	321284	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	321183	2	40	5.0	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	325628	1	5	20.0	5.0	✓
TSS by Gravimetry	E160-H	316021	1	18	5.5	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	325627	1	20	5.0	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	327880	1	19	5.2	5.0	✓
Chloride in Water by IC	E235.Cl	315073	1	14	7.1	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	321540	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	321131	1	19	5.2	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	315075	1	5	20.0	5.0	✓
Fluoride in Water by IC	E235.F	315072	1	14	7.1	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	315070	1	13	7.6	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	315071	1	13	7.6	5.0	✓
Sulfate in Water by IC	E235.SO4	315069	1	13	7.6	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	325626	1	5	20.0	5.0	✓
Total Mercury in Water by CVAAS	E508	321284	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	321183	2	40	5.0	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	325628	1	5	20.0	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 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).

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
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.
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.
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.
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 CaCO3), dissolved” is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 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.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Hardness (Calculated) from Total Ca/Mg	EC100A Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in CaCO3 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
Preparation for Ammonia	EP298 Vancouver - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
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 HNO3.
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	: **VA21C2230**	Page	: 1 of 22
Client	: Regional District of Kitimat-Stikine	Laboratory	: Vancouver - Environmental
Contact	: Hannah Shinton	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	: 07-Oct-2021 21:10
PO	: ----	Date Analysis Commenced	: 08-Oct-2021
C-O-C number	: ----	Issue Date	: 26-Oct-2021 09:48
Sampler	: HS		
Site	:		
Quote number	: Q62338		
No. of samples received	: 6		
No. of samples analysed	: 6		

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.

Signatories	*Position*	*Laboratory Department*
Annabelle Prasad	Analyst	Metals, Burnaby, British Columbia
Dee Lee	Analyst	Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Owen Cheng		Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Shaneel Dayal	Analyst	Metals, Burnaby, British Columbia
Tracy Harley	Supervisor - Water Quality Instrumentation	Inorganics, Burnaby, British Columbia

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: 315066)											
VA21C2230-001	SW-1	conductivity	----	E100	2.0	µS/cm	59.1	59.1	0.00%	10%	----
Physical Tests (QC Lot: 315067)											
VA21C2230-001	SW-1	pH	----	E108	0.10	pH units	7.66	7.66	0.0783%	4%	----
Physical Tests (QC Lot: 315068)											
VA21C2230-003	SW-6	alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	46.1	46.3	0.477%	20%	----
Physical Tests (QC Lot: 316021)											
FJ2101084-001	Anonymous	solids, total suspended [TSS]	----	E160-H	3.0	mg/L	6.1	5.5	0.6	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 315069)											
VA21C2230-001	SW-1	sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	0.91	0.90	0.01	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 315070)											
VA21C2230-001	SW-1	nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.0635	0.0527	18.6%	20%	----
Anions and Nutrients (QC Lot: 315071)											
VA21C2230-001	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: 315072)											
VA21C2230-001	SW-1	fluoride	16984-48-8	E235.F	0.020	mg/L	<0.020	<0.020	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 315073)											
VA21C2230-001	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: 315075)											
VA21C2230-001	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: 325626)											
VA21C2230-001	SW-1	Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	0.058	0.064	0.006	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 325627)											
VA21C2230-001	SW-1	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 325628)											
VA21C2230-001	SW-1	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0059	0.0078	0.0019	Diff <2x LOR	----
Total Metals (QC Lot: 321183)											
VA21C2135-001	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	0.00052	0.00052	0.000009	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00090	0.00091	0.000004	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.0716	0.0732	2.18%	20%	----
		beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.000020	<0.000020	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: 321183) - continued											
VA21C2135-001	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	0.028	0.029	0.0004	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.0000201	0.0000205	0.0000004	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	50	mg/L	131000 µg/L	132	0.362%	20%	----
		cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	0.00067	0.00072	0.00005	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	0.00066	0.00067	0.000002	Diff <2x LOR	----
		iron, total	7439-89-6	E420	10	mg/L	500 µg/L	0.529	5.62%	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	0.0067	0.0067	0.00006	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	5.0	mg/L	55800 µg/L	56.5	1.26%	20%	----
		manganese, total	7439-96-5	E420	0.10	mg/L	1310 µg/L	1.35	3.06%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00286	0.00302	5.58%	20%	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	0.00829	0.00845	1.96%	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	50	mg/L	4860 µg/L	5.10	4.86%	20%	----
		rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00140	0.00143	0.00004	Diff <2x LOR	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	0.00280	0.00290	3.83%	20%	----
		silicon, total	7440-21-3	E420	0.10	mg/L	7.82	7.85	0.295%	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	50	mg/L	68000 µg/L	69.5	2.18%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.728	0.735	0.966%	20%	----
		sulfur, total	7704-34-9	E420	500	mg/L	59200 µg/L	60.0	1.47%	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	<0.00030	<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	0.00715	0.00734	2.74%	20%	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	0.00071	0.00071	0.000004	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	0.0102	0.0105	0.0003	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: 321284)											

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: 321284) - continued											
VA21C2226-007	Anonymous	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Total Metals (QC Lot: 324058)											
KS2103329-001	Anonymous	aluminum, total	7429-90-5	E420	0.0100	mg/L	0.0557	0.0564	0.0007	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00514	0.00518	0.610%	20%	----
		barium, total	7440-39-3	E420	0.0200	mg/L	<0.0200	<0.0200	0	Diff <2x LOR	----
		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	0.100	mg/L	<0.100	<0.100	0	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.000200	mg/L	<0.000200	<0.000200	0	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	0.100	mg/L	0.559	0.570	0.011	Diff <2x LOR	----
		cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		chromium, total	7440-47-3	E420	0.00200	mg/L	<0.00200	<0.00200	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	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.030	mg/L	<0.030	<0.030	0	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000500	mg/L	<0.000500	<0.000500	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	<0.100	<0.100	0	Diff <2x LOR	----
		manganese, total	7439-96-5	E420	0.00200	mg/L	<0.00200	<0.00200	0	Diff <2x LOR	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00635	0.00639	0.717%	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	0.057	0.007	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.100	mg/L	0.266	0.276	0.011	Diff <2x LOR	----
		rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00022	0.00024	0.00001	Diff <2x LOR	----
		selenium, total	7782-49-2	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		silicon, total	7440-21-3	E420	0.10	mg/L	17.6	17.8	1.45%	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	2.00	mg/L	75.6	77.1	1.93%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.00173	0.00174	0.000009	Diff <2x LOR	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	3.57	3.60	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: 324058) - continued											
KS2103329-001	Anonymous	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	0.00200	0.00202	0.928%	20%	----
		uranium, total	7440-61-1	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	0.00994	0.0103	3.27%	20%	----
		zinc, total	7440-66-6	E420	0.0500	mg/L	<0.0500	<0.0500	0	Diff <2x LOR	----
		zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 321131)											
VA21C2151-012	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0033	0.0030	0.0003	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00028	0.00027	0.000002	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.0213	0.0214	0.775%	20%	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0198	0.0202	2.22%	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	0.014	0.014	0.0007	Diff <2x LOR	----
		cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.0000314	0.0000306	0.0000008	Diff <2x LOR	----
		calcium, dissolved	7440-70-2	E421	0.050	mg/L	87.4	87.9	0.526%	20%	----
		cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	0.00107	0.00106	1.31%	20%	----
		copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00054	0.00055	0.00001	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	<0.0010	<0.0010	0	Diff <2x LOR	----
		magnesium, dissolved	7439-95-4	E421	0.100	mg/L	7.32	7.43	1.54%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00046	0.00047	0.000003	Diff <2x LOR	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00555	0.00554	0.290%	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	0.100	mg/L	1.23	1.24	0.546%	20%	----
		rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00062	0.00066	0.00004	Diff <2x LOR	----
		selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.00528	0.00498	5.82%	20%	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	9.55	9.29	2.74%	20%	----
		silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, dissolved	17341-25-2	E421	0.050	mg/L	4.06	4.06	0.0256%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.276	0.274	0.659%	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*
Dissolved Metals (QC Lot: 321131) - continued											
VA21C2151-012	Anonymous	sulfur, dissolved	7704-34-9	E421	0.50	mg/L	60.4	57.5	4.83%	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	0.00017	<0.00010	0.00007	Diff <2x LOR	----
		titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	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	0.00101	0.000997	1.70%	20%	----
		vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	0.00091	0.00092	0.000003	Diff <2x LOR	----
		zinc, dissolved	7440-66-6	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 321540)											
FJ2101076-001	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Aggregate Organics (QC Lot: 316234)											
VA21C2206-001	Anonymous	biochemical oxygen demand [BOD]	----	E550	2.0	mg/L	<2.0	<2.0	0.0%	30%	----
Aggregate Organics (QC Lot: 327880)											
FJ2101148-001	Anonymous	chemical oxygen demand [COD]	----	E559	20	mg/L	56	54	2	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: 315066)						
conductivity	----	E100	1	µS/cm	1.1	----
Physical Tests (QCLot: 315068)						
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 316021)						
solids, total suspended [TSS]	----	E160-H	3	mg/L	<3.0	----
Anions and Nutrients (QCLot: 315069)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 315070)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 315071)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 315072)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 315073)						
chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 315075)						
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 325626)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 325627)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 325628)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Total Metals (QCLot: 321183)						
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: 321183) - continued						
cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
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: 321284)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Total Metals (QCLot: 324058)						
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: 324058) - 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	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
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	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 321131)						
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	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
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	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 321131) - continued						
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: 321540)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Aggregate Organics (QCLot: 316234)						
biochemical oxygen demand [BOD]	----	E550	2	mg/L	<2.0	----
Aggregate Organics (QCLot: 327880)						
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	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 315066)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	102	90.0	110	----
Physical Tests (QCLot: 315067)									
pH	----	E108	----	pH units	7 pH units	99.8	98.0	102	----
Physical Tests (QCLot: 315068)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	104	85.0	115	----
Physical Tests (QCLot: 316021)									
solids, total suspended [TSS]	----	E160-H	3	mg/L	150 mg/L	97.2	85.0	115	----
Anions and Nutrients (QCLot: 315069)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 315070)									
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: 315071)									
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: 315072)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 315073)									
chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	99.5	90.0	110	----
Anions and Nutrients (QCLot: 315075)									
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	102	80.0	120	----
Anions and Nutrients (QCLot: 325626)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	99.9	75.0	125	----
Anions and Nutrients (QCLot: 325627)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	93.3	85.0	115	----
Anions and Nutrients (QCLot: 325628)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	90.2	80.0	120	----
Total Metals (QCLot: 321183)									
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	108	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	104	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	107	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	101	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	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 (%)		
					Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 321183) - continued									
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	108	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	96.2	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	99.1	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	103	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	100	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	107	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	97.1	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	103	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	107	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	99.6	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	120	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	108	80.0	120	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	108	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	103	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	103	80.0	120	----
sodium, total	17341-25-2	E420	0.05	mg/L	50 mg/L	103	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	96.4	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	98.3	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	99.5	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	99.1	80.0	120	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	102	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	100	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	103	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	103	80.0	120	----
Total Metals (QCLot: 321284)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	98.2	80.0	120	----
Total Metals (QCLot: 324058)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	101	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
Total Metals (QCLot: 324058) - continued									
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	96.6	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	98.2	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	98.5	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	99.2	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	97.0	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	86.5	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	94.4	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	99.4	80.0	120	----
cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	94.0	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	96.2	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	98.4	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	97.0	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	95.5	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	100	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	95.1	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	95.3	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	97.2	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	96.7	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	97.4	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	108	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	99.9	80.0	120	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	101	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	98.3	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	95.9	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	98.0	80.0	120	----
sodium, total	17341-25-2	E420	0.05	mg/L	50 mg/L	96.3	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	97.8	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	87.4	80.0	120	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	93.3	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	97.8	80.0	120	----
thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	93.5	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	95.8	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	94.6	80.0	120	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	97.6	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	98.8	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	99.1	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	94.4	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Dissolved Metals (QCLot: 321131)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	100	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	106	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	99.7	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	104	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	100	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	105	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	96.0	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	95.1	80.0	120	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	101	80.0	120	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	98.2	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	97.7	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	96.5	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	102	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	98.8	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	92.6	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	99.7	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	98.5	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	109	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	95.8	80.0	120	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	108	80.0	120	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	104	80.0	120	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	99.1	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	97.5	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	100	80.0	120	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	100	80.0	120	----
sodium, dissolved	17341-25-2	E421	0.05	mg/L	50 mg/L	98.6	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	100	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	102	80.0	120	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	94.7	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	102	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	96.9	80.0	120	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	99.1	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	98.3	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	101	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: 321131) - continued									
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	97.0	80.0	120	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	102	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	99.2	80.0	120	----
Aggregate Organics (QCLot: 316234)									
biochemical oxygen demand [BOD]	----	E550	2	mg/L	198 mg/L	89.5	85.0	115	----
Aggregate Organics (QCLot: 327880)									
chemical oxygen demand [COD]	----	E559	20	mg/L	100 mg/L	111	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: 315069)										
VA21C2230-002	SW-3	sulfate (as SO4)	14808-79-8	E235.SO4	500 mg/L	500 mg/L	100.0	75.0	125	----
Anions and Nutrients (QCLot: 315070)										
VA21C2230-002	SW-3	nitrate (as N)	14797-55-8	E235.NO3-L	12.8 mg/L	12.5 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 315071)										
VA21C2230-002	SW-3	nitrite (as N)	14797-65-0	E235.NO2-L	2.52 mg/L	2.5 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 315072)										
VA21C2230-002	SW-3	fluoride	16984-48-8	E235.F	5.20 mg/L	5 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 315073)										
VA21C2230-002	SW-3	chloride	16887-00-6	E235.Cl	508 mg/L	500 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 315075)										
VA21C2230-002	SW-3	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0320 mg/L	0.03 mg/L	107	70.0	130	----
Anions and Nutrients (QCLot: 325626)										
VA21C2230-002	SW-3	Kjeldahl nitrogen, total [TKN]	----	E318	49.0 mg/L	2.5 mg/L	97.9	70.0	130	----
Anions and Nutrients (QCLot: 325627)										
VA21C2230-002	SW-3	ammonia, total (as N)	7664-41-7	E298	ND mg/L	0.1 mg/L	ND	75.0	125	MS-B
Anions and Nutrients (QCLot: 325628)										
VA21C2230-002	SW-3	phosphorus, total	7723-14-0	E372-U	ND mg/L	0.05 mg/L	ND	70.0	130	----
Total Metals (QCLot: 321183)										
VA21C2172-001	Anonymous	aluminum, total	7429-90-5	E420	0.389 mg/L	0.4 mg/L	97.3	70.0	130	----
		antimony, total	7440-36-0	E420	0.0371 mg/L	0.04 mg/L	92.9	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0403 mg/L	0.04 mg/L	101	70.0	130	----
		barium, total	7440-39-3	E420	0.0385 mg/L	0.04 mg/L	96.2	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0768 mg/L	0.08 mg/L	96.0	70.0	130	----
		bismuth, total	7440-69-9	E420	0.0177 mg/L	0.02 mg/L	88.5	70.0	130	----
		boron, total	7440-42-8	E420	0.180 mg/L	0.2 mg/L	90.0	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00759 mg/L	0.008 mg/L	94.9	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	8 mg/L	ND	70.0	130	----
		cesium, total	7440-46-2	E420	0.0192 mg/L	0.02 mg/L	95.8	70.0	130	----
		chromium, total	7440-47-3	E420	0.0798 mg/L	0.08 mg/L	99.8	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: 321183) - continued										
VA21C2172-001	Anonymous	cobalt, total	7440-48-4	E420	0.0388 mg/L	0.04 mg/L	96.9	70.0	130	----
		copper, total	7440-50-8	E420	0.0376 mg/L	0.04 mg/L	94.1	70.0	130	----
		iron, total	7439-89-6	E420	3.86 mg/L	4 mg/L	96.6	70.0	130	----
		lead, total	7439-92-1	E420	0.0357 mg/L	0.04 mg/L	89.2	70.0	130	----
		lithium, total	7439-93-2	E420	0.187 mg/L	0.2 mg/L	93.4	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	ND mg/L	0.04 mg/L	ND	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0387 mg/L	0.04 mg/L	96.8	70.0	130	----
		nickel, total	7440-02-0	E420	0.0764 mg/L	0.08 mg/L	95.4	70.0	130	----
		phosphorus, total	7723-14-0	E420	20.6 mg/L	20 mg/L	103	70.0	130	----
		potassium, total	7440-09-7	E420	7.80 mg/L	8 mg/L	97.5	70.0	130	----
		rubidium, total	7440-17-7	E420	0.0393 mg/L	0.04 mg/L	98.3	70.0	130	----
		selenium, total	7782-49-2	E420	0.0854 mg/L	0.08 mg/L	107	70.0	130	----
		silicon, total	7440-21-3	E420	18.6 mg/L	20 mg/L	92.8	70.0	130	----
		silver, total	7440-22-4	E420	0.00712 mg/L	0.008 mg/L	89.0	70.0	130	----
		sodium, total	17341-25-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.04 mg/L	ND	70.0	130	----
		sulfur, total	7704-34-9	E420	ND mg/L	40 mg/L	ND	70.0	130	----
		tellurium, total	13494-80-9	E420	0.0804 mg/L	0.08 mg/L	100	70.0	130	----
		thallium, total	7440-28-0	E420	0.00711 mg/L	0.008 mg/L	88.9	70.0	130	----
		thorium, total	7440-29-1	E420	0.0406 mg/L	0.04 mg/L	102	70.0	130	----
		tin, total	7440-31-5	E420	0.0390 mg/L	0.04 mg/L	97.5	70.0	130	----
		titanium, total	7440-32-6	E420	0.0802 mg/L	0.08 mg/L	100	70.0	130	----
		tungsten, total	7440-33-7	E420	0.0370 mg/L	0.04 mg/L	92.4	70.0	130	----
		uranium, total	7440-61-1	E420	0.00757 mg/L	0.008 mg/L	94.6	70.0	130	----
		vanadium, total	7440-62-2	E420	0.202 mg/L	0.2 mg/L	101	70.0	130	----
		zinc, total	7440-66-6	E420	0.812 mg/L	0.8 mg/L	101	70.0	130	----
		zirconium, total	7440-67-7	E420	0.0768 mg/L	0.08 mg/L	96.0	70.0	130	----
Total Metals (QCLot: 321284)										
VA21C2226-008	Anonymous	mercury, total	7439-97-6	E508	0.0000949 mg/L	0.0001 mg/L	94.9	70.0	130	----
Total Metals (QCLot: 324058)										
KS2103330-001	Anonymous	aluminum, total	7429-90-5	E420	0.201 mg/L	0.2 mg/L	100	70.0	130	----
		antimony, total	7440-36-0	E420	0.0194 mg/L	0.02 mg/L	97.1	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0198 mg/L	0.02 mg/L	99.0	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	0.0411 mg/L	0.04 mg/L	103	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: 324058) - continued										
KS2103330-001	Anonymous	bismuth, total	7440-69-9	E420	0.00926 mg/L	0.01 mg/L	92.6	70.0	130	----
		boron, total	7440-42-8	E420	0.093 mg/L	0.1 mg/L	93.4	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00368 mg/L	0.004 mg/L	92.0	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	0.00977 mg/L	0.01 mg/L	97.7	70.0	130	----
		chromium, total	7440-47-3	E420	0.0399 mg/L	0.04 mg/L	99.8	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0190 mg/L	0.02 mg/L	95.1	70.0	130	----
		copper, total	7440-50-8	E420	0.0188 mg/L	0.02 mg/L	93.9	70.0	130	----
		iron, total	7439-89-6	E420	1.92 mg/L	2 mg/L	96.2	70.0	130	----
		lead, total	7439-92-1	E420	0.0187 mg/L	0.02 mg/L	93.3	70.0	130	----
		lithium, total	7439-93-2	E420	0.104 mg/L	0.1 mg/L	104	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	0.0198 mg/L	0.02 mg/L	98.9	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0201 mg/L	0.02 mg/L	100	70.0	130	----
		nickel, total	7440-02-0	E420	0.0380 mg/L	0.04 mg/L	95.0	70.0	130	----
		phosphorus, total	7723-14-0	E420	10.6 mg/L	10 mg/L	106	70.0	130	----
		potassium, total	7440-09-7	E420	4.05 mg/L	4 mg/L	101	70.0	130	----
		rubidium, total	7440-17-7	E420	0.0197 mg/L	0.02 mg/L	98.7	70.0	130	----
		selenium, total	7782-49-2	E420	0.0399 mg/L	0.04 mg/L	99.7	70.0	130	----
		silicon, total	7440-21-3	E420	9.07 mg/L	10 mg/L	90.7	70.0	130	----
		silver, total	7440-22-4	E420	0.00385 mg/L	0.004 mg/L	96.2	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	20.6 mg/L	20 mg/L	103	70.0	130	----
		tellurium, total	13494-80-9	E420	0.0350 mg/L	0.04 mg/L	87.6	70.0	130	----
		thallium, total	7440-28-0	E420	0.00373 mg/L	0.004 mg/L	93.3	70.0	130	----
		thorium, total	7440-29-1	E420	0.0215 mg/L	0.02 mg/L	107	70.0	130	----
		tin, total	7440-31-5	E420	0.0197 mg/L	0.02 mg/L	98.7	70.0	130	----
		titanium, total	7440-32-6	E420	0.0386 mg/L	0.04 mg/L	96.4	70.0	130	----
		tungsten, total	7440-33-7	E420	0.0197 mg/L	0.02 mg/L	98.6	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	0.102 mg/L	0.1 mg/L	102	70.0	130	----
		zinc, total	7440-66-6	E420	0.379 mg/L	0.4 mg/L	94.6	70.0	130	----
		zirconium, total	7440-67-7	E420	0.0396 mg/L	0.04 mg/L	99.1	70.0	130	----
Dissolved Metals (QCLot: 321131)										
VA21C2151-013	Anonymous	aluminum, dissolved	7429-90-5	E421	0.200 mg/L	0.2 mg/L	100.0	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: 321131) - continued										
VA21C2151-013	Anonymous	antimony, dissolved	7440-36-0	E421	0.0222 mg/L	0.02 mg/L	111	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.0192 mg/L	0.02 mg/L	96.3	70.0	130	----
		barium, dissolved	7440-39-3	E421	0.0198 mg/L	0.02 mg/L	99.0	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.0429 mg/L	0.04 mg/L	107	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.0100 mg/L	0.01 mg/L	100	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.101 mg/L	0.1 mg/L	101	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	0.0112 mg/L	0.01 mg/L	112	70.0	130	----
		chromium, dissolved	7440-47-3	E421	0.0390 mg/L	0.04 mg/L	97.5	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.0194 mg/L	0.02 mg/L	97.2	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.0198 mg/L	0.02 mg/L	99.1	70.0	130	----
		iron, dissolved	7439-89-6	E421	1.94 mg/L	2 mg/L	97.0	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.0218 mg/L	0.02 mg/L	109	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	0.0194 mg/L	0.02 mg/L	97.2	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.0222 mg/L	0.02 mg/L	111	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.0389 mg/L	0.04 mg/L	97.3	70.0	130	----
		phosphorus, dissolved	7723-14-0	E421	9.90 mg/L	10 mg/L	99.0	70.0	130	----
		potassium, dissolved	7440-09-7	E421	4.07 mg/L	4 mg/L	102	70.0	130	----
		rubidium, dissolved	7440-17-7	E421	0.0196 mg/L	0.02 mg/L	98.3	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.0402 mg/L	0.04 mg/L	100	70.0	130	----
		silicon, dissolved	7440-21-3	E421	8.54 mg/L	10 mg/L	85.4	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.00434 mg/L	0.004 mg/L	108	70.0	130	----
		sodium, dissolved	17341-25-2	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	19.3 mg/L	20 mg/L	96.7	70.0	130	----
		tellurium, dissolved	13494-80-9	E421	0.0441 mg/L	0.04 mg/L	110	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.00430 mg/L	0.004 mg/L	108	70.0	130	----
		thorium, dissolved	7440-29-1	E421	0.0234 mg/L	0.02 mg/L	117	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.0197 mg/L	0.02 mg/L	98.6	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.0381 mg/L	0.04 mg/L	95.3	70.0	130	----
		tungsten, dissolved	7440-33-7	E421	0.0212 mg/L	0.02 mg/L	106	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.00433 mg/L	0.004 mg/L	108	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	0.404 mg/L	0.4 mg/L	101	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: 321131) - continued										
VA21C2151-013	Anonymous	zirconium, dissolved	7440-67-7	E421	0.0440 mg/L	0.04 mg/L	110	70.0	130	----
Dissolved Metals (QCLot: 321540)										
VA21C2135-001	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000966 mg/L	0.0001 mg/L	96.6	70.0	130	----
Aggregate Organics (QCLot: 327880)										
FJ2101148-002	Anonymous	chemical oxygen demand [COD]	----	E559	107 mg/L	100 mg/L	107	75.0	125	----

Qualifiers

Qualifier	Description
MS-B	*Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.*

Chain of Custody (COC) / Analytical Request Form

ALS Environmental
www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here
(lab use only)

COC Number: 17 -

Page 1 of

Report To	Contact and company name below will appear on the final report
Company:	Regional District of Kitimat-Stikine
Contact:	Hannah Shinton
Phone:	250-615-6100
	Company address below will appear on the final report
Street:	4545 Lazelle Avenue
City/Province:	Terrace/BC
Postal Code:	V8G4E1
Invoice To	Same as Report To ☐ YES ☑ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	Regional District of Kitimat-Stikine
Contact:	Nicki Veikle

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Quality Control (QC) Report with Report ☑ YES ☐ NO
☑ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: hshinton@rdks.bc.ca
Email 2: nveikle@rdks.bc.ca;
Email 3: eblaney@rdks.bc.ca

Invoice Distribution

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

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

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

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

Date and Time Required for all E&P TATs:

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

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

ALS Lab Work Order # (lab use only):

ALS Contact:

Sampler: H.Shinton

Analysis Request

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

ALS Sample # (lab use only)	Sample Identification	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Dissolved metals (F/P)	Total metals (P)	alkalinity (as CaCO3)	Total Hardness	Dissolved Hardness	Ammonia (P)	Fluoride, Chloride	COD and BOD (P)	sulphate	Nitrate and Nitrite	TSS	total Kjeldahl nitrogen (P)	pH, Conductivity	Total phosphorus (P)	ortho-phosphorus (P)	SAMPLES ON HOLD	Sample is hazardous (please provide further detail)	NUMBER OF CONTAINERS
	SW-1	07-Oct-21	9:59	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			
	SW-3	07-Oct-21	10:23	Effluent	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			
	SW-6	07-Oct-21	10:38	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			
	SW-21	07-Oct-21	9:25	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			
	DUP	07-Oct-21	12:00	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			
	~~Field Blank~~			Water	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~			
	Travel Blank	07-Oct-21	—	Water		R				R	R	R										

Environmental Division
Vancouver
Work Order Reference
VA21C2230

Telephone : +1 604 253 4188

Terrace Shipping
2 Coolers
___ Carbouys
Ground ☐
Air ☒
SFX ☐

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

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ | SIF Observations Yes ☐ No ☐
Ice Packs ☑ Ice Cubes ☐ | Custody seal intact Yes ☐ No ☐
Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
10.3	9.4						6

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Hannah Shinton	Date: October 7th 2021	Time:	Received by: Chris	Date: 7-Oct-21	Time: 1320	Received by:	Date: 10/7	Time: 9110

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

SEPT 2017 FRONT

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

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

APPENDIX E

Well Report

Stantec Consulting Ltd.
4623 Park Avenue, Terrace, BC V8G 1V5

August 26, 2021
File: 123221889

Attention: Nicki Veikle, Environmental Coordinator
Regional District of Kitimat-Stikine
Suite 300 – 4545 Lazelle Avenue
Terrace, BC V8G 4E1

Dear Ms. Veikle,

Reference: Memo – 2021 Groundwater Monitoring Well Installation
Thornhill Transfer Station – 3016 Old Lakelse Lake Road, Terrace, BC

Stantec Consulting Ltd. (Stantec) was retained by the Regional District of Kitimat-Stikine (RDKS, the Client) to complete the proposed design and installation of two groundwater monitoring wells at the Thornhill Transfer Station, at the site of the former Thornhill Landfill located at 3016 Lakelse Lake Road outside of Terrace, BC (hereafter referred to as the "Site") outlined in a proposal dated March 30, 2021, provided by Stantec (Reference: SIR21_030). The design and installation of the two wells was intended to meet the groundwater monitoring requirements outlined in Operational Certificate 4057 under which the closed landfill operates.

Stantec issued a letter on July 8, 2021 outlining the proposed locations of the well installations. It was recommended that two wells be installed on the Site: a "background" location situated hydraulically up-gradient of the landfill ("MW21-01"); and one located hydraulically down-gradient of the landfill ("MW21-02"). Several existing wells (BH96-01, BH96-02, BH96-03, and MW21-03), installed by others are present on the Site. The recommended locations for the wells was based on a combination of a desktop review of hydraulic conditions at the Site and input from RDKS.

Well Installation

Location Selection

Based on topographic data provided in Figure 3 of the Sperling Hansen's 2021 *Thornhill Landfill Closure Assessment Report* that was provided for reviewing during the design of this program, the inferred direction of groundwater flow in the general area of Thornhill Landfill is expected to be north-northwest towards Thornhill Creek. More locally, groundwater flowing under the landfill is expected to follow this direction, entering the tributary that begins near the northern toe of the landfill and enters Thornhill Creek less than a kilometer downstream.

The "background" location (MW21-01) was initially planned to replace the former background well BH96-03; however, the former location of BH96-03 is now the location of the scale shack for the existing Thornhill Transfer Station, and the adjacent decommissioned landfill is at a higher elevation than the Transfer Station site which has the possibility to effect local groundwater flow patterns near the former well. A background well should be sited in a location that is not influenced by landfill leachate, and is within the same aquifer as

the groundwater assessed for downgradient impacts from the landfill, thus providing an opportunity to accurately compare groundwater quality and potential impacts from the landfill leachate. Therefore, MW21-01 was installed adjacent to the Transfer Station building located east of the former landfill, and inferred to be situated hydraulically cross-gradient. Additionally, test pit and drilling observations from the Sperling Hansen's 1997 *Hydrogeotechnical Investigation* report, also provided for Stantec's review, indicated that this location was within the targeted clay unit. Stantec notes that there is still a chance that impacts from the landfill may be present at this location as there is a lack of recent groundwater monitoring or sampling data in this part of the Site. Potentially unidentified hydraulic influence from the landfill footprint cannot be completely ruled out until RDKS completes sampling of the well.

The down-gradient well (MW21-02) was initially planned to be installed near the western toe of the landfill; however, the location was shifted further to the north to be more directly topographically down-gradient of the landfill as a pre-existing well (MW21-03[1]) was discovered in the initial proposed location during preparation activities. Details of the installation for MW21-03 are unknown; however, based on the location, elevation, and depth to groundwater, it is inferred that the well is installed within the clay aquitard. The amended location for MW21-02 was deemed appropriate based on the topographically down-gradient orientiation from the landfill and as the the location was expected to be within the same clay hydraulic unit as the landfill.

Drilling and Soil Stratigraphy

Drilling activities were conducted on July 12 and 13, 2021. Two boreholes were advanced on the Site and completed as monitoring wells by Blue Max Drilling Inc. (Blue Max) of Terrace, BC using a track-mounted sonic drill rig. Soil cores from the drilling were observed and logged for soil type, colour, moisture, plasticity, and indications of contamination (such as staining and/or odours).

Following drilling, the boreholes were allowed to equilibriate for up to 16 hours to allow groundwater levels to stabilize, and well screens were installed at the observed groundwater depths. Based on a request from RDKS, and low volumes of water observed at MW21-01, a larger diameter (100 mm) PVC Schedule 40 pipe was used to install the well, and pea gravel was used as filtration material surrounding the well screen to allow for additional flow. MW21-02 consisted of 50 mm diameter PVC Schedule 40 pipe with a 10/20 filter sand pack surrounding the screen.

Stratigraphy at MW21-01 was found to generally be gravels overlying silt material at approximately 22 metres below ground surface (mbgs). Clay materials were encountered at MW21-02 from the surface to the maximum depth of investigation (approximately 12.2 mbgs). Staining and/or hydrocarbon-like odours were not observed during the drilling of MW21-01 and MW21-02.

Detailed soil stratigraphy and depth information for each borehole location, and details of the well installations, are provided on the borehole logs presented in Attachment B. The stratigraphy observed on

[1] As the source and installation details of the well were unknown, RDKS assigned "MW21-03" to the well as an arbitrary label.

the Site was consistent with the descriptions of the clay and gravel units presented in previous reports conducted on the Site by others.

Groundwater Monitoring

RDKS conducted groundwater monitoring and elevation survey activities on the newly installed and existing groundwater wells on the Site on July 19, 2021. RDKS provided Stantec with the data from the survey and monitoring to be included in this report, as shown in Table below.

Table 1: Groundwater Monitoring and Elevation Data (provided by RDKS)

Location	Coordinates		TOC Elevation (m)	Well Depth (mbTOC)	Water Level (mbTOC)	Water Elevation (m)
	Northing	Easting				
MW21-01	6038298.722	533439.850	186.092	23.29	21.22	164.872
MW21-02	6038532.955	533199.782	162.795	13.18	9.24	153.555
MW21-03	6038349	533028	172.54	6.04	2.47	170.07
BH96-01	6038160.177	533389.217	196.418	>60.0	Unknown	-
BH96-02	6038424.663	533240.003	171.697	15.88	9.27	162.427

m: metres
TOC: top of casing
mbTOC: metres below top of casing

Based on the water elevations provided by RDKS, and the inference that MW21-03 is screened within the aquitard, the groundwater flow direction within the clay unit is interpreted to be towards the northwest, as shown on Figure 2. This is relatively consistent with the interpretation based on the previous reports conducted by others for the Site. Based on the topography, MW21-01 (installed in a gravel aquifer) is inferred to be cross-gradient of the Site. Additional hydrogeological assessments would be required to confirm the detailed groundwater flow patterns at the Site, including the direction of groundwater flow within the gravel aquafer, and the interconnectivity of groundwater flow between the gravel aquifer and clay aquitard.

Reference: **Memo – 2021 Groundwater Monitoring Well Installation Thornhill Transfer Station – 3016 Old Lakelse Lake Road, Terrace, BC**

Closing

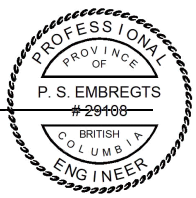
We trust that this memo meets your current requirements, please contact the below for any further details.

Regards,

Stantec Consulting Ltd.

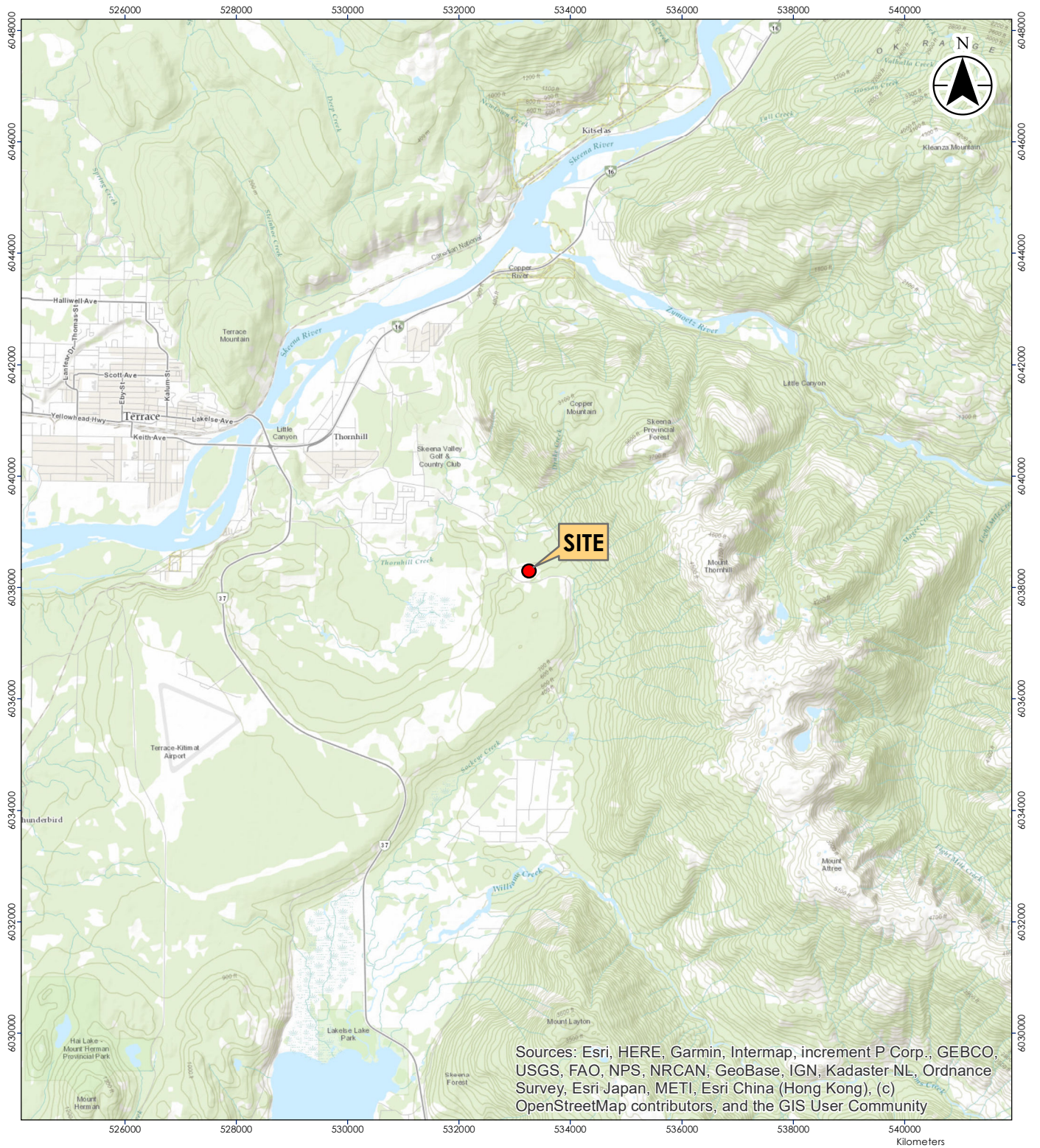
Kelsey Baker B.ASc., E.I.T.
Environmental Engineer in Training
Phone: 250 580 6856
Kelsey.Baker@stantec.com

Paul Embregts P.Eng., CSAP
Senior Environmental Engineer
Phone: 250 470 4487
Paul.Embregts@stantec.com



Attachments: A: Figures
B: Borehole Logs

gc v:\1232\active\123221889\05_report_deliv\documentation\draft_vs1\well_install_memo\123221889_thornhill_landfill_gw_20210720.docx



Notes

1. Coordinate System: NAD 1983 UTM Zone 9N
2. Base map provided by ESRI Web Mapping Service (WMS)

Stantec

Project Information

Project No:	123221889
Scale:	1:100,000
Date:	2021-JUL-28
Drawn by:	G. HUYNH
Checked by:	K. BAKER

Project Location

3016 OLD LAKELSE LAKE ROAD
TERRACE, BC

Client / Project

REGIONAL DISTRICT OF KITIMAT-STIKINE

THORNHILL TRANSFER STATION

Title

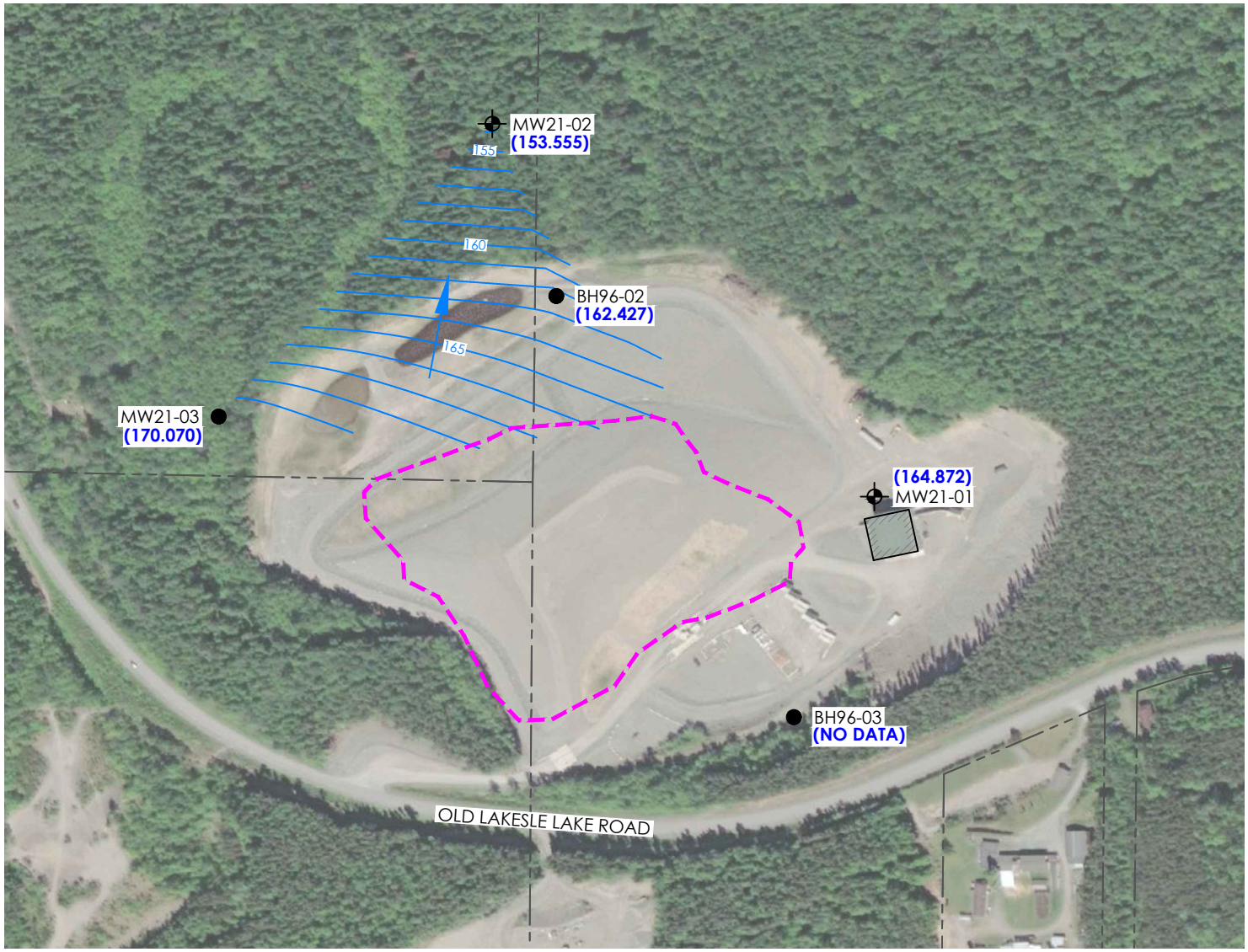
SITE LOCATION PLAN

Figure No.

1

S:\1232\projects\123221889\drawings\thornhill_transfer_station\123221889_001_site_location_plan.mxd
2021-07-28 By: ghuynh

ORIGINAL SHEET ANSI A



N

LEGEND

- EXISTING BUILDING
- APPROXIMATE LANDFILL BOUNDARY
- LOT LINE
- MONITORING WELL LOCATION (STANTEC, 2021)
- BOREHOLE LOCATION (BY OTHERS)
- (###) GROUNDWATER ELEVATION (m)
- GROUNDWATER CONTOUR (m)
- GROUNDWATER FLOW DIRECTION

SCALE IN METRES

0 50 100 150 200

1:4000

Stantec

Project Information

Project No.:	123221889
Scale:	1:4000
Date:	2021-JUL-30
Drawn by:	G. HUYNH
Checked by:	K. BAKER

Project Location

3016 OLD LAKESLE LAKE ROAD
TERRACE, BC

Client/Project

REGIONAL DISTRICT OF KITIMAT-STIKINE

THORNHILL TRANSFER STATION

Title

SITE PLAN

Figure No.

2

ORIGINAL SHEET - ANSI A

Groundwater Monitoring Well: MW21-01

Project:	Thronhill Transfer Station	**Method:**	Sonic
Client:	RDKS	**Date started/completed:**	12-Jul-2021 / 13-Jul-2021
Location:	3016 Old Lakelse Lake Road, Terrace, BC	**Ground surface elevation:**	185.28 m AMSL
Number:	123221889	**Top of casing elevation:**	186.09 m AMSL
Field investigator:	KB	**Easting:**	-128.483876
Contractor:	Blue Max Drilling Inc.	**Northing:**	54.491205

SUBSURFACE PROFILE				INSTALLATION DETAILS	
Depth (ft) (m)	Graphic Log	Stratigraphic Description	Elevation (m AMSL) Depth (m BGS)	Diagram	Description
-0.5			185.88		
-1					10 cm diameter PVC Pipe and End Cap
0 0.0		Ground Surface	185.28		
		SAND and GRAVEL Grey, fine to coarse grained, with cobbles (fill). Loose, dry to moist, odours and/or staining not observed.	0.00		
1 0.5					
2					
3 1.0					
4					
5 1.5					
6					
7 2.0					
8					
9 2.5					
10 3.0			182.08		
		SAND and GRAVEL Grey, coarse grained SAND and fine to coarse grained GRAVEL, with cobbles. Loose, moist, odours and/or staining not observed.	3.20		
11 3.5					
12			181.48		
		SAND and GRAVEL Grey, fine to coarse grained, with cobbles. Loose, moist, odours and/or staining not observed.	3.80		
13 4.0					
14					
15 4.5					
16					
17 5.0		Dry and silty at 5 to 5.3 m (shatterred rock)			
18 5.5					

Screen Interval: 18.30 - 21.30 m BGS
Sand Pack Interval: 18.30 - 21.30 m BGS
Well Seal Interval: 0.00 - 17.70 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

Stantec

Drawn By/Checked By: KB/

Groundwater Monitoring Well: MW21-01

Project:	Thronhill Transfer Station	**Method:**	Sonic
Client:	RDKS	**Date started/completed:**	12-Jul-2021 / 13-Jul-2021
Location:	3016 Old Lakelse Lake Road, Terrace, BC	**Ground surface elevation:**	185.28 m AMSL
Number:	123221889	**Top of casing elevation:**	186.09 m AMSL
Field investigator:	KB	**Easting:**	-128.483876
Contractor:	Blue Max Drilling Inc.	**Northing:**	54.491205

SUBSURFACE PROFILE				INSTALLATION DETAILS	
Depth (ft)	Depth (m)	Graphic Log	Stratigraphic Description	Elevation (m AMSL) Depth (m BGS)	Diagram / Description
19			SAND and GRAVEL Grey, fine to coarse grained, with cobbles. Loose, moist, odours and/or staining not observed.		
20	6.0				
21					
22	6.5				
23					
24	7.0				
25					
26	7.5				
27					
28	8.0				
	8.5			176.58	
29			SAND and GRAVEL Grey, fine to coarse grained, with silt. Loose, moist to wet, odours and/or staining not observed.	8.70	← Bentonite Seal
30	9.0				
31			Trace silt below 9.3 m		
32	9.5				
33					
34	10.0				
35	10.5		Dry and silty at 10.5 to 10.8 m (shattered rock)		
36					
37	11.0				
38	11.5		Purple seam between 11.4 and 11.5 m		

Screen Interval: 18.30 - 21.30 m BGS
Sand Pack Interval: 18.30 - 21.30 m BGS
Well Seal Interval: 0.00 - 17.70 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

Stantec

Drawn By/Checked By: KB/

Groundwater Monitoring Well: MW21-01

Project:	Thronhill Transfer Station	**Method:**	Sonic
Client:	RDKS	**Date started/completed:**	12-Jul-2021 / 13-Jul-2021
Location:	3016 Old Lakelse Lake Road, Terrace, BC	**Ground surface elevation:**	185.28 m AMSL
Number:	123221889	**Top of casing elevation:**	186.09 m AMSL
Field investigator:	KB	**Easting:**	-128.483876
Contractor:	Blue Max Drilling Inc.	**Northing:**	54.491205

SUBSURFACE PROFILE				INSTALLATION DETAILS	
Depth (ft) (m)	Graphic Log	Stratigraphic Description	Elevation (m AMSL) Depth (m BGS)	Diagram	Description
39 — 12.0		SAND and GRAVEL Grey, fine to coarse grained, with silt. Loose, moist to wet, odours and/or staining not observed.			
40		Wet with trace to no fines between 12.3 and 13.5 m (inferred drill water and fines washed out)			
41 — 12.5					
42					
43 — 13.0					
44					
45 — 13.5					
46					
47 — 14.0					
48					
49 — 14.5					
50 — 15.0		Wet with trace to no fines between 15.1 and 16.4 m (inferred drill water and fines washed out)			
51 — 15.5					
52					
53 — 16.0					
54					
55 — 16.5					
56					
57 — 17.0					
58 — 17.5					

Screen Interval: 18.30 - 21.30 m BGS
Sand Pack Interval: 18.30 - 21.30 m BGS
Well Seal Interval: 0.00 - 17.70 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

Stantec

Drawn By/Checked By: KB/

Groundwater Monitoring Well: MW21-01

Project:	Thronhill Transfer Station	**Method:**	Sonic
Client:	RDKS	**Date started/completed:**	12-Jul-2021 / 13-Jul-2021
Location:	3016 Old Lakelse Lake Road, Terrace, BC	**Ground surface elevation:**	185.28 m AMSL
Number:	123221889	**Top of casing elevation:**	186.09 m AMSL
Field investigator:	KB	**Easting:**	-128.483876
Contractor:	Blue Max Drilling Inc.	**Northing:**	54.491205

SUBSURFACE PROFILE					INSTALLATION DETAILS	
Depth (ft)	Depth (m)	Graphic Log	Stratigraphic Description	Elevation (m AMSL) Depth (m BGS)	Diagram	Description
60	18.5		SAND and GRAVEL Grey, fine to coarse grained, with silt. Loose, moist to wet, odours and/or staining not observed.			
61			Wet with trace to no fines between 18.6 and 19.5 m (inferred drill water and fines washed out)			
62	19.0					
63						
64	19.5					Pea Gravel
65						50 mm 020 Slot PVC Pipe
66	20.0					
67	20.5					Groundwater at 20.41 mbgs on July 19, 2021
68				164.58		
69	21.0		SAND Grey, medium to coarse grained, trace gravel and cobbles. Loose, wet, odours and/or staining not observed.	20.70		
70						
71	21.5					Bentonite Seal
72	22.0			163.38		
73			Sandy SILT Brown, with clay, trace fine grained gravel. Stiff, moist to wet, odours and/or staining not observed.	21.90		
74	22.5					
75						Slough
76	23.0					
77	23.5			161.78		
78			ROCK Grey	23.50 161.58		
79	24.0		End of Borehole	23.70		

Screen Interval: 18.30 - 21.30 m BGS
Sand Pack Interval: 18.30 - 21.30 m BGS
Well Seal Interval: 0.00 - 17.70 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

Stantec

Drawn By/Checked By: KB/

Groundwater Monitoring Well: MW21-02

Project:	Thronhill Transfer Station	**Method:**	Sonic
Client:	RDKS	**Date started/completed:**	12-Jul-2021
Location:	3016 Old Lakelse Lake Road, Terrace, BC	**Ground surface elevation:**	161.78 m AMSL
Number:	123221889	**Top of casing elevation:**	162.80 m AMSL
Field investigator:	KB	**Easting:**	-128.487437
Contractor:	Blue Max Drilling Inc.	**Northing:**	54.4933

SUBSURFACE PROFILE | INSTALLATION DETAILS

Depth (ft)	Depth (m)	Graphic Log	Stratigraphic Description	Elevation (m AMSL) Depth (m BGS)	Diagram	Description
				162.82		
	-1.0					
-3						
	-0.5					J-Plug & Stick-Up Well Pipe
-2						
-1						
			Ground Surface	161.78		
0	0.0		CLAY	0.00		
			Grey, with gravel, trace organics. Stiff, moist, odours and/or staining not observed.	161.63		Cement & Stick-Up Steel Road Box
			CLAY	0.15		
1			Grey. Very stiff, moist, odours and/or staining not observed.			
	0.5					
2						
3	1.0					
4						
5	1.5					
6						
	2.0					
7						
8	2.5					
9			Stiff below at 2.7 m			
10	3.0					
			Stiff to soft and wet below 3.2 m			
11						
12	3.5					
13	4.0					
14						
			Soft below 4.4 m			
15	4.5					
16						
	5.0					

Screen Interval: 10.67 - 12.20 m BGS
Sand Pack Interval: 10.67 - 12.20 m BGS
Well Seal Interval: 0.20 - 10.37 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

Stantec

Drawn By/Checked By: KB/

Groundwater Monitoring Well: MW21-02

Project:	Thronhill Transfer Station	**Method:**	Sonic
Client:	RDKS	**Date started/completed:**	12-Jul-2021
Location:	3016 Old Lakelse Lake Road, Terrace, BC	**Ground surface elevation:**	161.78 m AMSL
Number:	123221889	**Top of casing elevation:**	162.80 m AMSL
Field investigator:	KB	**Easting:**	-128.487437
Contractor:	Blue Max Drilling Inc.	**Northing:**	54.4933

SUBSURFACE PROFILE				INSTALLATION DETAILS	
Depth (ft) (m)	Graphic Log	Stratigraphic Description	Elevation (m AMSL) Depth (m BGS)	Diagram	Description
18 5.5		CLAY Grey. Very stiff, moist, odours and/or staining not observed.			Bentonite Seal
19 6.0					
20					
21 6.5					
22					
23 7.0					
24					
25 7.5					
26					
27 8.0					Groundwater at 8.22 mbgs on July 19, 2021
28 8.5					
29					
30 9.0					
31					
32 9.5					
33 10.0					
34					
35 10.5					
36					
37 11.0					10/20 Filter Sand

Screen Interval: 10.67 - 12.20 m BGS
Sand Pack Interval: 10.67 - 12.20 m BGS
Well Seal Interval: 0.20 - 10.37 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

Stantec

Drawn By/Checked By: KB/

Groundwater Monitoring Well: MW21-02

Project:	Thronhill Transfer Station	**Method:**	Sonic
Client:	RDKS	**Date started/completed:**	12-Jul-2021
Location:	3016 Old Lakelse Lake Road, Terrace, BC	**Ground surface elevation:**	161.78 m AMSL
Number:	123221889	**Top of casing elevation:**	162.80 m AMSL
Field investigator:	KB	**Easting:**	-128.487437
Contractor:	Blue Max Drilling Inc.	**Northing:**	54.4933

SUBSURFACE PROFILE					INSTALLATION DETAILS	
Depth (ft)	Depth (m)	Graphic Log	Stratigraphic Description	Elevation (m AMSL) Depth (m BGS)	Diagram	Description
38	11.5		CLAY Grey. Very stiff, moist, odours and/or staining not observed.			50 mm 010 Slot PVC Pipe
39	12.0					
40				149.58		
			End of Borehole	12.20		
41	12.5					
42						
43	13.0					
44						
45	13.5					
46						
47	14.0					
48						
49	14.5					
50						
51	15.0					
52						
53	15.5					
54						
55	16.0					
56						
57	16.5					
	17.0					
	17.5					

Screen Interval: 10.67 - 12.20 m BGS
Sand Pack Interval: 10.67 - 12.20 m BGS
Well Seal Interval: 0.20 - 10.37 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

Stantec

Drawn By/Checked By: KB/

BOREHOLE LOG

PROJECT: PRJ96020

BOREHOLE: BH96-1
PAGE 1 OF 4

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

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

DEPTH (m)	STRATIGRAPHY	STRATIGRAPHIC DESCRIPTION	MONITOR DETAILS & NUMBER	SAMPLE NUMBER	T.O.P. = 0.75 m above ground WATER LEVEL	COMMENTS
		Coarse SAND. Dark grey-brown. Some gravel. Trace cobbles. Loose. Moist.			hole dry to 62.50 m below ground	AIR ROTARY DRILLING Drilling Contractor: Double D Drilling, Terrace, BC
2.00						
4.00						
6.00						
7.62						
8.00		GRAVEL and Coarse SAND Grey-brown. Trace cobbles. Loose. Damp.				
9.14						
10.00		GRAVEL and Coarse SAND. Grey. Some cobbles. Trace silt. Loose. Dry.				
12.00						
14.00						
15.24						
16.00		GRAVEL and Coarse SAND Grey-brown. Some cobbles. Trace silt. Loose. Damp.				
18.00						
18.29						
		GRAVEL. Some sand. Some cobbles. Loose. Dry.				
29.60						

BOREHOLE LOG

PROJECT: PRJ96020

BOREHOLE: BH96-1

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

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

DEPTH (m)	STRATIGRAPHY	STRATIGRAPHIC DESCRIPTION	MONITOR DETAILS & NUMBER	SAMPLE NUMBER
		GRAVEL. Some sand. Some cobbles. Loose. Dry.		
22.00				
22.86		GRAVEL and Coarse SAND. Some cobbles. Trace silt. Loose. Damp.		
24.00				
24.38		GRAVEL. Some sand. Some cobbles. Loose. Dry.		
26.00				
27.43		GRAVEL and Coarse SAND. Some cobbles. Trace silt. Loose. Damp.		
28.00				
30.00				
32.00		Coarse gravely SAND Loose Moist		
34.00				
36.00				
38.00				
39.62				
40.00				

BOREHOLE LOG

PROJECT: PRJ96020

BOREHOLE: BH96-1

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

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

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

BOREHOLE LOG

PROJECT: PRJ96020

BOREHOLE: BH96-1
PAGE 4 OF 4

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

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

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

BOREHOLE LOG

PROJECT: PRJ96020

BOREHOLE: BH96-2

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

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

DEPTH (m)	STRATIGRAPHY	STRATIGRAPHIC DESCRIPTION	MONITOR DETAILS & NUMBER	SAMPLE NUMBER	SAMPLE INTERVAL	T.O.P = 1.02 m above ground WATER LEVEL	COMMENTS
0.91		SAND and GRAVEL FILL.					AIR ROTARY DRILLING
		CLAY Brown. Occasional rounded gravel. Soft. Moist. Stiff below 1.52 m.		S1			DRILLING CONTRACTOR DOUBLE D DRILLING, TERRACE, BC
2.00							
4.00							
4.27		CLAY Grey-brown. Occasional red-brown mottling. Stiff. Moist.					
6.00							
8.00							
10.00						▽ 10.00 m 13/06/96	
12.00							
				S2			
14.00							
16.00							
16.15		BOTTOM OF HOLE AT 16.15 m					
18.00							
20.00							

BOREHOLE LOG

PROJECT: PRJ96020

BOREHOLE: BH96-3

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

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

DEPTH (m)	STRATIGRAPHY	STRATIGRAPHIC DESCRIPTION	MONITOR DETAILS & NUMBER	SAMPLE NUMBER	SAMPLE INTERVAL	T.O.P. = 1.18 m above ground / WATER LEVEL	COMMENTS
		GRAVEL FILL Dark grey-brown Some silt Loose Moist.					AIR ROTARY DRILLING
1.52							
2.00		SAND and GRAVEL FILL Dark grey-brown Some silt Some clay Occasional pieces of wood, plastic, glass and cloth Loose Moist Leachate odour.					
2.44							
4.00		CLAY FILL Dark grey-brown Some gravel Some pieces of wood and glass Stiff Moist.		S1			
4.57							
6.00		CLAY Dark grey-brown Some gravel Some sand Stiff Moist					
8.00							
9.14							
10.00		Clayey GRAVEL Brown Loose Wet Saturated below 11.58 m Strong diesel odour below 10.36 m		S2			S2 submitted for analysis of hydro carbon content
12.00						▽ 12.94 m 13/06/96	
13.72							
14.00		BOTTOM OF HOLE AT 13.72 m					
16.00		Drilling Contractor: Double D Drilling, Terrace, B.C.					
18.00							
20.00							

golder.com

Appendix B Monitoring Well Intallation Reports

Stantec Consulting Ltd.
4623 Park Avenue, Terrace, BC V8G 1V5

August 26, 2021
File: 123221889

Attention: Nicki Veikle, Environmental Coordinator
Regional District of Kitimat-Stikine
Suite 300 – 4545 Lazelle Avenue
Terrace, BC V8G 4E1

Dear Ms. Veikle,

Reference: Memo – 2021 Groundwater Monitoring Well Installation
Thornhill Transfer Station – 3016 Old Lakelse Lake Road, Terrace, BC

Stantec Consulting Ltd. (Stantec) was retained by the Regional District of Kitimat-Stikine (RDKS, the Client) to complete the proposed design and installation of two groundwater monitoring wells at the Thornhill Transfer Station, at the site of the former Thornhill Landfill located at 3016 Lakelse Lake Road outside of Terrace, BC (hereafter referred to as the "Site") outlined in a proposal dated March 30, 2021, provided by Stantec (Reference: SIR21_030). The design and installation of the two wells was intended to meet the groundwater monitoring requirements outlined in Operational Certificate 4057 under which the closed landfill operates.

Stantec issued a letter on July 8, 2021 outlining the proposed locations of the well installations. It was recommended that two wells be installed on the Site: a "background" location situated hydraulically up-gradient of the landfill ("MW21-01"); and one located hydraulically down-gradient of the landfill ("MW21-02"). Several existing wells (BH96-01, BH96-02, BH96-03, and MW21-03), installed by others are present on the Site. The recommended locations for the wells was based on a combination of a desktop review of hydraulic conditions at the Site and input from RDKS.

Well Installation

Location Selection

Based on topographic data provided in Figure 3 of the Sperling Hansen's 2021 *Thornhill Landfill Closure Assessment Report* that was provided for reviewing during the design of this program, the inferred direction of groundwater flow in the general area of Thornhill Landfill is expected to be north-northwest towards Thornhill Creek. More locally, groundwater flowing under the landfill is expected to follow this direction, entering the tributary that begins near the northern toe of the landfill and enters Thornhill Creek less than a kilometer downstream.

The "background" location (MW21-01) was initially planned to replace the former background well BH96-03; however, the former location of BH96-03 is now the location of the scale shack for the existing Thornhill Transfer Station, and the adjacent decommissioned landfill is at a higher elevation than the Transfer Station site which has the possibility to effect local groundwater flow patterns near the former well. A background well should be sited in a location that is not influenced by landfill leachate, and is within the same aquifer as

the groundwater assessed for downgradient impacts from the landfill, thus providing an opportunity to accurately compare groundwater quality and potential impacts from the landfill leachate. Therefore, MW21-01 was installed adjacent to the Transfer Station building located east of the former landfill, and inferred to be situated hydraulically cross-gradient. Additionally, test pit and drilling observations from the Sperling Hansen's 1997 *Hydrogeotechnical Investigation* report, also provided for Stantec's review, indicated that this location was within the targeted clay unit. Stantec notes that there is still a chance that impacts from the landfill may be present at this location as there is a lack of recent groundwater monitoring or sampling data in this part of the Site. Potentially unidentified hydraulic influence from the landfill footprint cannot be completely ruled out until RDKS completes sampling of the well.

The down-gradient well (MW21-02) was initially planned to be installed near the western toe of the landfill; however, the location was shifted further to the north to be more directly topographically down-gradient of the landfill as a pre-existing well (MW21-03[1]) was discovered in the initial proposed location during preparation activities. Details of the installation for MW21-03 are unknown; however, based on the location, elevation, and depth to groundwater, it is inferred that the well is installed within the clay aquitard. The amended location for MW21-02 was deemed appropriate based on the topographically down-gradient orientiation from the landfill and as the the location was expected to be within the same clay hydraulic unit as the landfill.

Drilling and Soil Stratigraphy

Drilling activities were conducted on July 12 and 13, 2021. Two boreholes were advanced on the Site and completed as monitoring wells by Blue Max Drilling Inc. (Blue Max) of Terrace, BC using a track-mounted sonic drill rig. Soil cores from the drilling were observed and logged for soil type, colour, moisture, plasticity, and indications of contamination (such as staining and/or odours).

Following drilling, the boreholes were allowed to equilibriate for up to 16 hours to allow groundwater levels to stabilize, and well screens were installed at the observed groundwater depths. Based on a request from RDKS, and low volumes of water observed at MW21-01, a larger diameter (100 mm) PVC Schedule 40 pipe was used to install the well, and pea gravel was used as filtration material surrounding the well screen to allow for additional flow. MW21-02 consisted of 50 mm diameter PVC Schedule 40 pipe with a 10/20 filter sand pack surrounding the screen.

Stratigraphy at MW21-01 was found to generally be gravels overlying silt material at approximately 22 metres below ground surface (mbgs). Clay materials were encountered at MW21-02 from the surface to the maximum depth of investigation (approximately 12.2 mbgs). Staining and/or hydrocarbon-like odours were not observed during the drilling of MW21-01 and MW21-02.

Detailed soil stratigraphy and depth information for each borehole location, and details of the well installations, are provided on the borehole logs presented in Attachment B. The stratigraphy observed on

[1] As the source and installation details of the well were unknown, RDKS assigned "MW21-03" to the well as an arbitrary label.

the Site was consistent with the descriptions of the clay and gravel units presented in previous reports conducted on the Site by others.

Groundwater Monitoring

RDKS conducted groundwater monitoring and elevation survey activities on the newly installed and existing groundwater wells on the Site on July 19, 2021. RDKS provided Stantec with the data from the survey and monitoring to be included in this report, as shown in Table below.

Table 1: Groundwater Monitoring and Elevation Data (provided by RDKS)

Location	Coordinates		TOC Elevation (m)	Well Depth (mbTOC)	Water Level (mbTOC)	Water Elevation (m)
	Northing	Easting				
MW21-01	6038298.722	533439.850	186.092	23.29	21.22	164.872
MW21-02	6038532.955	533199.782	162.795	13.18	9.24	153.555
MW21-03	6038349	533028	172.54	6.04	2.47	170.07
BH96-01	6038160.177	533389.217	196.418	>60.0	Unknown	-
BH96-02	6038424.663	533240.003	171.697	15.88	9.27	162.427

m: metres
TOC: top of casing
mbTOC: metres below top of casing

Based on the water elevations provided by RDKS, and the inference that MW21-03 is screened within the aquitard, the groundwater flow direction within the clay unit is interpreted to be towards the northwest, as shown on Figure 2. This is relatively consistent with the interpretation based on the previous reports conducted by others for the Site. Based on the topography, MW21-01 (installed in a gravel aquifer) is inferred to be cross-gradient of the Site. Additional hydrogeological assessments would be required to confirm the detailed groundwater flow patterns at the Site, including the direction of groundwater flow within the gravel aquafer, and the interconnectivity of groundwater flow between the gravel aquifer and clay aquitard.

Reference: **Memo – 2021 Groundwater Monitoring Well Installation Thornhill Transfer Station – 3016 Old Lakelse Lake Road, Terrace, BC**

Closing

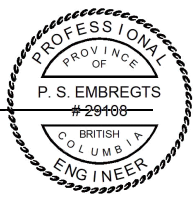
We trust that this memo meets your current requirements, please contact the below for any further details.

Regards,

Stantec Consulting Ltd.

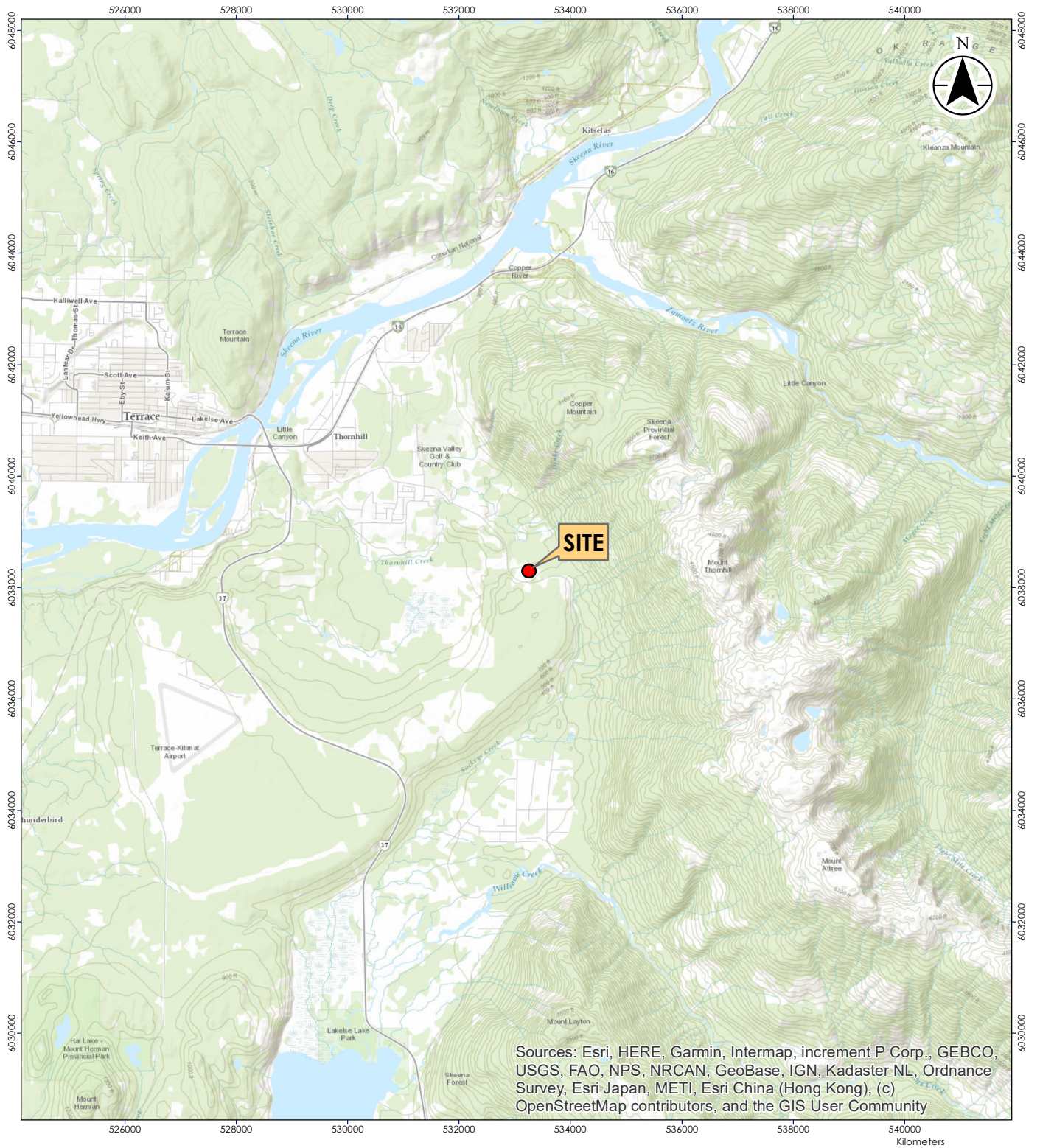
Kelsey Baker B.ASc., E.I.T.
Environmental Engineer in Training
Phone: 250 580 6856
Kelsey.Baker@stantec.com

Paul Embregts P.Eng., CSAP
Senior Environmental Engineer
Phone: 250 470 4487
Paul.Embregts@stantec.com



Attachments: A: Figures
B: Borehole Logs

gc v:\1232\active\123221889\05_report_deliv\documentation\draft_vs1\well_install_memo\123221889_thornhill_landfill_gw_20210720.docx



Notes

1. Coordinate System: NAD 1983 UTM Zone 9N
2. Base map provided by ESRI Web Mapping Service (WMS)

Stantec

Project Information

Project No:	123221889
Scale:	1:100,000
Date:	2021-JUL-28
Drawn by:	G. HUYNH
Checked by:	K. BAKER

Project Location

3016 OLD LAKELSE LAKE ROAD
TERRACE, BC

Client / Project

REGIONAL DISTRICT OF KITIMAT-STIKINE

THORNHILL TRANSFER STATION

Title

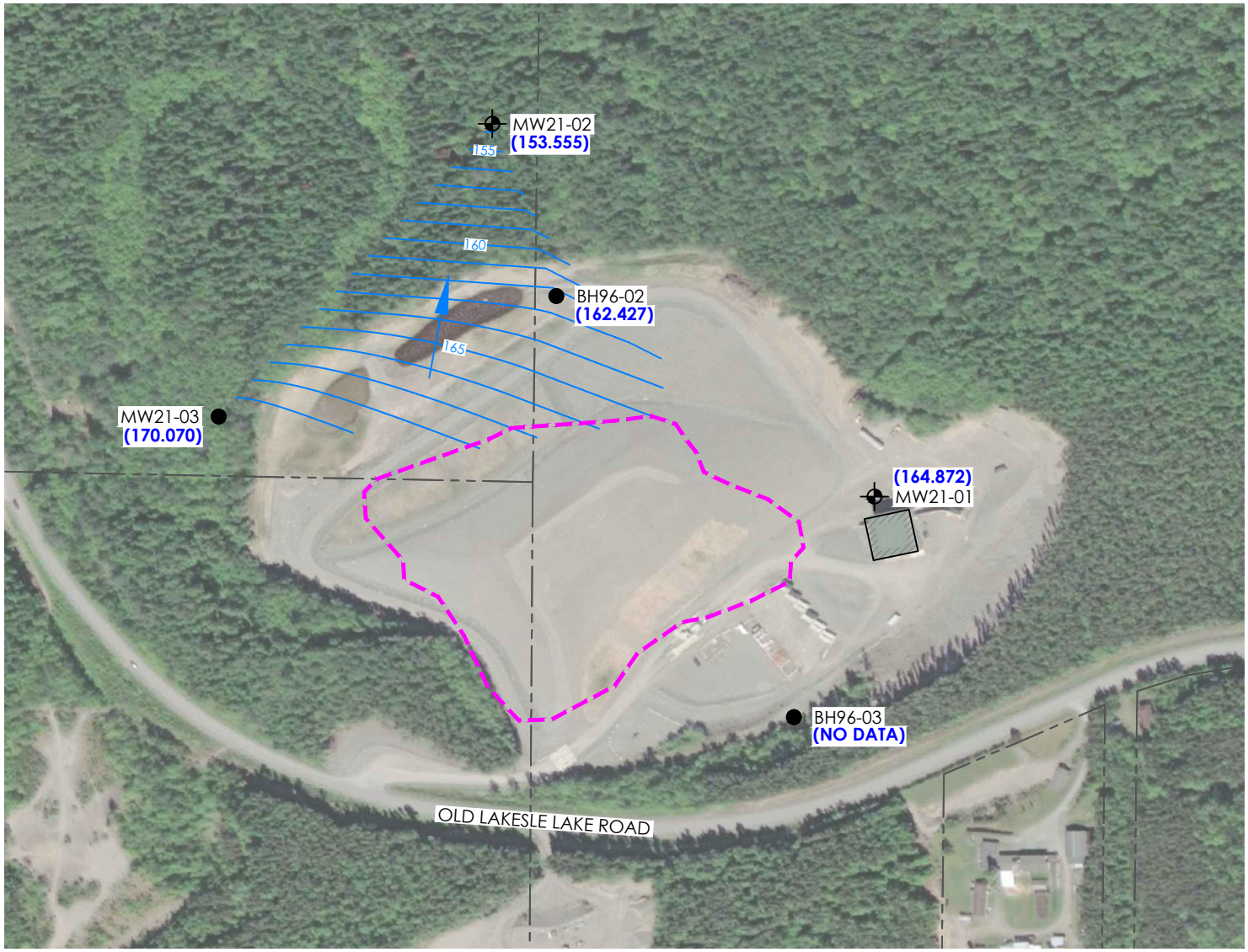
SITE LOCATION PLAN

Figure No.

1

S:\1232\projects\123221889\drawings\thornhill_transfer_station\123221889_001_site_location_plan.mxd
2021-07-28 By: ghuynh

ORIGINAL SHEET ANSI A



N

LEGEND

- EXISTING BUILDING
- APPROXIMATE LANDFILL BOUNDARY
- LOT LINE
- MONITORING WELL LOCATION (STANTEC, 2021)
- BOREHOLE LOCATION (BY OTHERS)
- (###) GROUNDWATER ELEVATION (m)
- GROUNDWATER CONTOUR (m)
- GROUNDWATER FLOW DIRECTION

SCALE IN METRES

0 50 100 150 200

1:4000

Stantec

Project Information

Project No.:	123221889
Scale:	1:4000
Date:	2021-JUL-30
Drawn by:	G. HUYNH
Checked by:	K. BAKER

Project Location

3016 OLD LAKESLE LAKE ROAD
TERRACE, BC

Client/Project

REGIONAL DISTRICT OF KITIMAT-STIKINE

THORNHILL TRANSFER STATION

Title

SITE PLAN

Figure No.

2

ORIGINAL SHEET - ANSI A

Groundwater Monitoring Well: MW21-01

Project:	Thronhill Transfer Station	**Method:**	Sonic
Client:	RDKS	**Date started/completed:**	12-Jul-2021 / 13-Jul-2021
Location:	3016 Old Lakelse Lake Road, Terrace, BC	**Ground surface elevation:**	185.28 m AMSL
Number:	123221889	**Top of casing elevation:**	186.09 m AMSL
Field investigator:	KB	**Easting:**	-128.483876
Contractor:	Blue Max Drilling Inc.	**Northing:**	54.491205

SUBSURFACE PROFILE				INSTALLATION DETAILS	
Depth (ft) (m)	Graphic Log	Stratigraphic Description	Elevation (m AMSL) Depth (m BGS)	Diagram	Description
-0.5			185.88		
-1					10 cm diameter PVC Pipe and End Cap
0 0.0		Ground Surface	185.28		
		SAND and GRAVEL Grey, fine to coarse grained, with cobbles (fill). Loose, dry to moist, odours and/or staining not observed.	0.00		
1 0.5					
2					
3 1.0					
4					
5 1.5					
6					
7 2.0					
8					
9 2.5					
10 3.0			182.08		
		SAND and GRAVEL Grey, coarse grained SAND and fine to coarse grained GRAVEL, with cobbles. Loose, moist, odours and/or staining not observed.	3.20		
11 3.5					
12			181.48		
		SAND and GRAVEL Grey, fine to coarse grained, with cobbles. Loose, moist, odours and/or staining not observed.	3.80		
13 4.0					
14					
15 4.5					
16					
17 5.0		Dry and silty at 5 to 5.3 m (shatterred rock)			
18 5.5					

Screen Interval: 18.30 - 21.30 m BGS
Sand Pack Interval: 18.30 - 21.30 m BGS
Well Seal Interval: 0.00 - 17.70 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

Stantec

Drawn By/Checked By: KB/

Groundwater Monitoring Well: MW21-01

Project:	Thronhill Transfer Station	**Method:**	Sonic
Client:	RDKS	**Date started/completed:**	12-Jul-2021 / 13-Jul-2021
Location:	3016 Old Lakelse Lake Road, Terrace, BC	**Ground surface elevation:**	185.28 m AMSL
Number:	123221889	**Top of casing elevation:**	186.09 m AMSL
Field investigator:	KB	**Easting:**	-128.483876
Contractor:	Blue Max Drilling Inc.	**Northing:**	54.491205

SUBSURFACE PROFILE				INSTALLATION DETAILS	
Depth (ft)	Depth (m)	Graphic Log	Stratigraphic Description	Elevation (m AMSL) Depth (m BGS)	Diagram / Description
19			SAND and GRAVEL Grey, fine to coarse grained, with cobbles. Loose, moist, odours and/or staining not observed.		
20	6.0				
21					
22	6.5				
23					
24	7.0				
25					
26	7.5				
27					
28	8.0				
	8.5			176.58	
29			SAND and GRAVEL Grey, fine to coarse grained, with silt. Loose, moist to wet, odours and/or staining not observed.	8.70	← Bentonite Seal
30	9.0				
31			Trace silt below 9.3 m		
32	9.5				
33					
34	10.0				
35	10.5		Dry and silty at 10.5 to 10.8 m (shattered rock)		
36					
37	11.0				
38	11.5		Purple seam between 11.4 and 11.5 m		

Screen Interval: 18.30 - 21.30 m BGS
Sand Pack Interval: 18.30 - 21.30 m BGS
Well Seal Interval: 0.00 - 17.70 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

Stantec

Drawn By/Checked By: KB/

Groundwater Monitoring Well: MW21-01

Project:	Thronhill Transfer Station	**Method:**	Sonic
Client:	RDKS	**Date started/completed:**	12-Jul-2021 / 13-Jul-2021
Location:	3016 Old Lakelse Lake Road, Terrace, BC	**Ground surface elevation:**	185.28 m AMSL
Number:	123221889	**Top of casing elevation:**	186.09 m AMSL
Field investigator:	KB	**Easting:**	-128.483876
Contractor:	Blue Max Drilling Inc.	**Northing:**	54.491205

SUBSURFACE PROFILE				INSTALLATION DETAILS	
Depth (ft) (m)	Graphic Log	Stratigraphic Description	Elevation (m AMSL) Depth (m BGS)	Diagram	Description
39 — 12.0		SAND and GRAVEL Grey, fine to coarse grained, with silt. Loose, moist to wet, odours and/or staining not observed.			
40		Wet with trace to no fines between 12.3 and 13.5 m (inferred drill water and fines washed out)			
41 — 12.5					
42					
43 — 13.0					
44					
45 — 13.5					
46					
47 — 14.0					
48					
49 — 14.5					
50 — 15.0		Wet with trace to no fines between 15.1 and 16.4 m (inferred drill water and fines washed out)			
51 — 15.5					
52					
53 — 16.0					
54					
55 — 16.5					
56					
57 — 17.0					
58 — 17.5					

Screen Interval: 18.30 - 21.30 m BGS
Sand Pack Interval: 18.30 - 21.30 m BGS
Well Seal Interval: 0.00 - 17.70 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

Stantec

Drawn By/Checked By: KB/

Groundwater Monitoring Well: MW21-01

Project:	Thronhill Transfer Station	**Method:**	Sonic
Client:	RDKS	**Date started/completed:**	12-Jul-2021 / 13-Jul-2021
Location:	3016 Old Lakelse Lake Road, Terrace, BC	**Ground surface elevation:**	185.28 m AMSL
Number:	123221889	**Top of casing elevation:**	186.09 m AMSL
Field investigator:	KB	**Easting:**	-128.483876
Contractor:	Blue Max Drilling Inc.	**Northing:**	54.491205

SUBSURFACE PROFILE					INSTALLATION DETAILS	
Depth (ft)	Depth (m)	Graphic Log	Stratigraphic Description	Elevation (m AMSL) Depth (m BGS)	Diagram	Description
60	18.5		SAND and GRAVEL Grey, fine to coarse grained, with silt. Loose, moist to wet, odours and/or staining not observed.			
61			Wet with trace to no fines between 18.6 and 19.5 m (inferred drill water and fines washed out)			
62	19.0					
63						
64	19.5					Pea Gravel
65						50 mm 020 Slot PVC Pipe
66	20.0					
67	20.5					Groundwater at 20.41 mbgs on July 19, 2021
68				164.58		
69	21.0		SAND Grey, medium to coarse grained, trace gravel and cobbles. Loose, wet, odours and/or staining not observed.	20.70		
70						
71	21.5					Bentonite Seal
72	22.0			163.38		
73			Sandy SILT Brown, with clay, trace fine grained gravel. Stiff, moist to wet, odours and/or staining not observed.	21.90		
74	22.5					
75						Slough
76	23.0					
77	23.5			161.78		
78			ROCK Grey	23.50 161.58		
79	24.0		End of Borehole	23.70		

Screen Interval: 18.30 - 21.30 m BGS
Sand Pack Interval: 18.30 - 21.30 m BGS
Well Seal Interval: 0.00 - 17.70 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

Stantec

Drawn By/Checked By: KB/

Groundwater Monitoring Well: MW21-02

Project:	Thronhill Transfer Station	**Method:**	Sonic
Client:	RDKS	**Date started/completed:**	12-Jul-2021
Location:	3016 Old Lakelse Lake Road, Terrace, BC	**Ground surface elevation:**	161.78 m AMSL
Number:	123221889	**Top of casing elevation:**	162.80 m AMSL
Field investigator:	KB	**Easting:**	-128.487437
Contractor:	Blue Max Drilling Inc.	**Northing:**	54.4933

SUBSURFACE PROFILE | INSTALLATION DETAILS

Depth (ft)	Depth (m)	Graphic Log	Stratigraphic Description	Elevation (m AMSL) Depth (m BGS)	Diagram	Description
				162.82		
	-1.0					
-3						
	-0.5					J-Plug & Stick-Up Well Pipe
-2						
-1						
			Ground Surface	161.78		
0	0.0		CLAY	0.00		
			Grey, with gravel, trace organics. Stiff, moist, odours and/or staining not observed.	161.63		Cement & Stick-Up Steel Road Box
			CLAY	0.15		
1			Grey. Very stiff, moist, odours and/or staining not observed.			
	0.5					
2						
3	1.0					
4						
5	1.5					
6						
	2.0					
7						
8	2.5					
9			Stiff below at 2.7 m			
10	3.0					
			Stiff to soft and wet below 3.2 m			
11						
12	3.5					
13	4.0					
14						
			Soft below 4.4 m			
15	4.5					
16						
	5.0					

Screen Interval: 10.67 - 12.20 m BGS
Sand Pack Interval: 10.67 - 12.20 m BGS
Well Seal Interval: 0.20 - 10.37 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

Stantec

Drawn By/Checked By: KB/

Groundwater Monitoring Well: MW21-02

Project:	Thronhill Transfer Station	**Method:**	Sonic
Client:	RDKS	**Date started/completed:**	12-Jul-2021
Location:	3016 Old Lakelse Lake Road, Terrace, BC	**Ground surface elevation:**	161.78 m AMSL
Number:	123221889	**Top of casing elevation:**	162.80 m AMSL
Field investigator:	KB	**Easting:**	-128.487437
Contractor:	Blue Max Drilling Inc.	**Northing:**	54.4933

SUBSURFACE PROFILE				INSTALLATION DETAILS	
Depth (ft) (m)	Graphic Log	Stratigraphic Description	Elevation (m AMSL) Depth (m BGS)	Diagram	Description
18 5.5		CLAY Grey. Very stiff, moist, odours and/or staining not observed.			Bentonite Seal
19 6.0					
20					
21 6.5					
22					
23 7.0					
24					
25 7.5					
26					
27 8.0					Groundwater at 8.22 mbgs on July 19, 2021
28 8.5					
29					
30 9.0					
31					
32 9.5					
33 10.0					
34					
35 10.5					
36					
37 11.0					10/20 Filter Sand

Screen Interval: 10.67 - 12.20 m BGS
Sand Pack Interval: 10.67 - 12.20 m BGS
Well Seal Interval: 0.20 - 10.37 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

Stantec

Drawn By/Checked By: KB/

Groundwater Monitoring Well: MW21-02

Project:	Thronhill Transfer Station	**Method:**	Sonic
Client:	RDKS	**Date started/completed:**	12-Jul-2021
Location:	3016 Old Lakelse Lake Road, Terrace, BC	**Ground surface elevation:**	161.78 m AMSL
Number:	123221889	**Top of casing elevation:**	162.80 m AMSL
Field investigator:	KB	**Easting:**	-128.487437
Contractor:	Blue Max Drilling Inc.	**Northing:**	54.4933

SUBSURFACE PROFILE					INSTALLATION DETAILS	
Depth (ft)	Depth (m)	Graphic Log	Stratigraphic Description	Elevation (m AMSL) Depth (m BGS)	Diagram	Description
38	11.5		CLAY Grey. Very stiff, moist, odours and/or staining not observed.			50 mm 010 Slot PVC Pipe
39	12.0					
40				149.58		
			End of Borehole	12.20		
41	12.5					
42						
43	13.0					
44						
45	13.5					
46						
47	14.0					
48						
49	14.5					
50						
51	15.0					
52						
53	15.5					
54						
55	16.0					
56						
57	16.5					
	17.0					
	17.5					

Screen Interval: 10.67 - 12.20 m BGS
Sand Pack Interval: 10.67 - 12.20 m BGS
Well Seal Interval: 0.20 - 10.37 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

Stantec

Drawn By/Checked By: KB/

BOREHOLE LOG

PROJECT: PRJ96020

BOREHOLE: BH96-1
PAGE 1 OF 4

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

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

DEPTH (m)	STRATIGRAPHY	STRATIGRAPHIC DESCRIPTION	MONITOR DETAILS & NUMBER	SAMPLE NUMBER	T.O.P. = 0.75 m above ground WATER LEVEL	COMMENTS
		Coarse SAND. Dark grey-brown. Some gravel. Trace cobbles. Loose. Moist.			hole dry to 62.50 m below ground	AIR ROTARY DRILLING Drilling Contractor: Double D Drilling, Terrace, BC
2.00						
4.00						
6.00						
7.62						
8.00		GRAVEL and Coarse SAND Grey-brown. Trace cobbles. Loose. Damp.				
9.14						
10.00		GRAVEL and Coarse SAND. Grey. Some cobbles. Trace silt. Loose. Dry.				
12.00						
14.00						
15.24						
16.00		GRAVEL and Coarse SAND Grey-brown. Some cobbles. Trace silt. Loose. Damp.				
18.00						
18.29						
		GRAVEL. Some sand. Some cobbles. Loose. Dry.				
29.60						

BOREHOLE LOG

PROJECT: PRJ96020

BOREHOLE: BH96-1

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

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

DEPTH (m)	STRATIGRAPHY	STRATIGRAPHIC DESCRIPTION	MONITOR DETAILS & NUMBER	SAMPLE NUMBER
		GRAVEL. Some sand. Some cobbles. Loose. Dry.		
22.00				
22.86		GRAVEL and Coarse SAND. Some cobbles. Trace silt. Loose. Damp.		
24.00				
24.38		GRAVEL. Some sand. Some cobbles. Loose. Dry.		
26.00				
27.43		GRAVEL and Coarse SAND. Some cobbles. Trace silt. Loose. Damp.		
28.00				
30.00				
32.00		Coarse gravely SAND Loose Moist		
34.00				
36.00				
38.00				
39.62				
40.00				

BOREHOLE LOG

PROJECT: PRJ96020

BOREHOLE: BH96-1

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

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

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

BOREHOLE LOG

PROJECT: PRJ96020

BOREHOLE: BH96-1
PAGE 4 OF 4

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

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

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

BOREHOLE LOG

PROJECT: PRJ96020

BOREHOLE: BH96-2

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

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

DEPTH (m)	STRATIGRAPHY	STRATIGRAPHIC DESCRIPTION	MONITOR DETAILS & NUMBER	SAMPLE NUMBER	SAMPLE INTERVAL	T.O.P = 1.02 m above ground WATER LEVEL	COMMENTS
0.91		SAND and GRAVEL FILL.					AIR ROTARY DRILLING
		CLAY Brown. Occasional rounded gravel. Soft. Moist. Stiff below 1.52 m.		S1			DRILLING CONTRACTOR DOUBLE D DRILLING, TERRACE, BC
2.00							
4.00							
4.27		CLAY Grey-brown. Occasional red-brown mottling. Stiff. Moist.					
6.00							
8.00							
10.00						▽ 10.00 m 13/06/96	
12.00							
				S2			
14.00							
16.00							
16.15		BOTTOM OF HOLE AT 16.15 m					
18.00							
20.00							

BOREHOLE LOG

PROJECT: PRJ96020

BOREHOLE: BH96-3

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

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

DEPTH (m)	STRATIGRAPHY	STRATIGRAPHIC DESCRIPTION	MONITOR DETAILS & NUMBER	SAMPLE NUMBER	SAMPLE INTERVAL	T.O.P. = 1.18 m above ground / WATER LEVEL	COMMENTS
		GRAVEL FILL Dark grey-brown Some silt Loose Moist.					AIR ROTARY DRILLING
1.52							
2.00		SAND and GRAVEL FILL Dark grey-brown Some silt Some clay Occasional pieces of wood, plastic, glass and cloth Loose Moist Leachate odour.					
2.44							
4.00		CLAY FILL Dark grey-brown Some gravel Some pieces of wood and glass Stiff Moist.		S1			
4.57							
6.00		CLAY Dark grey-brown Some gravel Some sand Stiff Moist					
8.00							
9.14							
10.00		Clayey GRAVEL Brown Loose Wet Saturated below 11.58 m Strong diesel odour below 10.36 m		S2			S2 submitted for analysis of hydro carbon content
12.00						▽ 12.94 m 13/06/96	
13.72							
14.00		BOTTOM OF HOLE AT 13.72 m					
16.00		Drilling Contractor: Double D Drilling, Terrace, B.C.					
18.00							
20.00							