FORCEMAN RIDGE WASTE MANAGEMENT FACILITY

2021 Annual Report

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Regional District of Kitimat-Stikine

Executive Summary

The Forceman Ridge Waste Management Facility (FRWMF) was commissioned in 2016, and has been receiving waste from the Greater Terrace Area, and from construction sites and work camps in the District of Kitimat. The site includes a five-stage leachate treatment system, phytoremediation orchard, septage receiving facility, composting facility, and engineered landfill. The site is operated under Operational Certificate (OC) MR-17277 which includes a comprehensive environmental effects monitoring program and requirements to report non-compliance events. In 2021 the RDKS received one OC amendment, two temporary authorisations for waste, and two temporary authorisations for leachate discharge. FRWMF also registered as a receiving site for asbestos, under the Hazardous Waste Regulation (HWR) in 2021 to allow for the disposal of larger loads of asbestos.

FRWMF was filling in lift 5 of phase 1a at the end of 2021 and received 20,148 tonnes of solid waste over the year. Of this waste, 14,626 tonnes came from within the service-area, and 5,522 tonnes was received from outside of the service-area and industrial construction projects. The site recorded 2,918 transactions across the scale, with the majority of transactions coming from out of service-area users.

There were no mammalian wildlife incidents or encounters observed during 2021 at the. The facility experienced minimal vector activity from birds, including raptor species (bald eagles), and corvid species (crows and ravens).

FRWMF reported one non-compliance event in 2021 for exceeding the discharge volume and conditions of the OC. The site received an OC amendment later that year which will prevent future non-compliance under the same conditions. Additional authorisations were granted in 2021 for the receipt of special waste types not authorised under the OC, and for emergency discharge from the leachate treatment system.

Projects of note completed in 2021 include routine maintenance, pruning and spacing of the phytoremediation orchard, clearing of the north and northwest section of the lease, and installation of fence posts to accommodate future expansion of the landfill and phytoremediation orchard. 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

The Forceman Ridge Waste Management Facility (FRWMF) is operated under Operational Certificate (OC) MR-17227, Issued by the Ministry of Environment (ENV) in November 2008, and most recently amended in November 2021. The OC requires the operator to submit an operational and environmental annual report for each 12-month period. This report fulfills the operational reporting requirements, and captures major works and projects completed in the same year. The Operational Certificate authorizes the discharge of municipal solid and liquid wastes and outlines the criteria for environmental and human protection at FRWMF.

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

Table 1: Report Objectives

Waste Tracking
Summary of Visits to FRWMF
Quantity of Waste Received, Recycled and Composted
Quantity of Liquid Waste Received
Quantity of Waste Asbestos Received
Facility Updates and Maintenance
Operational Certificate Amendments
Airspace Utilization
Fence Clearing
Phytoremediation
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 by WSP Golder and contained in Appendix A of this report.

2 Background

FRWMF opened in November 2016 and is owned and operated by the Regional District of Kitimat-Stikine (RDKS). It is located 40 km south of the City of Terrace at 3112 Highway 37. Access is via the North Kitimat, Chist Creek, and Scully Creek Forest Service Roads.

FRWMF is responsible for the management of municipal solid and liquid waste generated from commercial and residential sources in the greater Terrace area in accordance with the Regional District Kitimat-Stikine Solid Waste Management Plan (1995). An updated Solid Waste Management Plan was submitted to ENV for review on November 1st, 2021. Most solid waste received is consolidated at the Thornhill Transfer Station (TTS), also owned and managed by the RDKS, and hauled to FRWMF for final disposal.

Landfill operations are regulated by ENV under the OC, issued in November 2008, most recently amended in November 2021. Operations are conducted in accordance with the Forceman Ridge Landfill Design Operations and Closure Plan (DOCP) prepared by Sperling Hansen Associates in 2017. Waste is accepted for disposal at FRWMF under Bylaw No. 671 (as amended) which outlines accepted, restricted, and prohibited wastes, as well as tipping fees.

The footprint for the Waste Management Facility lease is 53.5 ha in size; this area includes buffer reserves. FRWMF (Figure 1) contains a compost facility, septage receiving facility, an engineered landfill, five stage leachate treatment and detection system, and a phytoremediation orchard. Currently the landfill filling is in lift 5 of Phase 1A.

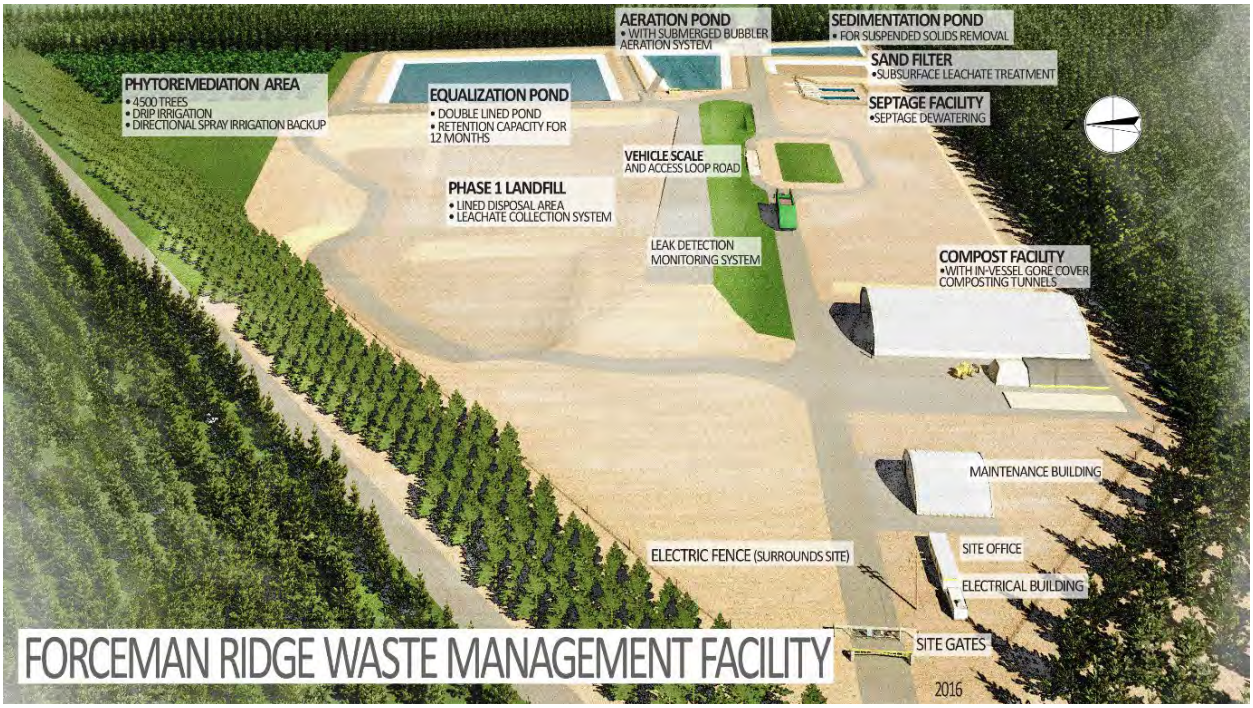

Figure 1 Overview Forceman Ridge Waste Management Facility

2.1 Landfill

The landfill is double lined with a high-density polyethylene and clay matting composite with leachate capture. Captured leachate is pumped to a 90,000 m^3 equalization pond. Leachate is then pumped from the equalization pond to the aeration pond, which has 30 diffusers for bio-oxidation treatment. After

treatment in the aeration pond, leachate flows passively to the sedimentation pond, which allows for settling of biomasses and suspended solids. Treated leachate is then sent through a sand filter and discharged to the phytoremediation orchard or rapid infiltration ditch during April through October (amended to year-round in November of 2021 OC amendment).

On February 20, 2021, FRWMF became a Registered Site under the Hazardous Waste Regulation (HWR) for asbestos. As a Registered Site, unlimited amounts of asbestos can be accepted for final disposal in accordance with section 40 of the HWR. A condition of this authorisation is that asbestos received onsite be reported in the annual report. The HWR registration site number for FRWMF is 110582 (Appendix B).

Projects of note completed in 2021 include routine maintenance, pruning and spacing of the phytoremediation orchard, clearing of the north and northwest section of the lease, and installation of fence posts to accommodate future expansion of the landfill.

2.2 Composting

Since November 2016, FRWMF has operated a compost facility for residential as well as institutional, commercial, and industrial (ICI) organics in the Terrace area. Residential organics are collected curbside, or residents can self-haul their organics to the Thornhill Transfer Station. Organics collection for businesses and industry is through contracted commercial haulers. Collected organics are taken to the Thornhill Transfer Station, consolidated, and hauled to the FRWMF Compost Facility. The City of Terrace operates a yard and garden curbside waste collection service from May to September for City of Terrace residents only; it is windrow composted and the finished product is used in municipal parks and community garden areas.

The FRWMF Compost Facility utilizes a Gore® composting system and has the capability of producing Class A compost. The facility hosts three windrow stations inside a Mega-Dome®, and two curing bays outside. Collected organics are mixed with hog fuel collected from a local sawmill or from chipping diverted untreated and unprocessed wood residue. Temperature, oxygen, and moisture levels are monitored during the composting process. It takes approximately eight weeks to generate Class A compost. The finished compost is initially slated to be used as final cover material for final closure of the Thornhill Landfill, as well as to close future phases of the Forceman Ridge Landfill. Leachate from the compost facility is collected and stored in separate containment near the compost facility. The collected leachate is used for additional moisture for the compost; any surplus of compost leachate is sent through the leachate treatment process.

3 Waste Disposal

The FRWMF serves residents and business in the greater Terrace area. Waste from approximately 19,606 residents and 8,661 dwellings[1] is disposed of at the FRWMF. In addition to residential, commercial, and ICI users within the service area, the facility accepts waste from several work camps

[1] 2021 Census Canada Pollution and Dwelling Counts

and construction sites in the District of Kitimat, including the LNG Canada and Coastal Gas Link Pipeline projects.

The FRWMF accepts waste from tax-paying, "in service-area" users, as well as waste from non-taxpaying, "out of service-area" users. The service area includes Electoral Area C, Electoral Area E (Thornhill), and the City of Terrace. Out of service-area users refer large to industry, short-term projects and work camps within the region, and the District of Kitimat who operates a landfill for their residents.

In April 2021, the District of Kitimat passed an amendment to the Municipal Code with the adoption of a new solid waste bylaw that would prohibit waste from industrial workcamps and industrial construction sites from being accepted at the Kitimat Landfill[2]. The RDKS has been accepting C&D waste from industry within the District of Kitimat since 2017 when deconstruction of the former Methanex site commenced. The prohibition of industrial camp waste resulted in an increase in MSW received at FRWMF in 2021.

Out of service-area waste is charged under its own rate schedule under the bylaw, with an additional 50% surcharge. The rate schedule was established in 2021, and the surcharge was raised from 25% to 50%. In 2021, the majority of transactions at the Forceman Ridge WMF were from out of service-area users. The total user counts, including transactions from the Coastal Gas Link and LNG Canada projects, are provided in Table 2.

Table 2: Count of Users at Forceman Ridge WMF in 2021

User Type	Count of Scale Transactions
In Service-Area	**1,217**
General Controlled Waste	699
Operational Hauling from TTS	518
Out of Service-Area	**1,701**
General Controlled Waste	53
Coastal Gas Link Waste	206
LNG Canada Waste	1,442

Solid waste collected through curbside collection programs or self-hauled to the Thornhill Transfer Station is sorted, compacted, and hauled to the Forceman Ridge WMF. In 2021, a total of 14,939 tonnes of municipal solid waste including out-of-service area waste, refuse, construction and demolition waste (C&D), and various types of controlled waste were disposed of within Phase 1A, lifts 3 and 4 of the Forceman Ridge Landfill. An additional 5,209 tonnes of diverted waste was received, including soil, clean wood, metal, concrete, and organics through the compost facility.

The annual totals from January through to December 2021 of solid waste received at the Forceman Ridge WMF are shown in Table 3. Tonnages of diverted wastes are also included in the table.

[2] District of Kitimat Regular Council Meeting Agenda, September 20, 2021 https://www.kitimat.ca/en/municipal-hall/resources/Documents/Council-Meetings-and-Agendas/Agendas/2021_09_20_Agenda_Final.pdf

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

Waste Type	Tonnes In Service-Area	Tonnes Out Service-Area	Total Tonnes
Landfilled Waste	**11,252**	**3,676**	**14,939**
Tipped Waste	1,217	3,676	4,893
Asbestos	102	-	102
C&D	1,072	3,284	4,356
Land Clearing	11	-	11
Refuse	32	308	341
Septage Cake	-	84	84
Refuse from TTS	10,046	-	10,046
Diverted Waste	**3,363**	**1,845**	**5,209**
Tipped Waste	1,738	1,845	3,583
Asphalt Shingles	14	-	14
Clean Wood	69	1,001	1,070
Concrete	7	109	116
Organics	-	351	351
Poultry Carcass	2	-	2
Septage	1,646	-	1,646
Soil	-	384	384
Hauled from TTS	1,626	-	1,626
Clean Wood	95	-	95
Organics	1,114	-	1,114
Yard & Garden	416	-	416
Total	**14,626**	**5,522**	**20,148**

In service-area waste received at FRMWF in 2021 totalled 14,626 tonnes (including septage), with 3,363 tonnes of this waste being diverted from burial in the landfill. Out of service-area waste received at FRWMF in 2021 totalled 5,522 tonnes, with 1,845 tonnes of this waste being diverted from the landfill including clean wood, soil, concrete, and organics.

Out of service area waste comprised 25% of the total waste landfilled and 52% of diverted solid waste (excluding septage) at the Forceman Ridge WMF in 2021. Operational waste, which is waste transferred from the TTS, accounted for 58% of waste received at the facility over the year.

3.1 Landfilled Wastes

Landfilled waste is disposed in the active face of the landfill. This waste includes asbestos, C&D, land clearing waste, refuse, and septage cake.

Asbestos

Asbestos containing waste, including waste asbestos as defined in the HWR, generated from residential, commercial, and institutional customers is accepted in the Forceman Ridge Landfill through the Controlled Waste application process. Asbestos containing waste is received at the landfill using approved containment methods under Section 40 of the HWR and is accepted by scheduled appointment for immediate burial in the landfill.

Asbestos disposed at FRWMF totalled **102 tonnes** from a total of 49 tip events. Large sources of asbestos were received from demolition projects including the Coast Mountain College campus dorms in Terrace (68 tonnes), and from the new hospital construction site in Terrace (11 tonnes). Asbestos waste was not accepted from outside of the service-area in 2021.

Construction and Demolition

C&D waste accepted at FRWMF includes painted and treated wood waste, demolition waste, construction waste products from out of service area, and from loads greater than 5 m^3 from within the service aera. In 2021, **4,356 tonnes** of construction and demolition waste was disposed of in the Forceman Ridge landfill, with 3,284 tonnes of this total coming from outside of the service-area.

Land Clearing Waste

Land clearing waste is defined as waste produced from the clearing of land for development, including trunks, stumps, tree branches 75 millimeters in diameter or greater, treetops, and whole trees. Land clearing debris does not include other organic materials, such as vegetative matter, tree branches under 75 millimeters, and compostable structural wood waste. Due to presence of rock and gravel within this land clearing debris, this material is often deposited in the landfill. In 2021, **11 tonnes** of land clearing debris were disposed of in the landfill.

Refuse

Refuse includes general municipal solid waste transferred from the TTS (curbside refuse, commercial and self hauled refuse, and small loads of C&D waste), City of Terrace wastewater treatment plant screenings, and industrial work camp refuse received at FRWMF though the non-controlled waste permitting process. In 2021 **10,387 tonnes** of refuse was received from the TTS and tipping at FRWMF, with 308 tonnes of this total coming from outside of the service-area.

Septage Cake

In 2020 and 2021 Septage Cake was accepted for disposal in the landfill where it was immediately buried with waste from the TTS. Septage Cake is comprised of dewatered septage solids from a wastewater treatment plant serving a work camp in Kitimat. In March 2021 it was determined that Septage Cake was not an authorised material under the OC, and a temporary authorization was received to continue accept Septage Cake for a four-week period. Notice was served to the waste generator and acceptance of this waste stream was ultimately discontinued. In 2021, **84 tonnes** of septage cake were received for at FRMWF.

3.2 Diverted Wastes

Diverted waste includes materials that are recycled on site, such as asphalt shingles, concrete, contaminated soils, metal, and materials diverted from the landfill for disposal through other avenues, such as septage received in the septage bays, and organics accepted in the compost facility.

Asphalt Shingles

Asphalt shingles that are received as a single load are segregated for re-use as alternative daily cover. In 2021, **14 tonnes** of asphalt shingles were received at FRMWF. No asphalt shingles were received at the facility from out of service-area.

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, **1,165 tonnes** of clean wood waste were received from the TTS and tipping at FRWMF, with 1,001 tonnes of this waste received from outside of the service-area.

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. In 2021, **116 tonnes** of broken concrete was received at the facility, with 109 tonnes of this waste received from outside of the service-area.

Contaminated Soils

Contaminated soil, including soil with contaminants greater than the industrial criteria of the Contaminated Sites Regulation, but less than hazardous waste, as defined by the HWR, are accepted for disposal at FRWMF. Soil, including contaminated soils, fall into two categories, soils suitable for cover and soils not suitable for cover. Soils are suitable for cover if they are mineral soils that are not clay or organic soils. In 2021, **384 tonnes** of contaminated soil was accepted from outside of the service-area.

Metals

Metals are not accepted at Forceman Ridge. Unauthorized metal that comes comingled in loads is segregated on-site and sold at market value to local recyclers. Metals are accepted for free at several scrapyards within the Terrace area. No metals were recorded as received at the facility during 2021.

Organics

Organics includes food scraps that are received from commercial sources, industrial work camps, and from the curbside program 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, **1,465 tonnes** of organics were received in the composting facility from the TTS and industrial work camps, with 351 tonnes of this total coming from out of the service-area.

Poultry Carcasses

The RDKS received an emergency authorization to accept Poultry carcasses from a local poultry farm in Terrace following a long-standing heat wave that resulted in significant mortalities to the farms livestock. These poultry carcasses were accepted for disposal in the compost facility. In 2021, **2 tonnes** of poultry carcasses were received at the compost facility.

Septage

Septage includes septic tank pumpage and treated sewage sludge, but does not include other sewage wastes (wastewater, sewage or slurry, including catch basins, oil water separators, or shop floor drains). Septage is disposed of directly in the Forceman Ridge septage receiving facility. The facility has two lagoons (septage bays) available for disposal which dewater the septage. Liquid from dewatering is treated in the leachate treatment system.

In 2021, **1,646 tonnes** of septage were disposed of in the septage facility. Dewatered solids cleaned from the bottom of the septage bays are mixed with wood chips and the resulting product is windrowed in a designated location on the landfill footprint. In 2021, **1 tonne** of dewatered solids were transferred to the designated windrow for composting. The resulting biosolids will be utilized as final cover material for the landfill.

4 Wildlife Occurrences and Observations

The Forceman Ridge WMF 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 a 2.1-metre-high composite electrified fence. To prevent vectors from gaining access to the landfill active face, Revelstoke Iron Grizzly (RIG) plates are used as alternative daily cover and are positioned on the active face at the end of each day to cover all waste. Soil from site is used as intermediate cover.

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 Forms.

There were no mammalian wildlife incidents or encounters observed during 2021 at the FRWMF.

4.1 Bird and Vector Control

Birds, such as ravens and crows, are a nuisance at landfill sites, as they can scatter litter into the surrounding environment. Bird control at Forceman Ridge WMF is based on thorough and complete cover of waste. The active face is only exposed when a load of waste is delivered to the landfill. Between loads, the active face is covered with the RIG plates or alternative daily cover. There was minimal vector activity from birds, including raptor species (bald eagles), and corvid species (crows and ravens).

5 Operations

5.1 OC Amendments and Authorisations

In 2021 the RDKS received one Operational Certificate amendment, two temporary authorisations for waste, and two temporary authorisations for leachate discharge. The amended OC, and temporary authorisations, are included in Appendix C. The details of the authorisations and amendments are listed in Table 4.

Table 4: Description Temporary Authorisations, and OC Amendments in 2021

Temporary Authorisation Date & Section of OC	Description
January 19, 2021 Section 2.2.3 Authorized Works	To discharge from the sand filter and sedimentation pond from January 19 to January 29, 2021
March 15, 2021 Section 2.1.2 Characteristics of the Discharge	To allow the acceptance of 9 tonnes of sewage cake from LNGC Cedar Valley Lodge to be discharged once per week for a period of four weeks.
March 16, 2021 Section 2.4.1 Quantity of Discharge	To discharge from the sand filter and sedimentation pond from March 16 to April 1, 2021
June 6, 2021 Section 2.4.1 Quantity of Discharge	Emergency authorisation to accept poultry carcasses in the compost facility and landfill from Daybreak Farms in Terrace that were mortalities from heatwave conditions.
Amendment Date & Section of OC	**Description**
Operational Certificate Amendment November 4, 2021	
Section 2.2.3 Authorized Works	To update the Site Plan and locate the clean wood burn area to the Northern part of the lease outside of the fence.
Section 2.4.1 Quantity of Discharge	To increase the maximum authorised rate of discharge to 1,000 m^3/day, to include the rapid infiltration ditch as a discharge location, and to remove the seasonal discharge restrictions of April to October.
Section 2.4.3 Authorised Works	To add the rapid infiltration ditches to the discharge location for the leachate collection and treatment facilities.

5.2 Non-Compliance Reports

There were no non-compliance reports submitted for FRWMF in 2021.

5.3 Airspace and Compaction

Two airspace and compaction studies were performed in 2021 to measure the air space consumed, and waste density achieved. The studies looked at the volume of waste accepted at the facility, and the volume of soil removed from the borrow pit. The results of the airspace compaction reports are expressed as waste density (tonnes/m^3) and a ratio of waste to cover. The optimal waste density is 0.75 tonnes/m^3 and the optimal waste to cover ratio is 4 to 1. The results of the airspace compaction surveys completed in 2021 are listed below:

- May 7, 2021 – 0.68 tonnes/m^3 and 2.57:1 waste to cover
- Dec 20, 2021 – 0.68 tonnes/m^3 and 4.40:1 waste to cover

The airspace compaction reports are included in Appendix D of the report.

5.4 Landfill Gas Collection

Landfill gas collection and flaring has not been initiated at the Forceman Ridge WMF. The Forceman Ridge site is now in the planning and design stage of landfill gas collection.

5.5 Phytoremediation

During the month of October 2021, the phytoremediation orchard underwent some general and prescribed maintenance according to the *Phytoremediation Plantation Maintenance Manual* produced by R. McDougall and Sperling Hansen Associates. Figure 2 shows the state of the phytoremediation orchard prior to maintenance and Figure 3 depicts it after. Treeline Enterprises was awarded the contract to:

- Brush the volunteer shrubs and trees between the planted rows,
- Adjust the spacing between the cultivated trees according to manual specifications and,
- Prune the retained cultivated trees

5.6 Scale Maintenance

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

- April 30, 2021
- September 23, 2021

6 Environmental Monitoring

The RDKS performs regular monitoring and sampling of surface water, groundwater, and leachate at the FRWMF 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 *Forceman Ridge Waste Management Facility 2021 Annual Water Quality Monitoring Report*, prepared by WSP Golder, and contained in Appendix A of this report.

Figure 2: Phytoremediation Orchard on August 25th 2021 prior to maintenance work

Figure 3: Phytoremediation Orchard after the completion of pruning, spacing, and removing of volunteer trees

Groundwater

There are sixteen monitoring wells located around the facility. Two are background wells, eight are early detection and six are located further beyond the early detection zone and monitored for water elevation. The wells are monitored quarterly and sampled annually. In-Situ parameters are monitored using a YSI and TLC Depth Tape. Lab parameters are collected in sample bottles and shipped to ALS for analysis.

Surface Water

There are five surface water sampling and monitoring locations for this facility located downgradient to the West of the landfill. They are located on or connected to Onion and the Clearwater Lakes. The sites are monitored quarterly and sampled annually during the lowest stream flows. In-Situ parameters are monitored using a YSI and flow meter. Lab parameters are collected in sample bottles and shipped to ALS for analysis.

Facility

There are two facility compliance points. One is for treated leachate prior to discharge to the phytoremediation area and the other is a composite soil sample from the phytoremediation area. The

treated leachate prior to the phytoremediation orchard is monitored quarterly and sampled annually. It is monitored with a YSI as well as an In-Situ LaMotte iron test kit. The phytoremediation soil is sampled once annually, prior to the start of discharge. Lab parameters are collected in sample bottles and shipped to ALS for analysis.

7 Summary

During 2021, 14,939 tonnes of refuse, including garbage, construction and demolition materials, and controlled waste, were disposed in the Forceman Ridge landfill; 5,209 tonnes of materials were diverted from the landfill. Diverted materials include 1,465 tonnes of organics, 1 tonne of dewatered septage, 384 tonnes of contaminated soils, 1,165 tonnes of clean wood and 14 tonnes of asphalt shingles.

There were no mammalian wildlife incidents or encounters observed during 2021 at the Forceman Ridge WMF. There was minimal vector activity from birds, including raptor species (bald eagles), and corvid species (crows and ravens).

Projects of note completed in 2021 include routine maintenance, pruning and spacing of the phytoremediation orchard, clearing of the north and northwest section of the lease, and installation of fence posts to accommodate future expansion of the landfill and phytoremediation orchard. There was one non-compliance for the facility for the duration of the reported year. In 2021 the RDKS received one OC amendment, two temporary authorisations for waste, and two temporary authorisations for leachate discharge.

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Appendix A Environmental Monitoring Report

REPORT

Forceman Ridge Waste Management Facility

2021 Annual Environmental Effects Monitoring Report

Submitted to:

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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 Forceman Waste Management Facility (WMF, the "Site", also referred to as the landfill in previous reports). The Site is located 30 km south of Terrace at 3112 Highway 37. The Ministry of Environment and Climate Change Strategy (ENV) requires annual reporting, as specified in Operational Certificate No. 17227, first issued on 2 November 2008, amended November 2021, and temporarily amended in January and March 2021, (the "OC", Appendix A)

The scope of work for the EEM Program includes the following:

- **Leachate Monitoring:** Annual sampling of leachate station F5 - Sand Filter and quarterly measurements of field parameters (conductivity, temperature, dissolved oxygen, turbidity and volume).
- **Soil Sampling:** Composite soil sampling from the Phytoremediation Stand, collected annually, prior to first discharge of the year.
- **Surface Water Monitoring**: Annual **s**ampling of five surface water stations. Quarterly measurements of field parameters (conductivity, temperature, turbidity, water level and flow rate).
- **Groundwater Monitoring**: Sampling of ten groundwater monitoring wells at the Site, conducted annually. Quarterly measurement of field parameters (conductivity and temperature). Quarterly measurements of water elevation at six monitoring wells.
- **Quality Assurance/Quality Control (QA/QC) Program**: Collection of field duplicates and field blanks (field QA/QC program) as well the laboratory QA/QC program as documented in the laboratory reports.
- **Reporting**: An annual report is to be submitted to ENV no later than 30 June of the following year.

No impact to groundwater quality, nor to the surface water receiving environment, is apparent from the 2021 monitoring program. Groundwater and surface water monitoring results were below applicable standards, with the exception of dissolved copper at all surface water monitoring sites. The presence of dissolved copper above the BC WQG at all surface water sampling locations, together with its occurrence in historical monitoring data, suggest these concentrations are regional in nature.

Monitoring of the treatment system demonstrated that phytoremediation soil samples were less than the applicable CSR standards. While the laboratory tested pH of leachate fell outside the range of the OC during emergency discharge authorizations in the first quarter of 2021, it returned to within the acceptable range for the remaining three quarters.

Golder presents the following recommendations for future work at the Forceman WMF:

- The current monitoring program should be continued in 2022.
- 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).

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 2021. The findings, interpretations and conclusions concerning the Site conditions are based solely on the information provided to Golder.

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

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

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

The services performed as described in this report were conducted in a manner consistent with that level of care and skill normally exercised by other members of the engineering and science professions currently practicing under similar conditions, subject to the time limits and financial and physical constraints applicable to the services. The content of this report is based on information provided by the RDKS to Golder in March 2021, our present understanding of the Site conditions, and our professional judgment in light of such information available at the time of this report. This report provides a professional opinion, and therefore no warranty is either expressed, implied or made as to the conclusions, advice and recommendations offered in this report. This report does not provide a legal opinion regarding compliance with applicable laws. With respect to regulatory compliance issues, it should be noted that regulatory statutes and the interpretation of regulatory statutes are subject to change.

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

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APPENDICES

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 Forceman Ridge Management Facility (WMF, the "Site"). The Site is located 30 km south of the City of Terrace at 3112 Highway 37. The Ministry of Environment and Climate Change Strategy (ENV) requires annual reporting, as specified in Operational Certificate No. 17227, first issued on 2 November 2008, amended November 2021, and temporarily amended in January and March 2021, (the "OC", Appendix A).

1.1 Objective and Scope of Work

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

- **Leachate Monitoring:** Annual sampling of leachate station F5 - Sand Filter and quarterly measurements of field parameters (conductivity, temperature, dissolved oxygen, turbidity and volume).
- **Soil Sampling:** Composite soil sampling from the Phytoremediation Stand, collected annually, prior to first discharge of the year.
- **Surface Water Monitoring**: Annual **s**ampling of five surface water stations. Quarterly measurements of field parameters (conductivity, temperature, turbidity, water level and flow rate).
- **Groundwater Monitoring**: Sampling of ten groundwater monitoring wells at the Site, conducted annually. Quarterly measurement of field parameters (conductivity and temperature). Quarterly measurements of water elevation at six monitoring wells.
- **Quality Assurance/Quality Control (QA/QC) Program**: Collection of field duplicates and field blanks (field QA/QC program) as well the laboratory QA/QC program as documented in the laboratory reports.
- **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 hydrogeological investigations of the Site have been undertaken by Agra Earth and Environmental (1998) and Golder (2000, 2003, 2006, 2007, 2008 and 2011). The most recent annual monitoring report for 2020 was prepared by Sperling Hansen Associates (SHA) (SHA, 2021).

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 Area (Clague 1983)
- Google Earth (accessed May 2022)
- Monitoring Well Installation and Updated Hydrogeological Assessment (Golder 2011)
- Forceman Ridge Waste Management Facility Design, Operations and Closure Plan Update (SHA 2015)

The WMF is located south of Lakelse Lake and east of Highway 37, off the Chist Creek Forest Service Road. The WMF is located on flat lying terrain, with an overall slight slope downwards from northeast to southwest. Onion lake is located downslope of the Site on the west side of the Highway, with Lower Clearwater Lake and Upper Clearwater Lake located further west. Surface water flows from Upper Clearwater Lake in the south to Lower Clearwater Lake in the north. Flow from Lower Clearwater Lake is directed northward via Clearwater Creek towards Lakelse Lake. No surface water conduits from the Site to these surface water bodies is evident in aerial photographs.

The site is underlain by a thick sequence of sand and gravel, inferred to be deltaic glacial fluvial sediments (Clague 1983). These sediments extend to depths of greater than 60 m based on borehole logs from previous monitoring well installation programs.

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

Monitoring Location	OC Station ID	Sample Type	Easting *UTM*	Northing *UTM*	Inferred Groundwater Gradient
MW-01	E251530	Groundwater	531353	6018032	Downgradient[1]
MW-02	E251531	Groundwater	531341	6018723	Upgradient
MW-03	E251532	Groundwater	530719	6018153	Downgradient
MW-04	E251533	Groundwater	530750	6017195	Downgradient
MW-05	E251534	Groundwater level	530049	6016551	Downgradient
MW-06	E251535	Groundwater level	531230	6015977	Downgradient
MW-07	E251530	Groundwater	530282	6018832	Downgradient
MW-08	E302210	Groundwater	529925	6018269	Downgradient
MW-09	E302211	Groundwater	530040	6017330	Downgradient
MW-10	E287382	Groundwater level	531369	6016530	Downgradient
MW-11	E287383	Groundwater level	532149	6015692	Downgradient
MW-12	E287384	Groundwater level	530660	6016332	Downgradient
MW-13	E287385	Groundwater	531409	6019029	Upgradient
MW-14	E287386	Groundwater level	531990	6017064	Downgradient
MW-15	E302210	Groundwater	531171	6017953	Downgradient
MW-16	E302211	Groundwater	531009	6017986	Downgradient
SW-01	E273828	Surface Water	529699	6018262	Downgradient
SW-02	E273829	Surface Water	528908	6017519	Downgradient
SW-03	E273831	Surface Water	528720	6018167	Downgradient
SW-04	E306587	Surface Water	528663	6019436	Downgradient
SW-05	E296117	Surface Water	528273	6019463	Downgradient
F5 - Sand Filter	E249852	Leachate, Soil	531146	6018102	Within WMF
Discontinued from the EEM					
F1 - Raw Landfill Leachate	-	Leachate	531149	6018201	Within WMF
F2 - Raw Septage/ Composting Effluent	-	Leachate	531149	6018194	Within WMF
F3 - Aeration Pond Inlet	-	Leachate	531163	6018113	Within WMF
F4 - Sedimentation Pond Inlet	-	Leachate	531268	6018031	Within WMF
F6 - Compost Facility	-	Leachate	530883	6018070	Within WMF

Notes:
Coordinates are approximate.

[1] Referenced as a downgradient well in the O.C but could be considered an upgradient well based on groundwater flow data.

1.5 Regulatory Framework

In British Columbia, environmental matters pertaining to contaminated sites generally fall under the jurisdiction of the ENV, pursuant to the Environmental Management Act (ENV 2003). Regulations and guidelines supporting EMA and the OC consist of the BC Contaminated Sites Regulation (ENV 1996), the BC Water Quality Guidelines (ENV 2021a, 2021b), each of which is summarized in this section along with the OC criteria 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) are considered applicable for groundwater quality. Schedule 3.1 soil standards for industrial land use (IL) with exposure pathways AW-F, DW, intake (INT), toxicity (TOX), human health (HH), and ecological health (EH) are considered applicable for soil sampling from the Phytoremediation Stand.

  For groundwater screening criteria above, CSR DW was considered appliable to the Site based on ENV Protocol 21 *Water Use Determination* (ENV 2017). 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 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.

- ***OC Permit Criteria***: The OC has outlined the following criteria in Table 2 below for leachate samples prior to discharge to the phytoremediation stands or rapid infiltration ditch (F5 – Sand Filter).

Table 2: OC Leachate Criteria

Parameter	Units	OC Limits
pH	-	6.5 - 8.5
Ammonia, Total (as N)	mg/L	214
Chloride (Cl)	mg/L	5000
Total Nitrogen as N	mg/L	300
Cadmium (Cd)-Total	mg/L	0.1
Iron (Fe)-Total	mg/L	6
Zinc (Zn)-Total	mg/L	100

2.0 MONITORING METHODOLOGY

2.1 Sampling Methods

RDKS completed the field sampling and field QA/QC during the 2021 monitoring year. Water and soil 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 manufacture's 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

There are three lakes, Onion Lake, Lower Clearwater Lake and Upper Clearwater Lake, located downslope of the WMF. A description of the surface water sampling locations associated with these receiving environments is provided in Table 3 below.

Table 3: Surface Water Locations

Location	Description
SW-01	East side of Onion Lake
SW-02	Outlet of Upper Clearwater Lake
SW-03	Outlet of Lower Clearwater Lake
SW-04	Creek discharging from Onion Lake
SW-05	Clearwater Creek downstream of Lower Clearwater Lake

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Deviations from OC requirements

Samples were collected as per the requirements of OC 17227.

2.3 Groundwater Sampling

The 2021 groundwater monitoring program consisted of groundwater sampling at ten wells and water level measurements at six wells at the Site (Figure 2). Per the OC, groundwater samples were collected quarterly (March, June, August and November) for field parameters and annually (November) for laboratory analysis. A description of each groundwater sampling location is provided in Table 4 below.

Table 4: Groundwater Locations

Location	Description
MW-01	Early Detection Well located along the east property line (upgradient of the WMF).
MW-02	Located northeast of the property and considered upgradient of the WMF representing background groundwater quality.
MW-03	Early Detection Well located at the southwest portion of the property.
MW-04	Compliance Property Well located approximately 900 meters south of the property.

Location	Description
MW-05	Water level only. Located approximately 2 km southwest of the property and west of the Stewart-Cassiar Highway.
MW-06	Water level only. Located approximately 2.5 km south of the property.
MW-07	Compliance Property Well located approximately 1 km northwest of the property.
MW-08	Compliance Property Well located approximately 750 meters west of the property on the north side of Chist Creek Forest Road.
MW-09	Compliance Property Well located approximately 900 meters southwest of the property.
MW-10	Water level only. Located approximately 1.5 km south of the property.
MW-11	Water level only. Located approximately 3 km southeast of the property.
MW-12	Water level only. Located approximately 2 km south of the property.
MW-13	Located northeast of the property and north of MW-02. Location considered upgradient of the WMF representing background groundwater quality.
MW-14	Water level only. Located approximately 1.2 km southeast of the property.
MW-15	Early Detection Well located along the southeast property line.
MW-16	Early Detection Well located at the south property line.

Deviations from OC requirements

Samples were collected as per the requirements of OC 17227, with the exception of monitoring well MW-05, where a water level could not be obtained because it was inaccessible.

2.4 Leachate and Soil Sampling

An annual leachate sample is collected at station F5 - Sand Filter, which is the OC compliance point for leachate discharge onto the phytoremediation stand. An annual soil sample from the Phytoremediation Stand is also to be collected and tested prior to leachate discharge, as per the OC 17227.

Deviations from OC requirements

Leachate and soil samples were collected in April 2021 as per the requirements of OC 17227. Furthermore, additional leachate samples from F5 were collected in January, March, August, November 2021 to support RDKS environmental monitoring efforts.

2.5 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.
  - Soil: RPD less than 30% for inorganics and 40% 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

Site monitoring wells are completed in sands and gravels at depths ranging from 27 m to 62 m below ground surface (bgs), with the exception of MW-8, which was completed at 14 m bgs. For the most part, groundwater is observed at depths of 26 m to 49 m below ground surface, with the exception of the shallower installation at MW-8 where groundwater is on the order of 8 m below ground surface. Seasonal variations in groundwater levels of 2 m to 3 m are evident at most wells, with the exception of upgradient monitoring well MW-2 where variations of up to 13 m have been measured.

Groundwater flow is directed from northeast to the southwest across the Site, as illustrated by the groundwater contour map in Figure 3 that was developed based on June 2021 groundwater levels. As shown on the map, there is a regional groundwater flow divide south of the Site extending west-southwest to east-northeast across the plateau between Lakelse Lake and the Kitimat River. Groundwater flow from the Site appears to be directed towards the Clearwater Lakes, ultimately discharging into the Lakelse Lake watershed.

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, all groundwater concentrations were less the CSR DW standards.

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 (SW-1)
- Dissolved copper* (All stations)

*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 Leachate Quality

Analytical results for the leachate samples were compared to the applicable OC criteria (Appendix C). In 2021, leachate concentrations were less than the OC limits, with the exception of the following parameters:

- pH, laboratory (F5 - Sand Filter and duplicate on March 15). Note that RDKS received a temporary authorization to discharge on 15 March 2021 (Appendix A), as the pond levels were high due to the large amount of precipitation received at the Site. The field monitoring at F5 – Sand Filter on this date yielded a compliant pH of 6.55 using the YSI.

3.5 Soil Quality

Analytical results for the phytoremediation soil samples were compared to the applicable CSR IL criteria (Appendix C). In 2021, all soil concentrations were less than the CSR IL standards.

3.6 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 5 below.

Table 5: Field QA/QC Results

Media	Location	Parameters Above RPD DQO	Parameters Above DF DQO
Leachate	F5 - Sand Filter	T. Nitrogen (32%), T. Molybdenum (87%)	-
Leachate	F5 - Sand Filter	Nitrate (as N) (186%), T. Orthophosphate (38%)	-
Leachate	F5 - Sand Filter	T. Orthophosphate (21%), T. Phosphorus (74%), T. Aluminum (117%), T. Cadmium (39%), T. Copper (41%), T. Iron (34%), T. Lead (147%), T. Titanium (117%), T. Uranium (61%), T. Zinc (134%)	-
Groundwater	MW-2	T. Organic Carbon (23%), D. Cadmium (24%), D. Copper (145%), D. Iron (29%)	-
Surface Water	SW-05	T. Manganese (36%)	-

In general, the RPDs greater than the DQO targets outlined above for the leachate samples demonstrates the inherent natural sample variability of leachate. The RPDs greater than the DQO targets for groundwater and surface water do not represent a concern since exceedances of those parameters in those mediums were not observed.

The results of the laboratory quality control program met the laboratory's internal criteria for acceptable results with the following exceptions:

- Duplicates: Total Kjeldahl nitrogen (10 April 2021)
- 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 (duplicate, F5 - Sand Filter in 15 March 2021 and 01 September 2021; sand filter in 01 September 2021; SW-01, SW-02, SW-03, SW-04, SW-05, duplicate in 08 November 2021)

From the QA/QC information provided, the precision and accuracy of the laboratory data is 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 2012 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)

A review of the trend plots shows that parameter values have been relatively constant over the monitoring years.

In groundwater, the only observable trend is an apparent increase in conductivity at MW-15, located immediately south of the sand filter, and possibly nearby MW-16. Conductivity at these locations is slightly higher than elsewhere; however, elevated concentrations of other constituents, such as chloride, that would be indicative of a WMF influence, are not evident at these locations and all downgradient groundwater results are below applicable standards. Therefore, an impact of the WMF on groundwater quality is not evident.

In surface water, an overall decline in conductivity is apparent at all surface monitoring locations except SW-1. For other constituents, no trends are evident. The presence of total copper above the BC WQG at all surface water sampling locations, together with its occurrence in historical monitoring data, suggest these concentrations are regional in nature. Similarly, the low dissolved oxygen observed at SW-1 is consistent with historical measurements. No other constituents were found in surface water above the BC WQG, suggesting the WMF is not impacting the nearby receiving environments of Onion Lake and Clearwater Lakes.

The laboratory pH of leachate collected at the F5 - Sand Filter was more acidic (5.6) in March 2021 than the range required by the OC of 6.5 to 8.5. However, the field pH for this sample measured using the YSI was within the OC range (6.55). Furthermore, pH had returned to within the acceptable range for the subsequent three quarters of 2021. Phytoremediation soil samples were less than the applicable CSR standards.

5.0 CONCLUSIONS AND RECOMMENDATIONS

No impact to groundwater quality, nor to the surface water receiving environment, is apparent from the 2021 monitoring program. Groundwater and surface water monitoring results were below applicable standards, with the exception of dissolved copper at all surface water monitoring sites. The presence of dissolved copper above the BC WQG at all surface water sampling locations, together with its occurrence in historical monitoring data, suggest these concentrations are regional in nature.

Monitoring of the treatment system demonstrated that phytoremediation soil samples were less than the applicable CSR standards. While the laboratory tested pH of leachate fell outside the range of the OC during emergency discharge authorizations in the first quarter of 2021, it returned to within the acceptable range for the remaining three quarters.

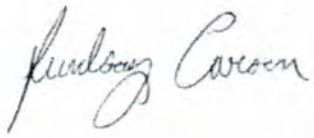
Golder presents the following recommendations for future work at the Forceman WMF:

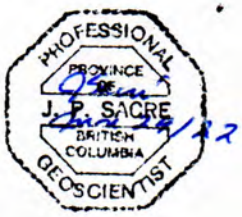
- The current monitoring program should be continued in 2022.
- Add dissolved organic carbon to surface water analyses to allow for a more accurate comparison to the BC WQG (AW-F) for dissolved copper. The guideline is based on the Copper Biotic Ligand Model (BLM) which is dependant on sample pH, hardness, 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.





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Environmental Engineer

Jillian Sacré, MSc, PGeo
Principal, Senior Hydrogeologist

LC/JS/asd

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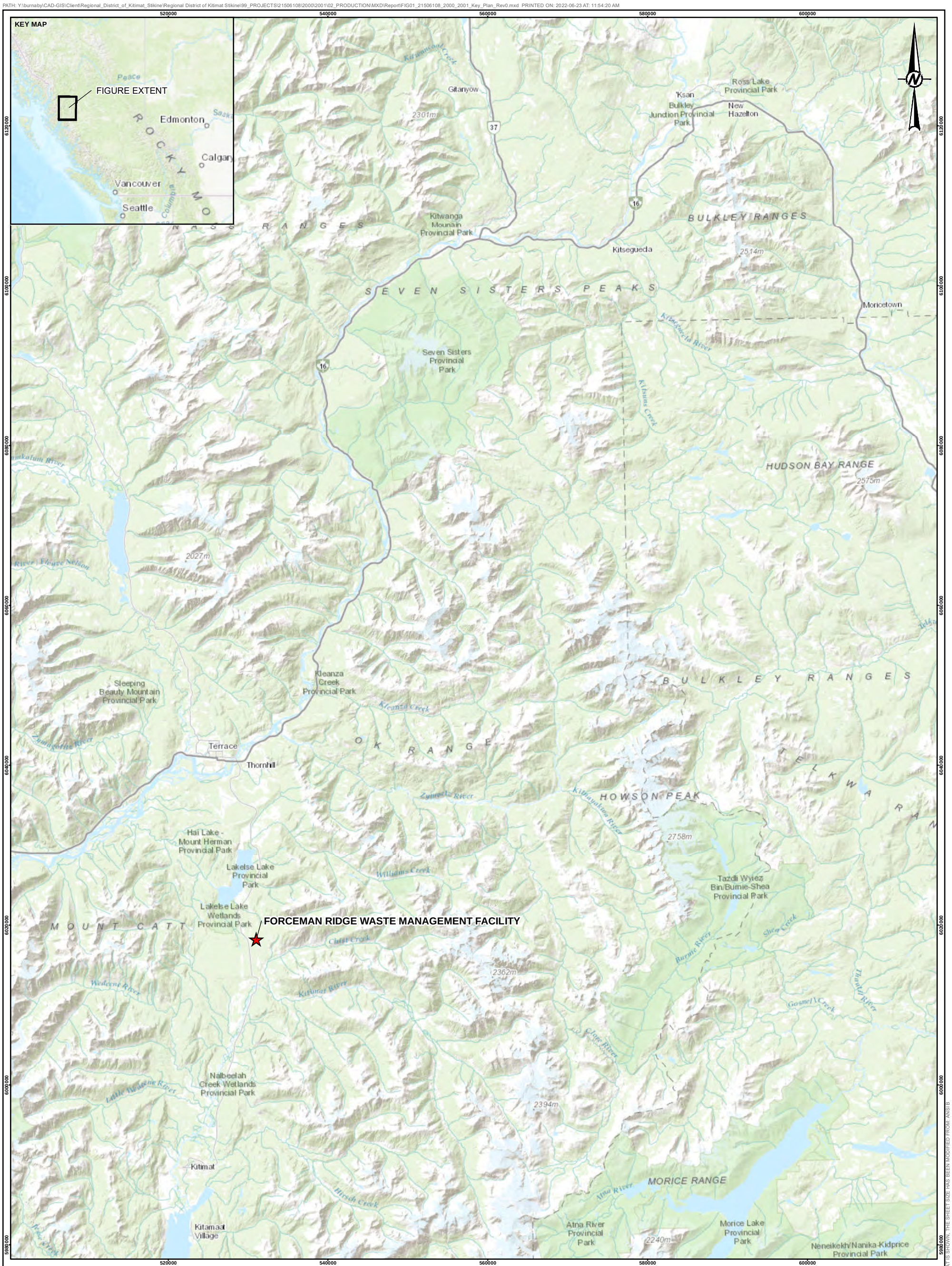

LEGEND

★ 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
FORCEMAN WASTE MANAGEMENT FACILITY

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
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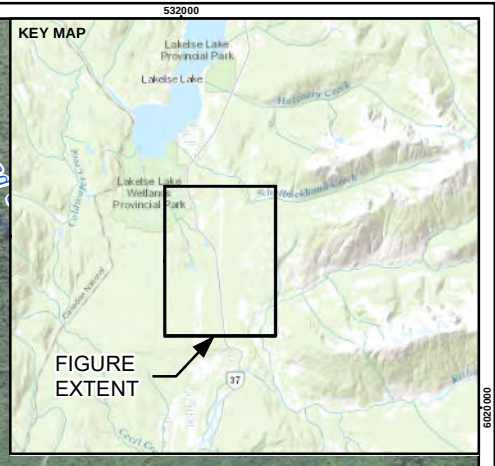
6021000 6018000 6016000

KEY MAP



SW-05 SW-04 SW-03 SW-02 SW-01

MW-13 MW-07 MW-02 MW-08 MW-03 MW-01 MW-16 MW-15 MW-09 MW-04 MW-14 MW-05 MW-10 MW-12 MW-06 MW-11

PHYTOREMEDIATION

F1 F2 F3 F4 F5 F6

37 Hwy 37 Clearwater Creek Wedeene Mainline N Kitimat FSR

LEGEND

PROJECT DATA

SAMPLE LOCATIONS

- MONITORING WELL
- SURFACE WATER
- SOIL SAMPLE LOCATION
- LEACHATE SAMPLE LOCATION
- HISTORICAL (DISCONTINUED FROM EEM)
- WATERCOURSE
- SITE BOUNDARY

NOT FOR CONSTRUCTION

0 400 800

1:20,000 METRES

NOTE(S)

1. SITE FEATURES ARE APPROXIMATE.

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3. WATERBODY DATA CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENSE – BRITISH COLUMBIA.
4. CONTOUR DATA CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENSE – CANADA.
5. SITE BOUNDARY DATA CONTAINS INFORMATION DERIVED FROM AND LICENSED UNDER THE OPEN GOVERNMENT LICENSE – BRITISH COLUMBIA (TANTALIS CROWN LAND LEASE).

COORDINATE SYSTEM: NAD 1983 UTM ZONE 9N

CLIENT

REGIONAL DISTRICT OF KITIMAT-STIKINE

PROJECT

FORCEMAN WASTE MANAGEMENT FACILITY

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	2000/2001	0	2

529000
530000
531000
532000
533000
6019000
6018000
6017000
6016000

Clearwater Creek
Onion Lake
Lower Clearwater Lake
Upper Clearwater Lake

MW-13
206.70
MW-7
189.21
MW-2
186.02
MW-8
152.98
MW-3
186.57
MW-1
204.17
MW-16
186.31
MW-15
188.79
MW-9
157.98
MW-4
168.15
MW-14
205.79
MW-10
178.60
MW-12
178.58
MW-6
178.16
MW-11
169.42

155
160
165
170
175
180
185
190
195
200
205

N

LEGEND

- MW-11 — Groundwater Monitoring Well
- 204.17 — Water Level - Monitoring Well (masl)
- 200 — Inferred Water Table Elevation Contours (June 2021)
- Approximate Groundwater Flow Direction
- Inferred Groundwater Flow Divide
- Creek
- Landfill Boundary
- Waste Management Facility Area

NOTE(S)

REFERENCE(S)

1. Base Map: Forceman Ridge Waste Management Facility 2020 Annual Water Quality Monitoring Report, Sperling Hansen Associates.
2. Base Map: Google Earth (2021).

NOT FOR CONSTRUCTION

0m 500m 1000m 1500m

CLIENT
Reginal District of Kitimat-Stickie

CONSULTANT
WSP GOLDER

YYYY-MM-DD	2022-06-20
DESIGNED	KQ
PREPARED	KQ
REVIEWED	LC
APPROVED	JS

PROJECT
Forceman Ridge Waste Management Facility
Environmental Effects Monitoring Program

TITLE
GROUNDWATER ELEVATIONS JUNE 2021

PROJECT NO.	CONTROL	REV.	FIGURE
21506108	2001	0	3

APPENDIX A

Operational Certificate

April 20, 2017

Tracking Number: 333328
Authorization Number: 17227

REGISTERED MAIL

REGIONAL DISTRICT OF KITIMAT-STIKINE
300 4545 LAZELLE AVENUE
TERRACE BC V8G 4E1

Dear Operational Certificate Holder:

Enclosed is Amended Operational Certificate 17227 issued under the provisions of the *Environmental Management Act*. Your attention is respectfully directed to the terms and conditions outlined in the operational certificate.

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

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

Administration of this permit will be carried out by staff from the Environmental Protection Division's Regional Operations Branch. Plans, data and reports pertinent to the permit are to be submitted by email or electronic transfer to the Director, designated Officer, or as further instructed.

Yours truly,

for Director, *Environmental Management Act*
Authorizations - North

Enclosure

cc: Environment Canada

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

BRITISH COLUMBIA

MINISTRY OF ENVIRONMENT

OPERATIONAL CERTIFICATE
17227

for the

FORCEMAN RIDGE REGIONAL LANDFILL

Under the Provisions of the Environmental Management Act
and in Accordance with the
Regional District of Kitimat-Stikine's Solid Waste Management Plan

REGIONAL DISTRICT OF KITIMAT-STIKINE

Suite 300 – 4545 Lazelle Avenue

Terrace, British Columbia

V8J 4E1

is authorized to store, handle, treat and discharge municipal waste at a sanitary landfill facility located near Forceman Ridge approximately 30 km south of Terrace, British Columbia, subject to the terms and conditions listed below. Contravention of any of these conditions is a violation of the *Environmental Management Act* and may result in prosecution.

Date Issued: November 7, 2008
Date Amended: April 20, 2017
(most recent)

for Director, *Environmental Management Act*
Authorizations - North
Operational Certificate Number: 17227

1. LOCATION OF LANDFILL PROPERTY

The location of the property where discharges are authorized to occur is described as District Lot 8128, Range 5, Coast District.

2. AUTHORIZED DISCHARGES

2.1. Municipal Solid Waste

This section applies to the discharge of municipal solid waste to ground. The site reference number for this discharge is E249849.

2.1.1. Quantity of Discharge

The quantity of solid wastes discharged to ground shall not exceed the design capacity of the landfill facility specified as follows: (1) by an engineered final design footprint (see section 3.3); and (2) by engineered excavation and final grade contours (see section 3.4).

2.1.2. Characteristics of the Discharge

Subject to sections 6.2, 6.3 and 6.4, the characteristics of the discharge shall be typical of municipal solid waste.

2.1.3. Authorized Works

The authorized works are a separate municipal solid waste disposal area and related appurtenances located approximately as shown on the attached site plan.

2.2. Open Burning Air Contaminants

This section applies to the discharge of air contaminants to the atmosphere from the regulated open burning of selected combustibles. The site reference number for this discharge is E249850.

2.2.1. Quantity of Discharge

The maximum authorized quantity of discharge of air contaminants is indeterminate.

2.2.2. Characteristics of the Discharge

The characteristics of the discharge shall be typical of those resulting from the regulated open burning of selected combustibles as per section 11.3.

2.2.3. Authorized Works

The authorized works are a separate burn area associated with a landfill operation and related appurtenances located approximately as shown on the attached Site Plan.

2.3. Liquid Wastes

This section applies to the discharge of selected liquid wastes to the ground. The site reference number for this discharge is E249851.

2.3.1. Quantity of Discharge

The maximum authorized quantity of discharge is indeterminate.

2.3.2. Characteristics of the Discharge

The characteristics of the discharge shall be those typical of septic tank pumpage, holding tank effluent, sewage treatment plant sludges, and wash water and grit from drain sumps at car and light truck wash facilities and parking lots.

2.3.3. Authorized Works

The authorized works are liquid waste storage and treatment lagoons and related appurtenances located approximately as shown on the attached Site Plan.

2.4. Leachate

This section applies to the discharge of leachate to a phytoremediation area. The site reference number for this discharge is E249852.

2.4.1. Quantity of Discharge

The maximum authorized rate of discharge is 609 m^3/day and the average rate of discharge is 400 m^3/day. The discharge may occur

24 hours/day, 7 days/week during the months of April to October inclusive.

2.4.2. Characteristics of the Discharge

The characteristics of treated leachate shall not exceed the following limits:

Total Nitrogen	300 mg/L
Ammonia	214 mg/L
pH	6.5 to 8.5
Chloride	5000 mg/L
Total iron	6 mg/L
Total zinc	100 mg/L
Total cadmium	0.1 mg/L

2.4.3. Authorized Works

The authorized works are leachate collection and treatment facilities including an equalization basin, aeration lagoon, sedimentation pond, sand filter and hybrid poplar plantation and related appurtenances located approximately as shown on the attached Site Plan.

3. LANDFILL DESIGN

3.1. Design by Qualified Professional(s)

The landfill and associated works [including but not limited to the size(s) and location(s) of disposal area(s), maximum allowable slopes of disposal area(s), leachate management system, progressive and final closure details, etc.] shall be designed by qualified professionals [such as engineer(s) and/or geoscientist(s)] registered in the Province of British Columbia who have expertise in the field of landfill design. Where a

design feature prepared by a qualified professional is in conflict with any requirement of this operational certificate, it shall be brought to the attention of the Director who shall determine a resolution to the conflict.

3.2. Construction

The landfill and associated works shall be constructed in accordance with the design prepared by qualified professionals.

3.3. Engineered Footprint

The landfill design shall include preparation of an engineered final design footprint delineating the maximum extent of solid waste disposal allowable at the facility horizontally (in plan view). The engineered final design footprint shall be clearly shown on a scaled plan of the site and the plan shall be made available in an electronic format as a computer aided design (CAD) drawing.

3.4. Engineered Excavation and Final Grade Contours

The landfill design shall include preparation of engineered excavation grade (if below grade landfilling is to occur) and final grade contours delineating the maximum extent of solid waste disposal allowable at the facility vertically (in cross-sectional view). The engineered excavation and final grade contours shall be clearly shown on scaled drawings (accompanied with typical cross sections to aid in depicting the landfill profile) and the drawings shall be made available in an electronic format as computer aided design (CAD) drawings.

4. LANDFILL GAS MANAGEMENT

4.1. Lower Explosive Limit

The landfill shall be operated such that combustible gas concentrations do not exceed the lower explosive limit in soils at the property boundary or 25% of the lower explosive limit in any on-site or off-site structure or facility, including any services (water, sewer, electrical, etc.).

5. LEACHATE MANAGEMENT REQUIREMENTS

5.1. Leachate Containment

The operational certificate holder shall ensure that leachate is contained through the use of a barrier system. The barrier system shall consist of a minimum of 2 metres of natural, *in-situ* clay with a hydraulic conductivity of 1×10^{-6} cm/s or less. Alternatively, an engineered barrier may be used provided it is equivalent to or better than the natural clay barrier specified above. The actual specifications of the leachate containment system shall be set out in the detailed engineering design.

5.2. Leachate Collection

A continuous drainage blanket shall be established beneath all landfill phases. The drainage blanket shall consist of, or be equivalent to, a minimum 300 mm thick layer of clean gravel with an effective hydraulic conductivity exceeding 1×10^{-1} cm/s. The leachate collection system shall be designed such that the hydraulic head on top of the barrier layer does not exceed 300 mm at any time.

5.3. Protection Against Clogging

The drainage layer shall be protected against sedimentation and bio-chemical clogging. Under no circumstances shall leachate piping or leachate collectors be wrapped in geotextile.

6. GENERAL REQUIREMENTS

6.1. Site Identification

A sign shall be erected at the main entrance to the site which identifies the following: site name, owner and operator, contact phone number and address, tipping fees (if applicable) and prohibited wastes. The lettering on the sign shall be such that it is clearly readable upon approach.

6.2. Prohibited Wastes

No wastes as defined by the *Hazardous Waste Regulation* shall be received, stored or disposed of at this site except as authorized by the Director. Lead-acid batteries shall not be landfilled but may be salvaged/recycled provided they are stored, handled and shipped in compliance with the *Hazardous Waste Regulation* and with section 10 of

this operational certificate. Tires equal to or less than 43.2 centimetres (17") in rim size and autohulks shall not be landfilled.

6.3. Waste Asbestos

Notwithstanding section 6.2 of this operational certificate, the disposal of waste asbestos under section 2.1 of this operational certificate and in compliance with the requirements of the *Hazardous Waste Regulation* is hereby authorized.

6.4. Contaminated Soil

Soil that contains contaminants in concentrations less than "hazardous waste" as defined by the *Hazardous Waste Regulation* may be disposed at the landfill site. Disposal includes monofilling, co-disposal with other wastes, use as a refuse cell berm material and use as a refuse cell cover material. Disposal must occur within a disposal area as authorized by sections 7 and 8 of this operational certificate. Disposal does not include use as final cover material.

6.5. Waste Measurement

The quantity of waste material landfilled at the site shall be measured using a weigh scale or by volume or estimated by means suitable to the Director. The results shall be submitted once per year on or before June 30 for the previous year expressed in tonnes/yr and/or m^3/yr.

6.6. Ozone Depleting Substances

Release of ozone depleting substances from the storage, handling and disposal of used refrigerator equipment, freezers, motor vehicle air conditioners and other air conditioning equipment, fire extinguishers or other equipment containing ozone depleting substances is strictly forbidden as per the requirements of the *Ozone Depleting Substances and other Halocarbons Regulation.*

6.7. Fire Prevention

The operational certificate holder shall make all reasonable efforts to prevent unauthorized fires from occurring at the landfill site. As a minimum, a fire break clear of all combustible materials at least 15 metres wide shall surround all disposal, treatment and individual storage areas

which have received or are receiving combustible materials. Disposal areas that have had 30 cm of compacted mineral soil cell cover or final cover applied are exempt. Water supply and pumping capabilities and/or soil and earth moving equipment shall be maintained at a sufficient level to extinguish fires. In addition, reasonable efforts shall include, but are not necessarily limited to, the preparation of a fire prevention and response plan.

6.8. Extinguishment of Fires

In the event of an unauthorized fire (including any smouldering fire), the operational certificate holder shall immediately make all reasonable efforts to extinguish the fire. Any fire which poses a threat to public health or to neighbouring property shall be reported to Emergency Management BC at 1-800-663-3456, the local fire authority, and/or the BC Wildfire Service at 1-800-663-5555.

6.9. Buffer Zone

No material shall be landfilled within 50 metres of the property boundary.

6.10. Litter Control

The operational certificate holder shall make all reasonable efforts to prevent litter from scattering. Any litter scattered on neighbouring property shall be cleaned up as soon as practicable.

6.11. Water Table Restriction

Wastes shall not be deposited or stored less than 1.2 metres above the highest groundwater level.

6.12. Inert Materials

Specific inert materials may be exempted from the requirements of section 6.11 by the Director. The permission of the Director must be obtained in writing prior to any disposal or handling of inert materials on an exemption basis.

6.13. Bear-Proof Containment of Putrescibles

All putrescible wastes that arrive at the landfill facility must be immediately contained within a bear-proof bin (i.e. on-site transfer station of bear-proof design and construction) or within an area enclosed by an electric fence. Grass, leaves, weeds, branches and ground woodwaste are not considered putrescible for the purposes of this operational certificate.

6.14. Electric Fencing

6.14.1. Design, Construction and Maintenance

Wherever required, electric fencing and gate systems at the landfill shall be designed, constructed, and maintained such that bears are prevented from entering into the landfill through any portion of the fence or gates at any time of the day.

6.14.2. Fence Type

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

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

6.14.3. Wire Tension

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

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

where: *Tension* is in lbs force

Temperature is in °C

6.14.4. Post Spacing

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

6.14.5. Grounding System

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

6.14.6. Period of Operation

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

6.14.7. Minimum Voltage

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

6.14.8. Gate(s)

Any access through electric fencing for vehicles, equipment and personnel shall consist of an electrified gate system that is closed during non-operating hours. The gate system shall be electrified to a minimum voltage of 6,000 volts at all times except when being opened or closed. Any gate that is open during operating hours shall be periodically checked by the attendant for bear activity during hours of operation. Gaps between the gate and the fence and ground, and between gate panels (for a double-hung gate), shall not exceed 10 cm.

6.14.9. Fence Inspections

The entire perimeter of the electric fencing shall be inspected at least once every seven days and the voltage of the fencing measured at several points along the fencing and at each gate using a proper electric fence voltmeter matched to the brand of the fence charging unit. The results of voltage testing shall be recorded in a log book or electronic record. Any results less than the minimum 6,000 volts shall be immediately investigated for the cause of the low voltage (e.g., low battery, litter, vegetation, loose or crossed wires, broken insulators, breaks in the grounding system, etc.). Corrective actions to restore proper voltage shall be immediately undertaken.

Signs of digging or other attempts by bears to penetrate electric fencing shall be recorded in a log book or electronic record. Any penetrations through electric fencing by bears shall be immediately reported to the Conservation Officer Service at 1-877-952-7277.

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

6.15. Municipal Solid Waste Separation

Municipal solid waste may be separated into the following streams: (1) a mixed waste stream including putrescibles for disposal; (2) a mixed waste

stream not including any putrescibles for disposal; (3) an organic waste stream, including untreated wood wastes, for composting; (4) a selected waste stream for salvage and recycling; and (5) a selected combustibles waste stream for open burning or air-curtain burning. Each of these waste streams is subject to all of the general requirements contained in sections 6.1 through 6.14 above, as well as being subject to specific requirements as outlined in a separate section for each below.

6.16 Groundwater Quality

The characteristics of the groundwater at the property boundary shall not exceed drinking water standards in Schedule 6 of the Contaminated Sites Regulation. Where natural background water quality concentrations exceed the aforementioned standard, the characteristics of the groundwater at the property boundary must not exceed background concentrations.

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

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

7. OPERATIONAL REQUIREMENTS FOR DISPOSAL OF SOLID WASTES CONTAINING PUTRESCIBLES

7.1. Location

The operational certificate holder shall identify an area for disposal of putrescible refuse (herein referred to as the putrescible disposal area) that is within the authorized municipal solid waste disposal footprint (see section 2.1.1). Disposal of any solid wastes consisting of or mixed with putrescibles shall be restricted to the designated putrescible disposal area.

7.2. Nature of Wastes

Wastes disposed at the active face of the putrescible disposal area may include any municipal solid waste except liquid wastes and hot ashes or as otherwise restricted by section 6.2.

7.3. Bear-Proofing

The putrescible waste disposal area shall be maintained inside an electric fence. The electric fence shall comply with all requirements of section 6.14.

7.4. Waste Compaction

Wastes at the active face of the putrescible disposal area shall be spread in layers of 60 centimetres or less on the active face and then compacted with a minimum of three (3) passes with heavy equipment.

7.5. Maximum Lift Height

The maximum height of any lift of compacted refuse in the putrescible disposal area shall be 5 metres.

7.6. Waste Cover

Cover shall be applied to refuse in the putrescible disposal area as specified below. The operational certificate holder shall maintain a log book or electronic record with all dates of cover application.

7.6.1. Active Face Cover

Except as otherwise stated in sub-section 7.6.2, the active face of the putrescible disposal area does not normally require cover. Based on information concerning environmental or public health concerns related to exposed refuse at the active face, however, the Director may require that the active face be covered completely at a specified frequency with 0.15 m of soil (or functional equivalent) for a specified period.

7.6.2. Cell Cover

A uniform cover of 30 cm compacted soil shall be applied to all sides of the active refuse cell in the putrescible disposal area such

that no more than 500 m^2 of refuse are exposed at the active face at any time and such that the volume of refuse in the cell does not exceed 5,000 m^3. Once the maximum volume of refuse has been reached in a cell, the active face shall be covered with 30 cm of compacted soil and a new refuse cell begun.

7.6.3. Final Cover

Completed portions of the putrescible disposal area shall progressively receive final cover during the active life of the landfill (see section 15.5).

7.7. Dead Animal Disposal

Dead animals and animal parts shall be disposed of in the putrescible disposal area and covered as soon as practicable with a minimum of 60 centimetres of soil and/or refuse material such that flies and scavenging animals are prevented from accessing the carrion.

8. OPERATIONAL REQUIREMENTS FOR DISPOSAL OF NON-PUTRESCIBLE SOLID WASTES

8.1. Location

The operational certificate holder may identify an area for the disposal of non-putrescible wastes (herein referred to as the non-putrescible disposal area) that is within the authorized municipal solid waste disposal footprint (see sub-section 2.1.1).

8.2. Nature of Wastes

Wastes disposed at the active face of the non-putrescible disposal area may include any municipal solid waste except putrescibles, liquid wastes and hot ashes or materials otherwise restricted by section 6.2.

8.3. Waste Compaction

Wastes at the active face of the non-putrescible disposal area shall be spread in layers of 60 centimetres or less on the active face and then compacted with a minimum of three (3) passes with heavy equipment.

8.4. Maximum Lift Height

The maximum height of any lift of compacted refuse in the non-putrescible disposal area shall be 5 metres.

8.5. Waste Cover

Cover shall be applied to refuse in the non-pustrescible disposal area as specified below. The operational certificate holder shall maintain a log book or electronic record with all dates of cover application.

8.5.1. Active Face Cover

Except as otherwise stated in sub-section 8.5.2, the active face of the non-putrescible disposal area does not normally require cover. Based on information concerning environmental or public health concerns related to exposed refuse at the active face, however, the Director may require that the active face be covered completely at a specified frequency with 0.15 m of soil (or functional equivalent) for a specified period.

8.5.2. Cell Cover

A uniform cover of 30 cm compacted soil shall be applied to all sides of the active refuse cell in the non-pustrescible disposal area such that no more than 500 m^2 of refuse are exposed at the active face at any time and such that the volume of refuse in the cell does not exceed 5,000 m^3. Once the maximum volume of refuse has been reached in a cell, the active face shall be covered with 30 cm of compacted soil and a new refuse cell begun.

8.5.3. Final Cover

Completed portions of the non-putrescible disposal area shall progressively receive final cover during the active life of the landfill (see section 15.5).

9. OPERATIONAL REQUIREMENTS FOR COMPOSTING

9.1. Location

The operational certificate holder may identify an area for composting (herein referred to as the composting area). Any composting shall be restricted to the designated composting area. This area shall be clearly identified at the landfill site.

9.2. On-Site Usage of Compost Product

Composting may be conducted passively by static pile (i.e., no aeration, etc.) provided the compost product is used on-site at the landfill for cover, reclamation or landscaping purposes. The compost piles must be rested at least one year after the last addition of organic waste prior to use.

9.3. Use of Sewage Sludge

Dewatered sludge from the liquid waste disposal lagoons authorized by section 2.3 may be included in static compost piles provided: the sludge is first blended with carbonaceous material (e.g., sawdust and/or wood shavings); and the public is prohibited from accessing any composting area that includes sludge.

9.4. Off-site Usage of Compost Product

If compost product is to be made available to the public or otherwise used offsite, composting operations shall comply with the requirements of the *Organic Matter Recycling Regulation* and any other relevant composting legislation.

9.5. Bear-Proofing

If the composting operation is to receive any organic wastes that are potential attractants to bears, then composting shall be completely enclosed by an electric fence or contained in a bear-proof structure (building or composting vessel). The electric fence shall comply with all requirements of section 6.14.

10. OPERATIONAL REQUIREMENTS FOR STORAGE OF SELECTED WASTES FOR SALVAGE AND RECYCLING

10.1. Location

The operational certificate holder may identify an area for the storage of selected wastes for salvage and recycling (herein referred to as the salvage/recycling area). Any salvage/recycling shall be restricted to the designated salvage/recycling area.

10.2. Nature of Wastes

Wastes to be salvaged/recycled may be any items with potential salvage or recycling value but shall not include any refuse consisting of or containing putrescibles, any liquid wastes, hot ashes or materials otherwise restricted by section 6.2.

10.3. Contamination

Contamination of any of the designated salvage/recycling storage piles with putrescible wastes shall be cleaned up immediately. Contamination of any of the storage piles with materials other than the intended salvageable/recyclable material (e.g., scrap metal with wood waste, or white goods with demolition debris, etc.) may result in a requirement to clean up the contamination or to landfill the contaminated material.

11. OPERATIONAL REQUIREMENTS FOR REGULATED OPEN BURNING

11.1. Location

The operational certificate holder may identify an area for the use of open burning to treat selected combustibles (herein referred to as the open burning area). Any open burning of selected wastes shall be restricted to the designated open burning area.

11.2. Quantity, Timing and Duration of Discharge

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

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

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

11.3. Nature of Wastes

Acceptable materials for burning may only include dry, unpainted, untreated demolition, construction and packing-related wood residue, clean stumps and brush, but shall exclude nuisance-causing combustibles such as glue-containing wood, painted and treated wood, sawdust, yard wastes, mulch, wood chips, rubber, plastics, tars, insulation, roofing material, asphalt shingles, etc.

11.4. Favourable Weather for Smoke Dispersion

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

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

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

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

11.5. Fire Accelerant

An approved fire accelerant such as diesel fuel or commercial fire starter gel or a flame-thrower shall be used to ensure efficient and rapid ignition of the waste material.

11.6. Minimization of Smoke

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

11.7. Extinguishment Contingency Plan

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

i) Inadequate smoke dispersion in the surrounding environment;

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

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

11.8. Extinguishment

All combustion shall be completely extinguished at the end of the authorized period as set out in Section 6.2.

12. OPERATIONAL REQUIREMENTS FOR DISPOSAL OF LIQUID WASTES

12.1. Location

The operational certificate holder may identify an area for the controlled disposal of selected liquid wastes (herein referred to as the liquid waste disposal area). Disposal of any liquid wastes from pumper trucks or the like shall be restricted to the designated liquid waste disposal area.

12.2. Liquid Waste Disposal Lagoons

Disposal of any liquid wastes shall be to properly designed and constructed lagoon(s) located in the liquid waste disposal area. The lagoon(s) shall function as decant lagoons (with decant discharged to an authorized liquid waste handling system such as a leachate treatment system) and/or as part of an organic matter composting system. The

lagoons shall be of an impervious design that prevents the escapement of liquid to the ground. In all cases, design and construction of the liquid waste disposal lagoon(s) shall be such that seepage through the berms shall not occur.

12.3. Signage and Fencing

The liquid waste disposal area shall be fenced with chainlink or steel woven-wire (e.g., page wire) a minimum of 1.2 metres high. Signs identifying the nature of the lagoon disposal area shall be erected on all sides of the fence such that the lagoons are easily identifiable from any approach.

12.4. Freeboard

A minimum freeboard of 50 centimetres shall be maintained at all times. The lagoon berms shall be maintained in good working order and the Director shall be notified immediately of any failure or overflow.

12.5. Nature of Wastes

The nature of wastes which may be discharged to a designated lagoon is that of typical septic tank pumpage, sewage holding tank waste, sewage treatment plant sludge, and wash water and grit from drain sumps at automobile wash facilities (intended primarily for cars and light trucks) and parking lots. Industrial liquid wastes and sludges shall be excluded.

12.6. Off-Loading Chute

An off-loading chute shall be provided to ensure that all effluent enters the lagoon and does not spill on the ground in the unloading area.

12.7. Sludge Removal

If the sludge is to be removed from a lagoon for final disposal at an active face of a designated solid waste disposal area (under section 7) or for composting (under section 9), then the lagoon must be rested for a sufficient amount of time to allow the wastes to dewater. Semi-solid sludge may be removed and stockpiled above ground for further dewatering provided: the sludge stockpile is located on impervious ground; drainage from the stockpile area is directed into the lagoon or other approved liquid waste disposal system (e.g., a leachate collection

and treatment system) and provided the sludge stockpile is contained within a signed and fenced area as per section 12.3. Once the solidified sludge is deposited at an active face of a designated solid waste disposal area, it must be covered immediately with a minimum of 30 centimetres of cover material and then the area of sludge disposal compacted immediately after cover is applied.

12.8. Lagoon Closure

If a lagoon is to be closed without removal of sludge as per section 12.7, the sludge must be allowed to dewater to a moisture content that will support final cover. The lagoon must then be covered with a minimum of 1 metre of compacted soil and sloped to promote runoff.

12.9. Volume Measurement

The operational certificate holder shall maintain a log book or electronic record with quantities of sewage wastes discharged to the lagoons.

13. MONITORING REQUIREMENTS

The operational certificate holder shall carry out an environmental monitoring program as follows:

13.1 Treated Leachate/Phytoremediation Area

Location	Parameters	Frequency
E249852 Treated Leachate Prior to Discharge to Phytoremediation Area	Lab: total metals, alkalinity, chloride, fluoride, sulphate, hardness, ammonia, nitrate, nitrite, total organic carbon, orthophosphorus, COD, BOD, VOCs[1], pH	Quarterly→Annually*
	Field: conductivity, temperature, DO and turbidity	Monthly→Quarterly*
	Volume	Continuous during seasonal discharge

E306624 Composite Soil Sample[2] from Phytoremediation Area	Lab: metals, salinity	Annually, prior to discharge each season.

[1]One-time sample of VOCs for background levels
[2]Composite sample assembled from 4 locations from a pre-established list of 12 locations
* quarterly reduced to annually and monthly reduced to quarterly following two complete years of sampling.

13.2 Groundwater

Location	Parameters	Frequency
Background E251531 MW-02 E287385 MW-13 Early Detection E251530 MW-01 E251532 MW-03 E251533 MW-04 E287379 MW-07 E287380 MW-08 E287381 MW-09 E302210 MW-15 E302211 MW-16	Lab: dissolved metals, alkalinity, chloride, fluoride, sulphate, hardness, ammonia, nitrate, nitrite, TOC, COD, VOCs[1], pH	Quarterly→Annually*
	Field: conductivity, temperature	Monthly→Quarterly*
All of the above wells and: E251534 MW-05 E251535 MW-06 E287382 MW-10 E287383 MW-11 E287384 MW-12 E287386 MW-14	Water elevation	quarterly

[1]One-time sample of VOCs for background levels
* quarterly reduced to annually and monthly reduced to quarterly following two complete years of sampling.

Date Issued: November 7, 2008
Date Amended: April 20, 2017
(most recent)

for Director, *Environmental Management Act*
Authorizations - North
Operational Certificate Number: 17227

13.3 Surface Water

Location	Parameters	Frequency
E273828 SW-01 (Onion Lake) E273829 SW-02 (Upper Clearwater Lake at outlet) E273831 SW-03 (Lower Clearwater Lake at outlet) E306587 SW-04 (Creek from Onion Lake at FSR) E296117 SW-05 (Clearwater Creek at FSR)	Lab: total metals, dissolved metals, chloride, fluoride, sulphate, hardness, ammonia, nitrate, nitrite, COD, BOD, pH	Quarterly→Annually*
	Field: conductivity, temperature, turbidity, water level, flow rate	Monthly→Quarterly*

* quarterly reduced to annually and monthly reduced to quarterly following two complete years of sampling. Once sampling on an annual basis commences, it shall occur during the season with lowest stream flows

13.4 Leachate and Water Monitoring Procedures

13.4.1 Sampling Procedures

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

13.4.2 Analytical Procedures

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

13.4.3 Quality Assurance and Quality Control

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:

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

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

c) Each duplicate sample shall be submitted to the laboratory; one of the pair identified as the regular sample, and the other, as a blind sample identified by a fictitious site-name established solely to identify the duplicate sample.

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

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

14. DATA ANALYSES AND REPORTING

14.1. Log Book

As required by sections 6.14.9, 7.6, 8.5, and 12.9 the operational certificate holder shall maintain a log book or electronic record. The log book or electronic record shall be made available for inspection upon request by Ministry staff or Kitselas First Nation.

14.2. Reporting

Whenever required, the operational certificate holder shall submit data, studies and reports to the Director by email or electronic transfer or as otherwise instructed.

An annual report shall be submitted to the Director and posted on the Regional District of Kitimat-Stikine website on or before June 30 each year for the previous calendar year.

The annual report shall contain at minimum:

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

ii) Occurrences or observations of wildlife attempting to access the facility;

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

14.3. Groundwater Model

The operational certificate holder shall have a qualified professional maintain the existing groundwater model of the landfill site and immediate downstream receiving environment using all available, relevant groundwater and surface water monitoring, stream flow, and precipitation data. Development of the groundwater model shall include a water balance assessment for the drainage area in which the landfill site is situated. The groundwater model shall define, where possible, the groundwater regime (flow directions, flow rates, groundwater divide, any evidence of a leachate plume, extent of plume, etc.) at and in the immediate surrounding area of the landfill site. Based on monitoring data and inferred groundwater flow direction from each previous year, the annual report as required in Section 14.2 shall contain a preliminary assessment of any recommended changes to the model. Based on this assessment and any other information available, the Director may require that a formal update to the model be undertaken.

15. CLOSURE REQUIREMENTS

15.1. Notification of Closure

The operational certificate holder shall notify the Director and Kitselas First Nation in writing of intentions to close the landfill site.

15.2. Closure Plan

A closure plan shall be submitted to the Director upon request. Upon issuance of the draft closure plan, the Kitselas First Nation shall also be provided with a copy. The closure plan shall, as a minimum, include the following:

- proposed end-use of the landfill property after closure;
- anticipated total waste volume and tonnage, and life of the landfill (i.e., closure date);
- a topographic plan showing the final elevation contours of the landfill and surface water diversion and drainage controls;
- design of the final cover suited to the intended end-use of the site, including the thickness and permeability of barrier layers and drainage layers, and information on topsoil, vegetative cover and erosion prevention controls;
- procedures for notifying the public about the closure and about alternative waste disposal facilities;
- rodent and nuisance wildlife control procedures;
- 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;
- 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);
- 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
- an estimated cost, updated annually, to carry out closure and post-closure activities for a minimum period of 25 years.

15.3. 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 15.2, plus a reasonable contingency for any remediation which may be required.

15.4. Final Cover

The final cover system shall be designed by a qualified professional to match the intended end-use of the landfill site and to match the needs of any required environmental management systems (leachate minimization or recirculation, as the case may be, landfill gas collection and treatment, etc.). Generally, the final cover shall consist of a layer of 1 metre of low permeability ($<1 \times 10^{-5}$ cm/s) compacted soil followed by a layer of topsoil suitable for establishment of vegetation. Use of higher permeability soil must first be approved by the Director. The final cover shall be constructed with minimum and maximum slopes as specified by a qualified professional (see section 3.4) to promote runoff and minimize erosion, with appropriate runon/runoff drainage controls, erosion controls, and gas venting controls. The site shall be seeded with a grass/legume mixture suited to the local climate.

15.5. Progressive Application of Final Cover

Completed portions of the landfill shall progressively receive final cover during the active life of the landfill. The maximum area of disposed refuse that has not yet received final cover shall not exceed 25% of the total final footprint area. Final cover is to be applied according to the specifications identified in section 15.4.

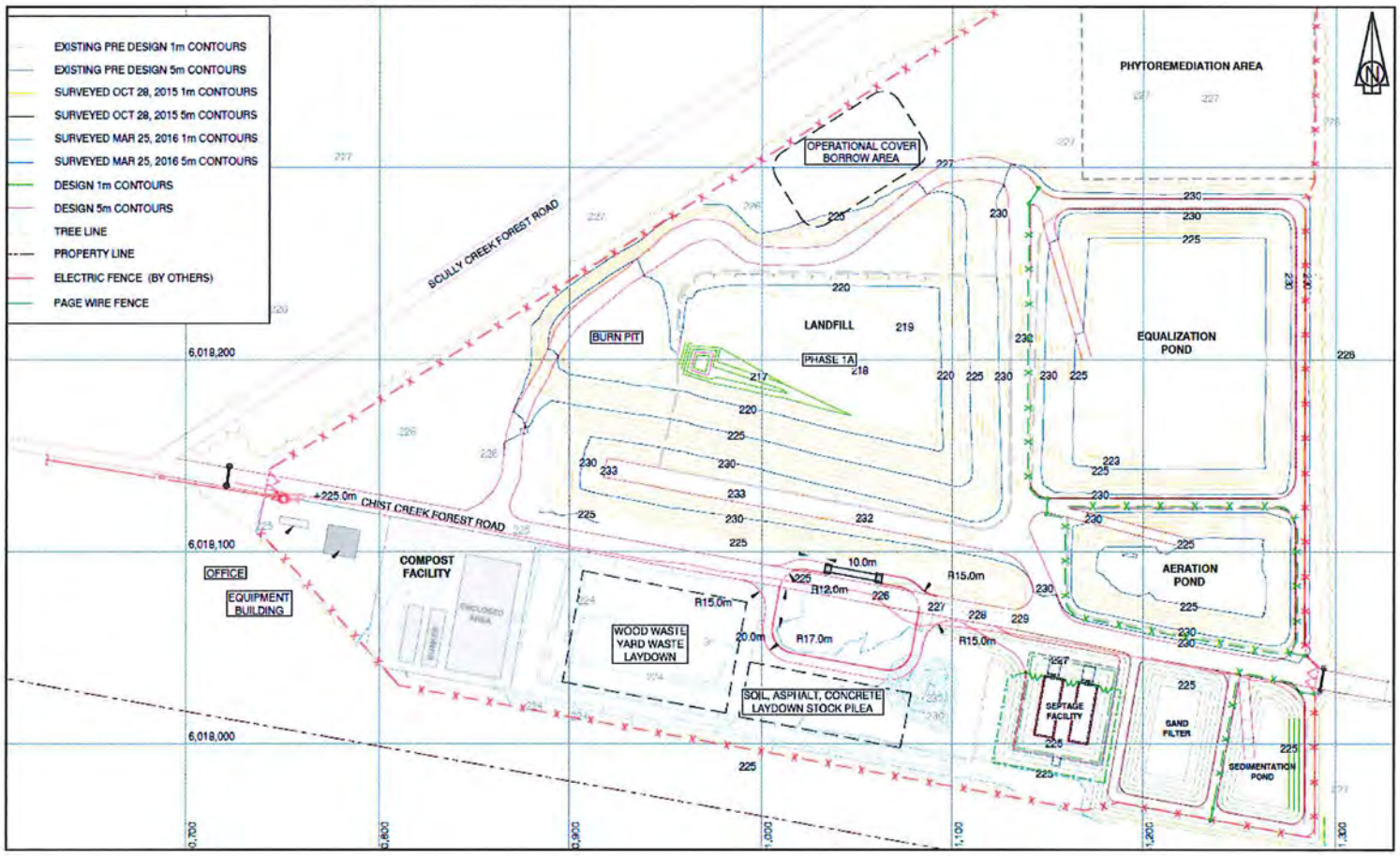
16. ENVIRONMENTAL IMPACT

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, install additional pollution control works, or change the method of operation.

17. MAINTENANCE OF WORKS, EMERGENCY PROCEDURES AND NON-COMPLIANCE REPORTING

The operational certificate holder shall inspect the operation regularly and maintain it in good order. The operational certificate holder shall immediately notify the Director or designate as well as the Kitselas First Nation of any circumstance which prevents continuing operation in the approved manner or results in noncompliance with the requirements of this operational certificate.

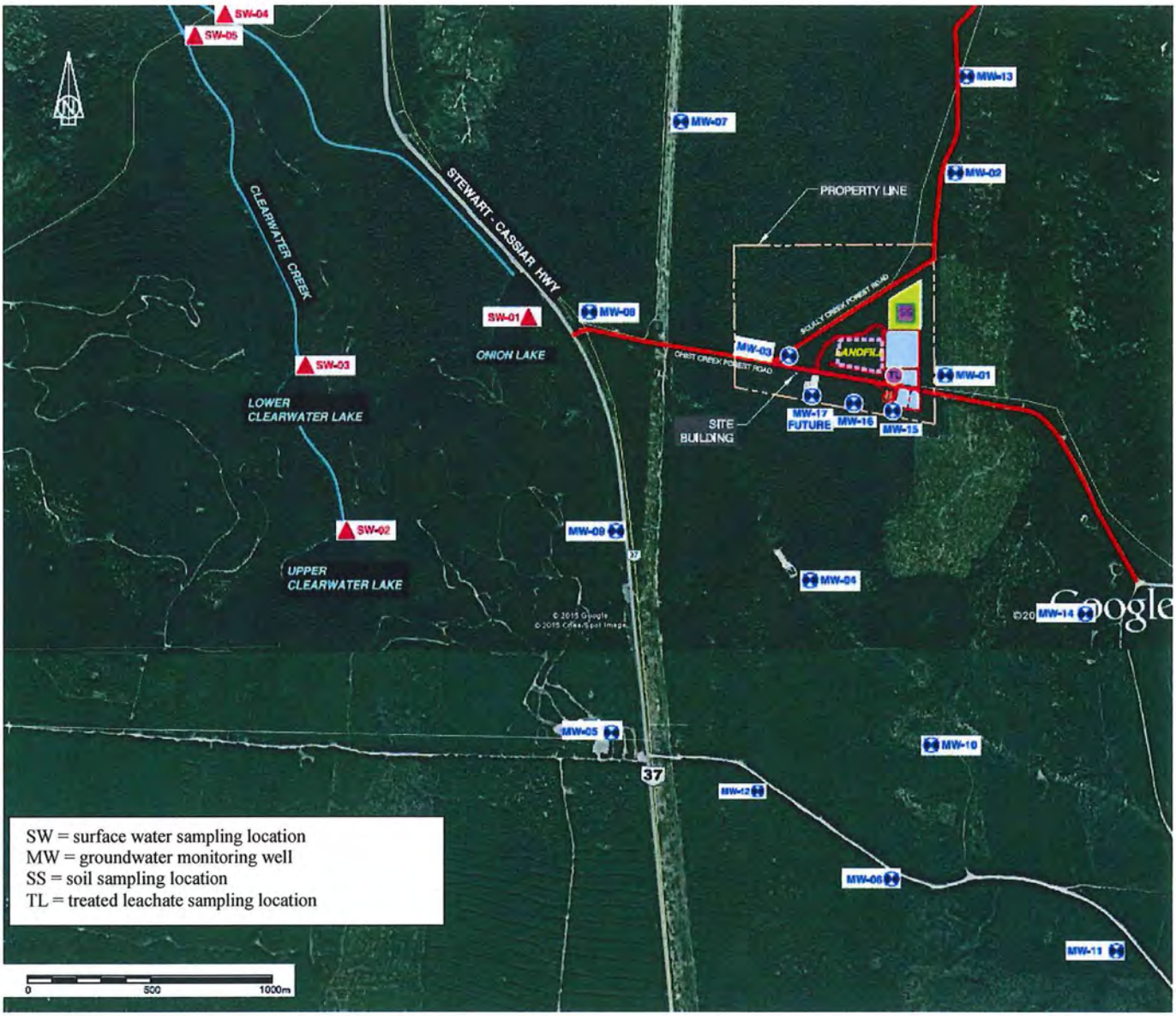
SITE PLAN



Date Issued: November 7, 2008
Date Amended: April 20, 2017
(most recent)

for Director, *Environmental Management Act*
Authorizations - North
Operational Certificate Number: 17227

MONITORING LOCATIONS



Date Issued: November 7, 2008
Date Amended: April 20, 2017
(most recent)

for Director, *Environmental Management Act*
Authorizations - North
Operational Certificate Number: 17227

November 24, 2021

Tracking Number: 408044
Authorization Number: 17227

REGIONAL DISTRICT OF KITIMAT-STIKINE
300 4545 LAZELLE AVENUE
TERRACE, BC
V8G 4E1

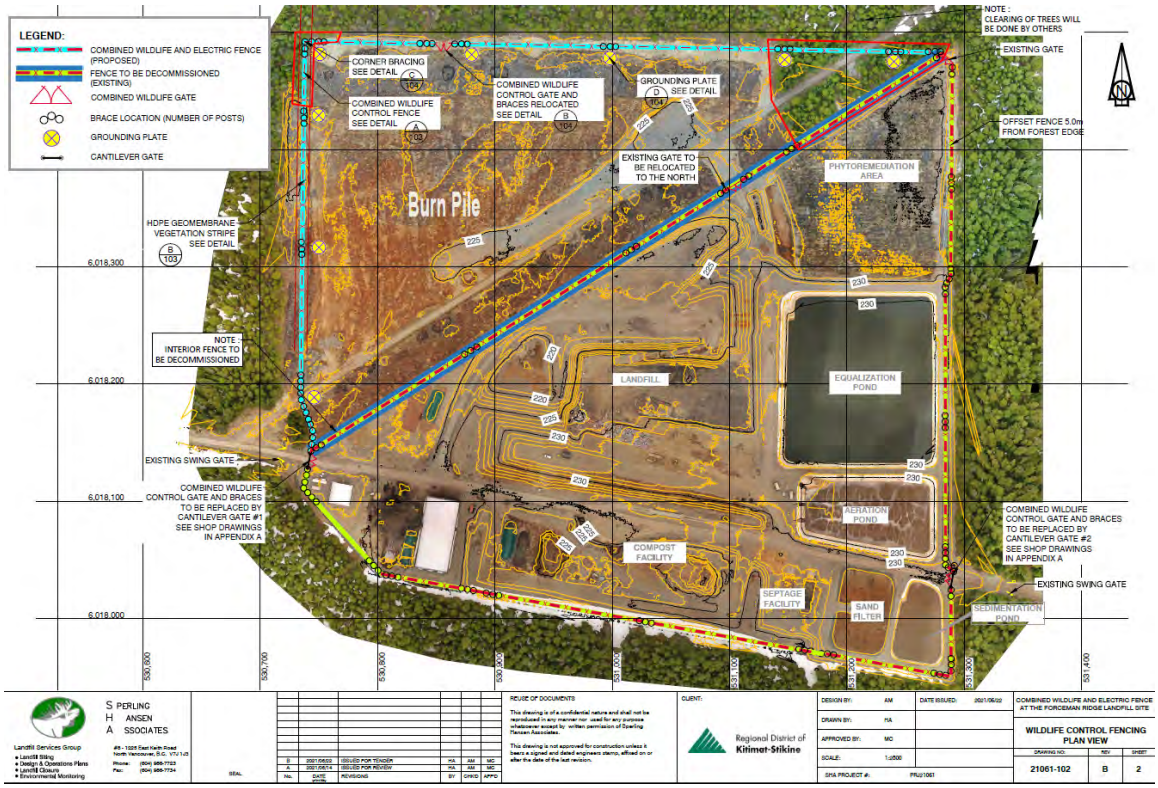
Dear REGIONAL DISTRICT OF KITIMAT-STIKINE,

Your application for an Authorization amendment under the Environmental Management Act

In response to your letter dated October 21, 2021, and pursuant to Section 16(4) of the *Environmental Management Act*, I as the Director approve the following changes to Sections 2.2.3, 2.4.1 and 2.4.3 of the Operational Certificate 17227.

Section 2.2.3,

Update to the Site Plan to facilitate relocation of the open burn area as shown on the update of the Site Plan below:



From: Section 2.4.1 Quantity of Discharge

The maximum. authorized rate of discharge is 609 m3/day and the average rate of discharge is 400 m3/day. The discharge may occur 24 hours/day, 7 days/week during the months of April to October inclusive.

To: Section 2.4.1 Quantity of Discharge

The maximum authorized rate of discharge to the phytoremediation stand and rapid infiltration trenches is 1000 m^3/day and the average rate of discharge is 400m^3/day. The discharge may occur 24 hours/day, 7 days/week.

From: Section 2.4.3 Authorized Works

The authorized works are leachate collection and treatment facilities including an equalization basin, aeration lagoon, sedimentation pond, sand filter and hybrid poplar plantation and related appurtenances located approximately as shown on the attached Site Plan.

To: Section 2.4.3 Authorized Works

The authorized works are leachate collection and treatment facilities including an equalization basin, aeration lagoon, sedimentation pond, sand filter, rapid infiltration trenches, hybrid poplar plantation and related appurtenances located approximately as shown on the attached Site Plan.

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

January 19, 2021 Authorization: 17227

REGIONAL DISTRICT OF KITIMAT-STIKINE
300 4545 LAZELLE AVENUE
TERRACE, BC
V8G 4E1

Via Email: mhaley@rdks.ca

Dear Megan Haley:

Re: Temporary Amendment – 17227

We are in receipt of your January 19, 2021 request to discharge from your sand filter and sedimentation pond until January 29, 2021 due to a large amount of precipitation that occurred during 2020 and 2021. We understand that this request has been made in order to prevent the overtopping and possible breach of the ponds at the Forceman Ridge Landfill.

Pursuant to Section 16 of the *Environmental Management Act*, I hereby approve a temporary amendment of Section 2.4.1. for the period of January 19, 2021 to January 29, 2021 only.

From:

The maximum authorized rate of discharge is 609 m3/day and the average rate of discharge is 400 m3/day. The discharge may occur 24 hours/day, 7 days/week during the months of April to November 9, inclusive.

To:

The maximum authorized rate of discharge is 609 m3/day and the average rate of discharge is 400 m3/day. The discharge may occur 24 hours/day, 7 days/week from January 19, 2021 to January 29, 2021, inclusive.

Ministry of Environment and Climate Change Strategy
Authorizations - North
Regional Operations Branch
Environmental Protection Division
Mailing Address:
325 - 1011 4th Avenue
Prince George BC V2L 3H9
Telephone: 250-645-9403
Facsimile: 250 565-6629
Website: www.gov.bc.ca/en

Reporting requirements include the following and a report must be submitted to the director on or before February 5, 2021:

1. Total volume discharged
2. Water quality parameters for: total nitrogen, ammonia, pH, chloride and total metals

This amendment does not affect any other requirements of the OC 17227, which remain in full force and effect. Additionally, this amendment does not constitute approval by any other agency with jurisdiction over this matter.

This decision may also be appealed to the Environmental Appeal Board in accordance with Part 8 of the Environmental Management Act. An appeal must be delivered 30 days from the date that the notice of this decision is given. For further information, please contact the Environmental Appeal Board at 250-387-3464, via email eabinfo@gov.bc.ca or visit their website at http://www.eab.gov.bc.ca/ .

If you have any questions regarding this letter, please contact Leonard Cook, Environmental Protection Officer at (250) 645-9403 or by email at leonard.cook@gov.bc.ca.

Yours truly,

Karen Moores, for *Director Environmental Management Act*
Section Head, *Authorizations – North*
Environmental Protection Division
Ministry of Environment & Climate Change Strategy

March 16, 2021 Authorization: 17227

REGIONAL DISTRICT OF KITIMAT-STIKINE
300 4545 LAZELLE AVENUE
TERRACE, BC
V8G 4E1

Via Email: mhaley@rdks.ca

Dear Megan Haley:

Re: Temporary Amendment – 17227

We are in receipt of your March 15, 2021 request to discharge from your sand filter and sedimentation pond until April 1, 2021 due to a large amount of precipitation that occurred during 2020 and 2021. We understand that this request has been made in order to prevent the overtopping and possible breach of the ponds at the Forceman Ridge Landfill.

Pursuant to Section 16 of the *Environmental Management Act*, I hereby approve a temporary amendment of Section 2.4.1. for the period of March 16, 2021 to April 1, 2021 only.

From:

The maximum authorized rate of discharge is 609 m3/day and the average rate of discharge is 400 m3/day. The discharge may occur 24 hours/day, 7 days/week during the months of April to November 9, inclusive.

To:

The maximum authorized rate of discharge is 609 m3/day and the average rate of discharge is 400 m3/day. The discharge may occur 24 hours/day, 7 days/week from March 15, 2021 to April, 2021, inclusive.

Ministry of Environment and Climate Change Strategy
Authorizations - North
Regional Operations Branch
Environmental Protection Division
Mailing Address:
325 - 1011 4th Avenue
Prince George BC V2L 3H9
Telephone: 250-645-9403
Facsimile: 250 565-6629
Website: www.gov.bc.ca/en

Reporting requirements include the following and a report must be submitted to the director on or before April 5, 2021:

1. Total volume discharged
2. Water quality parameters for: total nitrogen, ammonia, pH, chloride and total metals

This amendment does not affect any other requirements of the OC 17227, which remain in full force and effect. Additionally, this amendment does not constitute approval by any other agency with jurisdiction over this matter.

This decision may also be appealed to the Environmental Appeal Board in accordance with Part 8 of the Environmental Management Act. An appeal must be delivered 30 days from the date that the notice of this decision is given. For further information, please contact the Environmental Appeal Board at 250-387-3464, via email eabinfo@gov.bc.ca or visit their website at http://www.eab.gov.bc.ca/ .

If you have any questions regarding this letter, please contact Leonard Cook, Environmental Protection Officer at (250) 645-9403 or by email at leonard.cook@gov.bc.ca.

Yours truly,

Karen Moores, for *Director Environmental Management Act*
Section Head, *Authorizations – North*
Environmental Protection Division
Ministry of Environment & Climate Change Strategy

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.

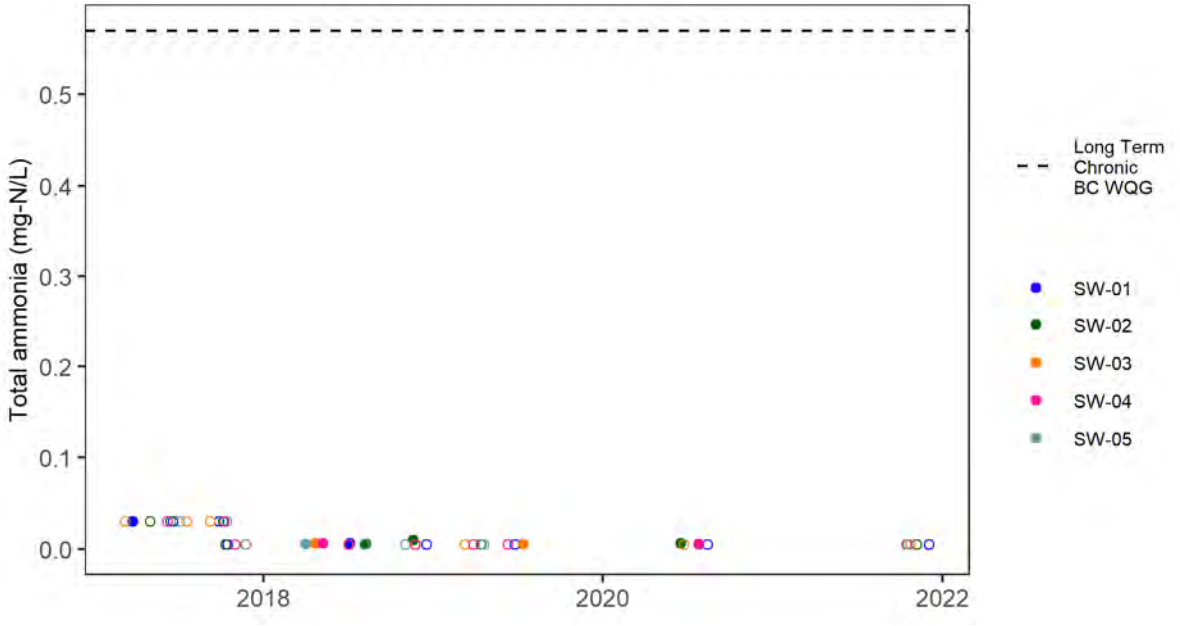


Figure B-1: Temporal plot of total ammonia surface water concentrations, 2017 to 2021.

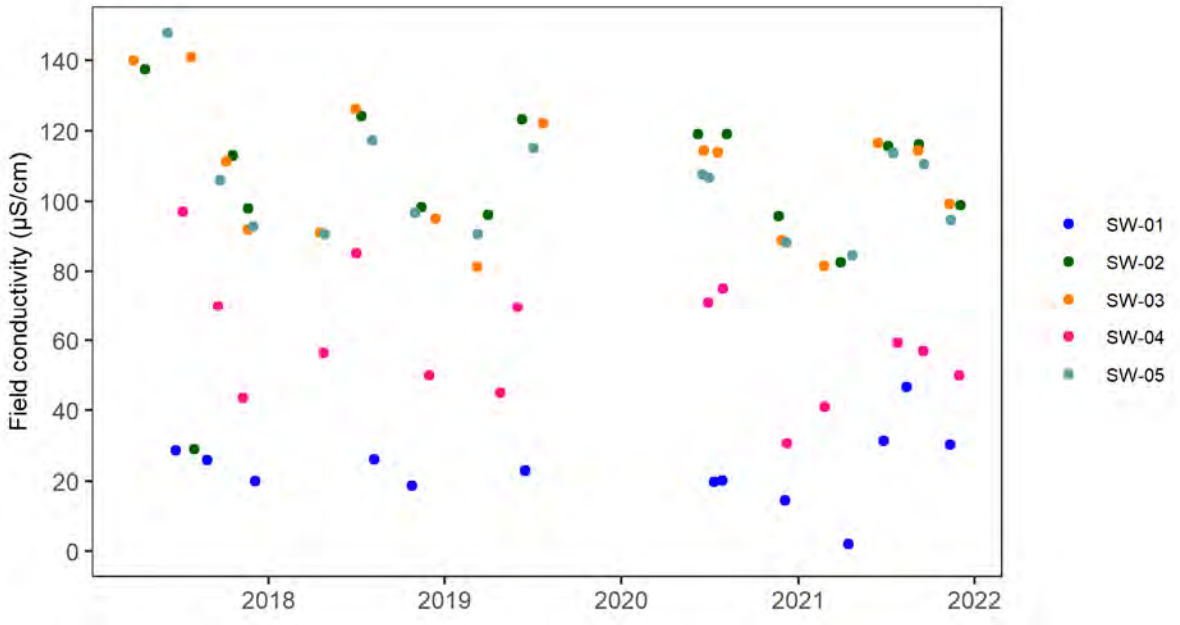


Figure B-2: Temporal plot of field conductivity surface water concentrations, 2017 to 2021.

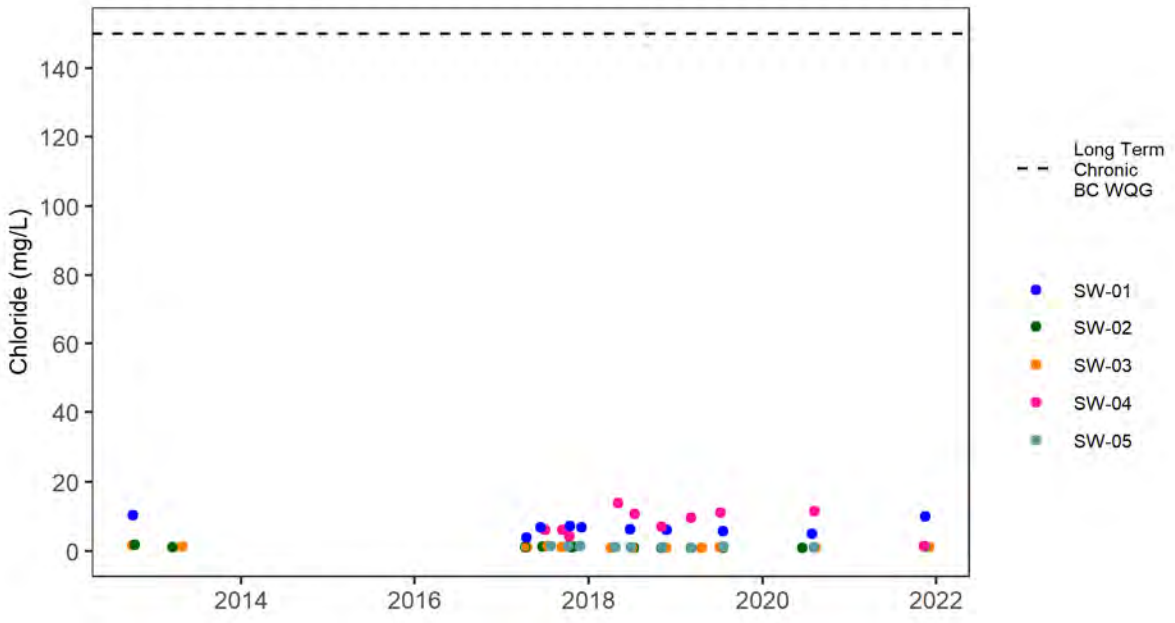


Figure B-3: Temporal plot of chloride surface water concentrations, 2012 to 2021.

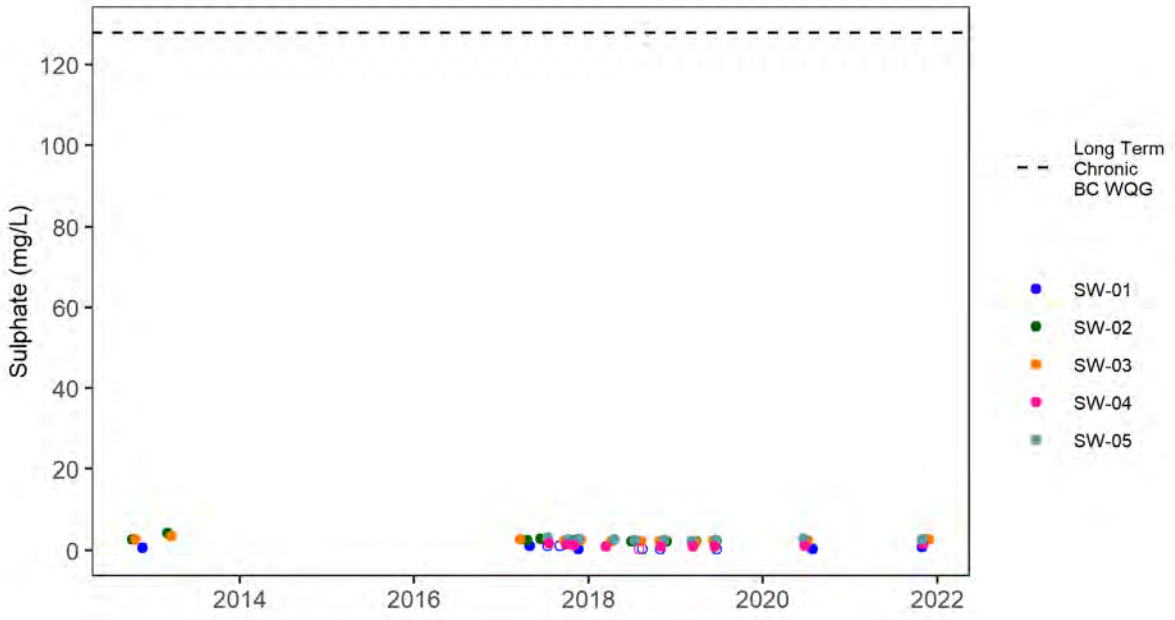


Figure B-4: Temporal plot of sulphate surface water concentrations, 2012 to 2021.

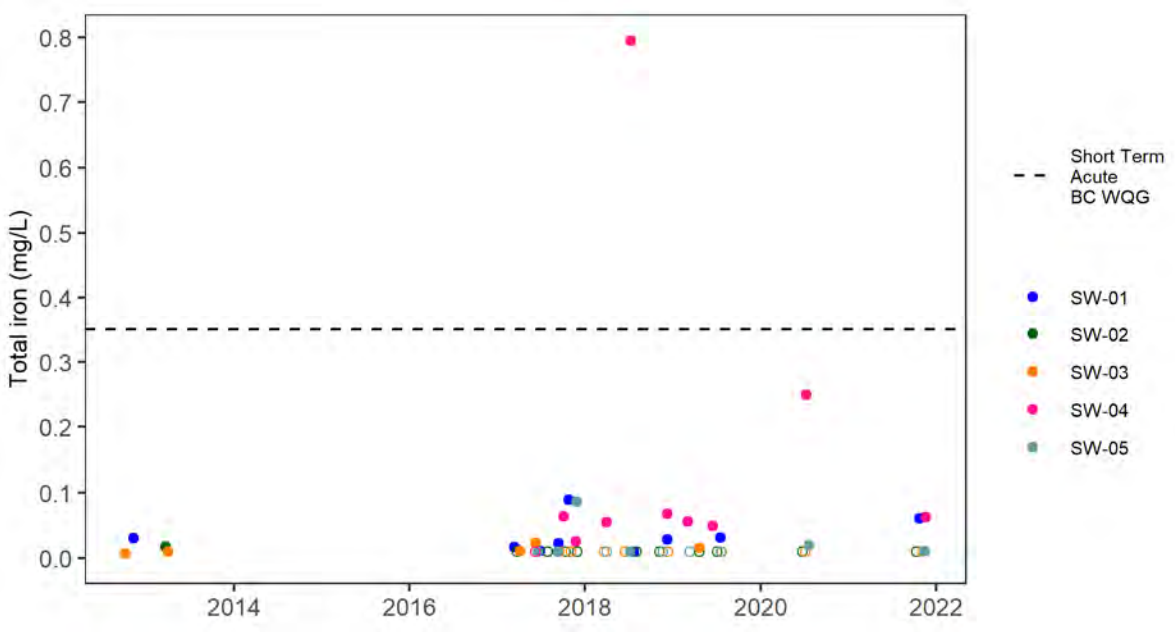


Figure B-5: Temporal plot of total iron surface water concentrations, 2012 to 2021.

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.

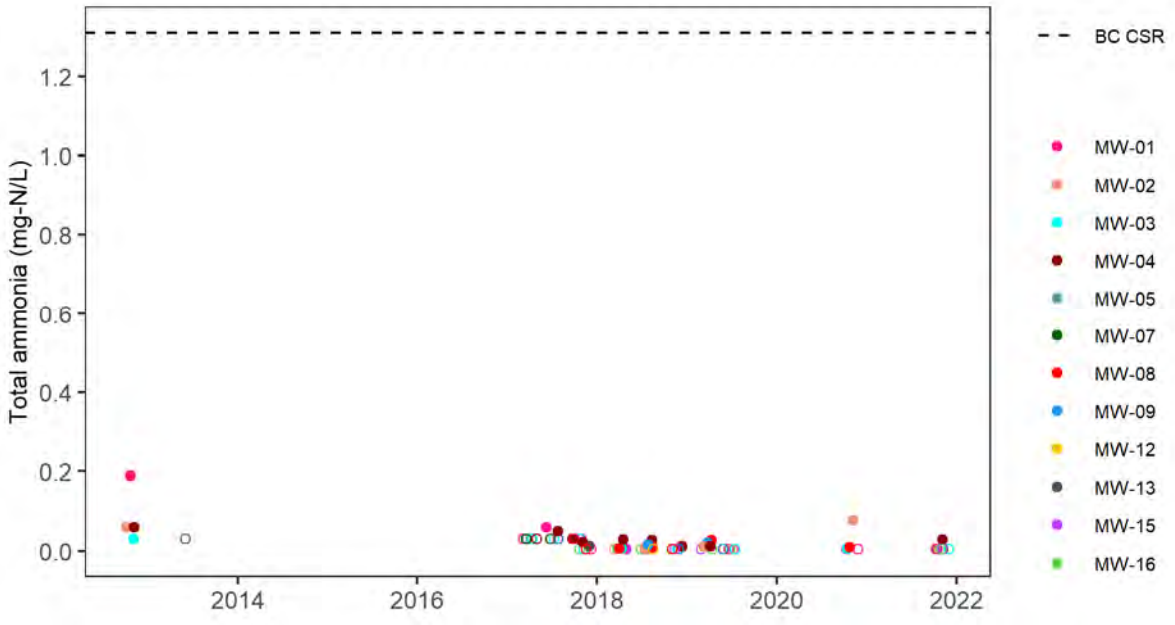


Figure B-6: Temporal plot of total ammonia groundwater concentrations, 2012 to 2021.

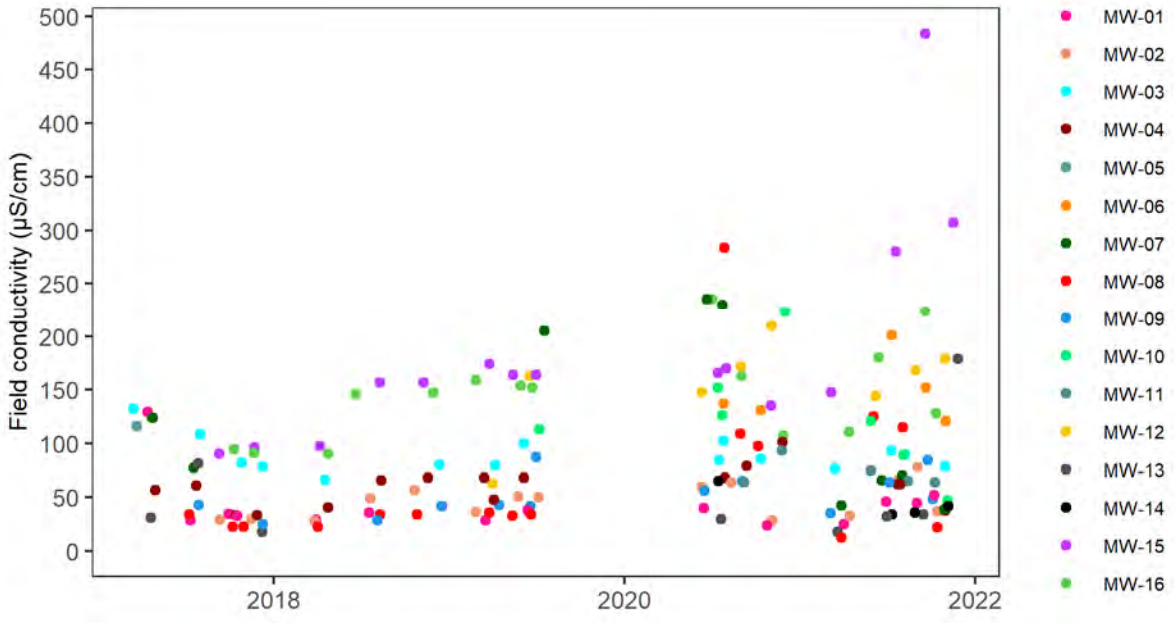


Figure B-7: Temporal plot of field conductivity groundwater concentrations, 2017 to 2021.

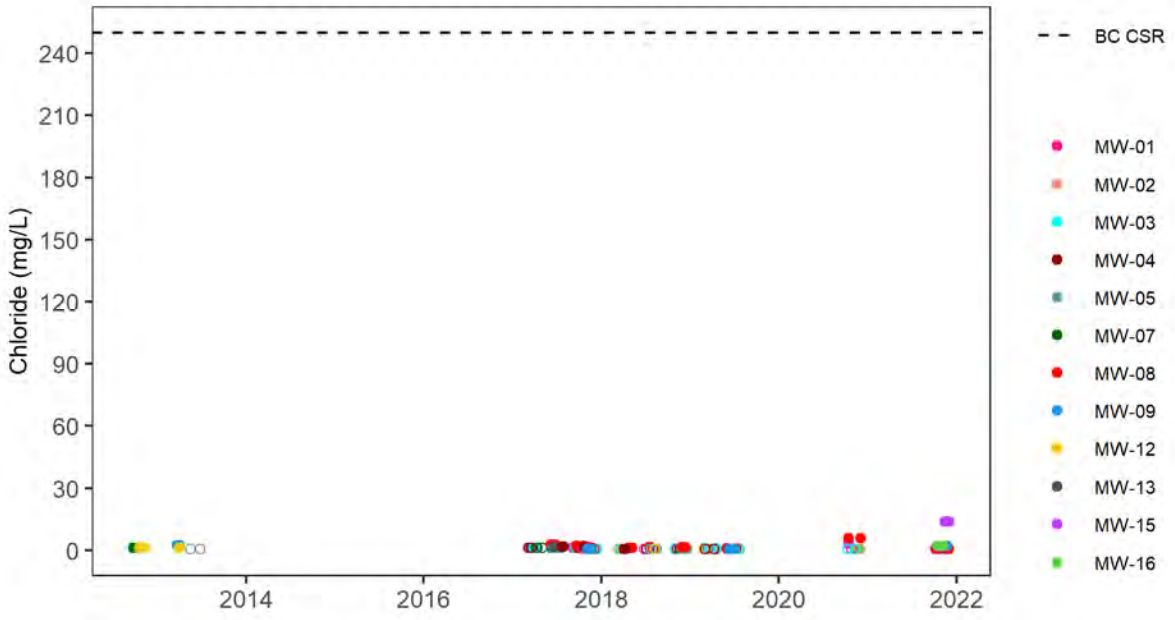


Figure B-8: Temporal plot of chloride groundwater concentrations, 2012 to 2021.

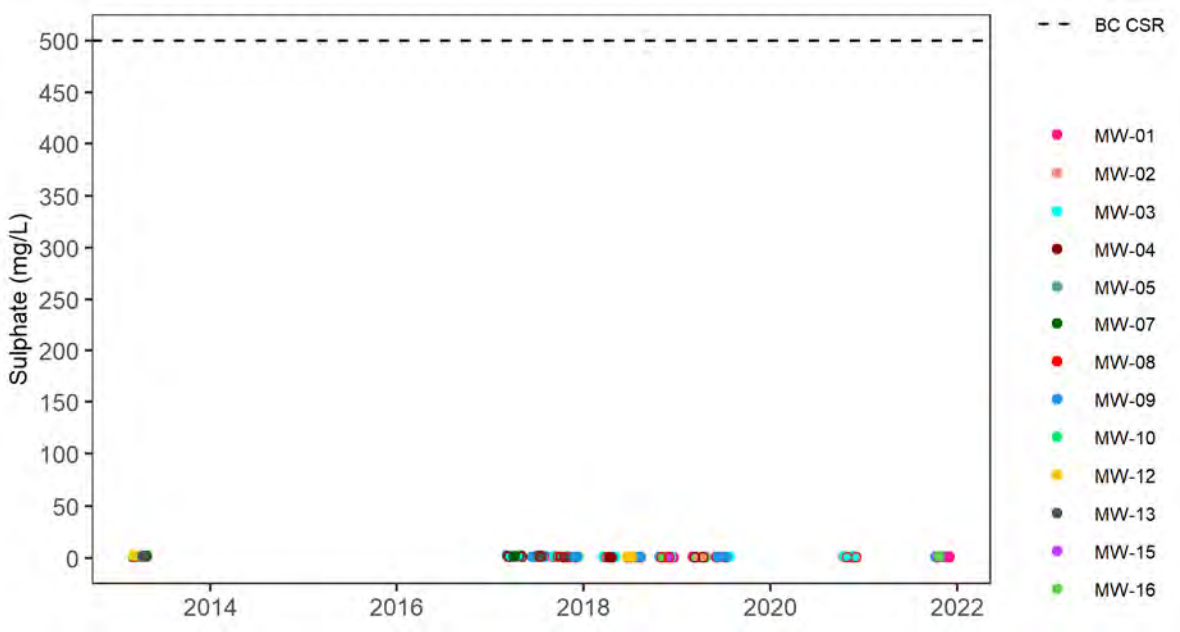


Figure B-9: Temporal plot of sulphate groundwater concentrations, 2013 to 2021.

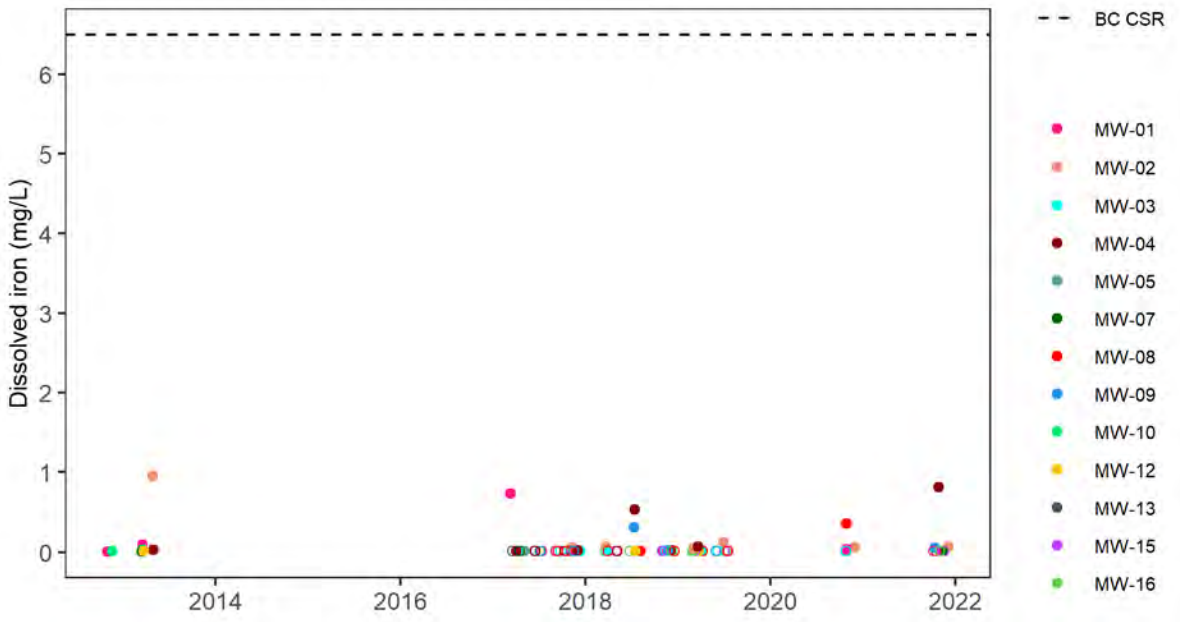


Figure B-10: Temporal plot of dissolved iron groundwater concentrations, 2012 to 2021.

APPENDIX C

Analytical Data

1 - Surface Water Data

Appendix C: Analytical Data
Table C-1: Results of Surface Water Analyses
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name		SW-01	SW-01	SW-01	SW-01	SW-01	SW-01	SW-01	SW-01	SW-01	SW-01	SW-01	SW-01	SW-01
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	2012-10-22	2017-04-02	2017-07-05	2017-09-26	2017-11-08	2018-07-17	2018-11-19	2019-06-25	2020-06-18	2020-07-16	2020-11-06	2021-03-24	2021-06-25
Field Measured																
pH	-	6.5 - 9.0	6.5 - 9.0	-	-	**6.3**[(Mn, Mx)]	8.1	7.9	7.5	7.8	7.9	7.7	7.8	7.3	7.8	7.2
Temperature	°C	-	-	-	-	20	16	5.4	20	7.0	19	16	16	7.3	-0.1	19
Dissolved oxygen	mg/L	8[(a)]	5[(a)]	-	-	**6.5**[(Mn)]	12	9.7	**0.60**[(Mn, Mx)]	**7.1**[(Mn)]	**7.5**[(Mn)]	**5.0**[(Mn)]	**5.0**[(Mn)]	8.9	**7.7**[(Mn)]	8.1
Conductivity	µS/cm	-	-	-	-	29	26	20	26	19	23	20	20	14	2.0	31
Conventional Parameters																
pH, lab	-	6.5 - 9.0	6.5 - 9.0	**6.3**[(Mn, Mx)]	6.6	6.8	6.7	6.8	6.9	6.7	6.5	-	**6.2**[(Mn, Mx)]	-	-	-
Specific conductivity	µS/cm	-	-	34	14	30	31	-	-	-	-	-	22	-	-	-
Hardness, as $CaCO_3$	mg/L	-	-	3.9	1.4	3.0	3.6	2.8	2.5	2.7	2.5	-	2.3	-	-	-
Total alkalinity, as $CaCO_3$	mg/L	20[(a)]	-	**3.9**[(Mn)]	**2.3**[(Mn)]	**4.0**[(Mn)]	**3.0**[(Mn)]	-	-	-	-	-	-	-	-	-
Total suspended solids	mg/L	-	-	-	-	2.0	2.3	-	-	-	-	-	-	-	-	-
Total organic carbon	mg/L	-	-	2.2	0.65	<0.5	1.7	-	-	-	-	-	-	-	-	-
Major Ions																
Bicarbonate, as $CaCO_3$	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromide	mg/L	-	-	-	-	-	-	<0.05	-	<0.05	<0.05	-	<0.5	-	-	-
Calcium	mg/L	-	-	-	-	-	-	0.89	0.79	0.85	0.80	-	0.73	-	-	-
Chloride	mg/L	150	600	10	3.9	6.9	7.1	6.9	6.2	6.1	5.7	-	4.9	-	-	-
Fluoride	mg/L	-	0.40 - 1.3[(b)]	-	-	<0.1	<0.1	0.027	0.023	0.025	0.025	-	0.026	-	-	-
Magnesium	mg/L	-	-	0.21	-	0.12	0.15	0.15	0.12	0.13	0.12	-	0.11	-	-	-
Potassium	mg/L	-	-	0.24	-	0.12	0.19	0.19	0.13	0.15	0.15	-	0.12	-	-	-
Sodium	mg/L	-	-	5.5	2.0	3.8	4.5	4.4	3.7	3.8	3.6	-	3.1	-	-	-
Sulphate	mg/L	128 - 309[(b)]	-	0.62	1.1	<1.0	<1.0	0.31	<0.3	<0.3	<0.3	-	0.31	-	-	-
Nutrients																
Nitrate	mg-N/L	3.0	33	-	-	<0.01	0.017	<0.005	<0.005	<0.005	<0.005	-	<0.005	-	-	-
Nitrite	mg-N/L	0.20[(c)]	0.60[(c)]	-	-	<0.01	<0.01	<0.001	<0.001	<0.001	<0.001	-	<0.001	-	-	-
Total ammonia	mg-N/L	0.57 - 2.0[(d)]	2.9 - 26[(e)]	-	0.030	<0.03	<0.03	<0.005	0.0060	<0.005	<0.005	-	<0.005	-	-	-
Total nitrogen	mg-N/L	-	-	-	0.11	0.051	0.16	-	-	-	-	-	-	-	-	-
Total phosphorus	mg-P/L	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	-	-	-
Dissolved phosphorus	mg-P/L	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	-	-	-
Chemical oxygen demand	mg/L	-	-	-	-	-	-	<20	<20	<20	<20	-	20	-	-	-
Total Metals																
Aluminum	mg/L	-	-	0.0065	0.0058	0.014	0.021	0.049	0.011	0.0067	0.026	-	0.0064	-	-	-
Antimony	mg/L	0.0090	-	-	-	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	-	<0.0001	-	-	-
Arsenic	mg/L	-	0.0050	-	-	<0.0005	<0.0005	0.00010	0.00012	<0.0001	0.00022	-	0.00016	-	-	-
Barium	mg/L	1.0	-	0.013	0.0041	<0.005	0.0051	0.0065	0.0053	0.0056	0.0051	-	0.0039	-	-	-
Beryllium	mg/L	0.00013	-	-	-	<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	-	<0.00005	-	-	-
Boron	mg/L	1.2	-	-	-	0.0070	0.0059	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	-	-
Cadmium	mg/L	-	-	0.000056	0.000014	<0.00001	<0.00001	0.000021	<0.000005	<0.000005	0.000013	-	<0.000005	-	-	-
Calcium	mg/L	-	-	1.2	0.43	1.0	1.2	0.91	0.82	0.91	0.79	-	0.79	-	-	-
Cesium	mg/L	-	-	-	-	-	-	0.000011	<0.00001	<0.00001	<0.00001	-	<0.00001	-	-	-
Chromium	mg/L	0.0010[(f)]	-	-	-	<0.0005	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	-	<0.0001	-	-	-
Cobalt	mg/L	0.0040	0.11	-	0.00025	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	<0.0001	-	-	-
Copper	mg/L	-	-	0.0011	0.00025	<0.0002	<0.0004	<0.0005	<0.0005	0.00069	<0.0005	-	<0.0005	-	-	-
Iron	mg/L	-	1.0	0.030	0.017	0.011	0.022	0.089	0.010	0.028	0.031	-	<0.01	-	-	-
Lead	mg/L	0.0058[(b)]	0.0030 - 0.064[(b)]	-	-	<0.0001	<0.0002	0.00011	<0.00005	<0.00005	0.00013	-	<0.00005	-	-	-
Lithium	mg/L	-	-	-	-	0.00010	0.00012	<0.001	<0.001	<0.001	<0.001	-	<0.001	-	-	-
Magnesium	mg/L	-	-	0.21	0.076	0.14	0.16	0.15	0.14	0.13	0.12	-	0.12	-	-	-
Manganese	mg/L	0.77 - 0.97[(b)]	0.82 - 1.5[(b)]	0.021	0.0078	0.0079	0.015	0.060	0.012	0.039	0.023	-	0.011	-	-	-
Mercury	mg/L	0.000010	-	-	-	<0.00002[(DL>Mn)]	<0.00001	<0.000025[(DL>Mn)]	<0.000005	<0.000005	<0.000005	-	<0.000005	-	-	-
Molybdenum	mg/L	7.6	46	-	-	<0.0001	<0.0001	<0.00005	<0.00005	<0.00005	<0.00005	-	<0.00005	-	-	-
Nickel	mg/L	0.025 - 0.083[(b)]	-	-	-	<0.0002	<0.0004	<0.0005	<0.0005	<0.0005	<0.0005	-	<0.0005	-	-	-
Potassium	mg/L	-	-	0.27	0.13	0.17	0.19	0.23	0.15	0.15	0.14	-	0.14	-	-	-
Rubidium	mg/L	-	-	-	-	-	-	0.00035	0.00026	0.00030	0.00027	-	0.00025	-	-	-
Selenium	mg/L	0.0020	-	-	-	<0.0005	<0.0005	<0.00005	<0.00005	<0.00005	<0.00005	-	<0.00005	-	-	-
Silicon	mg/L	-	-	0.49	-	<1.0	<1.0	0.13	<0.1	0.19	0.11	-	0.11	-	-	-
Silver	mg/L	0.000050[(b)]	0.00010[(b)]	-	-	**0.000055**[(Mn)]	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001	-	<0.00001	-	-	-
Sodium	mg/L	-	-	5.5	2.0	4.2	4.6	4.3	3.8	3.9	3.4	-	3.1	-	-	-
Strontium	mg/L	-	-	0.012	0.0034	0.0075	0.0076	0.0078	0.0067	0.0076	0.0067	-	0.0060	-	-	-
Sulphur	mg/L	-	-	-	-	<3.0	<3.0	<0.5	<0.5	<0.5	<0.5	-	<0.5	-	-	-
Tellurium	mg/L	-	-	-	-	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	-	<0.0002	-	-	-
Thallium	mg/L	0.00080	-	-	-	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	-	<0.00001	-	-	-
Thorium	mg/L	-	-	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	<0.0001	-	-	-
Tin	mg/L	-	-	-	-	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	-	<0.0001	-	-	-
Titanium	mg/L	-	-	-	-	<0.005	<0.005	0.0018	0.00031	<0.0003	0.00033	-	<0.0003	-	-	-
Tungsten	mg/L	-	-	-	-	-	-	<0.0001	<0.0001	<0.0001	<0.0001	-	<0.0001	-	-	-
Uranium	mg/L	0.0085	-	-	-	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	-	<0.00001	-	-	-
Vanadium	mg/L	-	-	-	-	<0.001	<0.001	<0.0005	<0.0005	<0.0005	<0.0005	-	<0.0005	-	-	-
Zinc	mg/L	0.0075[(b)]	0.033[(b)]	-	-	<0.004	0.0050	<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	-	<0.0002	-	-	-

Appendix C: Analytical Data
Table C-1: Results of Surface Water Analyses
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name		SW-01	SW-01	SW-02	SW-02	SW-02	SW-02	SW-02	SW-02	SW-02	SW-02	SW-02	SW-02
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	2021-08-27	2021-11-08	2012-10-22	2013-04-02	2017-04-06	2017-07-05	2017-09-26	2017-11-08	2018-07-17	2018-11-19	2019-03-29	2019-06-25	2020-06-18
Field Measured																
pH	-	6.5 - 9.0	6.5 - 9.0	7.3	7.5	-	-	7.7	8.3	8.3	8.1	7.9	7.3	7.6	8.0	7.1
Temperature	°C	-	-	18	6.7	-	-	5.2	6.8	11	5.3	15	5.8	4.7	15	14
Dissolved oxygen	mg/L	8[a]	5[a]	71	9.1	-	-	-	**2.5**[Mn, Mx]	14	9.4	**4.2**[Mn, Mx]	**6.1**[Mn]	8.4	9.3	**5.2**[Mn]
Conductivity	µS/cm	-	-	47	30	-	-	138	29	113	98	124	98	96	123	119
Conventional Parameters																
pH, lab	-	6.5 - 9.0	6.5 - 9.0	-	6.7	7.8	8.0	7.9	8.1	8.1	8.2	8.3	8.2	8.1	8.2	-
Specific conductivity	µS/cm	-	-	-	44	154	154	148	164	161	-	-	-	-	-	-
Hardness, as $CaCO_3$	mg/L	-	-	-	5.4	75	76	69	77	78	78	75	74	79	81	-
Total alkalinity, as $CaCO_3$	mg/L	20[a]	-	-	-	77	76	73	80	79	-	-	-	-	-	-
Total suspended solids	mg/L	-	-	-	-	-	-	<1.0	<1.0	<1.0	-	-	-	-	-	-
Total organic carbon	mg/L	-	-	-	-	-	-	<0.5	<0.5	0.89	-	-	-	-	-	-
Major Ions																
Bicarbonate, as $CaCO_3$	mg/L	-	-	-	-	77	-	-	-	-	-	-	-	-	-	-
Bromide	mg/L	-	-	-	<0.05	-	-	-	-	-	<0.05	-	<0.05	<0.05	<0.05	-
Calcium	mg/L	-	-	-	1.7	26	25	25	24	27	28	27	26	28	29	-
Chloride	mg/L	150	600	-	9.9	1.8	1.1	<1.0	1.2	1.0	1.2	0.84	0.84	0.88	0.88	-
Fluoride	mg/L	-	0.40 - 1.3[b]	-	0.024	-	-	<0.1	<0.1	<0.1	0.052	0.049	0.049	0.048	0.049	-
Magnesium	mg/L	-	-	-	0.24	2.3	1.9	1.9	1.9	2.3	2.2	2.1	2.2	2.1	2.2	-
Potassium	mg/L	-	-	-	0.24	0.90	0.77	0.73	0.71	0.85	0.89	0.80	0.84	0.82	0.78	-
Sodium	mg/L	-	-	-	5.7	1.9	1.7	1.7	1.7	2.0	2.2	1.9	2.0	1.9	1.9	-
Sulphate	mg/L	128 - 309[b]	-	-	0.70	2.6	4.3	2.5	2.8	2.3	2.6	2.2	2.1	2.2	2.3	-
Nutrients																
Nitrate	mg-N/L	3.0	33	-	0.0060	-	-	<0.01	<0.01	0.012	0.013	<0.005	<0.005	0.018	0.012	-
Nitrite	mg-N/L	0.20[c]	0.60[c]	-	<0.001	-	-	<0.01	<0.01	<0.01	<0.001	<0.001	<0.001	<0.001	<0.001	-
Total ammonia	mg-N/L	0.57 - 2.0[d]	2.9 - 26[e]	-	<0.005	-	-	<0.03	<0.03	<0.03	<0.005	0.0053	0.0097	<0.005	<0.005	-
Total nitrogen	mg-N/L	-	-	-	-	-	0.048	0.094	<0.05	0.072	-	-	-	-	-	-
Total phosphorus	mg-P/L	-	-	-	<0.05	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Dissolved phosphorus	mg-P/L	-	-	-	<0.05	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Chemical oxygen demand	mg/L	-	-	-	<20	-	-	-	-	-	<20	<20	<20	<20	<20	-
Total Metals																
Aluminum	mg/L	-	-	-	0.0089	-	0.0052	<0.005	<0.005	<0.005	<0.003	0.0033	0.0069	<0.003	<0.003	-
Antimony	mg/L	0.0090	-	-	<0.0001	-	-	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-
Arsenic	mg/L	-	0.0050	-	0.00014	0.0019	0.0018	0.0017	0.0019	0.0019	0.0019	0.0021	0.0021	0.0020	0.0021	-
Barium	mg/L	1.0	-	-	0.014	0.022	0.020	0.022	0.024	0.021	0.022	0.025	0.024	0.025	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	-
Bismuth	mg/L	-	-	-	<0.00005	-	-	<0.0001	<0.0001	<0.0001	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	-
Boron	mg/L	1.2	-	-	<0.01	-	-	0.0060	0.012	0.0087	<0.01	<0.01	<0.01	<0.01	<0.01	-
Cadmium	mg/L	-	-	-	0.0000059	0.000025	0.000011	<0.00001	<0.00001	<0.00001	<0.000005	<0.000005	0.000061	<0.000005	0.000015	-
Calcium	mg/L	-	-	-	1.8	26	26	25	27	28	28	27	26	29	26	-
Cesium	mg/L	-	-	-	<0.00001	-	-	-	-	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	-
Chromium	mg/L	0.0010[f]	-	-	<0.0005	-	-	<0.0005	<0.0005	0.00069	0.00032	0.00041	0.00035	0.00035	0.00037	-
Cobalt	mg/L	0.0040	0.11	-	<0.0001	-	-	<0.00005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-
Copper	mg/L	-	-	-	<0.0005	0.00093	-	<0.0002	<0.0002	<0.0004	<0.0005	<0.0005	0.00072	<0.0005	<0.0005	-
Iron	mg/L	-	1.0	-	0.061	-	0.017	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Lead	mg/L	0.0058[b]	0.0030 - 0.064[b]	-	<0.00005	-	-	<0.0001	<0.0001	<0.0002	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	-
Lithium	mg/L	-	-	-	<0.001	-	-	0.0011	0.0012	0.0012	0.0011	0.0011	0.0011	0.0011	0.0012	-
Magnesium	mg/L	-	-	-	0.24	2.3	0.0012	1.9	2.1	2.3	2.3	2.2	2.0	2.3	2.0	-
Manganese	mg/L	0.77 - 0.97[b]	0.82 - 1.5[b]	-	0.081	-	**2.1**[Mn, Mx]	0.00048	0.00038	0.00044	0.00077	0.0013	0.0013	0.00051	0.00043	-
Mercury	mg/L	0.000010	-	-	<0.000005	-	-	<0.00002[DL>Mn]	<0.00002[DL>Mn]	<0.00001	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	-
Molybdenum	mg/L	7.6	46	-	<0.00005	-	-	0.00028	0.00031	0.00029	0.00028	0.00029	0.00030	0.00028	0.00027	-
Nickel	mg/L	0.025 - 0.083[b]	-	-	<0.0005	-	-	<0.0002	<0.0002	<0.0004	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	-
Potassium	mg/L	-	-	-	0.22	0.89	0.78	0.72	0.83	0.86	0.82	0.82	1.1	0.83	0.82	-
Rubidium	mg/L	-	-	-	0.00039	-	-	-	-	-	0.00036	0.00034	0.00061	0.00036	0.00031	-
Selenium	mg/L	0.0020	-	-	0.000056	0.00013	-	<0.0005	<0.0005	<0.0005	0.00014	0.00013	0.00013	0.00011	0.00011	-
Silicon	mg/L	-	-	-	0.46	4.6	5.0	4.9	5.0	5.0	5.0	4.8	4.9	5.3	5.0	-
Silver	mg/L	0.000050[b]	0.00010[b]	-	<0.00001	-	-	<0.00005	**0.000066**[Mn]	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	-
Sodium	mg/L	-	-	-	5.5	1.9	1.9	1.7	1.9	2.0	1.9	2.2	2.0	2.0	1.9	-
Strontium	mg/L	-	-	-	0.015	0.099	0.095	0.091	0.11	0.093	0.099	0.100	0.10	0.10	0.098	-
Sulphur	mg/L	-	-	-	<0.5	-	-	<3.0	<3.0	<3.0	0.87	0.67	0.61	0.84	0.71	-
Tellurium	mg/L	-	-	-	<0.0002	-	-	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	-
Thallium	mg/L	0.00080	-	-	<0.00001	-	-	<0.00002	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	-
Thorium	mg/L	-	-	-	<0.0001	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-
Tin	mg/L	-	-	-	<0.0001	-	-	<0.0002	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-
Titanium	mg/L	-	-	-	<0.0003	-	-	<0.005	<0.005	<0.005	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	-
Tungsten	mg/L	-	-	-	<0.0001	-	-	-	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-
Uranium	mg/L	0.0085	-	-	<0.00001	0.00011	0.00011	0.000090	0.00012	0.00010	0.000094	0.00010	0.00011	0.00010	0.00011	-
Vanadium	mg/L	-	-	-	<0.0005	-	-	<0.001	0.0012	0.0011	0.00095	0.0013	0.0011	0.0011	0.0011	-
Zinc	mg/L	0.0075[b]	0.033[b]	-	<0.003	-	-	<0.004	<0.004	<0.004	<0.003	<0.003	0.0040	<0.003	<0.003	-
Zirconium	mg/L	-	-	-	<0.0002	-	-	<0.0001	<0.0001	<0.0001	<0.00006	<0.00006	<0.00006	<0.00006	<0.0002	-

Appendix C: Analytical Data
Table C-1: Results of Surface Water Analyses
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name		SW-02	SW-02	SW-02	SW-02	SW-02	SW-02	SW-03	SW-03	SW-03	SW-03	SW-03	SW-03	SW-03
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	2020-07-16	2020-11-06	2021-03-24	2021-06-25	2021-08-27	2021-11-08	2012-10-22	2013-04-02	2017-04-06	2017-07-05	2017-09-26	2017-11-08	2018-04-12
Field Measured																
pH	-	6.5 - 9.0	6.5 - 9.0	8.0	8.0	8.0	8.3	8.1	8.1	-	-	7.6	7.5	8.2	8.0	7.6
Temperature	°C	-	-	14	6.3	3.6	13	12	5.5	-	-	7.0	14	11	4.2	5.2
Dissolved oxygen	mg/L	8[a]	5[a]	**5.1[Mn]**	10	10	9.8	10	9.5	-	-	-	-	14	12	16
Conductivity	µS/cm	-	-	119	96	83	116	116	99	-	-	140	141	111	92	91
Conventional Parameters																
pH, lab	-	6.5 - 9.0	6.5 - 9.0	8.1	-	-	-	-	8.1	7.5	7.9	8.0	8.1	7.9	8.2	8.2
Specific conductivity	µS/cm	-	-	156	-	-	-	-	157	149	151	145	161	158	-	-
Hardness, as $CaCO_3$	mg/L	-	-	73	-	-	-	-	74	73	73	68	75	73	79	70
Total alkalinity, as $CaCO_3$	mg/L	20[a]	-	-	-	-	-	-	-	-	75	71	78	76	-	-
Total suspended solids	mg/L	-	-	-	-	-	-	-	-	-	-	1.1	1.8	<1.0	-	-
Total organic carbon	mg/L	-	-	-	-	-	-	-	-	1.1	-	<0.5	<0.5	0.65	-	<0.5
Major Ions																
Bicarbonate, as $CaCO_3$	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromide	mg/L	-	-	<0.5	-	-	-	-	<0.05	-	-	-	-	-	<0.05	<0.05
Calcium	mg/L	-	-	26	-	-	-	-	26	25	24	23	24	26	28	25
Chloride	mg/L	150	600	0.87	-	-	-	-	1.0	1.7	1.3	1.1	1.4	1.1	0.97	0.86
Fluoride	mg/L	-	0.40 - 1.3[b]	0.050	-	-	-	-	0.048	-	-	<0.1	<0.1	<0.1	0.050	0.047
Magnesium	mg/L	-	-	2.1	-	-	-	-	2.0	2.2	1.9	1.8	1.9	2.2	2.2	2.0
Potassium	mg/L	-	-	0.79	-	-	-	-	0.79	0.88	0.77	0.70	0.72	0.82	0.80	0.77
Sodium	mg/L	-	-	1.8	-	-	-	-	1.9	1.9	1.7	1.7	1.8	2.0	2.1	1.7
Sulphate	mg/L	128 - 309[b]	-	2.4	-	-	-	-	2.6	2.6	3.4	2.6	2.8	2.4	2.5	2.2
Nutrients																
Nitrate	mg-N/L	3.0	33	<0.005	-	-	-	-	0.0075	0.036	0.032	<0.01	<0.01	0.012	0.016	0.0089
Nitrite	mg-N/L	0.20[c]	0.60[c]	<0.001	-	-	-	-	<0.001	-	-	<0.01	<0.01	<0.01	<0.001	<0.001
Total ammonia	mg-N/L	0.57 - 2.0[d]	2.9 - 26[e]	0.0062	-	-	-	-	<0.005	-	-	<0.03	<0.03	<0.03	<0.005	0.0063
Total nitrogen	mg-N/L	-	-	-	-	-	-	-	-	-	0.049	<0.02	0.12	<0.05	-	-
Total phosphorus	mg-P/L	-	-	<0.05	-	-	-	-	<0.05	-	-	<0.05	<0.05	<0.05	<0.05	<0.05
Dissolved phosphorus	mg-P/L	-	-	<0.05	-	-	-	-	<0.05	-	-	<0.05	<0.05	<0.05	<0.05	<0.05
Chemical oxygen demand	mg/L	-	-	<20	-	-	-	-	<20	-	-	-	-	-	<20	<20
Total Metals																
Aluminum	mg/L	-	-	<0.003	-	-	-	-	0.0040	0.0032	0.0043	0.0056	0.015	<0.005	<0.003	0.0051
Antimony	mg/L	0.0090	-	<0.0001	-	-	-	-	<0.0001	-	-	<0.0001	0.00010	<0.0002	<0.0001	<0.0001
Arsenic	mg/L	-	0.0050	0.0021	-	-	-	-	0.0017	0.0018	0.0019	0.0016	0.0019	0.0020	0.0018	0.0017
Barium	mg/L	1.0	-	0.022	-	-	-	-	0.022	0.022	0.023	0.019	0.022	0.022	0.022	0.020
Beryllium	mg/L	0.00013	-	<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	<0.00005	<0.00005
Boron	mg/L	1.2	-	<0.01	-	-	-	-	<0.01	-	-	0.0070	0.0072	0.0083	<0.01	<0.01
Cadmium	mg/L	-	-	<0.000005	-	-	-	-	<0.000005	-	-	<0.00001	<0.00001	<0.00001	<0.000005	<0.000005
Calcium	mg/L	-	-	27	-	-	-	-	27	26	27	24	27	30	28	24
Cesium	mg/L	-	-	<0.00001	-	-	-	-	<0.00001	-	-	-	-	-	<0.00001	<0.00001
Chromium	mg/L	0.0010[f]	-	0.00039	-	-	-	-	<0.0005	-	-	<0.0005	<0.0005	0.00066	0.00034	0.00045
Cobalt	mg/L	0.0040	0.11	<0.0001	-	-	-	-	<0.0001	-	-	<0.00005	<0.0001	<0.0001	<0.0001	<0.0001
Copper	mg/L	-	-	<0.0005	-	-	-	-	<0.0005	0.00074	-	<0.0002	<0.0002	<0.0004	<0.0005	<0.0005
Iron	mg/L	-	1.0	<0.01	-	-	-	-	<0.01	0.0069	0.0091	0.011	0.023	<0.01	<0.01	<0.01
Lead	mg/L	0.0058[b]	0.0030 - 0.064[b]	<0.00005	-	-	-	-	<0.00005	-	-	<0.0001	<0.0001	<0.0002	<0.00005	<0.00005
Lithium	mg/L	-	-	0.0012	-	-	-	-	0.0012	-	-	0.0010	0.0012	0.0013	<0.001	0.0012
Magnesium	mg/L	-	-	2.1	-	-	-	-	2.0	2.2	2.2	1.9	2.1	2.4	2.3	1.8
Manganese	mg/L	0.77 - 0.97[b]	0.82 - 1.5[b]	0.00046	-	-	-	-	0.00087	-	-	0.00075	0.0011	0.0011	0.00051	0.00067
Mercury	mg/L	0.000010	-	<0.000005	-	-	-	-	<0.000005	-	-	<0.00002[(DL>Mn)]	<0.00002[(DL>Mn)]	<0.00001	<0.000005	<0.000005
Molybdenum	mg/L	7.6	46	0.00028	-	-	-	-	0.00029	-	-	0.00029	0.00032	0.00032	0.00028	0.00028
Nickel	mg/L	0.025 - 0.083[b]	-	<0.0005	-	-	-	-	<0.0005	-	-	<0.0002	<0.0002	<0.0004	<0.0005	<0.0005
Potassium	mg/L	-	-	0.80	-	-	-	-	0.84	0.88	0.81	0.71	0.84	0.93	0.81	0.72
Rubidium	mg/L	-	-	0.00035	-	-	-	-	0.00032	-	-	-	-	-	0.00033	0.00033
Selenium	mg/L	0.0020	-	0.00013	-	-	-	-	0.00015	0.00013	-	<0.0005	<0.0005	<0.0005	0.00013	0.00014
Silicon	mg/L	-	-	4.8	-	-	-	-	5.4	4.7	5.1	4.8	5.0	5.2	5.1	4.6
Silver	mg/L	0.000050[b]	0.00010[b]	<0.00001	-	-	-	-	<0.00001	-	-	<0.00005	<0.00005	<0.00005	<0.00001	<0.00001
Sodium	mg/L	-	-	1.8	-	-	-	-	1.9	1.9	1.9	1.7	2.0	2.2	2.0	1.7
Strontium	mg/L	-	-	0.095	-	-	-	-	0.096	0.096	0.098	0.089	0.10	0.10	0.096	0.093
Sulphur	mg/L	-	-	1.1	-	-	-	-	0.84	-	-	<3.0	<3.0	<3.0	0.87	1.1
Tellurium	mg/L	-	-	<0.0002	-	-	-	-	<0.0002	-	-	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
Thallium	mg/L	0.00080	-	<0.00001	-	-	-	-	<0.00001	-	-	<0.00002	<0.00002	<0.00002	<0.00001	<0.00001
Thorium	mg/L	-	-	<0.0001	-	-	-	-	<0.0001	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Tin	mg/L	-	-	<0.0001	-	-	-	-	<0.0001	-	-	<0.0002	<0.0002	<0.0002	<0.0001	<0.0001
Titanium	mg/L	-	-	<0.0003	-	-	-	-	<0.0003	-	-	<0.005	<0.005	<0.005	<0.0003	<0.0003
Tungsten	mg/L	-	-	<0.0001	-	-	-	-	<0.0001	-	-	-	-	-	<0.0001	<0.0001
Uranium	mg/L	0.0085	-	0.00012	-	-	-	-	0.00011	0.00011	-	0.00010	0.00013	0.00011	0.000099	0.00011
Vanadium	mg/L	-	-	0.0013	-	-	-	-	0.00094	-	-	<0.001	0.0012	0.0011	0.00092	0.0010
Zinc	mg/L	0.0075[b]	0.033[b]	<0.003	-	-	-	-	<0.003	-	-	<0.004	<0.004	0.0046	<0.003	<0.003
Zirconium	mg/L	-	-	<0.0002	-	-	-	-	<0.0002	-	-	<0.0001	0.00058	<0.0001	<0.00006	<0.00006

Appendix C: Analytical Data
Table C-1: Results of Surface Water Analyses
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name		SW-03	SW-03	SW-03	SW-03	SW-03	SW-03	SW-03	SW-03	SW-03	SW-03	SW-03	SW-04	SW-04
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	2018-07-17	2018-11-19	2019-03-29	2019-06-25	2020-06-18	2020-07-16	2020-11-06	2021-03-24	2021-06-25	2021-08-27	2021-11-08	2017-07-05	2017-09-26
Field Measured																
pH	-	6.5 - 9.0	6.5 - 9.0	7.9	7.6	7.7	8.1	7.4	7.3	7.5	7.9	8.0	8.2	7.5	6.5	7.6
Temperature	°C	-	-	15	5.3	5.0	16	13	13	5.9	3.9	14	12	6.4	12	10
Dissolved oxygen	mg/L	8[a]	5[a]	**1.0[Mn, Mx]**	**5.4[Mn]**	11	11	**5.7[Mn]**	**5.4[Mn]**	12	14	10	11	13	9.4	14
Conductivity	µS/cm	-	-	126	95	81	122	114	114	89	81	117	114	99	97	70
Conventional Parameters																
pH, lab	-	6.5 - 9.0	6.5 - 9.0	8.2	8.2	8.0	8.2	-	8.1	-	-	-	-	8.1	7.5	7.6
Specific conductivity	µS/cm	-	-	-	-	-	-	-	152	-	-	-	-	157	105	104
Hardness, as $CaCO_3$	mg/L	-	-	74	72	67	80	-	69	-	-	-	-	74	42	42
Total alkalinity, as $CaCO_3$	mg/L	20[a]	-	-	-	-	-	-	-	-	-	-	-	-	42	40
Total suspended solids	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	<1.0	<1.0
Total organic carbon	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	1.5
Major Ions																
Bicarbonate, as $CaCO_3$	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromide	mg/L	-	-	-	<0.05	<0.05	<0.05	-	<0.05	-	-	-	-	<0.05	-	-
Calcium	mg/L	-	-	26	26	24	28	-	24	-	-	-	-	26	15	13
Chloride	mg/L	150	600	0.87	0.90	0.85	1.1	-	0.91	-	-	-	-	1.0	6.1	6.1
Fluoride	mg/L	-	0.40 - 1.3[b]	0.047	0.047	0.045	0.061	-	0.050	-	-	-	-	0.048	<0.1	<0.1
Magnesium	mg/L	-	-	2.0	2.0	1.9	2.2	-	2.0	-	-	-	-	2.0	1.1	1.1
Potassium	mg/L	-	-	0.79	0.79	0.72	0.81	-	0.79	-	-	-	-	0.79	0.51	0.66
Sodium	mg/L	-	-	1.9	2.0	1.7	2.0	-	1.8	-	-	-	-	1.9	4.7	4.3
Sulphate	mg/L	128 - 309[b]	-	2.3	2.1	2.0	2.4	-	2.4	-	-	-	-	2.6	1.7	1.4
Nutrients																
Nitrate	mg-N/L	3.0	33	<0.005	0.0069	0.012	0.0063	-	<0.005	-	-	-	-	0.0075	<0.01	<0.01
Nitrite	mg-N/L	0.20[c]	0.60[c]	<0.001	<0.001	<0.001	<0.001	-	<0.001	-	-	-	-	<0.001	<0.01	<0.01
Total ammonia	mg-N/L	0.57 - 2.0[d]	2.9 - 26[e]	<0.005	<0.005	<0.005	0.0054	-	<0.005	-	-	-	-	<0.005	<0.03	<0.03
Total nitrogen	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	0.066
Total phosphorus	mg-P/L	-	-	<0.05	<0.05	<0.05	<0.05	-	<0.05	-	-	-	-	<0.05	<0.05	<0.05
Dissolved phosphorus	mg-P/L	-	-	<0.05	<0.05	<0.05	<0.05	-	<0.05	-	-	-	-	<0.05	<0.05	<0.05
Chemical oxygen demand	mg/L	-	-	<20	<20	<20	<20	-	<20	-	-	-	-	<20	-	-
Total Metals																
Aluminum	mg/L	-	-	0.0040	0.0039	0.0098	0.0048	-	0.0038	-	-	-	-	0.0040	0.0061	0.017
Antimony	mg/L	0.0090	-	<0.0001	<0.0001	<0.0001	<0.0001	-	<0.0001	-	-	-	-	<0.0001	<0.0001	<0.0002
Arsenic	mg/L	-	0.0050	0.0020	0.0018	0.0016	0.0020	-	0.0021	-	-	-	-	0.0017	0.0018	0.0019
Barium	mg/L	1.0	-	0.021	0.022	0.020	0.019	-	0.020	-	-	-	-	0.022	0.012	0.013
Beryllium	mg/L	0.00013	-	<0.0001	<0.0001	<0.0001	<0.0001	-	<0.0001	-	-	-	-	<0.0001	<0.0001	<0.0001
Bismuth	mg/L	-	-	<0.00005	<0.00005	<0.00005	<0.00005	-	<0.00005	-	-	-	-	<0.00005	<0.0001	<0.0001
Boron	mg/L	1.2	-	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	-	-	-	<0.01	<0.005	0.012
Cadmium	mg/L	-	-	<0.000005	<0.000005	0.0000065	<0.000005	-	<0.000005	-	-	-	-	<0.000005	<0.00001	<0.00001
Calcium	mg/L	-	-	26	25	24	26	-	27	-	-	-	-	27	13	15
Cesium	mg/L	-	-	<0.00001	<0.00001	<0.00001	<0.00001	-	<0.00001	-	-	-	-	<0.00001	-	-
Chromium	mg/L	0.0010[f]	-	0.00044	0.00030	0.00031	0.00039	-	0.00034	-	-	-	-	<0.0005	<0.0005	0.00053
Cobalt	mg/L	0.0040	0.11	<0.0001	<0.0001	<0.0001	<0.0001	-	<0.0001	-	-	-	-	<0.0001	<0.0001	<0.0001
Copper	mg/L	-	-	<0.0005	<0.0005	<0.0005	<0.0005	-	<0.0005	-	-	-	-	<0.0005	<0.0002	<0.0004
Iron	mg/L	-	1.0	<0.01	<0.01	0.015	<0.01	-	<0.01	-	-	-	-	<0.01	<0.01	0.064
Lead	mg/L	0.0058[b]	0.0030 - 0.064[b]	<0.00005	<0.00005	<0.00005	<0.00005	-	<0.00005	-	-	-	-	<0.00005	<0.0001	<0.0002
Lithium	mg/L	-	-	0.0011	0.0011	<0.001	0.0012	-	0.0012	-	-	-	-	0.0012	0.00039	0.00047
Magnesium	mg/L	-	-	2.1	2.0	1.9	2.0	-	2.1	-	-	-	-	2.0	0.93	1.1
Manganese	mg/L	0.77 - 0.97[b]	0.82 - 1.5[b]	0.00095	0.00071	0.0016	0.0011	-	0.0010	-	-	-	-	0.00087	0.0011	0.015
Mercury	mg/L	0.000010	-	<0.000005	<0.000005	<0.000005	<0.000005	-	<0.000005	-	-	-	-	<0.000005	-	<0.00001
Molybdenum	mg/L	7.6	46	0.00029	0.00031	0.00026	0.00030	-	0.00035	-	-	-	-	0.00029	0.00021	0.00023
Nickel	mg/L	0.025 - 0.083[b]	-	<0.0005	<0.0005	<0.0005	<0.0005	-	<0.0005	-	-	-	-	<0.0005	<0.0002	<0.0004
Potassium	mg/L	-	-	0.80	0.82	0.70	0.81	-	0.82	-	-	-	-	0.84	0.43	0.72
Rubidium	mg/L	-	-	0.00029	0.00031	0.00029	0.00031	-	0.00035	-	-	-	-	0.00032	-	-
Selenium	mg/L	0.0020	-	0.000095	0.000091	0.00012	0.00014	-	0.00019	-	-	-	-	0.00015	<0.0005	<0.0005
Silicon	mg/L	-	-	4.6	5.0	4.5	5.1	-	4.8	-	-	-	-	5.4	4.2	4.6
Silver	mg/L	0.000050[b]	0.00010[b]	<0.00001	<0.00001	<0.00001	<0.00001	-	<0.00001	-	-	-	-	<0.00001	<0.00005	<0.00005
Sodium	mg/L	-	-	1.9	1.9	1.8	1.9	-	1.9	-	-	-	-	1.9	4.2	4.6
Strontium	mg/L	-	-	0.098	0.10	0.088	0.098	-	0.096	-	-	-	-	0.096	0.054	0.059
Sulphur	mg/L	-	-	0.87	0.76	0.70	0.77	-	0.95	-	-	-	-	0.84	<3.0	<3.0
Tellurium	mg/L	-	-	<0.0002	<0.0002	<0.0002	<0.0002	-	<0.0002	-	-	-	-	<0.0002	<0.0002	<0.0005
Thallium	mg/L	0.00080	-	<0.00001	<0.00001	<0.00001	<0.00001	-	<0.00001	-	-	-	-	<0.00001	<0.00002	<0.00002
Thorium	mg/L	-	-	<0.0001	<0.0001	<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	<0.0002
Titanium	mg/L	-	-	<0.0003	<0.0003	<0.0003	<0.0003	-	<0.0003	-	-	-	-	<0.0003	<0.005	<0.005
Tungsten	mg/L	-	-	<0.0001	<0.0001	<0.0001	<0.0001	-	<0.0001	-	-	-	-	<0.0001	-	-
Uranium	mg/L	0.0085	-	0.00011	0.00012	0.000094	0.00012	-	0.00012	-	-	-	-	0.00011	0.000047	0.000033
Vanadium	mg/L	-	-	0.0013	0.0010	0.0010	0.0011	-	0.0012	-	-	-	-	0.00094	<0.001	<0.001
Zinc	mg/L	0.0075[b]	0.033[b]	<0.003	<0.003	<0.003	<0.003	-	<0.003	-	-	-	-	<0.003	<0.004	<0.004
Zirconium	mg/L	-	-	0.000077	<0.00006	<0.00006	<0.0002	-	<0.0002	-	-	-	-	<0.0002	<0.0001	<0.0001

Appendix C: Analytical Data
Table C-1: Results of Surface Water Analyses
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name		SW-04	SW-04	SW-04	SW-04	SW-04	SW-04	SW-04	SW-04	SW-04	SW-04	SW-04	SW-04
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	2017-11-08	2018-04-12	2018-07-17	2018-11-19	2019-03-29	2019-06-25	2020-06-18	2020-07-16	2020-11-09	2021-03-24	2021-06-29	2021-08-27	2021-11-08
Field Measured																
pH	-	6.5 - 9.0	6.5 - 9.0	7.8	7.5	7.2	7.8	7.3	6.8	7.2	7.4	6.8	7.4	7.3	7.5	7.9
Temperature	°C	-	-	2.3	2.5	17	4.4	1.5	11	9.8	11	3.6	3.2	9.7	8.8	4.6
Dissolved oxygen	mg/L	8[a]	5[a]	14	13	**1.9**[Mn, Mx]	11	13	9.8	**7.9**[Mn]	**5.9**[Mn]	11	15	11	12	12
Conductivity	µS/cm	-	-	44	56	85	50	45	70	71	75	31	41	59	57	50
Conventional Parameters																
pH, lab	-	6.5 - 9.0	6.5 - 9.0	7.9	7.7	7.9	7.8	7.5	7.7	-	7.6	-	-	-	-	7.8
Specific conductivity	µS/cm	-	-	-	-	-	-	-	-	-	105	-	-	-	-	89
Hardness, as $CaCO_3$	mg/L	-	-	28	26	39	28	26	32	-	34	-	-	-	-	36
Total alkalinity, as $CaCO_3$	mg/L	20[a]	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total suspended solids	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total organic carbon	mg/L	-	-	-	1.9	-	-	-	-	-	-	-	-	-	-	-
Major Ions																
Bicarbonate, as $CaCO_3$	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromide	mg/L	-	-	-	<0.05	-	<0.05	<0.05	<0.05	-	<0.05	-	-	-	-	<0.05
Calcium	mg/L	-	-	9.8	9.3	14	9.7	9.0	11	-	12	-	-	-	-	12
Chloride	mg/L	150	600	4.1	14	11	7.0	9.6	11	-	12	-	-	-	-	1.4
Fluoride	mg/L	-	0.40 - 1.3[b]	0.038	0.035	0.039	0.038	0.037	0.053	-	0.045	-	-	-	-	0.039
Magnesium	mg/L	-	-	0.89	0.78	1.0	0.88	0.76	0.92	-	1.0	-	-	-	-	0.86
Potassium	mg/L	-	-	0.49	0.57	0.50	0.51	0.53	0.34	-	0.56	-	-	-	-	0.52
Sodium	mg/L	-	-	3.8	8.0	6.6	4.4	6.2	6.2	-	7.2	-	-	-	-	2.8
Sulphate	mg/L	128 - 309[b]	-	1.2	0.87	<0.3	0.90	0.87	0.94	-	1.1	-	-	-	-	1.6
Nutrients																
Nitrate	mg-N/L	3.0	33	<0.005	0.0054	0.084	<0.005	0.024	0.016	-	0.014	-	-	-	-	<0.005
Nitrite	mg-N/L	0.20[c]	0.60[c]	<0.001	<0.001	<0.001	<0.001	0.0015	<0.001	-	<0.001	-	-	-	-	<0.001
Total ammonia	mg-N/L	0.57 - 2.0[d]	2.9 - 26[e]	<0.005	0.0058	<0.005	<0.005	<0.005	<0.005	-	0.0053	-	-	-	-	<0.005
Total nitrogen	mg-N/L	-	-	<0.05	-	-	-	-	-	-	-	-	-	-	-	-
Total phosphorus	mg-P/L	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	-	-	-	-	<0.05
Dissolved phosphorus	mg-P/L	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	-	-	-	-	<0.05
Chemical oxygen demand	mg/L	-	-	<20	<20	<20	<20	<20	<20	-	29	-	-	-	-	<20
Total Metals																
Aluminum	mg/L	-	-	0.014	0.035	0.37	0.026	0.033	0.016	-	0.11	-	-	-	-	0.035
Antimony	mg/L	0.0090	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	<0.0001	-	-	-	-	<0.0001
Arsenic	mg/L	-	0.0050	0.0014	0.0010	0.0046	0.0013	0.0010	0.0016	-	0.0021	-	-	-	-	0.0022
Barium	mg/L	1.0	-	0.0100	0.011	0.027	0.010	0.011	0.014	-	0.017	-	-	-	-	0.011
Beryllium	mg/L	0.00013	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	<0.0001	-	-	-	-	<0.0001
Bismuth	mg/L	-	-	<0.00005	<0.00005	<0.00005	<0.00005	<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
Cadmium	mg/L	-	-	<0.000005	<0.000005	0.000015	<0.000005	<0.000005	<0.000005	-	<0.000005	-	-	-	-	<0.000005
Calcium	mg/L	-	-	11	8.4	15	10	8.5	12	-	12	-	-	-	-	13
Cesium	mg/L	-	-	<0.00001	<0.00001	0.000022	<0.00001	<0.00001	<0.00001	-	<0.00001	-	-	-	-	<0.00001
Chromium	mg/L	0.0010[f]	-	0.00015	0.00018	0.00073	0.00019	0.00014	<0.0001	-	0.00024	-	-	-	-	<0.0005
Cobalt	mg/L	0.0040	0.11	<0.0001	<0.0001	0.00037	<0.0001	<0.0001	<0.0001	-	<0.0001	-	-	-	-	<0.0001
Copper	mg/L	-	-	<0.0005	<0.0005	0.00073	<0.0005	<0.0005	<0.0005	-	<0.0005	-	-	-	-	<0.0005
Iron	mg/L	-	1.0	0.025	0.055	0.80	0.068	0.056	0.049	-	0.25	-	-	-	-	0.063
Lead	mg/L	0.0058[b]	0.0030 - 0.064[b]	<0.00005	<0.00005	0.00033	<0.00005	<0.00005	<0.00005	-	0.000099	-	-	-	-	<0.00005
Lithium	mg/L	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	-	-	-	-	<0.001
Magnesium	mg/L	-	-	0.85	0.71	1.2	0.86	0.72	0.91	-	1.0	-	-	-	-	0.86
Manganese	mg/L	0.77 - 0.97[b]	0.82 - 1.5[b]	0.0061	0.0094	0.24	0.017	0.011	0.019	-	0.059	-	-	-	-	0.018
Mercury	mg/L	0.000010	-	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	-	<0.000005	-	-	-	-	<0.000005
Molybdenum	mg/L	7.6	46	0.00016	0.00014	0.00024	0.00012	0.00013	0.00014	-	0.00019	-	-	-	-	0.00019
Nickel	mg/L	0.025 - 0.083[b]	-	<0.0005	<0.0005	0.00059	<0.0005	<0.0005	<0.0005	-	<0.0005	-	-	-	-	<0.0005
Potassium	mg/L	-	-	0.51	0.52	0.54	0.51	0.50	0.36	-	0.57	-	-	-	-	0.52
Rubidium	mg/L	-	-	0.00043	0.00048	0.00064	0.00051	0.00046	0.00038	-	0.00056	-	-	-	-	0.00034
Selenium	mg/L	0.0020	-	0.000055	0.000050	0.00017	<0.00005	<0.00005	<0.00005	-	<0.00005	-	-	-	-	0.000087
Silicon	mg/L	-	-	4.2	3.3	4.7	4.2	3.8	4.9	-	4.6	-	-	-	-	4.7
Silver	mg/L	0.000050[b]	0.00010[b]	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	-	<0.00001	-	-	-	-	<0.00001
Sodium	mg/L	-	-	3.6	7.7	7.0	4.3	5.8	6.2	-	7.0	-	-	-	-	2.7
Strontium	mg/L	-	-	0.046	0.043	0.069	0.048	0.042	0.056	-	0.062	-	-	-	-	0.049
Sulphur	mg/L	-	-	0.51	0.50	<0.5	<0.5	<0.5	<0.5	-	<0.5	-	-	-	-	0.63
Tellurium	mg/L	-	-	<0.0002	<0.0002	<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
Thorium	mg/L	-	-	<0.0001	<0.0001	<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	-	<0.0001	-	-	-	-	<0.0001
Titanium	mg/L	-	-	<0.0003	0.00062	0.0097	0.00047	0.00073	<0.0003	-	0.0028	-	-	-	-	0.00079
Tungsten	mg/L	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	<0.0001	-	-	-	-	<0.0001
Uranium	mg/L	0.0085	-	0.000025	0.000023	0.00020	0.000021	0.000021	0.000016	-	0.000055	-	-	-	-	0.000054
Vanadium	mg/L	-	-	<0.0005	0.00054	0.0026	0.00052	0.00069	0.00055	-	0.0010	-	-	-	-	0.00085
Zinc	mg/L	0.0075[b]	0.033[b]	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	-	-	-	-	<0.003
Zirconium	mg/L	-	-	<0.00006	<0.00006	<0.00006	<0.00006	<0.00006	<0.0002	-	<0.0002	-	-	-	-	<0.0002

Appendix C: Analytical Data
Table C-1: Results of Surface Water Analyses
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name		SW-05	SW-05	SW-05	SW-05	SW-05	SW-05	SW-05	SW-05	SW-05
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	2017-07-05	2017-09-26	2017-11-08	2018-04-12	2018-07-17	2018-11-19	2019-03-29	2019-06-25	2020-06-18
Field Measured												
pH	-	6.5 - 9.0	6.5 - 9.0	**6.0**[(Mn, Mx)]	8.1	8.0	7.5	7.7	6.8	7.0	7.8	7.6
Temperature	°C	-	-	12	9.1	4.1	4.6	12	5.2	4.1	12	10
Dissolved oxygen	mg/L	8[(a)]	5[(a)]	9.4	16	14	13	**5.3**[(Mn)]	9.3	13	11	8.3
Conductivity	µS/cm	-	-	148	106	93	91	117	97	91	115	108
Conventional Parameters												
pH, lab	-	6.5 - 9.0	6.5 - 9.0	7.9	8.0	8.2	7.9	6.6	8.1	8.0	8.2	-
Specific conductivity	µS/cm	-	-	162	162	-	-	-	-	-	-	-
Hardness, as $CaCO_3$	mg/L	-	-	74	83	73	75	74	72	70	79	-
Total alkalinity, as $CaCO_3$	mg/L	20[(a)]	-	78	78	-	-	-	-	-	-	-
Total suspended solids	mg/L	-	-	3.3	2.4	-	-	-	-	-	-	-
Total organic carbon	mg/L	-	-	<0.5	0.88	-	0.54	-	-	-	-	-
Major Ions												
Bicarbonate, as $CaCO_3$	mg/L	-	-	-	-	-	-	-	-	-	-	-
Bromide	mg/L	-	-	-	-	<0.05	<0.05	-	<0.05	<0.05	<0.05	-
Calcium	mg/L	-	-	23	27	25	26	26	25	28	28	-
Chloride	mg/L	150	600	1.5	1.4	1.4	1.1	1.1	1.1	0.89	1.2	-
Fluoride	mg/L	-	0.40 - 1.3[(b)]	<0.1	<0.1	0.056	0.052	0.051	0.053	0.052	0.060	-
Magnesium	mg/L	-	-	2.0	2.5	2.4	2.3	2.2	2.3	2.2	2.5	-
Potassium	mg/L	-	-	0.78	0.96	0.93	0.89	0.88	0.91	0.81	0.91	-
Sodium	mg/L	-	-	1.9	2.3	2.4	2.0	2.1	2.2	1.8	2.2	-
Sulphate	mg/L	128 - 309[(b)]	-	3.1	2.7	2.9	2.7	2.5	2.5	2.2	2.6	-
Nutrients												
Nitrate	mg-N/L	3.0	33	<0.01	0.014	0.018	0.013	<0.005	0.019	0.017	<0.005	-
Nitrite	mg-N/L	0.20[(c)]	0.60[(c)]	<0.01	<0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	-
Total ammonia	mg-N/L	0.57 - 2.0[(d)]	2.9 - 26[(e)]	<0.03	<0.03	<0.005	0.0057	<0.005	<0.005	<0.005	<0.005	-
Total nitrogen	mg-N/L	-	-	-	-	-	-	-	-	-	-	-
Total phosphorus	mg-P/L	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Dissolved phosphorus	mg-P/L	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Chemical oxygen demand	mg/L	-	-	-	-	<20	<20	<20	<20	<20	<20	-
Total Metals												
Aluminum	mg/L	-	-	0.010	0.0076	0.061	0.0067	0.0064	0.0073	0.0095	0.0060	-
Antimony	mg/L	0.0090	-	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-
Arsenic	mg/L	-	0.0050	0.0018	0.0018	0.0020	0.0017	0.0020	0.0018	0.0019	0.0021	-
Barium	mg/L	1.0	-	0.021	0.021	0.021	0.019	0.021	0.021	0.022	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	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	-
Boron	mg/L	1.2	-	0.010	0.0099	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Cadmium	mg/L	-	-	<0.00001	<0.00001	0.000029	<0.000005	<0.000005	<0.000005	0.0000072	<0.000005	-
Calcium	mg/L	-	-	26	29	28	23	26	25	27	26	-
Cesium	mg/L	-	-	-	-	0.000011	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	-
Chromium	mg/L	0.0010[(f)]	-	<0.0005	0.00068	0.00046	0.00034	0.00046	0.00036	0.00034	0.00036	-
Cobalt	mg/L	0.0040	0.11	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-
Copper	mg/L	-	-	<0.0002	<0.0004	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	-
Iron	mg/L	-	1.0	0.010	0.010	0.086	<0.01	0.010	<0.01	<0.01	<0.01	-
Lead	mg/L	0.0058[(b)]	0.0030 - 0.064[(b)]	<0.0001	<0.0002	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	-
Lithium	mg/L	-	-	0.0012	0.0012	0.0011	0.0011	0.0011	0.0011	0.0011	0.0012	-
Magnesium	mg/L	-	-	2.3	2.6	2.7	2.2	2.4	2.3	2.0	2.3	-
Manganese	mg/L	0.77 - 0.97[(b)]	0.82 - 1.5[(b)]	0.0013	0.0015	0.0066	0.00063	0.0015	0.0012	0.00050	0.0014	-
Mercury	mg/L	0.000010	-	<0.00002[(DL>Mn)]	<0.00001	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	-
Molybdenum	mg/L	7.6	46	0.00040	0.00038	0.00034	0.00035	0.00039	0.00038	0.00030	0.00039	-
Nickel	mg/L	0.025 - 0.083[(b)]	-	<0.0002	<0.0004	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	-
Potassium	mg/L	-	-	0.89	0.99	0.98	0.86	0.92	0.94	0.79	0.93	-
Rubidium	mg/L	-	-	-	-	0.00040	0.00029	0.00033	0.00034	0.00036	0.00031	-
Selenium	mg/L	0.0020	-	<0.0005	<0.0005	0.00015	0.00010	0.00015	0.00012	0.00011	0.00012	-
Silicon	mg/L	-	-	4.9	5.0	4.8	4.7	4.7	4.8	4.7	4.9	-
Silver	mg/L	0.000050[(b)]	0.00010[(b)]	**0.000062**[(Mn)]	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	-
Sodium	mg/L	-	-	2.1	2.3	2.3	2.1	2.2	2.2	2.0	2.1	-
Strontium	mg/L	-	-	0.10	0.100	0.10	0.097	0.10	0.10	0.11	0.11	-
Sulphur	mg/L	-	-	3.2	<3.0	1.1	0.71	0.81	0.78	0.97	0.90	-
Tellurium	mg/L	-	-	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	-
Thallium	mg/L	0.00080	-	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	-
Thorium	mg/L	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-
Tin	mg/L	-	-	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-
Titanium	mg/L	-	-	<0.005	<0.005	<0.0021	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	-
Tungsten	mg/L	-	-	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-
Uranium	mg/L	0.0085	-	0.00016	0.00015	0.00015	0.00014	0.00016	0.00017	0.00016	0.00016	-
Vanadium	mg/L	-	-	0.0012	0.0010	0.0011	0.0011	0.0012	0.00097	0.0011	0.0011	-
Zinc	mg/L	0.0075[(b)]	0.033[(b)]	<0.004	<0.004	<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	<0.00006	<0.00006	<0.0002	-

Appendix C: Analytical Data
Table C-1: Results of Surface Water Analyses
Forceman Ridge Waste Management Facility
Regional District of Kitimate Stikine

Parameter	Unit	Sample Name		SW-05	SW-05	SW-05	SW-05	SW-05	SW-05
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	2020-07-16	2020-11-09	2021-03-24	2021-06-29	2021-08-27	2021-11-08
Field Measured									
pH	-	6.5 - 9.0	6.5 - 9.0	7.7	7.7	8.0	7.6	8.0	7.9
Temperature	°C	-	-	10	4.7	4.4	12	11	5.1
Dissolved oxygen	mg/L	8[a]	5[a]	**4.6[Mn, Mx]**	12	14	10	12	12
Conductivity	µS/cm	-	-	107	88	85	114	111	95
Conventional Parameters									
pH, lab	-	6.5 - 9.0	6.5 - 9.0	8.0	-	-	-	-	8.1
Specific conductivity	µS/cm	-	-	160	-	-	-	-	158
Hardness, as $CaCO_3$	mg/L	-	-	71	-	-	-	-	74
Total alkalinity, as $CaCO_3$	mg/L	20[a]	-	-	-	-	-	-	-
Total suspended solids	mg/L	-	-	-	-	-	-	-	-
Total organic carbon	mg/L	-	-	-	-	-	-	-	-
Major Ions									
Bicarbonate, as $CaCO_3$	mg/L	-	-	-	-	-	-	-	-
Bromide	mg/L	-	-	<0.05	-	-	-	-	<0.5
Calcium	mg/L	-	-	25	-	-	-	-	25
Chloride	mg/L	150	600	1.1	-	-	-	-	1.2
Fluoride	mg/L	-	0.40 - 1.3[b]	0.055	-	-	-	-	0.051
Magnesium	mg/L	-	-	2.3	-	-	-	-	2.2
Potassium	mg/L	-	-	0.92	-	-	-	-	0.90
Sodium	mg/L	-	-	2.1	-	-	-	-	2.1
Sulphate	mg/L	128 - 309[b]	-	2.8	-	-	-	-	2.7
Nutrients									
Nitrate	mg-N/L	3.0	33	<0.005	-	-	-	-	0.014
Nitrite	mg-N/L	0.20[c]	0.60[c]	<0.001	-	-	-	-	<0.001
Total ammonia	mg-N/L	0.57 - 2.0[d]	2.9 - 26[e]	<0.005	-	-	-	-	<0.005
Total nitrogen	mg-N/L	-	-	-	-	-	-	-	-
Total phosphorus	mg-P/L	-	-	<0.05	-	-	-	-	<0.05
Dissolved phosphorus	mg-P/L	-	-	<0.05	-	-	-	-	<0.05
Chemical oxygen demand	mg/L	-	-	<20	-	-	-	-	<20
Total Metals									
Aluminum	mg/L	-	-	0.0066	-	-	-	-	0.0091
Antimony	mg/L	0.0090	-	<0.0001	-	-	-	-	<0.0001
Arsenic	mg/L	-	0.0050	0.0019	-	-	-	-	0.0018
Barium	mg/L	1.0	-	0.020	-	-	-	-	0.021
Beryllium	mg/L	0.00013	-	<0.0001	-	-	-	-	<0.0001
Bismuth	mg/L	-	-	<0.00005	-	-	-	-	<0.00005
Boron	mg/L	1.2	-	<0.01	-	-	-	-	<0.01
Cadmium	mg/L	-	-	<0.000005	-	-	-	-	<0.000005
Calcium	mg/L	-	-	26	-	-	-	-	26
Cesium	mg/L	-	-	<0.00001	-	-	-	-	<0.00001
Chromium	mg/L	0.0010[f]	-	0.00034	-	-	-	-	<0.0005
Cobalt	mg/L	0.0040	0.11	<0.0001	-	-	-	-	<0.0001
Copper	mg/L	-	-	<0.0005	-	-	-	-	<0.0005
Iron	mg/L	-	1.0	0.019	-	-	-	-	0.011
Lead	mg/L	0.0058[b]	0.0030 - 0.064[b]	<0.00005	-	-	-	-	<0.00005
Lithium	mg/L	-	-	0.0012	-	-	-	-	0.0012
Magnesium	mg/L	-	-	2.3	-	-	-	-	2.2
Manganese	mg/L	0.77 - 0.97[b]	0.82 - 1.5[b]	0.0014	-	-	-	-	0.0018
Mercury	mg/L	0.000010	-	<0.000005	-	-	-	-	<0.000005
Molybdenum	mg/L	7.6	46	0.00038	-	-	-	-	0.00034
Nickel	mg/L	0.025 - 0.083[b]	-	<0.0005	-	-	-	-	<0.0005
Potassium	mg/L	-	-	0.91	-	-	-	-	0.91
Rubidium	mg/L	-	-	0.00034	-	-	-	-	0.00033
Selenium	mg/L	0.0020	-	0.00014	-	-	-	-	0.00015
Silicon	mg/L	-	-	4.9	-	-	-	-	5.2
Silver	mg/L	0.000050[b]	0.00010[b]	<0.00001	-	-	-	-	<0.00001
Sodium	mg/L	-	-	2.1	-	-	-	-	2.1
Strontium	mg/L	-	-	0.10	-	-	-	-	0.097
Sulphur	mg/L	-	-	1.1	-	-	-	-	0.87
Tellurium	mg/L	-	-	<0.0002	-	-	-	-	<0.0002
Thallium	mg/L	0.00080	-	<0.00001	-	-	-	-	<0.00001
Thorium	mg/L	-	-	<0.0001	-	-	-	-	<0.0001
Tin	mg/L	-	-	<0.0001	-	-	-	-	<0.0001
Titanium	mg/L	-	-	<0.0003	-	-	-	-	<0.0003
Tungsten	mg/L	-	-	<0.0001	-	-	-	-	<0.0001
Uranium	mg/L	0.0085	-	0.00016	-	-	-	-	0.00015
Vanadium	mg/L	-	-	0.0011	-	-	-	-	0.00092
Zinc	mg/L	0.0075[b]	0.033[b]	<0.003	-	-	-	-	<0.003
Zirconium	mg/L	-	-	<0.0002	-	-	-	-	<0.0002

Parameter	Unit	Sample Name		SW-01	SW-01	SW-01	SW-01	SW-01	SW-01	SW-01	SW-01	SW-01	SW-01	SW-01	SW-01	SW-01
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	2012-10-22	2017-04-02	2017-07-05	2017-09-26	2017-11-08	2018-07-17	2018-11-19	2019-06-25	2020-06-18	2020-07-16	2020-11-06	2021-03-24	2021-06-25
Dissolved Metals																
Aluminum	mg/L	0.020 - 0.050[g]	0.047 - 0.10[g]	0.0034	0.0038	<0.005	<0.005	<0.001	0.0037	0.0015	0.0039	-	0.0022	-	-	-
Antimony	mg/L	-	-	-	-	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	-	<0.0001	-	-	-
Arsenic	mg/L	-	-	-	0.000050	<0.0005	<0.0005	0.00014	<0.0001	<0.0001	<0.0001	-	0.00010	-	-	-
Barium	mg/L	-	-	0.013	0.0045	<0.005	<0.005	0.0052	0.0048	0.0055	0.0046	-	0.0036	-	-	-
Beryllium	mg/L	-	-	-	-	<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	-	<0.00005	-	-	-
Boron	mg/L	-	-	-	-	<0.005	<0.005	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	-	-
Cadmium	mg/L	0.000018 - 0.00018[b]	0.000038 - 0.00048[b]	**0.0011**[(Mn, Mx)]	0.0000050	<0.00001	<0.00001	0.0000051	<0.000005	<0.000005	<0.000005	-	<0.000005	-	-	-
Cesium	mg/L	-	-	1.2	0.43	0.98	1.1	<0.00001	<0.00001	<0.00001	<0.00001	-	<0.00001	-	-	-
Chromium	mg/L	-	-	-	-	<0.0005	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	-	<0.0001	-	-	-
Cobalt	mg/L	-	-	-	0.000010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	<0.0001	-	-	-
Copper	mg/L	0.00020-0.00039[h]	0.00020-0.00040[h]	-	-	<0.0002	<0.0004[(DL>Mx)]	<0.0002	<0.0002	<0.0002	<0.0002	-	**0.00037**[(Mn, Mx)]	-	-	-
Iron	mg/L	-	0.35	0.010	-	0.010	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	-	-
Lead	mg/L	-	-	-	-	<0.0001	<0.0002	<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	-	<0.001	-	-	-
Manganese	mg/L	-	-	0.016	-	0.0053	0.0038	0.0077	0.0073	0.027	0.019	-	0.0054	-	-	-
Mercury	mg/L	-	-	-	-	-	<0.00001	<0.000005	<0.000005	<0.000005	<0.000005	-	<0.000005	-	-	-
Molybdenum	mg/L	-	-	-	-	<0.0001	<0.0001	<0.00005	<0.00005	<0.00005	<0.00005	-	<0.00005	-	-	-
Nickel	mg/L	-	-	-	-	<0.0002	<0.0004	<0.0005	<0.0005	<0.0005	<0.0005	-	<0.0005	-	-	-
Rubidium	mg/L	-	-	-	-	-	-	0.00027	0.00025	0.00025	0.00025	-	0.00020	-	-	-
Selenium	mg/L	-	-	-	-	<0.0005	<0.0005	<0.00005	<0.00005	<0.00005	<0.00005	-	<0.00005	-	-	-
Silicon	mg/L	-	-	0.48	-	<1.0	<1.0	0.066	<0.05	0.11	0.096	-	0.10	-	-	-
Silver	mg/L	-	-	-	-	<0.00005	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001	-	<0.00001	-	-	-
Strontium	mg/L	-	-	0.012	0.0039	0.0064	0.0073	0.0076	0.0064	0.0076	0.0063	-	0.0058	-	-	-
Sulphur	mg/L	-	-	-	-	<3.0	<3.0	<0.5	<0.5	<0.5	<0.5	-	<0.5	-	-	-
Tellurium	mg/L	-	-	-	-	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	-	<0.0002	-	-	-
Thallium	mg/L	-	-	-	-	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	-	<0.00001	-	-	-
Thorium	mg/L	-	-	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	<0.0001	-	-	-
Tin	mg/L	-	-	-	-	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	-	<0.0001	-	-	-
Titanium	mg/L	-	-	-	-	<0.005	<0.005	<0.0003	<0.0003	<0.0003	<0.0003	-	<0.0003	-	-	-
Tungsten	mg/L	-	-	-	-	-	-	<0.0001	<0.0001	<0.0001	<0.0001	-	<0.0001	-	-	-
Uranium	mg/L	-	-	-	-	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	-	<0.00001	-	-	-
Vanadium	mg/L	-	-	-	-	<0.001	<0.001	<0.0005	<0.0005	<0.0005	<0.0005	-	<0.0005	-	-	-
Zinc	mg/L	-	-	0.0067	0.0047	0.0041	0.0054	<0.001	<0.001	<0.001	<0.001	-	<0.001	-	-	-
Zirconium	mg/L	-	-	-	-	<0.0001	<0.0001	<0.00006	<0.00006	<0.00006	<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.
[e] & [f] = the ammonia guideline is pH and temperature dependent.
[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: Analytical Data
Table C-1: Results of Surface Water Analyses
Forceman Ridge Waste Management Facility
Regional District of Kitimate Stikine

Parameter	Unit	Sample Name		SW-01	SW-01	SW-02	SW-02	SW-02	SW-02	SW-02	SW-02	SW-02	SW-02	SW-02	SW-02
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	2021-08-27	2021-11-08	2012-10-22	2013-04-02	2017-04-06	2017-07-05	2017-09-26	2017-11-08	2018-07-17	2018-11-19	2019-03-29	2019-06-25	2020-06-18
Dissolved Metals																
Aluminum	mg/L	0.020 - 0.050[(g)]	0.047 - 0.10[(g)]	-	0.0035	0.045	-	<0.005	<0.005	<0.005	<0.001	<0.001	0.0011	<0.001	0.0014	-
Antimony	mg/L	-	-	-	<0.0001	-	-	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-
Arsenic	mg/L	-	-	-	0.00018	0.0020	0.0016	0.0017	0.0018	0.0020	0.0019	0.0019	0.0021	0.0020	0.0020	-
Barium	mg/L	-	-	-	0.014	0.022	0.019	0.020	0.021	0.021	0.023	0.023	0.023	0.023	0.023	-
Beryllium	mg/L	-	-	-	<0.0001	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-
Bismuth	mg/L	-	-	-	<0.00005	-	-	<0.0001	<0.0001	<0.0001	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	-
Boron	mg/L	-	-	-	<0.01	-	-	<0.004	0.0056	0.0064	<0.01	<0.01	<0.01	<0.01	<0.01	-
Cadmium	mg/L	0.000018 - 0.00018[(b)]	0.000038 - 0.00048[(b)]	-	0.0000054	-	0.0000070	<0.00001	<0.00001	<0.00001	0.000027	<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	-	-	-	<0.0005	-	-	<0.0005	<0.0005	<0.0005	0.00032	0.00040	0.00030	0.00032	0.00037	-
Cobalt	mg/L	-	-	-	<0.0001	-	-	<0.00005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-
Copper	mg/L	0.00020-0.00039[(h)]	0.00020-0.00040[(h)]	-	**0.00165**[(Mn, Mx)]	-	-	<0.0002	<0.0002	<0.0004[(DL>Mx)]	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	-
Iron	mg/L	-	0.35	-	0.017	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Lead	mg/L	-	-	-	<0.00005	-	-	<0.0001	<0.0001	<0.0002	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	-
Lithium	mg/L	-	-	-	<0.001	-	0.00097	0.0010	0.0010	0.0011	<0.001	0.0010	0.0010	0.0011	0.0011	-
Manganese	mg/L	-	-	-	0.074	-	0.00041	<0.0002	<0.0002	0.00031	<0.0001	0.00028	0.00069	0.00039	0.00028	-
Mercury	mg/L	-	-	-	<0.000005	-	-	<0.00002	-	<0.00001	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	-
Molybdenum	mg/L	-	-	-	0.000054	-	0.00028	0.00027	0.00028	0.00029	0.00028	0.00028	0.00028	0.00027	0.00029	-
Nickel	mg/L	-	-	-	<0.0005	-	-	<0.0002	<0.0002	<0.0004	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	-
Rubidium	mg/L	-	-	-	0.00037	-	-	-	-	-	0.00037	0.00032	0.00037	0.00035	0.00032	-
Selenium	mg/L	-	-	-	<0.00005	0.00015	0.00011	<0.0005	<0.0005	<0.0005	0.00011	0.000098	0.00012	0.00014	0.00013	-
Silicon	mg/L	-	-	-	0.40	4.5	4.3	5.0	4.6	5.1	4.7	4.5	4.8	4.7	4.7	-
Silver	mg/L	-	-	-	<0.00001	-	-	<0.00005	<0.00005	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	-
Strontium	mg/L	-	-	-	0.015	0.099	0.095	0.088	0.091	0.096	0.11	0.099	0.10	0.10	0.10	-
Sulphur	mg/L	-	-	-	<0.5	-	-	<3.0	<3.0	<3.0	0.59	0.63	0.71	0.52	0.63	-
Tellurium	mg/L	-	-	-	<0.0002	-	-	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	-
Thallium	mg/L	-	-	-	<0.00001	-	-	<0.00002	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	-
Thorium	mg/L	-	-	-	<0.0001	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-
Tin	mg/L	-	-	-	<0.0001	-	-	<0.0002	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-
Titanium	mg/L	-	-	-	<0.0003	-	-	<0.005	<0.005	<0.005	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	-
Tungsten	mg/L	-	-	-	<0.0001	-	-	-	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-
Uranium	mg/L	-	-	-	<0.00001	0.00012	-	0.000090	0.00011	0.00010	0.00010	0.00010	0.00011	0.00011	0.000095	-
Vanadium	mg/L	-	-	-	<0.0005	-	0.0012	<0.001	<0.001	<0.001	0.00097	0.00099	0.0010	0.0010	0.0011	-
Zinc	mg/L	-	-	-	0.0014	-	0.0020	<0.004	<0.004	<0.004	0.0010	<0.001	<0.001	<0.001	<0.001	-
Zirconium	mg/L	-	-	-	<0.0002	-	-	<0.0001	<0.0001	<0.0001	<0.00006	<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.
[(e) & (f)] = the ammonia guideline is pH and temperature dependent.
[(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

Parameter	Unit	Sample Name		SW-02	SW-02	SW-02	SW-02	SW-02	SW-02	SW-03	SW-03	SW-03	SW-03	SW-03	SW-03	SW-03
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	2020-07-16	2020-11-06	2021-03-24	2021-06-25	2021-08-27	2021-11-08	2012-10-22	2013-04-02	2017-04-06	2017-07-05	2017-09-26	2017-11-08	2018-04-12
Dissolved Metals																
Aluminum	mg/L	0.020 - 0.050[g]	0.047 - 0.10[g]	0.0016	-	-	-	-	0.0023	-	-	<0.005	<0.005	<0.005	<0.001	0.0024
Antimony	mg/L	-	-	<0.0001	-	-	-	-	<0.0001	-	-	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001
Arsenic	mg/L	-	-	0.0020	-	-	-	-	0.0017	0.0019	0.0016	0.0016	0.0017	0.0017	0.0018	0.0017
Barium	mg/L	-	-	0.023	-	-	-	-	0.023	0.022	0.021	0.018	0.020	0.020	0.023	0.020
Beryllium	mg/L	-	-	<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	<0.00005	<0.00005
Boron	mg/L	-	-	<0.01	-	-	-	-	<0.01	-	-	<0.004	<0.005	0.0058	<0.01	<0.01
Cadmium	mg/L	0.000018 - 0.00018[b]	0.000038 - 0.00048[b]	<0.000005	-	-	-	-	<0.000005	-	-	<0.00001	<0.00001	<0.00001	<0.000005	<0.000005
Cesium	mg/L	-	-	<0.00001	-	-	-	-	<0.00001	-	-	-	-	-	<0.00001	<0.00001
Chromium	mg/L	-	-	0.00036	-	-	-	-	<0.0005	-	-	<0.0005	0.00062	<0.0005	0.00028	0.00031
Cobalt	mg/L	-	-	<0.0001	-	-	-	-	<0.0001	-	-	<0.00005	<0.0001	<0.0001	<0.0001	<0.0001
Copper	mg/L	0.00020-0.00039[h]	0.00020-0.00040[h]	<0.0002	-	-	-	-	**0.0136**[Mn, Mx]	-	-	<0.0002	<0.0002	<0.0004[DL>Mx]	<0.0002	<0.0002
Iron	mg/L	-	0.35	<0.01	-	-	-	-	<0.01	0.0060	-	<0.01	<0.01	<0.01	<0.01	<0.01
Lead	mg/L	-	-	<0.00005	-	-	-	-	<0.00005	-	0.00040	<0.0001	<0.0001	<0.0002	<0.00005	<0.00005
Lithium	mg/L	-	-	0.0011	-	-	-	-	0.0012	-	0.0010	0.0010	0.0010	0.0011	<0.001	0.0010
Manganese	mg/L	-	-	0.00033	-	-	-	-	0.00079	-	0.00014	0.00026	0.00022	0.00034	<0.0001	0.00053
Mercury	mg/L	-	-	<0.000005	-	-	-	-	<0.000005	-	-	<0.00002	-	<0.00001	<0.000005	<0.000005
Molybdenum	mg/L	-	-	0.00027	-	-	-	-	0.00032	-	0.00028	0.00030	0.00031	0.00027	0.00030	0.00030
Nickel	mg/L	-	-	<0.0005	-	-	-	-	<0.0005	-	-	<0.0002	<0.0002	<0.0004	<0.0005	<0.0005
Rubidium	mg/L	-	-	0.00030	-	-	-	-	0.00029	-	-	-	-	-	0.00028	0.00027
Selenium	mg/L	-	-	0.00016	-	-	-	-	0.00014	0.00014	0.00011	<0.0005	<0.0005	<0.0005	0.00013	0.00013
Silicon	mg/L	-	-	4.6	-	-	-	-	4.7	4.6	4.3	4.8	4.6	4.9	4.6	4.7
Silver	mg/L	-	-	<0.00001	-	-	-	-	<0.00001	-	-	<0.00005	<0.00005	<0.00005	<0.00001	<0.00001
Strontium	mg/L	-	-	0.096	-	-	-	-	0.095	0.095	0.095	0.086	0.090	0.092	0.10	0.094
Sulphur	mg/L	-	-	1.0	-	-	-	-	0.86	-	-	<3.0	<3.0	<3.0	0.54	0.84
Tellurium	mg/L	-	-	<0.0002	-	-	-	-	<0.0002	-	-	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
Thallium	mg/L	-	-	<0.00001	-	-	-	-	<0.00001	-	-	<0.00002	<0.00002	<0.00002	<0.00001	<0.00001
Thorium	mg/L	-	-	<0.0001	-	-	-	-	<0.0001	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Tin	mg/L	-	-	<0.0001	-	-	-	-	<0.0001	-	-	<0.00011	<0.0002	<0.0002	<0.0001	<0.0001
Titanium	mg/L	-	-	<0.0003	-	-	-	-	<0.0003	-	-	<0.00012	<0.005	<0.005	<0.0003	<0.0003
Tungsten	mg/L	-	-	<0.0001	-	-	-	-	<0.0001	-	-	-	-	-	<0.0001	<0.0001
Uranium	mg/L	-	-	0.00011	-	-	-	-	0.00010	0.00011	0.00011	<0.00013	0.00012	0.000099	0.00011	0.00011
Vanadium	mg/L	-	-	0.0011	-	-	-	-	0.00091	-	0.0012	<0.00014	<0.001	<0.001	0.00092	0.00094
Zinc	mg/L	-	-	<0.001	-	-	-	-	0.0013	-	0.0016	<0.00015	<0.004	<0.004	<0.001	<0.001
Zirconium	mg/L	-	-	<0.0002	-	-	-	-	<0.0002	-	-	<0.00016	<0.0001	<0.0001	<0.00006	<0.00006

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.
[e] & [f] = the ammonia guideline is pH and temperature dependent.
[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

Parameter	Unit	Sample Name		SW-03	SW-03	SW-03	SW-03	SW-03	SW-03	SW-03	SW-03	SW-03	SW-03	SW-03	SW-04	SW-04
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	2018-07-17	2018-11-19	2019-03-29	2019-06-25	2020-06-18	2020-07-16	2020-11-06	2021-03-24	2021-06-25	2021-08-27	2021-11-08	2017-07-05	2017-09-26
Dissolved Metals																
Aluminum	mg/L	0.020 - 0.050[g]	0.047 - 0.10[g]	0.0020	0.0022	0.0059	0.0021	-	0.0020	-	-	-	-	0.0023	0.017	0.0071
Antimony	mg/L	-	-	<0.0001	<0.0001	<0.0001	<0.0001	-	<0.0001	-	-	-	-	<0.0001	<0.0001	<0.0002
Arsenic	mg/L	-	-	0.0019	0.0019	0.0016	0.0019	-	0.0020	-	-	-	-	0.0017	0.0021	0.0018
Barium	mg/L	-	-	0.021	0.021	0.019	0.020	-	0.020	-	-	-	-	0.023	0.014	0.012
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	-	<0.00005	-	-	-	-	<0.00005	<0.0001	<0.0001
Boron	mg/L	-	-	<0.01	0.011	<0.01	<0.01	-	<0.01	-	-	-	-	<0.01	0.0058	0.0067
Cadmium	mg/L	0.000018 - 0.00018[b]	0.000038 - 0.00048[b]	<0.000005	<0.000005	<0.000005	<0.000005	-	<0.000005	-	-	-	-	<0.000005	<0.00001	<0.00001
Cesium	mg/L	-	-	<0.00001	<0.00001	<0.00001	<0.00001	-	<0.00001	-	-	-	-	<0.00001	-	-
Chromium	mg/L	-	-	0.00040	0.00034	0.00028	0.00036	-	0.00034	-	-	-	-	<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
Copper	mg/L	0.00020-0.00039[h]	0.00020-0.00040[h]	<0.0002	<0.0002	<0.0002	<0.0002	-	<0.0002	-	-	-	-	**0.0136**[(Mn, Mx)]	<0.0002	<0.0004[(DL>Mx)]
Iron	mg/L	-	0.35	<0.01	<0.01	0.012	<0.01	-	<0.01	-	-	-	-	<0.01	0.045	0.032
Lead	mg/L	-	-	<0.00005	<0.00005	<0.00005	<0.00005	-	<0.00005	-	-	-	-	<0.00005	<0.0001	<0.0002
Lithium	mg/L	-	-	<0.001	0.0011	<0.001	0.0011	-	0.0011	-	-	-	-	0.0012	0.00051	0.00040
Manganese	mg/L	-	-	0.00054	0.00066	0.00093	0.00070	-	0.00062	-	-	-	-	0.00079	0.012	0.0059
Mercury	mg/L	-	-	<0.000005	<0.000005	<0.000005	<0.000005	-	<0.000005	-	-	-	-	<0.000005	<0.00002	<0.00001
Molybdenum	mg/L	-	-	0.00027	0.00030	0.00026	0.00027	-	0.00034	-	-	-	-	0.00032	0.00023	0.00022
Nickel	mg/L	-	-	<0.0005	<0.0005	<0.0005	<0.0005	-	<0.0005	-	-	-	-	<0.0005	<0.0002	<0.0004
Rubidium	mg/L	-	-	0.00029	0.00028	0.00027	0.00033	-	0.00034	-	-	-	-	0.00029	-	-
Selenium	mg/L	-	-	0.00015	0.00011	0.00012	0.00014	-	0.00016	-	-	-	-	0.00014	<0.0005	<0.0005
Silicon	mg/L	-	-	4.6	4.6	4.1	4.7	-	4.7	-	-	-	-	4.7	4.6	4.4
Silver	mg/L	-	-	<0.00001	<0.00001	<0.00001	<0.00001	-	<0.00001	-	-	-	-	<0.00001	<0.00005	<0.00005
Strontium	mg/L	-	-	0.098	0.10	0.087	0.096	-	0.095	-	-	-	-	0.095	0.063	0.057
Sulphur	mg/L	-	-	0.62	0.84	<0.5	0.65	-	0.92	-	-	-	-	0.86	<3.0	<3.0
Tellurium	mg/L	-	-	<0.0002	<0.0002	<0.0002	<0.0002	-	<0.0002	-	-	-	-	<0.0002	<0.0002	<0.0005
Thallium	mg/L	-	-	<0.00001	<0.00001	<0.00001	<0.00001	-	<0.00001	-	-	-	-	<0.00001	<0.00002	<0.00002
Thorium	mg/L	-	-	<0.0001	<0.0001	<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	<0.0002
Titanium	mg/L	-	-	<0.0003	<0.0003	<0.0003	<0.0003	-	<0.0003	-	-	-	-	<0.0003	<0.005	<0.005
Tungsten	mg/L	-	-	<0.0001	<0.0001	<0.0001	<0.0001	-	<0.0001	-	-	-	-	<0.0001	-	-
Uranium	mg/L	-	-	0.00010	0.00011	0.000097	0.00010	-	0.00012	-	-	-	-	0.00010	0.000062	0.000027
Vanadium	mg/L	-	-	0.00096	0.00091	0.00089	0.0011	-	0.0010	-	-	-	-	0.00091	<0.001	<0.001
Zinc	mg/L	-	-	<0.001	<0.001	<0.001	<0.001	-	<0.001	-	-	-	-	0.0013	<0.004	<0.004
Zirconium	mg/L	-	-	<0.00006	<0.00006	<0.00006	<0.0002	-	<0.0002	-	-	-	-	<0.0002	<0.0001	<0.0001

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.
[e] & [f] = the ammonia guideline is pH and temperature dependent.
[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

Parameter	Unit	Sample Name		SW-04	SW-04	SW-04	SW-04	SW-04	SW-04	SW-04	SW-04	SW-04	SW-04	SW-04	SW-04
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	2017-11-08	2018-04-12	2018-07-17	2018-11-19	2019-03-29	2019-06-25	2020-06-18	2020-07-16	2020-11-09	2021-03-24	2021-06-29	2021-08-27	2021-11-08
Dissolved Metals																
Aluminum	mg/L	0.020 - 0.050[g]	0.047 - 0.10[g]	0.012	0.026	0.0061	0.013	0.020	0.0077	-	0.016	-	-	-	-	0.011
Antimony	mg/L	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	<0.0001	-	-	-	-	<0.0001
Arsenic	mg/L	-	-	0.0013	0.00095	0.0016	0.0012	0.00099	0.0014	-	0.0014	-	-	-	-	0.0021
Barium	mg/L	-	-	0.010	0.012	0.015	0.010	0.010	0.014	-	0.016	-	-	-	-	0.013
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	<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 - 0.00018[b]	0.000038 - 0.00048[b]	<0.000005	<0.000005	<0.000005	<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	-	<0.00001	-	-	-	-	<0.00001
Chromium	mg/L	-	-	0.00013	0.00011	0.00014	0.00015	0.00013	<0.0001	-	0.00011	-	-	-	-	<0.0005
Cobalt	mg/L	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	<0.0001	-	-	-	-	<0.0001
Copper	mg/L	0.00020-0.00039[h]	0.00020-0.00040[h]	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	-	**0.00037[Mn, Mx]**	-	-	-	-	**0.00222[Mn, Mx]**
Iron	mg/L	-	0.35	0.013	0.022	0.018	0.032	0.033	0.026	-	0.049	-	-	-	-	0.024
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	<0.001	<0.001	-	<0.001	-	-	-	-	<0.001
Manganese	mg/L	-	-	0.0025	0.0038	0.0073	0.0084	0.0071	0.015	-	0.013	-	-	-	-	0.0072
Mercury	mg/L	-	-	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	-	<0.000005	-	-	-	-	<0.000005
Molybdenum	mg/L	-	-	0.00015	0.00011	0.00020	0.00014	0.00014	0.00015	-	0.00017	-	-	-		0.00020
Nickel	mg/L	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	-	<0.0005	-	-	-	-	<0.0005
Rubidium	mg/L	-	-	0.00038	0.00045	0.00044	0.00047	0.00041	0.00037	-	0.00050	-	-	-	-	0.00035
Selenium	mg/L	-	-	<0.00005	<0.00005	0.000057	<0.00005	<0.00005	<0.00005	-	<0.00005	-	-	-	-	0.000062
Silicon	mg/L	-	-	4.0	3.4	4.3	4.2	3.5	4.4	-	4.4	-	-	-	-	4.0
Silver	mg/L	-	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	-	<0.00001	-	-	-	-	<0.00001
Strontium	mg/L	-	-	0.047	0.044	0.065	0.048	0.041	0.058	-	0.058	-	-	-	-	0.048
Sulphur	mg/L	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	-	-	-	-	0.59
Tellurium	mg/L	-	-	<0.0002	<0.0002	<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
Thorium	mg/L	-	-	<0.0001	<0.0001	<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	-	<0.0001	-	-	-	-	<0.0001
Titanium	mg/L	-	-	<0.0003	<0.0003	<0.0003	<0.0003	0.00031	<0.0003	-	<0.0003	-	-	-	-	<0.0003
Tungsten	mg/L	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	<0.0001	-	-	-	-	<0.0001
Uranium	mg/L	-	-	0.000026	0.000017	0.000031	0.000020	0.000017	0.000013	-	0.000022	-	-	-	-	0.000040
Vanadium	mg/L	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	-	<0.0005	-	-	-	-	0.00073
Zinc	mg/L	-	-	<0.001	<0.001	0.0010	<0.001	<0.001	<0.001	-	<0.001	-	-	-	-	0.0023
Zirconium	mg/L	-	-	<0.00006	<0.00006	<0.00006	<0.00006	<0.00006	<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.
[e] & [f] = the ammonia guideline is pH and temperature dependent.
[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: Analytical Data
Table C-1: Results of Surface Water Analyses
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name		SW-05	SW-05	SW-05	SW-05	SW-05	SW-05	SW-05	SW-05	SW-05
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	2017-07-05	2017-09-26	2017-11-08	2018-04-12	2018-07-17	2018-11-19	2019-03-29	2019-06-25	2020-06-18
Dissolved Metals												
Aluminum	mg/L	0.020 - 0.050[g]	0.047 - 0.10[g]	<0.005	<0.005	0.0044	0.0056	0.0026	0.0032	0.0012	0.0024	-
Antimony	mg/L	-	-	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-
Arsenic	mg/L	-	-	0.0017	0.0018	0.0018	0.0018	0.0019	0.0019	0.0020	0.0020	-
Barium	mg/L	-	-	0.019	0.020	0.022	0.021	0.020	0.021	0.023	0.021	-
Beryllium	mg/L	-	-	<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	<0.00005	<0.00005	-
Boron	mg/L	-	-	0.0052	0.0073	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Cadmium	mg/L	0.000018 - 0.00018[b]	0.000038 - 0.00048[b]	<0.00001	<0.00001	0.0000050	<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	-	-	<0.0005	<0.0005	0.00035	0.00051	0.00033	0.00036	0.00033	0.00037	-
Cobalt	mg/L	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-
Copper	mg/L	0.00020-0.00039[h]	0.00020-0.00040[h]	<0.0002	<0.0004[DL>Mx]	**0.00033[Mn, Mx]**	<0.0002	**0.00025[Mn, Mx]**	<0.0002	<0.0002	<0.0002	-
Iron	mg/L	-	0.35	<0.01	<0.01	<0.01	<0.01	<0.01	0.012	<0.01	<0.01	-
Lead	mg/L	-	-	<0.0001	<0.0002	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	-
Lithium	mg/L	-	-	0.0010	0.0011	<0.001	0.0011	0.0010	0.0010	<0.001	0.0011	-
Manganese	mg/L	-	-	<0.0002	0.00038	<0.0001	0.00033	0.00073	0.0022	0.0064	0.00050	-
Mercury	mg/L	-	-	-	<0.00001	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	-
Molybdenum	mg/L	-	-	0.00038	0.00039	0.00040	0.00037	0.00036	0.00038	0.00027	0.00039	-
Nickel	mg/L	-	-	<0.0002	<0.0004	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	-
Rubidium	mg/L	-	-	-	-	0.00040	0.00034	0.00034	0.00029	0.00032	0.00033	-
Selenium	mg/L	-	-	<0.0005	<0.0005	0.00012	0.00014	0.00016	0.00014	0.00016	0.00015	-
Silicon	mg/L	-	-	4.6	5.0	4.6	4.6	4.5	4.6	4.4	4.6	-
Silver	mg/L	-	-	<0.00005	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	-
Strontium	mg/L	-	-	0.091	0.10	0.10	0.10	0.10	0.10	0.095	0.10	-
Sulphur	mg/L	-	-	<3.0	<3.0	0.79	0.83	0.85	0.85	<0.5	0.74	-
Tellurium	mg/L	-	-	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	-
Thallium	mg/L	-	-	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	-
Thorium	mg/L	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-
Tin	mg/L	-	-	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-
Titanium	mg/L	-	-	<0.005	<0.005	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	-
Tungsten	mg/L	-	-	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-
Uranium	mg/L	-	-	0.00015	0.00014	0.00015	0.00015	0.00014	0.00014	0.00014	0.00014	-
Vanadium	mg/L	-	-	<0.001	<0.001	0.00088	0.00091	0.00086	0.00087	0.000095	0.0010	-
Zinc	mg/L	-	-	<0.004	0.0043	0.0011	<0.001	<0.001	<0.001	<0.001	<0.001	-
Zirconium	mg/L	-	-	<0.0001	<0.0001	<0.00006	<0.00006	<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.
[e] & [f] = the ammonia guideline is pH and temperature dependent.
[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: Analytical Data
Table C-1: Results of Surface Water Analyses
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name		SW-05	SW-05	SW-05	SW-05	SW-05	SW-05
		BC WQG AW-F 30-day mean (Chronic)	BC WQG AW-F Maximum (Acute)	2020-07-16	2020-11-09	2021-03-24	2021-06-29	2021-08-27	2021-11-08
Dissolved Metals									
Aluminum	mg/L	0.020 - 0.050[g]	0.047 - 0.10[g]	0.0035	-	-	-	-	0.0036
Antimony	mg/L	-	-	<0.0001	-	-	-	-	<0.0001
Arsenic	mg/L	-	-	0.0019	-	-	-	-	0.0017
Barium	mg/L	-	-	0.021	-	-	-	-	0.022
Beryllium	mg/L	-	-	<0.0001	-	-	-	-	<0.0001
Bismuth	mg/L	-	-	<0.00005	-	-	-	-	<0.00005
Boron	mg/L	-	-	<0.01	-	-	-	-	<0.01
Cadmium	mg/L	0.000018 - 0.00018[b]	0.000038 - 0.00048[b]	<0.000005	-	-	-	-	<0.000005
Cesium	mg/L	-	-	<0.00001	-	-	-	-	<0.00001
Chromium	mg/L	-	-	0.00034	-	-	-	-	<0.0005
Cobalt	mg/L	-	-	<0.0001	-	-	-	-	<0.0001
Copper	mg/L	0.00020-0.00039[h]	0.00020-0.00040[h]	<0.0002	-	-	-	-	**0.0009**[Mn, Mx]
Iron	mg/L	-	0.35	<0.01	-	-	-	-	<0.01
Lead	mg/L	-	-	<0.00005	-	-	-	-	<0.00005
Lithium	mg/L	-	-	0.0011	-	-	-	-	0.0012
Manganese	mg/L	-	-	0.00052	-	-	-	-	0.00056
Mercury	mg/L	-	-	<0.000005	-	-	-	-	<0.000005
Molybdenum	mg/L	-	-	0.00039	-	-	-	-	0.00034
Nickel	mg/L	-	-	<0.0005	-	-	-	-	<0.0005
Rubidium	mg/L	-	-	0.00030	-	-	-	-	0.00032
Selenium	mg/L	-	-	0.00015	-	-	-	-	0.00014
Silicon	mg/L	-	-	4.7	-	-	-	-	4.7
Silver	mg/L	-	-	<0.00001	-	-	-	-	<0.00001
Strontium	mg/L	-	-	0.100	-	-	-	-	0.10
Sulphur	mg/L	-	-	1.2	-	-	-	-	0.82
Tellurium	mg/L	-	-	<0.0002	-	-	-	-	<0.0002
Thallium	mg/L	-	-	<0.00001	-	-	-	-	<0.00001
Thorium	mg/L	-	-	<0.0001	-	-	-	-	<0.0001
Tin	mg/L	-	-	<0.0001	-	-	-	-	<0.0001
Titanium	mg/L	-	-	<0.0003	-	-	-	-	<0.0003
Tungsten	mg/L	-	-	<0.0001	-	-	-	-	<0.0001
Uranium	mg/L	-	-	0.00016	-	-	-	-	0.00014
Vanadium	mg/L	-	-	0.0010	-	-	-	-	0.00087
Zinc	mg/L	-	-	<0.001	-	-	-	-	0.0010
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.
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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

2 - Groundwater Data

Appendix C
Results of Groundwater Analyses - MW-1
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Sample Name	MW-1	MW-1	MW-1	MW-1	MW-1
			Laboratory ID	WG_E251530_41204_N	WG_E251530_41366_N	WG_E251530_42830_N	WG_E251530_42922_N	WG_E251530_43010_N
			Sample Date	2012-10-22	2013-04-02	2017-04-05	2017-07-06	2017-10-02
			QA/QC					
Anions + Nutrients								
Alkalinity, Total as CaCO3		ug/L		10200	13600	18000	12000	-
Bromide (Br)		ug/L		-	-	-	-	-
Chloride (Cl)	250000	ug/L		-	-	< 1000	1300	< 1000
Fluoride (F)	1.5	mg/L		-	-	< 0.1	< 0.1	-
Nitrate (as N)	10000	ug/L		-	-	41	200	< 10
Nitrite (as N)	1000	ug/L		-	-	< 10	< 10	-
Ammonia (as N)		ug/L		190	-	< 30	60	< 30
Total Kjeldahl Nitrogen		ug/L		-	-	-	-	-
Sulfate (SO4)	500000	ug/L		-	1060	1100	< 1000	< 1000
Total Nitrogen		ug/L		322	-	-	-	175
Phosphorus, dissolved		ug/L		-	-	<50	<50	<50
Field + Physical								
Dissolved Oxygen, field measured		mg/L		-	-	-	2.5	-
Conductivity, field measured		uS/cm		-	-	129	28.8	34.4
pH, field measured		pH units		-	-	7.9	8.3	6.49
pH, lab		pH units		6.8	7	6.7	6	6.8
Specific conductivity, field measured		uS/cm		-	-	-	-	-
Temperature, field measured		deg c		-	-	5.8	6.8	5
Conductivity		uS/cm		15.2	-	-	-	58.9
Total Dissolved Solids		mg/L		7	-	-	-	29
Total Suspended Solids		mg/L		-	-	230	-	-
Total Organic Carbon		mg/L		-	2.14	0.59	1.1	-
Hardness, Calcium Carbonate		mg/L		-	10.4	13.1	6.15	-
Hardness, Calcium Carbonate (Dissolved)		mg/L		-	-	-	-	-
Chemical Oxygen Demand		mg/L		-	-	-	-	-
Depth to Water		mbtoc		-	-	-	-	-
Metals, Dissolved								
Aluminum	9500	ug/L		-	-	< 5	< 5	< 5
Antimony	6	ug/L		-	0.056	< 0.1	< 0.1	< 0.2
Arsenic	10	ug/L		-	0.201	< 0.5	< 0.5	< 0.5
Barium	1000	ug/L		1.3	1.55	13.7	< 5	7.1
Beryllium	8	ug/L		-	-	< 0.1	< 0.1	< 0.1
Bismuth		ug/L		-	-	< 0.1	< 0.1	< 0.1
Boron	5000	ug/L		-	-	8	< 5	< 5
Cadmium	5	ug/L		0.016	0.008	0.02	0.034	0.023
Calcium		ug/L		-	-	4490	2230	-
Chromium	50	ug/L		-	-	< 0.5	< 0.5	< 0.5
Cobalt	1	ug/L		-	0.764	**2.11**	0.2	0.14
Copper	1500	ug/L		0.69	-	0.5	0.22	< 0.4
Iron	6500	ug/L		8.2	92.3	735	< 10	< 10
Lead	10	ug/L		-	-	< 0.1	< 0.1	< 0.2
Lithium	8	ug/L		-	-	< 0.1	0.55	< 0.1
Magnesium		ug/L		149	310	457	213	790
Manganese	1500	ug/L		374	339	390	356	32
Mercury	1	ug/L		-	-	< 0.02	< 0.02	< 0.01
Molybdenum	250	ug/L		-	0.284	0.16	< 0.1	< 0.1
Nickel	80	ug/L		-	-	6.5	1.05	< 0.4
Potassium		ug/L		-	-	270	1090	-
Selenium	10	ug/L		-	0.056	< 0.5	< 0.5	< 0.5
Silicon		ug/L		481	220	2800	1100	5400
Silver	20	ug/L		-	-	< 0.05	< 0.05	< 0.05
Sodium	200000	ug/L		1700	1350	1570	1950	1400
Strontium	2500	ug/L		15.3	32.6	39.3	16.1	42.3
Sulphur (S)		ug/L		-	-	< 3000	< 3000	< 3000
Tellurium		ug/L		-	-	< 0.2	< 0.2	< 0.5
Thallium		ug/L		-	-	< 0.02	< 0.02	< 0.02
Thorium-232		ug/L		-	-	< 0.1	< 0.1	< 0.1
Tin	2500	ug/L		-	-	< 0.2	< 0.2	< 0.2
Titanium		ug/L		-	-	< 5	< 5	-
Uranium	20	ug/L		-	-	< 0.02	< 0.02	< 0.02
Vanadium	20	ug/L		-	-	< 1	< 1	< 1
Zinc	3000	ug/L		-	-	17.8	< 4	< 4
Zirconium		ug/L		-	-	< 0.1	< 0.1	< 0.1
Cesium		ug/L		-	-	-	-	-
Rubidium		ug/L		-	-	-	-	-
Tungsten	3	ug/L		-	-	-	-	-

Table Notes:

Standards from the Contaminated Sites Regulation (CSR) for the protection of

QA/QC = Quality Assurance/Quality Control; FDA/FD = 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 - MW-1
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Sample Name	MW-1	MW-1	MW-1	MW-1	MW-1
			Laboratory ID	WG_E251530_43053_N	WG_E251530_43199_N	WG_E251530_43299_N	WG_E251530_43424_N	WG_E251530_43549_N
			Sample Date	2017-11-14	2018-04-09	2018-07-18	2018-11-20	2019-03-25
			QA/QC					
Anions + Nutrients								
Alkalinity, Total as CaCO3		ug/L		27000	28100	1000	21900	15700
Bromide (Br)		ug/L		-	-	< 50	< 50	< 50
Chloride (Cl)	250000	ug/L		< 500	< 500	< 500	< 500	560
Fluoride (F)	1.5	mg/L		0.044	0.051	0.047	0.043	0.034
Nitrate (as N)	10000	ug/L		156	148	166	166	21.6
Nitrite (as N)	1000	ug/L		< 1	< 1	< 1	< 1	< 1
Ammonia (as N)		ug/L		< 5	6.6	8.2	< 5	11.7
Total Kjeldahl Nitrogen		ug/L		-	-	-	-	-
Sulfate (SO4)	500000	ug/L		640	660	650	670	1070
Total Nitrogen		ug/L		-	-	-	-	-
Phosphorus, dissolved		ug/L		<50	<50	<50	<50	<50
Field + Physical								
Dissolved Oxygen, field measured		mg/L		9.8	8.6	7.3	0.8	10.5
Conductivity, field measured		uS/cm		32.6	29.3	36	42	28.3
pH, field measured		pH units		6.33	5.81	5.75	6.15	6.74
pH, lab		pH units		7.26	7.52	-	-	6.68
Specific conductivity, field measured		uS/cm		-	-	-	-	-
Temperature, field measured		deg c		4.7	4.8	5.1	5	5
Conductivity		uS/cm		-	-	-	-	-
Total Dissolved Solids		mg/L		-	-	-	-	-
Total Suspended Solids		mg/L		-	-	-	-	-
Total Organic Carbon		mg/L		0.52	3.76	1.95	5.2	4.46
Hardness, Calcium Carbonate		mg/L		23.1	19.7	19.3	15.8	14
Hardness, Calcium Carbonate (Dissolved)		mg/L		-	-	-	-	-
Chemical Oxygen Demand		mg/L		< 20	< 20	< 20	23	< 20
Depth to Water		mbtoc		-	45.91	44.74	46.54	46.84
Metals, Dissolved								
Aluminum	9500	ug/L		2.4	2.4	3.9	3.8	3.5
Antimony	6	ug/L		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Arsenic	10	ug/L		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Barium	1000	ug/L		6.83	5.7	5.87	5.63	5.51
Beryllium	8	ug/L		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Bismuth		ug/L		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Boron	5000	ug/L		< 10	< 10	< 10	< 10	< 10
Cadmium	5	ug/L		0.0573	0.0309	0.0183	0.0939	0.0906
Calcium		ug/L		8010	6530	6330	5240	4740
Chromium	50	ug/L		< 0.1	0.13	0.14	0.12	0.16
Cobalt	1	ug/L		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Copper	1500	ug/L		< 0.2	< 0.2	< 0.2	0.24	< 0.2
Iron	6500	ug/L		12	< 10	< 10	11	11
Lead	10	ug/L		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Lithium	8	ug/L		< 1	< 1	< 1	< 1	< 1
Magnesium		ug/L		755	831	849	660	534
Manganese	1500	ug/L		19.8	7.76	5.17	5.75	3.19
Mercury	1	ug/L		< 0.005	< 0.005	< 0.005	< 0.005	0.0057
Molybdenum	250	ug/L		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nickel	80	ug/L		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Potassium		ug/L		270	250	273	270	255
Selenium	10	ug/L		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Silicon		ug/L		5100	5230	4930	5280	5470
Silver	20	ug/L		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Sodium	200000	ug/L		1290	1400	1500	1550	1400
Strontium	2500	ug/L		43.9	45.4	44.6	40.8	43.4
Sulphur (S)		ug/L		< 500	< 500	< 500	< 500	< 500
Tellurium		ug/L		< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Thallium		ug/L		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Thorium-232		ug/L		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Tin	2500	ug/L		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Titanium		ug/L		< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Uranium	20	ug/L		-	< 0.01	< 0.01	< 0.01	< 0.01
Vanadium	20	ug/L		-	< 0.5	< 0.5	< 0.5	< 0.5
Zinc	3000	ug/L		-	< 1	< 1	1.1	< 1
Zirconium		ug/L		-	< 0.06	< 0.06	< 0.06	< 0.06
Cesium		ug/L		-	< 0.01	< 0.01	< 0.01	< 0.01
Rubidium		ug/L		-	0.36	0.39	0.37	0.37
Tungsten	3	ug/L		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1

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 - MW-1
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Sample Name	MW-1	MW-1	MW-1	MW-1	MW-1
			Laboratory ID	WG_E251530_43627_N	WG_E251530_43642_N	WG_E251530_44011_N	WG_E251530_44057_N	WG_E251530_44139_N
			Sample Date	2019-06-11	2019-06-26	2020-06-29	2020-08-14	2020-11-04
			QA/QC					FDA
Anions + Nutrients								
Alkalinity, Total as CaCO3		ug/L		-	15300	-	-	16100
Bromide (Br)		ug/L		-	< 50	-	-	-
Chloride (Cl)	250000	ug/L		-	< 500	-	-	< 500
Fluoride (F)	1.5	mg/L		-	0.047	-	-	0.044
Nitrate (as N)	10000	ug/L		-	168	-	-	195
Nitrite (as N)	1000	ug/L		-	3	-	-	< 1
Ammonia (as N)		ug/L		-	< 5	-	-	< 5
Total Kjeldahl Nitrogen		ug/L		-	-	-	-	145
Sulfate (SO4)	500000	ug/L		-	780	-	-	670
Total Nitrogen		ug/L		-	-	-	-	-
Phosphorus, dissolved		ug/L		-	<50	-	-	<50
Field + Physical								
Dissolved Oxygen, field measured		mg/L		-	9.5	-	-	9.8
Conductivity, field measured		uS/cm		37	38	40	-	23.6
pH, field measured		pH units		-	6.29	-	-	5.73
pH, lab		pH units		-	7.34	-	-	6.98
Specific conductivity, field measured		uS/cm		-	-	-	-	36.8
Temperature, field measured		deg c		5.1	5.4	5.9	-	5.1
Conductivity		uS/cm		-	-	-	-	36.9
Total Dissolved Solids		mg/L		-	-	-	-	-
Total Suspended Solids		mg/L		-	-	-	-	-
Total Organic Carbon		mg/L		-	3.19	-	-	2.1
Hardness, Calcium Carbonate		mg/L		-	14.1	-	-	-
Hardness, Calcium Carbonate (Dissolved)		mg/L		-	-	-	-	14.9
Chemical Oxygen Demand		mg/L		-	< 20	-	-	< 20
Depth to Water		mbtoc		46.84	46.83	57	60	47.08
Metals, Dissolved								
Aluminum	9500	ug/L		-	3.2	-	-	8.4
Antimony	6	ug/L		-	< 0.1	-	-	< 0.1
Arsenic	10	ug/L		-	< 0.1	-	-	< 0.1
Barium	1000	ug/L		-	6.03	-	-	5.42
Beryllium	8	ug/L		-	< 0.1	-	-	< 0.1
Bismuth		ug/L		-	< 0.05	-	-	< 0.05
Boron	5000	ug/L		-	< 10	-	-	< 10
Cadmium	5	ug/L		-	0.18	-	-	0.0264
Calcium		ug/L		-	4810	-	-	5140
Chromium	50	ug/L		-	0.14	-	-	0.19
Cobalt	1	ug/L		-	< 0.1	-	-	< 0.1
Copper	1500	ug/L		-	< 0.2	-	-	< 0.2
Iron	6500	ug/L		-	< 10	-	-	40
Lead	10	ug/L		-	< 0.05	-	-	< 0.05
Lithium	8	ug/L		-	< 1	-	-	< 1
Magnesium		ug/L		-	512	-	-	502
Manganese	1500	ug/L		-	3.64	-	-	5.02
Mercury	1	ug/L		-	< 0.005	-	-	< 0.005
Molybdenum	250	ug/L		-	< 0.05	-	-	< 0.05
Nickel	80	ug/L		-	< 0.5	-	-	< 0.5
Potassium		ug/L		-	263	-	-	299
Selenium	10	ug/L		-	< 0.05	-	-	< 0.05
Silicon		ug/L		-	5030	-	-	5340
Silver	20	ug/L		-	< 0.01	-	-	< 0.01
Sodium	200000	ug/L		-	1490	-	-	1590
Strontium	2500	ug/L		-	46.5	-	-	52.8
Sulphur (S)		ug/L		-	< 500	-	-	< 500
Tellurium		ug/L		-	< 0.2	-	-	< 0.2
Thallium		ug/L		-	< 0.01	-	-	< 0.01
Thorium-232		ug/L		-	< 0.1	-	-	< 0.1
Tin	2500	ug/L		-	< 0.1	-	-	< 0.1
Titanium		ug/L		-	< 0.3	-	-	0.31
Uranium	20	ug/L		-	< 0.01	-	-	< 0.01
Vanadium	20	ug/L		-	< 0.5	-	-	< 0.5
Zinc	3000	ug/L		-	< 1	-	-	< 1
Zirconium		ug/L		-	< 0.2	-	-	< 0.2
Cesium		ug/L		-	< 0.01	-	-	< 0.01
Rubidium		ug/L		-	0.41	-	-	0.4
Tungsten	3	ug/L		-	< 0.1	-	-	< 0.1

Table Notes:
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Result exceeds applicable CSR standard **744**
Detection limit exceeds applicable CSR standard ***< 2***

Appendix C
Results of Groundwater Analyses - MW-1
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Sample Name	MW-1	MW-1	MW-1	MW-1	MW-1
			Laboratory ID	WG_E251530_44139_FD	WG_E251530_44284_N	WG_E251530_44370_N	WG_E251530_44434_N	VA21C4924-003
			Sample Date	2020-11-04	2021-03-29	2021-06-23	2021-08-26	2021-11-04
			QA/QC	FD				
Anions + Nutrients								
Alkalinity, Total as CaCO3		ug/L		17200	-	-	-	14900
Bromide (Br)		ug/L		-	-	-	-	< 50
Chloride (Cl)	250000	ug/L		< 500	-	-	-	< 500
Fluoride (F)	1.5	mg/L		0.045	-	-	-	0.044
Nitrate (as N)	10000	ug/L		192	-	-	-	176
Nitrite (as N)	1000	ug/L		< 1	-	-	-	< 1
Ammonia (as N)		ug/L		< 5	-	-	-	< 5
Total Kjeldahl Nitrogen		ug/L		106	-	-	-	72
Sulfate (SO4)	500000	ug/L		680	-	-	-	1140
Total Nitrogen		ug/L		-	-	-	-	-
Phosphorus, dissolved		ug/L		<50	-	-	-	<50
Field + Physical								
Dissolved Oxygen, field measured		mg/L		9.8	14.5	-	-	9.1
Conductivity, field measured		uS/cm		23.6	24.9	46	45	52
pH, field measured		pH units		5.73	6.17	-	-	5.96
pH, lab		pH units		6.98	-	-	-	6.5
Specific conductivity, field measured		uS/cm		36.8	40.2	-	-	33.4
Temperature, field measured		deg c		5.1	5.3	5.8	5.2	5.5
Conductivity		uS/cm		36.8	-	-	-	32.8
Total Dissolved Solids		mg/L		-	-	-	-	-
Total Suspended Solids		mg/L		-	-	-	-	-
Total Organic Carbon		mg/L		2.09	-	-	-	3.49
Hardness, Calcium Carbonate		mg/L		-	-	-	-	-
Hardness, Calcium Carbonate (Dissolved)		mg/L		14.9	-	-	-	12.2
Chemical Oxygen Demand		mg/L		< 20	-	-	-	< 20
Depth to Water		mbtoc		47.08	42.03	38.83	40.49	42.1
Metals, Dissolved								
Aluminum	9500	ug/L		8.2	-	-	-	3.5
Antimony	6	ug/L		< 0.1	-	-	-	< 0.1
Arsenic	10	ug/L		< 0.1	-	-	-	< 0.1
Barium	1000	ug/L		5.52	-	-	-	3.98
Beryllium	8	ug/L		< 0.1	-	-	-	< 0.1
Bismuth		ug/L		< 0.05	-	-	-	< 0.05
Boron	5000	ug/L		< 10	-	-	-	< 10
Cadmium	5	ug/L		0.0424	-	-	-	0.0175
Calcium		ug/L		5160	-	-	-	4260
Chromium	50	ug/L		0.2	-	-	-	< 0.5
Cobalt	1	ug/L		< 0.1	-	-	-	< 0.1
Copper	1500	ug/L		0.44	-	-	-	0.67
Iron	6500	ug/L		32	-	-	-	< 10
Lead	10	ug/L		< 0.05	-	-	-	< 0.05
Lithium	8	ug/L		< 1	-	-	-	< 1
Magnesium		ug/L		501	-	-	-	393
Manganese	1500	ug/L		4.93	-	-	-	1.23
Mercury	1	ug/L		< 0.005	-	-	-	< 0.005
Molybdenum	250	ug/L		0.079	-	-	-	< 0.05
Nickel	80	ug/L		< 0.5	-	-	-	< 0.5
Potassium		ug/L		285	-	-	-	245
Selenium	10	ug/L		< 0.05	-	-	-	0.066
Silicon		ug/L		5330	-	-	-	5050
Silver	20	ug/L		< 0.01	-	-	-	< 0.01
Sodium	200000	ug/L		1600	-	-	-	1370
Strontium	2500	ug/L		53.7	-	-	-	40.8
Sulphur (S)		ug/L		< 500	-	-	-	< 500
Tellurium		ug/L		< 0.2	-	-	-	< 0.2
Thallium		ug/L		< 0.01	-	-	-	< 0.01
Thorium-232		ug/L		< 0.1	-	-	-	< 0.1
Tin	2500	ug/L		< 0.1	-	-	-	< 0.1
Titanium		ug/L		< 0.3	-	-	-	< 0.3
Uranium	20	ug/L		< 0.01	-	-	-	< 0.01
Vanadium	20	ug/L		< 0.5	-	-	-	< 0.5
Zinc	3000	ug/L		1.3	-	-	-	< 1
Zirconium		ug/L		< 0.2	-	-	-	< 0.2
Cesium		ug/L		< 0.01	-	-	-	< 0.01
Rubidium		ug/L		0.37	-	-	-	0.34
Tungsten	3	ug/L		< 0.1	-	-	-	< 0.1

Table Notes:
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Result exceeds applicable CSR standard **744**
Detection limit exceeds applicable CSR standard ***< 2***

Appendix C
Results of Groundwater Analyses - MW-2
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Sample Name	MW-2	MW-2	MW-2	MW-2	MW-2
			Laboratory ID	WG_E251531_41204_N	WG_E251531_41366_N	WG_E251531_43010_N	WG_E251531_43053_N	WG_E251531_43200_N
			Sample Date	2012-10-22	2013-04-02	2017-10-02	2017-11-14	2018-04-10
			QA/QC					
Anions + Nutrients								
Alkalinity, Total as CaCO3		ug/L		12600	13000	24000	-	-
Bromide (Br)		ug/L		-	-	-	-	-
Chloride (Cl)	250000	ug/L		-	-	< 1000	510	< 500
Fluoride (F)	1.5	mg/L		-	-	< 0.1	-	0.021
Nitrate (as N)	10000	ug/L		-	-	< 10	212	227
Nitrite (as N)	1000	ug/L		-	-	< 100	-	< 1
Ammonia (as N)		ug/L		60	-	< 30	< 5	< 5
Total Kjeldahl Nitrogen		ug/L		-	-	-	-	-
Sulfate (SO4)	500000	ug/L		-	1300	1300	1130	1030
Total Nitrogen		ug/L		317	-	383	-	-
Phosphorus, dissolved		ug/L		-	-	<50	<50	<50
Field + Physical								
Dissolved Oxygen, field measured		mg/L		-	-	9.7	-	9.2
Conductivity, field measured		uS/cm		-	-	29.1	29.9	28
pH, field measured		pH units		-	-	6.36	6.31	5.84
pH, lab		pH units		7	7	6.6	7.21	7.43
Specific conductivity, field measured		uS/cm		-	-	-	-	-
Temperature, field measured		deg c		-	-	4.3	4.5	4
Conductivity		uS/cm		18.8	-	-	-	-
Total Dissolved Solids		mg/L		9	-	24	-	-
Total Suspended Solids		mg/L		-	-	270	-	-
Total Organic Carbon		mg/L		-	-	-	-	0.85
Hardness, Calcium Carbonate		mg/L		-	7.42	24.7	-	17.8
Hardness, Calcium Carbonate (Dissolved)		mg/L		-	-	-	-	-
Chemical Oxygen Demand		mg/L		-	-	-	-	37
Depth to Water		mbtoc		-	-	-	-	45.79
Metals, Dissolved								
Aluminum	9500	ug/L		-	-	< 5	1.5	1.5
Antimony	6	ug/L		-	-	< 0.2	< 0.1	< 0.1
Arsenic	10	ug/L		-	0.048	0.5	< 0.1	< 0.1
Barium	1000	ug/L		1.8	1.4	8.5	19.2	8.67
Beryllium	8	ug/L		-	-	< 0.1	< 0.1	< 0.1
Bismuth		ug/L		-	-	< 0.1	< 0.05	< 0.05
Boron	5000	ug/L		-	-	< 5	< 10	< 10
Cadmium	5	ug/L		0.074	-	0.014	0.0129	0.029
Calcium		ug/L		-	-	5990	-	6120
Chromium	50	ug/L		-	-	< 0.5	< 0.1	< 0.1
Cobalt	1	ug/L		-	0.03	0.12	0.16	0.14
Copper	1500	ug/L		0.71	-	< 0.4	< 0.2	< 0.2
Iron	6500	ug/L		-	953	< 10	60	74
Lead	10	ug/L		-	-	< 0.2	< 0.05	< 0.05
Lithium	8	ug/L		-	-	0.12	< 1	< 1
Magnesium		ug/L		118	-	763	658	620
Manganese	1500	ug/L		137	153	31.3	46.1	32
Mercury	1	ug/L		-	-	< 0.01	< 0.005	< 0.005
Molybdenum	250	ug/L		-	0.125	< 0.1	0.062	< 0.05
Nickel	80	ug/L		-	-	0.55	0.59	0.73
Potassium		ug/L		-	-	350	-	367
Selenium	10	ug/L		-	-	< 0.5	< 0.05	< 0.05
Silicon		ug/L		276	156	6100	5660	5700
Silver	20	ug/L		-	-	< 0.05	< 0.01	< 0.01
Sodium	200000	ug/L		1890	1640	1660	2030	1600
Strontium	2500	ug/L		18.5	19.3	41.7	43.2	48.3
Sulphur (S)		ug/L		-	-	< 3000	< 500	< 500
Tellurium		ug/L		-	-	< 0.5	< 0.2	< 0.2
Thallium		ug/L		-	-	< 0.02	< 0.01	< 0.01
Thorium-232		ug/L		-	-	< 0.1	< 0.1	< 0.1
Tin	2500	ug/L		-	-	< 0.2	< 0.1	< 0.1
Titanium		ug/L		-	-	< 5	-	< 0.3
Uranium	20	ug/L		-	-	< 0.02	< 0.01	< 0.01
Vanadium	20	ug/L		-	-	< 1	< 0.5	< 0.5
Zinc	3000	ug/L		-	-	< 4	1.3	< 1
Zirconium		ug/L		-	-	< 0.1	< 0.06	< 0.06
Cesium		ug/L		-	-	-	-	< 0.01
Rubidium		ug/L		-	-	-	-	0.36
Tungsten	3	ug/L		-	-	-	-	< 0.1

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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 - MW-2
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Sample Name	MW-2	MW-2	MW-2	MW-2	MW-2
			Laboratory ID	WG_E251531_43300_N	WG_E251531_43424_N	WG_E251531_43551_N	WG_E251531_43627_N	WG_E251531_43642_N
			Sample Date	2018-07-19	2018-11-20	2019-03-27	2019-06-11	2019-06-26
			QA/QC					
Anions + Nutrients								
Alkalinity, Total as CaCO3		ug/L		31100	25200	22600	-	27200
Bromide (Br)		ug/L		-	< 50	< 50	-	< 50
Chloride (Cl)	250000	ug/L		< 500	< 500	< 500	-	< 500
Fluoride (F)	1.5	mg/L		0.027	0.023	0.049	-	0.025
Nitrate (as N)	10000	ug/L		227	227	< 5	-	210
Nitrite (as N)	1000	ug/L		< 1	< 1	< 1	-	< 1
Ammonia (as N)		ug/L		5.8	13.4	11.7	-	< 5
Total Kjeldahl Nitrogen		ug/L		-	-	-	-	-
Sulfate (SO4)	500000	ug/L		1060	980	550	-	1040
Total Nitrogen		ug/L		-	-	-	-	-
Phosphorus, dissolved		ug/L		<50	<50	<50	-	<50
Field + Physical								
Dissolved Oxygen, field measured		mg/L		8.2	1	8.4	-	9.7
Conductivity, field measured		uS/cm		49	57	36.4	51	50
pH, field measured		pH units		5.97	6.48	7.02	-	6.57
pH, lab		pH units		-	-	7.22	-	7.08
Specific conductivity, field measured		uS/cm		-	-	-	-	-
Temperature, field measured		deg c		4	4.4	4.4	4.6	4.6
Conductivity		uS/cm		-	-	-	-	-
Total Dissolved Solids		mg/L		-	-	-	-	-
Total Suspended Solids		mg/L		-	-	-	-	-
Total Organic Carbon		mg/L		8.43	6.4	3.85	-	1.22
Hardness, Calcium Carbonate		mg/L		22.8	25.9	21.9	-	22
Hardness, Calcium Carbonate (Dissolved)		mg/L		-	-	-	-	-
Chemical Oxygen Demand		mg/L		49	28	< 20	-	< 20
Depth to Water		mbtoc		44.54	46.83	46.12	46.31	46.54
Metals, Dissolved								
Aluminum	9500	ug/L		2	4.7	3	-	2.8
Antimony	6	ug/L		< 0.1	< 0.1	< 0.1	-	< 0.1
Arsenic	10	ug/L		< 0.1	< 0.1	< 0.1	-	< 0.1
Barium	1000	ug/L		9.2	8.28	9.67	-	11.4
Beryllium	8	ug/L		< 0.1	< 0.1	< 0.1	-	< 0.1
Bismuth		ug/L		< 0.05	< 0.05	< 0.05	-	< 0.05
Boron	5000	ug/L		< 10	< 10	< 10	-	< 10
Cadmium	5	ug/L		0.0234	0.08	0.0456	-	0.0367
Calcium		ug/L		7750	8800	7580	-	7580
Chromium	50	ug/L		< 0.1	0.11	0.12	-	< 0.1
Cobalt	1	ug/L		0.15	< 0.1	0.24	-	0.32
Copper	1500	ug/L		< 0.2	0.34	< 0.2	-	< 0.2
Iron	6500	ug/L		< 10	14	48	-	125
Lead	10	ug/L		< 0.05	< 0.05	< 0.05	-	< 0.05
Lithium	8	ug/L		< 1	< 1	< 1	-	< 1
Magnesium		ug/L		832	956	724	-	741
Manganese	1500	ug/L		61.3	49.5	50.8	-	61.3
Mercury	1	ug/L		< 0.005	< 0.005	0.0074	-	< 0.005
Molybdenum	250	ug/L		< 0.05	< 0.05	< 0.05	-	< 0.05
Nickel	80	ug/L		0.61	0.71	0.55	-	0.54
Potassium		ug/L		423	444	393	-	411
Selenium	10	ug/L		< 0.05	< 0.05	< 0.05	-	< 0.05
Silicon		ug/L		5620	5540	6090	-	5750
Silver	20	ug/L		< 0.01	< 0.01	< 0.01	-	< 0.01
Sodium	200000	ug/L		1640	1710	1640	-	1680
Strontium	2500	ug/L		55.7	48.3	53.6	-	58
Sulphur (S)		ug/L		< 500	< 500	< 500	-	< 500
Tellurium		ug/L		< 0.2	< 0.2	< 0.2	-	< 0.2
Thallium		ug/L		< 0.01	< 0.01	< 0.01	-	< 0.01
Thorium-232		ug/L		< 0.1	< 0.1	< 0.1	-	< 0.1
Tin	2500	ug/L		< 0.1	0.28	< 0.1	-	< 0.1
Titanium		ug/L		< 0.3	< 0.3	< 0.3	-	< 0.3
Uranium	20	ug/L		< 0.01	< 0.01	< 0.01	-	< 0.01
Vanadium	20	ug/L		< 0.5	< 0.5	< 0.5	-	< 0.5
Zinc	3000	ug/L		< 1	< 1	< 1	-	1
Zirconium		ug/L		< 0.06	< 0.06	< 0.06	-	< 0.2
Cesium		ug/L		< 0.01	< 0.01	< 0.01	-	< 0.01
Rubidium		ug/L		0.5	0.5	0.42	-	0.43
Tungsten	3	ug/L		< 0.1	< 0.1	< 0.1	-	< 0.1

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

Appendix C
Results of Groundwater Analyses - MW-2
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Sample Name	MW-2	MW-2	MW-2	MW-2	MW-2
			Laboratory ID	WG_E251531_44011_N	WG_E251531_44057_N	WG_E251531_44138_N	WG_E251531_44285_N	WG_E251531_44371_N
			Sample Date	2020-06-29	2020-08-14	2020-11-03	2021-03-30	2021-06-24
			QA/QC					
Anions + Nutrients								
Alkalinity, Total as CaCO3		ug/L		-	-	20900	-	-
Bromide (Br)		ug/L		-	-	-	-	-
Chloride (Cl)	250000	ug/L		-	-	< 500	-	-
Fluoride (F)	1.5	mg/L		-	-	< 0.02	-	-
Nitrate (as N)	10000	ug/L		-	-	256	-	-
Nitrite (as N)	1000	ug/L		-	-	< 1	-	-
Ammonia (as N)		ug/L		-	-	77.1	-	-
Total Kjeldahl Nitrogen		ug/L		-	-	260	-	-
Sulfate (SO4)	500000	ug/L		-	-	930	-	-
Total Nitrogen		ug/L		-	-	-	-	-
Phosphorus, dissolved		ug/L		-	-	<50	-	-
Field + Physical								
Dissolved Oxygen, field measured		mg/L		-	-	7.9	7.5	-
Conductivity, field measured		uS/cm		60	64	28.7	32.6	66
pH, field measured		pH units		-	-	5.95	5.91	-
pH, lab		pH units		-	-	6.93	-	-
Specific conductivity, field measured		uS/cm		-	-	47	53.8	-
Temperature, field measured		deg c		4	4.2	4.2	4.4	4.2
Conductivity		uS/cm		-	-	48.5	-	-
Total Dissolved Solids		mg/L		-	-	-	-	-
Total Suspended Solids		mg/L		-	-	-	-	-
Total Organic Carbon		mg/L		-	-	1.57	-	-
Hardness, Calcium Carbonate		mg/L		-	-	-	-	-
Hardness, Calcium Carbonate (Dissolved)		mg/L		-	-	20.3	-	-
Chemical Oxygen Demand		mg/L		-	-	< 20	-	-
Depth to Water		mbtoc		55.93	55.9	46.8	40.75	53.98
Metals, Dissolved								
Aluminum	9500	ug/L		-	-	2.4	-	-
Antimony	6	ug/L		-	-	< 0.1	-	-
Arsenic	10	ug/L		-	-	0.14	-	-
Barium	1000	ug/L		-	-	11.4	-	-
Beryllium	8	ug/L		-	-	< 0.1	-	-
Bismuth		ug/L		-	-	< 0.05	-	-
Boron	5000	ug/L		-	-	< 10	-	-
Cadmium	5	ug/L		-	-	0.0787	-	-
Calcium		ug/L		-	-	7130	-	-
Chromium	50	ug/L		-	-	< 0.1	-	-
Cobalt	1	ug/L		-	-	0.16	-	-
Copper	1500	ug/L		-	-	1.63	-	-
Iron	6500	ug/L		-	-	59	-	-
Lead	10	ug/L		-	-	< 0.05	-	-
Lithium	8	ug/L		-	-	< 1	-	-
Magnesium		ug/L		-	-	610	-	-
Manganese	1500	ug/L		-	-	34.6	-	-
Mercury	1	ug/L		-	-	< 0.005	-	-
Molybdenum	250	ug/L		-	-	< 0.05	-	-
Nickel	80	ug/L		-	-	< 0.5	-	-
Potassium		ug/L		-	-	444	-	-
Selenium	10	ug/L		-	-	< 0.05	-	-
Silicon		ug/L		-	-	5830	-	-
Silver	20	ug/L		-	-	< 0.01	-	-
Sodium	200000	ug/L		-	-	1800	-	-
Strontium	2500	ug/L		-	-	63.8	-	-
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		-	-	< 0.3	-	-
Uranium	20	ug/L		-	-	< 0.01	-	-
Vanadium	20	ug/L		-	-	< 0.5	-	-
Zinc	3000	ug/L		-	-	3.2	-	-
Zirconium		ug/L		-	-	< 0.2	-	-
Cesium		ug/L		-	-	< 0.01	-	-
Rubidium		ug/L		-	-	0.44	-	-
Tungsten	3	ug/L		-	-	< 0.1	-	-

Table Notes:
Standards from the Contaminated Sites Regulation (CSR) for the protection of
QA/QC = Quality Assurance/Quality Control; FDA/FD = 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 - MW-2
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Sample Name	MW-2	MW-2	MW-2
			Laboratory ID	WG_E251531_44433_N	VA21C4924-001	VA21C4924-011
			Sample Date	2021-08-25	2021-11-03	2021-11-03
			QA/QC		FDA	FD
Anions + Nutrients						
Alkalinity, Total as CaCO3		ug/L		-	31400	32500
Bromide (Br)		ug/L		-	< 50	-
Chloride (Cl)	250000	ug/L		-	< 500	< 500
Fluoride (F)	1.5	mg/L		-	0.023	0.022
Nitrate (as N)	10000	ug/L		-	369	371
Nitrite (as N)	1000	ug/L		-	< 1	< 1
Ammonia (as N)		ug/L		-	6.6	5.5
Total Kjeldahl Nitrogen		ug/L		-	180	139
Sulfate (SO4)	500000	ug/L		-	820	820
Total Nitrogen		ug/L		-	-	-
Phosphorus, dissolved		ug/L		-	<50	<50
Field + Physical						
Dissolved Oxygen, field measured		mg/L		-	9.4	-
Conductivity, field measured		uS/cm		78	36.8	-
pH, field measured		pH units		-	6.21	-
pH, lab		pH units		-	6.66	6.54
Specific conductivity, field measured		uS/cm		-	59.1	-
Temperature, field measured		deg c		4.2	5.3	-
Conductivity		uS/cm		-	57.2	58.5
Total Dissolved Solids		mg/L		-	-	-
Total Suspended Solids		mg/L		-	-	-
Total Organic Carbon		mg/L		-	9.16	7.24
Hardness, Calcium Carbonate		mg/L		-	-	-
Hardness, Calcium Carbonate (Dissolved)		mg/L		-	23.1	24.2
Chemical Oxygen Demand		mg/L		-	41	39
Depth to Water		mbtoc		53.01	41.52	-
Metals, Dissolved						
Aluminum	9500	ug/L		-	3.8	3.5
Antimony	6	ug/L		-	< 0.1	< 0.1
Arsenic	10	ug/L		-	< 0.1	< 0.1
Barium	1000	ug/L		-	10.8	9.64
Beryllium	8	ug/L		-	< 0.1	< 0.1
Bismuth		ug/L		-	< 0.05	< 0.05
Boron	5000	ug/L		-	< 10	< 10
Cadmium	5	ug/L		-	0.0198	0.0251
Calcium		ug/L		-	7870	8290
Chromium	50	ug/L		-	< 0.5	< 0.5
Cobalt	1	ug/L		-	0.24	0.25
Copper	1500	ug/L		-	2.34	0.37
Iron	6500	ug/L		-	72	54
Lead	10	ug/L		-	< 0.05	< 0.05
Lithium	8	ug/L		-	< 1	< 1
Magnesium		ug/L		-	843	853
Manganese	1500	ug/L		-	45.6	46.9
Mercury	1	ug/L		-	< 0.005	< 0.005
Molybdenum	250	ug/L		-	< 0.05	< 0.05
Nickel	80	ug/L		-	0.53	0.5
Potassium		ug/L		-	423	436
Selenium	10	ug/L		-	< 0.05	< 0.05
Silicon		ug/L		-	5830	5960
Silver	20	ug/L		-	< 0.01	< 0.01
Sodium	200000	ug/L		-	1850	1840
Strontium	2500	ug/L		-	63.5	67
Sulphur (S)		ug/L		-	< 500	< 500
Tellurium		ug/L		-	< 0.2	< 0.2
Thallium		ug/L		-	< 0.01	< 0.01
Thorium-232		ug/L		-	< 0.1	< 0.1
Tin	2500	ug/L		-	0.1	< 0.1
Titanium		ug/L		-	< 0.3	< 0.3
Uranium	20	ug/L		-	< 0.01	< 0.01
Vanadium	20	ug/L		-	< 0.5	< 0.5
Zinc	3000	ug/L		-	3.7	< 1
Zirconium		ug/L		-	< 0.2	< 0.2
Cesium		ug/L		-	< 0.01	< 0.01
Rubidium		ug/L		-	0.5	0.47
Tungsten	3	ug/L		-	< 0.1	< 0.1

Table Notes:

Standards from the Contaminated Sites Regulation (CSR) for the protection of

QA/QC = Quality Assurance/Quality Control; FDA/FD = 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 - MW-3
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Sample Name	MW-3	MW-3	MW-3	MW-3	MW-3
			Laboratory ID	WG_E251532_41204_N	WG_E251532_41366_N	WG_E251532_42831_N	WG_E251532_42922_N	WG_E251532_43010_N
			Sample Date	2012-10-22	2013-04-02	2017-04-06	2017-07-06	2017-10-02
			QA/QC					
Anions + Nutrients								
Alkalinity, Total as CaCO3		ug/L		17300	18100	65000	61000	-
Bromide (Br)		ug/L		-	-	-	-	-
Chloride (Cl)	250000	ug/L		1000	-	< 1000	< 1000	< 1000
Fluoride (F)	1.5	mg/L		0.13	0.12	< 0.1	< 0.01	-
Nitrate (as N)	10000	ug/L		-	-	34	10	< 10
Nitrite (as N)	1000	ug/L		-	-	< 10	< 10	-
Ammonia (as N)		ug/L		30	-	< 30	< 30	< 30
Total Kjeldahl Nitrogen		ug/L		-	-	-	-	-
Sulfate (SO4)	500000	ug/L		-	1130	1500	1600	1500
Total Nitrogen		ug/L		233	-	-	-	84.8
Phosphorus, dissolved		ug/L		-	-	<50	<50	<50
Field + Physical								
Dissolved Oxygen, field measured		mg/L		-	-	12	16.6	6
Conductivity, field measured		uS/cm		-	-	132	108	82
pH, field measured		pH units		-	-	7.6	8.7	8.15
pH, lab		pH units		8.7	8.7	8.1	8.8	7.6
Specific conductivity, field measured		uS/cm		-	-	-	-	-
Temperature, field measured		deg c		-	-	-	3.7	-
Conductivity		uS/cm		29.3	-	-	-	121
Total Dissolved Solids		mg/L		13	-	-	-	60
Total Suspended Solids		mg/L		-	-	< 1	-	1
Total Organic Carbon		mg/L		-	-	< 0.5	< 0.5	-
Hardness, Calcium Carbonate		mg/L		-	14.9	62	52.5	-
Hardness, Calcium Carbonate (Dissolved)		mg/L		-	-	-	-	-
Chemical Oxygen Demand		mg/L		-	-	-	-	-
Depth to Water		mbtoc		-	-	-	-	-
Metals, Dissolved								
Aluminum	9500	ug/L		-	10.1	< 5	7.3	14.6
Antimony	6	ug/L		-	-	< 0.1	< 0.1	< 0.2
Arsenic	10	ug/L		-	0.052	0.65	0.6	0.93
Barium	1000	ug/L		-	0.58	8.7	6.1	8.6
Beryllium	8	ug/L		-	-	< 0.1	< 0.1	< 0.1
Bismuth		ug/L		-	-	< 0.1	< 0.1	< 0.1
Boron	5000	ug/L		-	-	< 4	24.1	< 5
Cadmium	5	ug/L		-	-	< 0.01	< 0.01	0.021
Calcium		ug/L		-	-	21500	11900	-
Chromium	50	ug/L		-	-	< 0.5	0.69	< 0.5
Cobalt	1	ug/L		-	-	< 0.05	0.79	< 0.1
Copper	1500	ug/L		0.93	-	7.9	8.41	20.9
Iron	6500	ug/L		-	-	16	< 10	< 10
Lead	10	ug/L		-	-	0.6	0.28	0.86
Lithium	8	ug/L		-	-	0.7	4.64	0.78
Magnesium		ug/L		277	-	1360	5520	1380
Manganese	1500	ug/L		17.8	5.3	5.69	4.96	8.85
Mercury	1	ug/L		-	-	< 0.02	< 0.02	< 0.01
Molybdenum	250	ug/L		-	0.222	< 0.1	0.13	0.12
Nickel	80	ug/L		-	-	< 0.2	1.74	1.15
Potassium		ug/L		-	-	510	460	-
Selenium	10	ug/L		-	-	< 0.5	< 0.5	< 0.5
Silicon		ug/L		-	-	5100	4500	5200
Silver	20	ug/L		-	-	< 0.05	< 0.05	< 0.05
Sodium	200000	ug/L		1430	1280	1740	1680	1780
Strontium	2500	ug/L		28.6	28.3	80.3	42.4	76.1
Sulphur (S)		ug/L		-	-	< 3000	< 3000	< 3000
Tellurium		ug/L		-	-	< 0.2	< 0.2	< 0.5
Thallium		ug/L		-	-	< 0.02	< 0.02	< 0.02
Thorium-232		ug/L		-	-	< 0.1	< 0.1	< 0.1
Tin	2500	ug/L		-	-	< 0.2	< 0.2	< 0.2
Titanium		ug/L		-	-	< 5	< 5	-
Uranium	20	ug/L		-	-	< 0.02	< 0.02	0.026
Vanadium	20	ug/L		-	-	< 1	< 1	< 1
Zinc	3000	ug/L		-	-	11.1	16.9	30.2
Zirconium		ug/L		-	-	< 0.1	< 0.1	< 0.1
Cesium		ug/L		-	-	-	-	-
Rubidium		ug/L		-	-	-	-	-
Tungsten	3	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 - MW-3
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Sample Name	MW-3	MW-3	MW-3	MW-3	MW-3
			Laboratory ID	WG_E251532_43053_N	WG_E251532_43200_N	WG_E251532_43424_N	WG_E251532_43549_N	WG_E251532_43642_N
			Sample Date	2017-11-14	2018-04-10	2018-11-20	2019-03-25	2019-06-26
			QA/QC					
Anions + Nutrients								
Alkalinity, Total as CaCO3		ug/L		56400	53400	60900	58400	67700
Bromide (Br)		ug/L		-	-	< 50	< 50	< 50
Chloride (Cl)	250000	ug/L		< 500	< 500	< 500	900	< 500
Fluoride (F)	1.5	mg/L		0.039	0.041	0.045	0.028	0.048
Nitrate (as N)	10000	ug/L		6.1	10.4	36	47.3	33.7
Nitrite (as N)	1000	ug/L		< 1	< 1	< 1	< 1	< 1
Ammonia (as N)		ug/L		< 5	5.5	< 5	< 5	< 5
Total Kjeldahl Nitrogen		ug/L		-	-	-	-	-
Sulfate (SO4)	500000	ug/L		1150	930	1040	370	1340
Total Nitrogen		ug/L		-	-	-	-	-
Phosphorus, dissolved		ug/L		<50	<50	<50	<50	<50
Field + Physical								
Dissolved Oxygen, field measured		mg/L		7.6	8.2	0.6	8.8	6.8
Conductivity, field measured		uS/cm		78.6	66.5	79.9	79.6	99.6
pH, field measured		pH units		8.92	7.33	7.9	8.15	7.98
pH, lab		pH units		8.23	7.93	-	8.08	8.05
Specific conductivity, field measured		uS/cm		-	-	-	-	-
Temperature, field measured		deg c		3	4.6	8.1	3.2	13.9
Conductivity		uS/cm		-	-	-	-	-
Total Dissolved Solids		mg/L		-	-	-	-	-
Total Suspended Solids		mg/L		-	-	-	-	-
Total Organic Carbon		mg/L		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Hardness, Calcium Carbonate		mg/L		54.1	47.3	60	53.6	67.6
Hardness, Calcium Carbonate (Dissolved)		mg/L		-	-	-	-	-
Chemical Oxygen Demand		mg/L		< 20	< 20	< 20	< 20	< 20
Depth to Water		mbtoc		-	44.53	-	-	-
Metals, Dissolved								
Aluminum	9500	ug/L		3.8	2.2	2.4	2.3	3.2
Antimony	6	ug/L		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Arsenic	10	ug/L		0.51	0.58	1.13	0.79	0.98
Barium	1000	ug/L		6.31	7.97	11.1	10.3	10.8
Beryllium	8	ug/L		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Bismuth		ug/L		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Boron	5000	ug/L		< 10	< 10	< 10	< 10	< 10
Cadmium	5	ug/L		0.338	0.0322	< 0.005	< 0.005	0.0129
Calcium		ug/L		13500	16800	21800	19100	23500
Chromium	50	ug/L		0.19	0.35	0.29	0.15	0.31
Cobalt	1	ug/L		0.25	< 0.1	< 0.1	< 0.1	0.15
Copper	1500	ug/L		21.1	3.66	3.15	1.99	2.49
Iron	6500	ug/L		12	14	< 10	25	< 10
Lead	10	ug/L		0.922	0.051	0.135	0.065	0.085
Lithium	8	ug/L		1.7	< 1	< 1	< 1	< 1
Magnesium		ug/L		4950	1320	1330	1450	1640
Manganese	1500	ug/L		14.5	31.6	0.25	5.97	2.89
Mercury	1	ug/L		< 0.005	< 0.005	< 0.005	0.0231	< 0.005
Molybdenum	250	ug/L		0.129	0.251	0.052	0.152	0.09
Nickel	80	ug/L		1.2	< 0.5	< 0.5	< 0.5	< 0.5
Potassium		ug/L		563	505	524	530	553
Selenium	10	ug/L		0.08	< 0.05	0.08	0.111	0.101
Silicon		ug/L		4140	4010	5110	4010	4650
Silver	20	ug/L		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Sodium	200000	ug/L		1620	1670	1770	1670	1750
Strontium	2500	ug/L		49.6	70.5	79.4	82.9	92.2
Sulphur (S)		ug/L		< 500	580	< 500	< 500	< 500
Tellurium		ug/L		< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Thallium		ug/L		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Thorium-232		ug/L		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Tin	2500	ug/L		0.81	0.26	< 0.1	< 0.1	< 0.1
Titanium		ug/L		< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Uranium	20	ug/L		-	0.013	0.022	0.017	0.021
Vanadium	20	ug/L		-	< 0.5	0.99	0.74	0.77
Zinc	3000	ug/L		-	15.8	7.3	5.4	5.3
Zirconium		ug/L		-	< 0.06	< 0.06	< 0.06	< 0.2
Cesium		ug/L		-	< 0.01	< 0.01	< 0.01	< 0.01
Rubidium		ug/L		-	0.28	0.32	0.31	0.34
Tungsten	3	ug/L		0.12	0.28	< 0.1	0.66	0.29

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 - MW-3
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Sample Name	MW-3	MW-3	MW-3	MW-3	MW-3	MW-3	MW-3
			Laboratory ID	WG_E251532_44011_N	WG_E251532_44057_N	WG_E251532_44139_N	WG_E251532_44258_N	WG_E251532_44371_N	WG_E251532_44432_N	VA21C4924-004
			Sample Date	2020-06-29	2020-08-14	2020-11-04	2021-03-03	2021-06-24	2021-08-24	2021-11-03
			QA/QC							
Anions + Nutrients										
Alkalinity, Total as CaCO3		ug/L		-	-	66800	-	-	-	66000
Bromide (Br)		ug/L		-	-	-	-	-	-	< 50
Chloride (Cl)	250000	ug/L		-	-	< 500	-	-	-	< 500
Fluoride (F)	1.5	mg/L		-	-	0.047	-	-	-	0.056
Nitrate (as N)	10000	ug/L		-	-	35.3	-	-	-	33.8
Nitrite (as N)	1000	ug/L		-	-	1.3	-	-	-	< 1
Ammonia (as N)		ug/L		-	-	6	-	-	-	< 5
Total Kjeldahl Nitrogen		ug/L		-	-	< 50	-	-	-	< 50
Sulfate (SO4)	500000	ug/L		-	-	1450	-	-	-	1330
Total Nitrogen		ug/L		-	-	-	-	-	-	-
Phosphorus, dissolved		ug/L		-	-	<50	-	-	-	<50
Field + Physical										
Dissolved Oxygen, field measured		mg/L		-	-	7	10.6	-	9.4	11.4
Conductivity, field measured		uS/cm		84	102	85.4	76.7	93	89.6	78.6
pH, field measured		pH units		-	-	8.23	8.24	-	8.36	8.41
pH, lab		pH units		-	-	8.02	-	-	-	7.96
Specific conductivity, field measured		uS/cm		-	-	128.6	122.1	-	109.8	129.8
Temperature, field measured		deg c		5.3	5.2	5.2	5.4	5.7	15.3	7
Conductivity		uS/cm		-	-	137	-	-	-	120
Total Dissolved Solids		mg/L		-	-	-	-	-	-	-
Total Suspended Solids		mg/L		-	-	-	-	-	-	-
Total Organic Carbon		mg/L		-	-	0.74	-	-	-	1.06
Hardness, Calcium Carbonate		mg/L		-	-	-	-	-	-	-
Hardness, Calcium Carbonate (Dissolved)		mg/L		-	-	65.3	-	-	-	55.6
Chemical Oxygen Demand		mg/L		-	-	< 20	-	-	-	< 20
Depth to Water		mbtoc		44.47	47.42	45.69	41.14	38.43	-	41.12
Metals, Dissolved										
Aluminum	9500	ug/L		-	-	3.2	-	-	-	2.8
Antimony	6	ug/L		-	-	< 0.1	-	-	-	< 0.1
Arsenic	10	ug/L		-	-	1.2	-	-	-	1.13
Barium	1000	ug/L		-	-	11.2	-	-	-	9.8
Beryllium	8	ug/L		-	-	< 0.1	-	-	-	< 0.1
Bismuth		ug/L		-	-	< 0.05	-	-	-	< 0.05
Boron	5000	ug/L		-	-	< 10	-	-	-	< 10
Cadmium	5	ug/L		-	-	< 0.005	-	-	-	< 0.005
Calcium		ug/L		-	-	23600	-	-	-	20100
Chromium	50	ug/L		-	-	0.33	-	-	-	< 0.5
Cobalt	1	ug/L		-	-	< 0.1	-	-	-	< 0.1
Copper	1500	ug/L		-	-	1.37	-	-	-	1.13
Iron	6500	ug/L		-	-	< 10	-	-	-	< 10
Lead	10	ug/L		-	-	< 0.05	-	-	-	< 0.05
Lithium	8	ug/L		-	-	< 1	-	-	-	< 1
Magnesium		ug/L		-	-	1540	-	-	-	1310
Manganese	1500	ug/L		-	-	0.56	-	-	-	3.28
Mercury	1	ug/L		-	-	< 0.005	-	-	-	< 0.005
Molybdenum	250	ug/L		-	-	< 0.05	-	-	-	0.054
Nickel	80	ug/L		-	-	< 0.5	-	-	-	< 0.5
Potassium		ug/L		-	-	576	-	-	-	522
Selenium	10	ug/L		-	-	0.15	-	-	-	0.084
Silicon		ug/L		-	-	5080	-	-	-	4980
Silver	20	ug/L		-	-	< 0.01	-	-	-	< 0.01
Sodium	200000	ug/L		-	-	1860	-	-	-	1670
Strontium	2500	ug/L		-	-	96.4	-	-	-	80.1
Sulphur (S)		ug/L		-	-	580	-	-	-	< 500
Tellurium		ug/L		-	-	< 0.2	-	-	-	< 0.2
Thallium		ug/L		-	-	< 0.01	-	-	-	< 0.01
Thorium-232		ug/L		-	-	< 0.1	-	-	-	< 0.1
Tin	2500	ug/L		-	-	< 0.1	-	-	-	< 0.1
Titanium		ug/L		-	-	< 0.3	-	-	-	< 0.3
Uranium	20	ug/L		-	-	0.022	-	-	-	0.02
Vanadium	20	ug/L		-	-	0.96	-	-	-	0.98
Zinc	3000	ug/L		-	-	2.3	-	-	-	3.5
Zirconium		ug/L		-	-	< 0.2	-	-	-	< 0.2
Cesium		ug/L		-	-	< 0.01	-	-	-	< 0.01
Rubidium		ug/L		-	-	0.33	-	-	-	0.3
Tungsten	3	ug/L		-	-	< 0.1	-	-	-	0.13

Table Notes:
Standards from the Contaminated Sites Regulation (CSR) for the protection of
QA/QC = Quality Assurance/Quality Control; FDA/FD = 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 - MW-4
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Sample Name	MW-4	MW-4	MW-4	MW-4	MW-4
			Laboratory ID	WG_E251533_41204_N	WG_E251533_41366_N	WG_E251533_41438_N	WG_E251533_42831_N	WG_E251533_42923_N
			Sample Date	2012-10-22	2013-04-02	2013-06-13	2017-04-06	2017-07-07
			QA/QC					
Anions + Nutrients								
Alkalinity, Total as CaCO3		ug/L		24300	28700	-	-	34000
Bromide (Br)		ug/L		-	-	-	-	-
Chloride (Cl)	250000	ug/L		-	-	-	< 1000	1800
Fluoride (F)	1.5	mg/L		0.16	0.2	-	-	< 0.1
Nitrate (as N)	10000	ug/L		-	-	-	< 10	71
Nitrite (as N)	1000	ug/L		-	-	-	-	< 10
Ammonia (as N)		ug/L		60	-	-	< 30	50
Total Kjeldahl Nitrogen		ug/L		-	-	-	-	-
Sulfate (SO4)	500000	ug/L		-	810	-	< 1000	< 1000
Total Nitrogen		ug/L		332	-	-	-	-
Phosphorus, dissolved		ug/L		-	-	-	<50	<50
Field + Physical								
Dissolved Oxygen, field measured		mg/L		-	-	-	-	1.5
Conductivity, field measured		uS/cm		-	-	-	57	61
pH, field measured		pH units		-	-	-	7.8	7.9
pH, lab		pH		8.5	7.4	-	8.3	8.2
Specific conductivity, field measured		uS/cm		-	-	-	-	-
Temperature, field measured		deg c		-	-	-	6.3	5.6
Conductivity		uS/cm		47.5	-	-	59.5	-
Total Dissolved Solids		mg/L		20	-	-	41	-
Total Suspended Solids		mg/L		-	-	-	270	-
Total Organic Carbon		mg/L		-	0.75	-	-	1.41
Hardness, Calcium Carbonate		mg/L		-	22.9	-	-	22.5
Hardness, Calcium Carbonate (Dissolved)		mg/L		-	-	-	-	-
Biochemical Oxygen Demand		mg/L		-	-	-	-	-
Chemical Oxygen Demand		mg/L		-	-	-	-	-
Depth to Water		mbtoc		-	-	-	-	-
Metals, Dissolved								
Aluminum	9500	ug/L		-	5.5	< 5	< 5	< 5
Antimony	6	ug/L		-	-	< 0.5	< 0.1	< 0.1
Arsenic	10	ug/L		-	0.076	-	< 0.5	< 0.5
Barium	1000	ug/L		6	5.19	-	37.5	9.8
Beryllium	8	ug/L		-	-	-	< 0.1	< 0.1
Bismuth		ug/L		-	-	-	< 0.1	< 0.1
Boron	5000	ug/L		-	-	-	6	< 5
Cadmium	5	ug/L		-	0.02	-	< 0.01	< 0.01
Calcium		ug/L		-	-	-	-	7460
Chromium	50	ug/L		-	-	-	< 0.5	< 0.5
Cobalt	1	ug/L		-	**7.6**	-	< 0.05	< 0.1
Copper	1500	ug/L		0.66	-	-	7.7	0.35
Iron	6500	ug/L		-	33.8	-	11	< 10
Lead	10	ug/L		-	-	-	< 0.1	< 0.1
Lithium	8	ug/L		-	-	-	0.4	0.72
Magnesium		ug/L		729	680	-	742	938
Manganese	1500	ug/L		96.3	348	-	23.7	< 0.2
Mercury	1	ug/L		-	-	-	< 0.02	< 0.02
Molybdenum	250	ug/L		-	0.116	-	0.14	< 0.1
Nickel	80	ug/L		-	-	-	0.5	0.22
Potassium		ug/L		-	-	-	-	1170
Selenium	10	ug/L		-	-	-	< 0.5	< 0.5
Silicon		ug/L		-	-	-	900	< 1000
Silver	20	ug/L		-	-	-	< 0.05	< 0.05
Sodium	200000	ug/L		1810	1520	-	2340	2710
Strontium	2500	ug/L		48.4	50.3	-	50.2	61.4
Sulphur (S)		ug/L		-	-	-	< 3000	< 3000
Tellurium		ug/L		-	-	-	< 0.2	< 0.2
Thallium		ug/L		-	-	-	< 0.02	< 0.02
Thorium-232		ug/L		-	-	-	< 0.1	< 0.1
Tin	2500	ug/L		-	-	-	< 0.2	< 0.2
Titanium		ug/L		-	-	-	-	< 5
Uranium	20	ug/L		-	-	-	< 0.02	< 0.02
Vanadium	20	ug/L		-	-	-	< 1	< 1
Zinc	3000	ug/L		-	-	-	8	< 4
Zirconium		ug/L		-	-	-	< 0.1	< 0.1
Cesium		ug/L		-	-	-	-	-
Rubidium		ug/L		-	-	-	-	-
Tungsten	3	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

< 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 - MW-4
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Sample Name	MW-4	MW-4	MW-4	MW-4	MW-4
			Laboratory ID	WG_E251533_43011_N	WG_E251533_43054_N	WG_E251533_43201_N	WG_E251533_43299_N	WG_E251533_43424_N
			Sample Date	2017-10-03	2017-11-15	2018-04-11	2018-07-18	2018-11-20
			QA/QC					
Anions + Nutrients								
Alkalinity, Total as CaCO3		ug/L		28000	27700	33200	39000	32900
Bromide (Br)		ug/L		-	-	< 50	< 50	< 50
Chloride (Cl)	250000	ug/L		1100	1610	540	< 500	< 500
Fluoride (F)	1.5	mg/L		0.11	0.09	0.076	0.048	0.045
Nitrate (as N)	10000	ug/L		< 10	13.9	129	61.8	46.6
Nitrite (as N)	1000	ug/L		< 10	< 1	< 1	< 1	< 1
Ammonia (as N)		ug/L		30	22.9	29.5	26.6	10.2
Total Kjeldahl Nitrogen		ug/L		-	-	-	-	-
Sulfate (SO4)	500000	ug/L		< 1000	< 300	340	750	< 300
Total Nitrogen		ug/L		285	-	-	-	-
Phosphorus, dissolved		ug/L		<50	<50	<50	<50	<50
Field + Physical								
Dissolved Oxygen, field measured		mg/L		8.9	6.4	5.9	5.5	8.6
Conductivity, field measured		uS/cm		33.5	33.3	40.8	66	68
pH, field measured		pH units		8.2	8.04	7.96	7.33	6.6
pH, lab		pH		8.1	7.62	7.65	-	-
Specific conductivity, field measured		uS/cm		-	-	-	-	-
Temperature, field measured		deg c		6.1	5	5.3	5.5	5.5
Conductivity		uS/cm		-	-	-	-	-
Total Dissolved Solids		mg/L		28	-	-	-	-
Total Suspended Solids		mg/L		66	-	-	-	-
Total Organic Carbon		mg/L		< 0.5	3.45	0.54	1.42	4.9
Hardness, Calcium Carbonate		mg/L		22.1	19.1	26.9	31.1	28.2
Hardness, Calcium Carbonate (Dissolved)		mg/L		-	-	-	-	-
Biochemical Oxygen Demand		mg/L		4.4	-	-	-	-
Chemical Oxygen Demand		mg/L		< 20	< 20	< 20	21	43
Depth to Water		mbtoc		-	24.4	24.62	24.19	24.99
Metals, Dissolved								
Aluminum	9500	ug/L		17.8	4.9	1.2	25.1	3.6
Antimony	6	ug/L		< 0.2	0.82	< 0.1	< 0.1	< 0.1
Arsenic	10	ug/L		< 0.5	0.94	< 0.1	0.11	< 0.1
Barium	1000	ug/L		7.9	6.81	5.03	9.98	9.94
Beryllium	8	ug/L		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Bismuth		ug/L		< 0.1	0.601	< 0.05	< 0.05	< 0.05
Boron	5000	ug/L		< 5	< 10	< 10	< 10	< 10
Cadmium	5	ug/L		0.482	0.484	< 0.005	0.0125	0.0446
Calcium		ug/L		6400	6160	9370	10900	9860
Chromium	50	ug/L		< 0.5	0.21	< 0.1	< 0.1	< 0.1
Cobalt	1	ug/L		< 0.1	0.25	< 0.1	< 0.1	< 0.1
Copper	1500	ug/L		2.1	3.72	< 0.2	6.6	1.77
Iron	6500	ug/L		< 10	18	< 10	536	22
Lead	10	ug/L		< 0.2	0.45	< 0.05	0.302	< 0.05
Lithium	8	ug/L		0.54	< 1	< 1	< 1	< 1
Magnesium		ug/L		921	895	837	964	874
Manganese	1500	ug/L		55.8	67.4	6.7	15.2	64.7
Mercury	1	ug/L		< 0.01	< 0.005	< 0.005	< 0.005	< 0.005
Molybdenum	250	ug/L		0.14	0.355	0.122	0.136	0.085
Nickel	80	ug/L		0.71	1.22	< 0.5	< 0.5	< 0.5
Potassium		ug/L		930	1160	757	759	790
Selenium	10	ug/L		< 0.5	0.866	< 0.05	< 0.05	< 0.05
Silicon		ug/L		< 1000	718	1330	2080	1330
Silver	20	ug/L		< 0.05	0.017	< 0.01	< 0.01	< 0.01
Sodium	200000	ug/L		2460	3130	2040	1900	1930
Strontium	2500	ug/L		57.3	53.6	59.1	63.5	60.4
Sulphur (S)		ug/L		< 3000	< 500	< 500	< 500	< 500
Tellurium		ug/L		< 0.5	< 0.2	< 0.2	< 0.2	< 0.2
Thallium		ug/L		< 0.02	0.851	< 0.01	< 0.01	< 0.01
Thorium-232		ug/L		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Tin	2500	ug/L		< 0.2	2.35	< 0.1	< 0.1	0.9
Titanium		ug/L		< 5	< 0.3	< 0.3	0.56	< 0.3
Uranium	20	ug/L		-	< 0.01	< 0.01	0.011	< 0.01
Vanadium	20	ug/L		-	< 0.5	< 0.5	< 0.5	< 0.5
Zinc	3000	ug/L		-	3.8	< 1	5.8	< 1
Zirconium		ug/L		-	< 0.06	< 0.06	< 0.06	< 0.06
Cesium		ug/L		-	0.042	< 0.01	< 0.01	< 0.01
Rubidium		ug/L		-	0.61	0.25	0.27	0.23
Tungsten	3	ug/L		-	< 0.1	< 0.1	< 0.1	< 0.1

Table Notes:
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Result exceeds applicable CSR standard **744**
Detection limit exceeds applicable CSR standard ***< 2***

Appendix C
Results of Groundwater Analyses - MW-4
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Sample Name	MW-4	MW-4	MW-4	MW-4	MW-4
			Laboratory ID	WG_E251533_43550_N	WG_E251533_43551_N	WG_E251533_43627_N	WG_E251533_44011_N	WG_E251533_44057_N
			Sample Date	2019-03-26	2019-03-27	2019-06-11	2020-06-29	2020-08-14
			QA/QC					
Anions + Nutrients								
Alkalinity, Total as CaCO3		ug/L		-	37500	-	-	-
Bromide (Br)		ug/L		-	< 50	-	-	-
Chloride (Cl)	250000	ug/L		-	< 500	-	-	-
Fluoride (F)	1.5	mg/L		-	< 0.02	-	-	-
Nitrate (as N)	10000	ug/L		-	< 5	-	-	-
Nitrite (as N)	1000	ug/L		-	< 1	-	-	-
Ammonia (as N)		ug/L		-	12.9	-	-	-
Total Kjeldahl Nitrogen		ug/L		-	-	-	-	-
Sulfate (SO4)	500000	ug/L		-	< 300	-	-	-
Total Nitrogen		ug/L		-	-	-	-	-
Phosphorus, dissolved		ug/L		-	<50	-	-	-
Field + Physical								
Dissolved Oxygen, field measured		mg/L		-	8	-	-	-
Conductivity, field measured		uS/cm		68	47.9	68	68	79
pH, field measured		pH units		-	7.66	-	-	-
pH, lab		pH		-	7.79	-	-	-
Specific conductivity, field measured		uS/cm		-	-	-	-	-
Temperature, field measured		deg c		5.8	4.6	5.6	5.8	5.5
Conductivity		uS/cm		-	-	-	-	-
Total Dissolved Solids		mg/L		-	-	-	-	-
Total Suspended Solids		mg/L		-	-	-	-	-
Total Organic Carbon		mg/L		-	5.27	-	-	-
Hardness, Calcium Carbonate		mg/L		-	36	-	-	-
Hardness, Calcium Carbonate (Dissolved)		mg/L		-	-	-	-	-
Biochemical Oxygen Demand		mg/L		-	-	-	-	-
Chemical Oxygen Demand		mg/L		-	< 20	-	-	-
Depth to Water		mbtoc		25.87	25.57	25.71	25.83	26.02
Metals, Dissolved								
Aluminum	9500	ug/L		-	7.8	-	-	-
Antimony	6	ug/L		-	< 0.1	-	-	-
Arsenic	10	ug/L		-	0.1	-	-	-
Barium	1000	ug/L		-	8.37	-	-	-
Beryllium	8	ug/L		-	< 0.1	-	-	-
Bismuth		ug/L		-	0.082	-	-	-
Boron	5000	ug/L		-	< 10	-	-	-
Cadmium	5	ug/L		-	0.186	-	-	-
Calcium		ug/L		-	11700	-	-	-
Chromium	50	ug/L		-	< 0.1	-	-	-
Cobalt	1	ug/L		-	< 0.1	-	-	-
Copper	1500	ug/L		-	1.14	-	-	-
Iron	6500	ug/L		-	73	-	-	-
Lead	10	ug/L		-	< 0.05	-	-	-
Lithium	8	ug/L		-	< 1	-	-	-
Magnesium		ug/L		-	1610	-	-	-
Manganese	1500	ug/L		-	3.44	-	-	-
Mercury	1	ug/L		-	< 0.005	-	-	-
Molybdenum	250	ug/L		-	< 0.05	-	-	-
Nickel	80	ug/L		-	< 0.5	-	-	-
Potassium		ug/L		-	1060	-	-	-
Selenium	10	ug/L		-	0.058	-	-	-
Silicon		ug/L		-	3690	-	-	-
Silver	20	ug/L		-	< 0.01	-	-	-
Sodium	200000	ug/L		-	2620	-	-	-
Strontium	2500	ug/L		-	72.9	-	-	-
Sulphur (S)		ug/L		-	550	-	-	-
Tellurium		ug/L		-	< 0.2	-	-	-
Thallium		ug/L		-	< 0.01	-	-	-
Thorium-232		ug/L		-	< 0.1	-	-	-
Tin	2500	ug/L		-	0.69	-	-	-
Titanium		ug/L		-	< 0.3	-	-	-
Uranium	20	ug/L		-	0.013	-	-	-
Vanadium	20	ug/L		-	< 0.5	-	-	-
Zinc	3000	ug/L		-	2	-	-	-
Zirconium		ug/L		-	< 0.06	-	-	-
Cesium		ug/L		-	< 0.01	-	-	-
Rubidium		ug/L		-	0.31	-	-	-
Tungsten	3	ug/L		-	< 0.1	-	-	-

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

Appendix C
Results of Groundwater Analyses - MW-4
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Sample Name	MW-4	MW-4	MW-4	MW-4
			Laboratory ID	WG_E251533_44138_N	WG_E251533_44371_N	WG_E251533_44434_N	VA21C4924-005
			Sample Date	2020-11-03	2021-06-24	2021-08-26	2021-11-03
			QA/QC				
Anions + Nutrients							
Alkalinity, Total as CaCO3		ug/L		-	-	-	44300
Bromide (Br)		ug/L		-	-	-	< 50
Chloride (Cl)	250000	ug/L		-	-	-	< 500
Fluoride (F)	1.5	mg/L		-	-	-	0.083
Nitrate (as N)	10000	ug/L		-	-	-	31.6
Nitrite (as N)	1000	ug/L		-	-	-	< 1
Ammonia (as N)		ug/L		-	-	-	29.2
Total Kjeldahl Nitrogen		ug/L		-	-	-	178
Sulfate (SO4)	500000	ug/L		-	-	-	1130
Total Nitrogen		ug/L		-	-	-	-
Phosphorus, dissolved		ug/L		-	-	-	<50
Field + Physical							
Dissolved Oxygen, field measured		mg/L		-	-	-	6.5
Conductivity, field measured		uS/cm		101	62	62	37.5
pH, field measured		pH units		-	-	-	8.92
pH, lab		pH		-	-	-	8.1
Specific conductivity, field measured		uS/cm		-	-	-	50.2
Temperature, field measured		deg c		5.5	5.5	5.6	5.6
Conductivity		uS/cm		-	-	-	69.5
Total Dissolved Solids		mg/L		-	-	-	-
Total Suspended Solids		mg/L		-	-	-	-
Total Organic Carbon		mg/L		-	-	-	6.71
Hardness, Calcium Carbonate		mg/L		-	-	-	-
Hardness, Calcium Carbonate (Dissolved)		mg/L		-	-	-	27.1
Biochemical Oxygen Demand		mg/L		-	-	-	-
Chemical Oxygen Demand		mg/L		-	-	-	81
Depth to Water		mbtoc		25.72	24.85	20.38	21.44
Metals, Dissolved							
Aluminum	9500	ug/L		-	-	-	14.3
Antimony	6	ug/L		-	-	-	< 0.1
Arsenic	10	ug/L		-	-	-	< 0.1
Barium	1000	ug/L		-	-	-	6.29
Beryllium	8	ug/L		-	-	-	< 0.1
Bismuth		ug/L		-	-	-	< 0.05
Boron	5000	ug/L		-	-	-	< 10
Cadmium	5	ug/L		-	-	-	0.0168
Calcium		ug/L		-	-	-	9400
Chromium	50	ug/L		-	-	-	< 0.5
Cobalt	1	ug/L		-	-	-	< 0.1
Copper	1500	ug/L		-	-	-	0.88
Iron	6500	ug/L		-	-	-	819
Lead	10	ug/L		-	-	-	0.09
Lithium	8	ug/L		-	-	-	< 1
Magnesium		ug/L		-	-	-	884
Manganese	1500	ug/L		-	-	-	12.9
Mercury	1	ug/L		-	-	-	< 0.005
Molybdenum	250	ug/L		-	-	-	0.051
Nickel	80	ug/L		-	-	-	< 0.5
Potassium		ug/L		-	-	-	893
Selenium	10	ug/L		-	-	-	< 0.05
Silicon		ug/L		-	-	-	1960
Silver	20	ug/L		-	-	-	< 0.01
Sodium	200000	ug/L		-	-	-	1890
Strontium	2500	ug/L		-	-	-	60.3
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		-	-	-	0.12
Titanium		ug/L		-	-	-	0.34
Uranium	20	ug/L		-	-	-	< 0.01
Vanadium	20	ug/L		-	-	-	< 0.5
Zinc	3000	ug/L		-	-	-	1
Zirconium		ug/L		-	-	-	< 0.2
Cesium		ug/L		-	-	-	< 0.01
Rubidium		ug/L		-	-	-	0.24
Tungsten	3	ug/L		-	-	-	< 0.1

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

< 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 - MW-5
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Sample Name	MW-5	MW-5	MW-5	MW-5	MW-5
			Laboratory ID	WG_E251534_41204_N	WG_E251534_41367_N	WG_E251534_41438_N	WG_E251534_42830_N	WG_E251534_44503_N
			Sample Date	2012-10-22	2013-04-03	2013-06-13	2017-04-05	2021-11-03
			QA/QC					
Anions + Nutrients								
Alkalinity, Total as CaCO3		ug/L		53100	57800	-	-	-
Alkalinity, Bicarbonate (HCO3) as CaCO3		ug/L		53100	-	-	-	-
Chloride (Cl)	250000	ug/L		-	-	< 500	< 1000	-
Fluoride (F)	1.5	mg/L		-	-	-	< 0.1	-
Nitrate (as N)	10000	ug/L		-	21	-	-	-
Nitrite (as N)	1000	ug/L		-	-	-	< 10	-
Ammonia (as N)		ug/L		-	-	-	< 30	-
Sulfate (SO4)	500000	ug/L		-	2030	-	-	-
Total Nitrogen		ug/L		290	-	-	-	-
Phosphorus, dissolved		ug/L		-	-	-	<50	-
Phosphorus, total		ug/L		501	-	-	<50	-
Field + Physical								
Conductivity, field measured		uS/cm		-	-	-	116	-
pH, field measured		pH units		-	-	-	7.4	-
pH, lab		pH		7.5	7.3	-	7.4	-
Conductivity		uS/cm		102	-	-	116	-
Total Dissolved Solids		mg/L		48	-	-	70	-
Total Suspended Solids		mg/L		-	-	-	7.7	-
Total Organic Carbon		mg/L		-	-	-	< 0.5	-
Hardness, Calcium Carbonate		mg/L		-	52.3	-	-	-
Depth to Water		mbtoc		-	-	-	-	44.33
Aluminum	9500	ug/L		-	3.6	< 5	< 5	-
Antimony	6	ug/L		-	0.106	< 0.5	< 0.1	-
Arsenic	10	ug/L		-	0.074	< 0.5	< 0.5	-
Barium	1000	ug/L		6	4.36	-	< 5	-
Beryllium	8	ug/L		-	-	-	< 0.1	-
Bismuth		ug/L		-	-	-	< 0.1	-
Boron	5000	ug/L		-	-	-	4	-
Cadmium	5	ug/L		-	0.016	-	< 0.01	-
Calcium		ug/L		6400	18200	-	18800	-
Cobalt	1	ug/L		-	-	-	< 0.05	-
Copper	1500	ug/L		0.66	6.78	-	3.4	-
Iron	6500	ug/L		-	-	-	10	-
Lead	10	ug/L		-	-	-	< 0.1	-
Lithium	8	ug/L		-	0.8	-	0.9	-
Magnesium		ug/L		729	1290	-	1350	-
Manganese	1500	ug/L		96.3	11.5	-	75.7	-
Mercury	1	ug/L		-	-	-	< 0.02	-
Molybdenum	250	ug/L		-	-	-	< 0.1	-
Nickel	80	ug/L		-	12.9	-	5	-
Potassium		ug/L		-	-	-	460	-
Silicon		ug/L		-	3900	-	4100	-
Silver	20	ug/L		-	-	-	< 0.05	-
Sodium	200000	ug/L		1810	1510	-	1620	-
Strontium	2500	ug/L		48.4	70.5	-	69.4	-
Sulphur (S)		ug/L		-	-	-	< 3000	-
Tellurium		ug/L		-	-	-	< 0.2	-
Thallium		ug/L		-	-	-	< 0.02	-
Thorium-232		ug/L		-	-	-	< 0.1	-
Tin	2500	ug/L		-	-	-	< 0.2	-
Titanium		ug/L		-	-	-	< 5	-
Vanadium	20	ug/L		-	-	-	< 1	-
Zinc	3000	ug/L		-	70.3	-	42.6	-
Zirconium		ug/L		-	-	-	< 0.1	-
Metals, Total								
Antimony	6	ug/L		-	-	-	< 0.1	-
Arsenic	10	ug/L		-	-	-	< 0.5	-
Barium	1000	ug/L		2.8	-	-	5.2	-
Beryllium	8	ug/L		-	-	-	< 0.1	-
Bismuth		ug/L		-	-	-	< 0.1	-
Boron	5000	ug/L		-	-	-	9	-
Cadmium	5	ug/L		-	-	-	< 0.01	-
Calcium		ug/L		17300	-	-	19400	-
Chromium	50	ug/L		-	-	-	< 0.5	-
Cobalt	1	ug/L		-	-	-	0.06	-
Copper	1500	ug/L		5.31	-	-	17.5	-
Iron	6500	ug/L		6.6	-	-	2490	-
Lead	10	ug/L		-	-	-	0.7	-
Lithium	8	ug/L		-	-	-	1	-
Magnesium		ug/L		1550	-	-	1330	-
Manganese	1500	ug/L		12.1	-	-	91.1	-
Mercury	1	ug/L		-	-	-	< 0.02	-
Molybdenum	250	ug/L		-	-	-	< 0.1	-
Nickel	80	ug/L		2.8	-	-	4.8	-
Potassium		ug/L		-	-	-	440	-
Selenium	10	ug/L		**2440**	-	-	< 0.5	-
Silicon		ug/L		-	-	-	4100	-
Silver	20	ug/L		**1680**	-	-	< 0.05	-
Sodium	200000	ug/L		73	-	-	1600	-
Strontium	2500	ug/L		-	-	-	70.5	-
Sulphur (S)		ug/L		-	-	-	< 3000	-
Tellurium		ug/L		-	-	-	< 0.2	-
Thallium		ug/L		-	-	-	< 0.02	-
Thorium-232		ug/L		-	-	-	< 0.1	-
Tin	2500	ug/L		-	-	-	< 0.2	-
Titanium		ug/L		29.9	-	-	< 5	-
Uranium	20	ug/L		-	-	-	< 0.02	-
Vanadium	20	ug/L		-	-	-	< 1	-
Zinc	3000	ug/L		-	-	-	52.4	-
Zirconium		ug/L		-	-	-	0.74	-

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

< 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 - MW-6
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Sample Name	MW-6	MW-6	MW-6	MW-6	MW-6	MW-6	MW-6
			Laboratory ID	WG_E251535_44011_N	WG_E251535_44057_N	WG_E251535_44139_N	WG_E251535_44284_N	WG_E251535_44370_N	WG_E251535_44434_N	WG_E251535_44504_N
			Sample Date	2020-06-29	2020-08-14	2020-11-04	2021-03-29	2021-06-23	2021-08-26	2021-11-04
			QA/QC							
Field + Physical										
Conductivity, field measured		uS/cm		-	137	131	-	201	152	121
Temperature, field measured		deg c		8.6	6.1	6	-	6	6	6
Depth to Water		mbtoc		-	33.77	34.08	31.51	29.84	29.62	30.15

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

< 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 - MW-7
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Sample Name: MW-7	MW-7	MW-7	MW-7	MW-7
			Laboratory ID: WG_E287379_41204_N	WG_E287379_41367_N	WG_E287379_42831_N	WG_E287379_42922_N	WG_E287379_43642_N
			Sample Date: 2012-10-22	2013-04-03	2017-04-06	2017-07-06	2019-06-26
			QA/QC:				
Anions + Nutrients							
Alkalinity, Total as CaCO3		ug/L	29600	38100	57000	58000	-
Bromide (Br)		ug/L	-	-	< 100	-	-
Chloride (Cl)	250000	ug/L	1300	-	< 1000	1300	-
Fluoride (F)	1.5	mg/L	-	-	< 0.1	0.1	-
Nitrate (as N)	10000	ug/L	-	-	61	55	-
Nitrite (as N)	1000	ug/L	-	-	< 10	< 10	-
Ammonia (as N)		ug/L	-	-	< 30	< 30	-
Total Kjeldahl Nitrogen		ug/L	-	-	-	-	-
Sulfate (SO4)	500000	ug/L	-	1680	1400	1400	-
Total Nitrogen		ug/L	260	-	< 1000	-	-
Phosphorus, dissolved		ug/L	-	-	<50	<50	-
Field + Physical							
Dissolved Oxygen, field measured		mg/L	-	-	-	78.3	-
Conductivity, field measured		uS/cm	-	-	124	77	205
pH, field measured		pH units	-	-	7.8	8.2	-
pH, lab		pH	8.5	8.6	8.1	8.4	-
Specific conductivity, field measured		uS/cm	-	-	-	-	-
Temperature, field measured		deg c	-	-	-	5.6	9.1
Conductivity		uS/cm	59.2	-	-	-	-
Total Dissolved Solids		mg/L	28	-	67	-	-
Total Suspended Solids		mg/L	-	-	34	-	-
Total Organic Carbon		mg/L	-	4.89	0.68	0.79	-
Hardness, Calcium Carbonate		mg/L	-	67.3	53.2	40.1	-
Hardness, Calcium Carbonate (Dissolved)		mg/L	-	-	-	-	-
Chemical Oxygen Demand		mg/L	-	-	-	-	-
Depth to Water		mbtoc	-	-	-	-	45.26
Metals, Dissolved							
Aluminum	9500	ug/L	18.3	19.8	12	14.3	-
Antimony	6	ug/L	-	0.158	< 0.1	0.39	-
Arsenic	10	ug/L	0.9	0.598	< 0.5	< 0.5	-
Barium	1000	ug/L	5.6	6.09	13.9	12.9	-
Beryllium	8	ug/L	-	-	< 0.1	< 0.1	-
Bismuth		ug/L	-	-	< 0.1	< 0.1	-
Boron	5000	ug/L	-	-	5	< 5	-
Cadmium	5	ug/L	0.017	0.012	0.23	0.011	-
Calcium		ug/L	-	-	18800	15200	-
Chromium	50	ug/L	-	-	< 0.5	< 0.5	-
Cobalt	1	ug/L	-	0.1	0.06	< 0.1	-
Copper	1500	ug/L	1.18	0.49	3.2	0.55	-
Iron	6500	ug/L	-	6.9	< 10	< 10	-
Lead	10	ug/L	-	-	< 0.1	< 0.1	-
Lithium	8	ug/L	-	-	0.7	0.85	-
Magnesium		ug/L	452	470	920	502	-
Manganese	1500	ug/L	-	0.82	3.23	0.25	-
Mercury	1	ug/L	-	-	< 0.02	< 0.02	-
Molybdenum	250	ug/L	-	0.15	0.9	0.15	-
Nickel	80	ug/L	-	-	2.4	< 0.2	-
Potassium		ug/L	-	-	660	570	-
Selenium	10	ug/L	-	0.051	< 0.5	< 0.5	-
Silicon		ug/L	4240	3790	4700	4300	-
Silver	20	ug/L	-	-	< 0.05	< 0.05	-
Sodium	200000	ug/L	1550	1260	1500	1480	-
Strontium	2500	ug/L	32.5	36.1	66.8	54.2	-
Sulphur (S)		ug/L	-	-	< 3000	< 3000	-
Tellurium		ug/L	-	-	< 0.2	< 0.2	-
Thallium		ug/L	-	-	< 0.02	< 0.02	-
Thorium-232		ug/L	-	-	< 0.1	< 0.1	-
Tin	2500	ug/L	-	-	< 0.2	< 0.2	-
Titanium		ug/L	-	-	< 5	< 5	-
Uranium	20	ug/L	-	0.02	0.04	0.023	-
Vanadium	20	ug/L	-	0.93	< 1	< 1	-
Zinc	3000	ug/L	-	1.9	12.6	< 4	-
Zirconium		ug/L	-	-	< 0.1	< 0.1	-
Cesium		ug/L	-	-	-	-	-
Rubidium		ug/L	-	-	-	-	-
Tungsten	3	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 - MW-7
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Sample Name	MW-7	MW-7	MW-7	MW-7	MW-7	MW-7
			Laboratory ID	WG_E287379_44011_N	WG_E287379_44057_N	WG_E287379_44285_N	WG_E287379_44371_N	WG_E287379_44433_N	VA21C4924-006
			Sample Date	2020-06-29	2020-08-14	2021-03-30	2021-06-24	2021-08-25	2021-11-03
			QA/QC						
Anions + Nutrients									
Alkalinity, Total as CaCO3		ug/L		-	-	-	-	-	31600
Bromide (Br)		ug/L		-	-	-	-	-	< 50
Chloride (Cl)	250000	ug/L		-	-	-	-	-	< 500
Fluoride (F)	1.5	mg/L		-	-	-	-	-	0.033
Nitrate (as N)	10000	ug/L		-	-	-	-	-	9.9
Nitrite (as N)	1000	ug/L		-	-	-	-	-	< 1
Ammonia (as N)		ug/L		-	-	-	-	-	< 5
Total Kjeldahl Nitrogen		ug/L		-	-	-	-	-	< 50
Sulfate (SO4)	500000	ug/L		-	-	-	-	-	1240
Total Nitrogen		ug/L		-	-	-	-	-	-
Phosphorus, dissolved		ug/L		-	-	-	-	-	<50
Field + Physical									
Dissolved Oxygen, field measured		mg/L		-	-	12.6	-	-	13.6
Conductivity, field measured		uS/cm		235	230	42.4	66	70	38.6
pH, field measured		pH units		-	-	8.66	-	-	8.66
pH, lab		pH		-	-	-	-	-	7.87
Specific conductivity, field measured		uS/cm		-	-	68.5	-	-	60.5
Temperature, field measured		deg c		6.2	6.1	5.8	5.7	5.7	6
Conductivity		uS/cm		-	-	-	-	-	60.9
Total Dissolved Solids		mg/L		-	-	-	-	-	-
Total Suspended Solids		mg/L		-	-	-	-	-	-
Total Organic Carbon		mg/L		-	-	-	-	-	1.48
Hardness, Calcium Carbonate		mg/L		-	-	-	-	-	-
Hardness, Calcium Carbonate (Dissolved)		mg/L		-	-	-	-	-	26.3
Chemical Oxygen Demand		mg/L		-	-	-	-	-	< 20
Depth to Water		mbtoc		45.38	45.38	42.3	40.79	41.08	42.45
Metals, Dissolved									
Aluminum	9500	ug/L		-	-	-	-	-	13.9
Antimony	6	ug/L		-	-	-	-	-	< 0.1
Arsenic	10	ug/L		-	-	-	-	-	0.97
Barium	1000	ug/L		-	-	-	-	-	6.64
Beryllium	8	ug/L		-	-	-	-	-	< 0.1
Bismuth		ug/L		-	-	-	-	-	< 0.05
Boron	5000	ug/L		-	-	-	-	-	< 10
Cadmium	5	ug/L		-	-	-	-	-	< 0.005
Calcium		ug/L		-	-	-	-	-	9980
Chromium	50	ug/L		-	-	-	-	-	< 0.5
Cobalt	1	ug/L		-	-	-	-	-	< 0.1
Copper	1500	ug/L		-	-	-	-	-	1.26
Iron	6500	ug/L		-	-	-	-	-	12
Lead	10	ug/L		-	-	-	-	-	0.067
Lithium	8	ug/L		-	-	-	-	-	< 1
Magnesium		ug/L		-	-	-	-	-	345
Manganese	1500	ug/L		-	-	-	-	-	0.85
Mercury	1	ug/L		-	-	-	-	-	< 0.005
Molybdenum	250	ug/L		-	-	-	-	-	0.188
Nickel	80	ug/L		-	-	-	-	-	< 0.5
Potassium		ug/L		-	-	-	-	-	348
Selenium	10	ug/L		-	-	-	-	-	0.052
Silicon		ug/L		-	-	-	-	-	4020
Silver	20	ug/L		-	-	-	-	-	< 0.01
Sodium	200000	ug/L		-	-	-	-	-	1190
Strontium	2500	ug/L		-	-	-	-	-	32.2
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		-	-	-	-	-	< 0.3
Uranium	20	ug/L		-	-	-	-	-	0.018
Vanadium	20	ug/L		-	-	-	-	-	0.88
Zinc	3000	ug/L		-	-	-	-	-	1.5
Zirconium		ug/L		-	-	-	-	-	< 0.2
Cesium		ug/L		-	-	-	-	-	< 0.01
Rubidium		ug/L		-	-	-	-	-	< 0.2
Tungsten	3	ug/L		-	-	-	-	-	< 0.1

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 - MW-8
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Sample Name	MW-8	MW-8	MW-8	MW-8	MW-8
			Laboratory ID	WG_E287380_41204_N	WG_E287380_41367_N	WG_E287380_41438_N	WG_E287380_42922_N	WG_E287380_43011_N
			Sample Date	2012-10-22	2013-04-03	2013-06-13	2017-07-06	2017-10-03
			QA/QC					
Anions + Nutrients								
Alkalinity, Total as CaCO3		ug/L		16000	16500	-	16000	-
Bromide (Br)		ug/L		-	-	-	-	-
Chloride (Cl)	250000	ug/L		-	-	-	2700	2200
Fluoride (F)	1.5	mg/L		-	-	-	< 0.1	-
Nitrate (as N)	10000	ug/L		-	-	-	170	< 100
Nitrite (as N)	1000	ug/L		-	-	-	< 10	-
Ammonia (as N)		ug/L		-	-	-	< 30	< 30
Total Kjeldahl Nitrogen		ug/L		-	-	-	-	-
Sulfate (SO4)	500000	ug/L		-	1310	-	< 1000	< 1000
Total Nitrogen		ug/L		311	-	-	-	168
Phosphorus		ug/L		-	-	-	<50	<50
Field + Physical								
Dissolved Oxygen, field measured		mg/L		-	-	-	6.6	-
Conductivity, field measured		uS/cm		-	-	-	34	22.4
pH, field measured		pH units		-	-	-	8.2	6.45
pH, lab		pH		6.5	6.3	-	6.1	6.2
Specific conductivity, field measured		uS/cm		-	-	-	-	-
Temperature, field measured		deg c		-	-	-	6.5	5.9
Conductivity		uS/cm		27.5	-	-	-	24.8
Total Dissolved Solids		mg/L		13	-	-	-	12
Total Suspended Solids		mg/L		-	-	-	-	190
Total Organic Carbon		mg/L		-	2.67	-	< 0.5	-
Hardness, Calcium Carbonate		mg/L		-	14.1	-	10.6	-
Hardness, Calcium Carbonate (Dissolved)		mg/L		-	-	-	-	-
Chemical Oxygen Demand		mg/L		-	-	-	-	-
Depth to Water		mbtoc		-	-	-	-	-
Metals, Dissolved								
Aluminum	9500	ug/L		-	3.3	< 5	< 5	6.7
Antimony	6	ug/L		-	-	< 0.5	0.18	< 0.2
Arsenic	10	ug/L		0.19	0.172	-	< 0.5	< 0.5
Barium	1000	ug/L		4.4	4.16	-	5.1	< 5
Beryllium	8	ug/L		-	-	-	< 0.1	< 0.1
Bismuth		ug/L		-	-	-	< 0.1	< 0.1
Boron	5000	ug/L		-	-	-	< 5	6.3
Cadmium	5	ug/L		0.011	0.012	-	0.213	0.029
Calcium		ug/L		-	-	-	3150	-
Chromium	50	ug/L		-	-	-	< 0.5	< 0.5
Cobalt	1	ug/L		-	0.011	-	< 0.1	< 0.1
Copper	1500	ug/L		0.58	-	-	1.94	< 0.4
Iron	6500	ug/L		-	-	-	< 10	< 10
Lead	10	ug/L		-	-	-	< 0.1	< 0.2
Lithium	8	ug/L		-	-	-	0.25	0.18
Magnesium		ug/L		416	370	-	270	363
Manganese	1500	ug/L		-	9.8	-	< 0.2	1.1
Mercury	1	ug/L		-	-	-	< 0.02	< 0.01
Molybdenum	250	ug/L		-	0.054	-	< 0.1	0.22
Nickel	80	ug/L		-	-	-	0.49	< 0.4
Potassium		ug/L		-	-	-	480	-
Selenium	10	ug/L		-	0.059	-	< 0.5	< 0.5
Silicon		ug/L		5930	5440	-	5900	6400
Silver	20	ug/L		-	-	-	< 0.05	< 0.05
Sodium	200000	ug/L		1680	1580	-	3070	2190
Strontium	2500	ug/L		36.8	42.3	-	42.5	47.2
Sulphur (S)		ug/L		-	-	-	< 3000	< 3000
Tellurium		ug/L		-	-	-	< 0.2	< 0.5
Thallium		ug/L		-	-	-	< 0.02	< 0.02
Thorium-232		ug/L		-	-	-	< 0.1	< 0.1
Tin	2500	ug/L		-	-	-	< 0.2	< 0.2
Titanium		ug/L		-	-	-	< 5	-
Uranium	20	ug/L		-	-	-	< 0.02	< 0.02
Vanadium	20	ug/L		-	-	-	< 1	< 1
Zinc	3000	ug/L		-	1.4	-	6.4	< 4
Zirconium		ug/L		-	-	-	< 0.1	< 0.1
Cesium		ug/L		-	-	-	-	-
Rubidium		ug/L		-	-	-	-	-
Tungsten	3	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
< 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 - MW-8
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Sample Name	MW-8	MW-8	MW-8	MW-8	MW-8
			Laboratory ID	WG_E287380_43054_N	WG_E287380_43200_N	WG_E287380_43299_N	WG_E287380_43425_N	WG_E287380_43549_N
			Sample Date	2017-11-15	2018-04-10	2018-07-18	2018-11-21	2019-03-25
			QA/QC					
Anions + Nutrients								
Alkalinity, Total as CaCO3		ug/L		16300	16900	17800	15100	17500
Bromide (Br)		ug/L		-	< 50	< 50	< 50	< 50
Chloride (Cl)	250000	ug/L		1130	1130	1400	1400	< 500
Fluoride (F)	1.5	mg/L		0.024	0.023	0.022	0.021	0.027
Nitrate (as N)	10000	ug/L		16	15.3	23.3	22.5	235
Nitrite (as N)	1000	ug/L		< 1	< 1	< 1	< 1	< 1
Ammonia (as N)		ug/L		< 5	5.6	8.9	< 5	26.6
Total Kjeldahl Nitrogen		ug/L		-	-	-	-	-
Sulfate (SO4)	500000	ug/L		< 300	< 300	< 300	< 300	1080
Total Nitrogen		ug/L		-	-	-	-	-
Phosphorus		ug/L		<50	<50	<50	<50	<50
Field + Physical								
Dissolved Oxygen, field measured		mg/L		9.6	11.6	8.1	0.3	11.3
Conductivity, field measured		uS/cm		22.6	22.4	34	34	36
pH, field measured		pH units		6.43	5.98	6.49	7.49	7.13
pH, lab		pH		6.94	7.37	-	-	6.67
Specific conductivity, field measured		uS/cm		-	-	-	-	-
Temperature, field measured		deg c		5.5	5.8	6.3	6.1	6.3
Conductivity		uS/cm		-	-	-	-	-
Total Dissolved Solids		mg/L		-	-	-	-	-
Total Suspended Solids		mg/L		-	-	-	-	-
Total Organic Carbon		mg/L		< 0.5	0.6	3.31	1.28	3.06
Hardness, Calcium Carbonate		mg/L		12	11.4	12.5	12.2	12.9
Hardness, Calcium Carbonate (Dissolved)		mg/L		-	-	-	-	-
Chemical Oxygen Demand		mg/L		< 20	< 20	25	< 20	< 20
Depth to Water		mbtoc		-	10.31	9.95	10.94	11.58
Metals, Dissolved								
Aluminum	9500	ug/L		2.4	3.6	14.4	4	7.3
Antimony	6	ug/L		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Arsenic	10	ug/L		0.1	< 0.1	0.15	0.11	0.16
Barium	1000	ug/L		10.3	5.16	5.49	5.08	6.33
Beryllium	8	ug/L		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Bismuth		ug/L		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Boron	5000	ug/L		< 10	< 10	< 10	< 10	< 10
Cadmium	5	ug/L		0.0439	0.186	0.123	0.0829	0.282
Calcium		ug/L		4090	3980	4330	4280	4400
Chromium	50	ug/L		0.21	0.25	0.21	0.18	0.21
Cobalt	1	ug/L		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Copper	1500	ug/L		< 0.2	0.97	0.37	< 0.2	1.14
Iron	6500	ug/L		< 10	< 10	16	< 10	< 10
Lead	10	ug/L		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Lithium	8	ug/L		< 1	< 1	< 1	< 1	< 1
Magnesium		ug/L		445	366	407	377	463
Manganese	1500	ug/L		1.17	2.04	10.1	2.33	3.42
Mercury	1	ug/L		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Molybdenum	250	ug/L		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nickel	80	ug/L		< 0.5	0.5	< 0.5	0.52	< 0.5
Potassium		ug/L		254	316	335	274	314
Selenium	10	ug/L		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Silicon		ug/L		6270	6090	5910	6320	6590
Silver	20	ug/L		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Sodium	200000	ug/L		2330	2390	2440	2400	2160
Strontium	2500	ug/L		51.6	52.5	47	51.3	45.3
Sulphur (S)		ug/L		< 500	< 500	< 500	< 500	< 500
Tellurium		ug/L		< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Thallium		ug/L		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Thorium-232		ug/L		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Tin	2500	ug/L		< 0.1	0.65	< 0.1	< 0.1	< 0.1
Titanium		ug/L		< 0.3	< 0.3	0.66	< 0.3	< 0.3
Uranium	20	ug/L		-	< 0.01	< 0.01	< 0.01	< 0.01
Vanadium	20	ug/L		-	< 0.5	< 0.5	< 0.5	< 0.5
Zinc	3000	ug/L		-	4.1	< 1	< 1	3.3
Zirconium		ug/L		-	< 0.06	< 0.06	< 0.06	< 0.06
Cesium		ug/L		-	< 0.01	< 0.01	< 0.01	< 0.01
Rubidium		ug/L		-	0.45	0.43	0.35	0.45
Tungsten	3	ug/L		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1

Table Notes:
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QA/QC = Quality Assurance/Quality Control; FDA/FD = 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 - MW-8
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Sample Name	MW-8	MW-8	MW-8	MW-8	MW-8
			Laboratory ID	WG_E287380_43627_N	WG_E287380_43642_N	WG_E287380_44011_N	WG_E287380_44057_N	WG_E287380_44139_N
			Sample Date	2019-06-11	2019-06-26	2020-06-29	2020-08-14	2020-11-04
			QA/QC					
Anions + Nutrients								
Alkalinity, Total as CaCO3		ug/L		-	16500	-	-	13300
Bromide (Br)		ug/L		-	< 50	-	-	-
Chloride (Cl)	250000	ug/L		-	920	-	-	5890
Fluoride (F)	1.5	mg/L		-	0.026	-	-	< 0.02
Nitrate (as N)	10000	ug/L		-	89.5	-	-	**12700**
Nitrite (as N)	1000	ug/L		-	< 1	-	-	< 1
Ammonia (as N)		ug/L		-	< 5	-	-	8.9
Total Kjeldahl Nitrogen		ug/L		-	-	-	-	141
Sulfate (SO4)	500000	ug/L		-	370	-	-	< 300
Total Nitrogen		ug/L		-	-	-	-	-
Phosphorus		ug/L		-	<50	-	-	<50
Field + Physical								
Dissolved Oxygen, field measured		mg/L		-	11.9	-	-	10
Conductivity, field measured		uS/cm		33	34	284	109	97.6
pH, field measured		pH units		-	7.02	-	-	5.93
pH, lab		pH		-	7.34	-	-	6.7
Specific conductivity, field measured		uS/cm		-	-	-	-	152.6
Temperature, field measured		deg c		6.1	6.4	6.7	6.3	6.2
Conductivity		uS/cm		-	-	-	-	160
Total Dissolved Solids		mg/L		-	-	-	-	-
Total Suspended Solids		mg/L		-	-	-	-	-
Total Organic Carbon		mg/L		-	0.8	-	-	1.84
Hardness, Calcium Carbonate		mg/L		-	12.3	-	-	-
Hardness, Calcium Carbonate (Dissolved)		mg/L		-	-	-	-	59.7
Chemical Oxygen Demand		mg/L		-	< 20	-	-	25
Depth to Water		mbtoc		11.41	11.42	13.8	12.74	12
Metals, Dissolved								
Aluminum	9500	ug/L		-	6.5	-	-	179
Antimony	6	ug/L		-	< 0.1	-	-	< 0.1
Arsenic	10	ug/L		-	0.11	-	-	0.26
Barium	1000	ug/L		-	6.24	-	-	26.7
Beryllium	8	ug/L		-	< 0.1	-	-	< 0.1
Bismuth		ug/L		-	< 0.05	-	-	< 0.05
Boron	5000	ug/L		-	< 10	-	-	< 10
Cadmium	5	ug/L		-	0.2	-	-	0.109
Calcium		ug/L		-	4260	-	-	20500
Chromium	50	ug/L		-	0.23	-	-	0.48
Cobalt	1	ug/L		-	< 0.1	-	-	0.31
Copper	1500	ug/L		-	0.77	-	-	2.53
Iron	6500	ug/L		-	< 10	-	-	358
Lead	10	ug/L		-	< 0.05	-	-	0.171
Lithium	8	ug/L		-	< 1	-	-	< 1
Magnesium		ug/L		-	407	-	-	2060
Manganese	1500	ug/L		-	2.18	-	-	18.8
Mercury	1	ug/L		-	< 0.005	-	-	< 0.005
Molybdenum	250	ug/L		-	< 0.05	-	-	< 0.05
Nickel	80	ug/L		-	< 0.5	-	-	1.28
Potassium		ug/L		-	308	-	-	603
Selenium	10	ug/L		-	< 0.05	-	-	< 0.05
Silicon		ug/L		-	6190	-	-	6550
Silver	20	ug/L		-	< 0.01	-	-	< 0.01
Sodium	200000	ug/L		-	2340	-	-	4260
Strontium	2500	ug/L		-	52.9	-	-	272
Sulphur (S)		ug/L		-	< 500	-	-	< 500
Tellurium		ug/L		-	< 0.2	-	-	< 0.2
Thallium		ug/L		-	< 0.01	-	-	< 0.01
Thorium-232		ug/L		-	< 0.1	-	-	< 0.1
Tin	2500	ug/L		-	< 0.1	-	-	< 0.1
Titanium		ug/L		-	< 0.3	-	-	5.91
Uranium	20	ug/L		-	< 0.01	-	-	< 0.01
Vanadium	20	ug/L		-	< 0.5	-	-	< 0.5
Zinc	3000	ug/L		-	5.9	-	-	3.7
Zirconium		ug/L		-	< 0.2	-	-	< 0.2
Cesium		ug/L		-	< 0.01	-	-	0.02
Rubidium		ug/L		-	0.36	-	-	0.79
Tungsten	3	ug/L		-	< 0.1	-	-	< 0.1

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QA/QC = Quality Assurance/Quality Control; FDA/FD = 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 - MW-8
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Sample Name	MW-8	MW-8	MW-8	MW-8
			Laboratory ID	WG_E287380_44286_N	WG_E287380_44370_N	WG_E287380_44433_N	VA21C4924-007
			Sample Date	2021-03-31	2021-06-23	2021-08-25	2021-11-03
			QA/QC				
Anions + Nutrients							
Alkalinity, Total as CaCO3		ug/L		-	-	-	20400
Bromide (Br)		ug/L		-	-	-	< 50
Chloride (Cl)	250000	ug/L		-	-	-	570
Fluoride (F)	1.5	mg/L		-	-	-	0.031
Nitrate (as N)	10000	ug/L		-	-	-	62.8
Nitrite (as N)	1000	ug/L		-	-	-	< 1
Ammonia (as N)		ug/L		-	-	-	< 5
Total Kjeldahl Nitrogen		ug/L		-	-	-	< 50
Sulfate (SO4)	500000	ug/L		-	-	-	520
Total Nitrogen		ug/L		-	-	-	-
Phosphorus		ug/L		-	-	-	<50
Field + Physical							
Dissolved Oxygen, field measured		mg/L		10.5	-	-	7.5
Conductivity, field measured		uS/cm		12.2	125	115	21.9
pH, field measured		pH units		6.32	-	-	6.42
pH, lab		pH		-	-	-	6.89
Specific conductivity, field measured		uS/cm		67.1	-	-	34.2
Temperature, field measured		deg c		5.5	5.7	6.4	6.2
Conductivity		uS/cm		-	-	-	38.1
Total Dissolved Solids		mg/L		-	-	-	-
Total Suspended Solids		mg/L		-	-	-	-
Total Organic Carbon		mg/L		-	-	-	1.23
Hardness, Calcium Carbonate		mg/L		-	-	-	-
Hardness, Calcium Carbonate (Dissolved)		mg/L		-	-	-	13.7
Chemical Oxygen Demand		mg/L		-	-	-	< 20
Depth to Water		mbtoc		7.74	49.02	6.68	7.69
Metals, Dissolved							
Aluminum	9500	ug/L		-	-	-	1.8
Antimony	6	ug/L		-	-	-	< 0.1
Arsenic	10	ug/L		-	-	-	0.13
Barium	1000	ug/L		-	-	-	4.5
Beryllium	8	ug/L		-	-	-	< 0.1
Bismuth		ug/L		-	-	-	< 0.05
Boron	5000	ug/L		-	-	-	< 10
Cadmium	5	ug/L		-	-	-	0.0169
Calcium		ug/L		-	-	-	4850
Chromium	50	ug/L		-	-	-	< 0.5
Cobalt	1	ug/L		-	-	-	< 0.1
Copper	1500	ug/L		-	-	-	0.36
Iron	6500	ug/L		-	-	-	< 10
Lead	10	ug/L		-	-	-	< 0.05
Lithium	8	ug/L		-	-	-	< 1
Magnesium		ug/L		-	-	-	390
Manganese	1500	ug/L		-	-	-	0.98
Mercury	1	ug/L		-	-	-	< 0.005
Molybdenum	250	ug/L		-	-	-	< 0.05
Nickel	80	ug/L		-	-	-	< 0.5
Potassium		ug/L		-	-	-	252
Selenium	10	ug/L		-	-	-	0.065
Silicon		ug/L		-	-	-	6110
Silver	20	ug/L		-	-	-	< 0.01
Sodium	200000	ug/L		-	-	-	1900
Strontium	2500	ug/L		-	-	-	47.3
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		-	-	-	< 0.3
Uranium	20	ug/L		-	-	-	< 0.01
Vanadium	20	ug/L		-	-	-	< 0.5
Zinc	3000	ug/L		-	-	-	< 1
Zirconium		ug/L		-	-	-	< 0.2
Cesium		ug/L		-	-	-	< 0.01
Rubidium		ug/L		-	-	-	0.32
Tungsten	3	ug/L		-	-	-	< 0.1

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QA/QC = Quality Assurance/Quality Control; FDA/FD = 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 - MW-9
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Sample Name	MW-9	MW-9	MW-9	MW-9	MW-9
			Laboratory ID	WG_E287381_41204_N	WG_E287381_41366_N	WG_E287381_42922_N	WG_E287381_43054_N	WG_E287381_43300_N
			Sample Date	2012-10-22	2013-04-02	2017-07-06	2017-11-15	2018-07-19
			QA/QC					
Anions + Nutrients								
Alkalinity, Total as CaCO3		ug/L		30600	24500	20000	16400	25400
Bromide (Br)		ug/L		-	-	-	-	-
Chloride (Cl)	250000	ug/L		-	2400	< 1000	500	< 500
Fluoride (F)	1.5	mg/L		-	-	< 0.1	0.031	0.032
Nitrate (as N)	10000	ug/L		22	39	46	34.3	20.5
Nitrite (as N)	1000	ug/L		-	-	< 10	< 1	< 1
Ammonia (as N)		ug/L		-	-	< 30	-	16.2
Total Kjeldahl Nitrogen		ug/L		-	-	-	-	-
Sulfate (SO4)	500000	ug/L		-	1830	1300	980	1070
Total Nitrogen		ug/L		213	-	149	-	-
Phosphorus, dissolved		ug/L		-	-	<50	<50	<50
Field + Physical								
Dissolved Oxygen, field measured		mg/L		-	-	8	9	6.9
Conductivity, field measured		uS/cm		-	-	43	24.7	28.8
pH, field measured		pH units		-	-	7.7	7.4	5.99
pH, lab		pH		6.7	6.9	6.6	7.08	-
Specific conductivity, field measured		uS/cm		-	-	-	-	-
Temperature, field measured		deg c		-	-	6	4.8	5.5
Conductivity		uS/cm		63.7	-	42	-	-
Total Dissolved Solids		mg/L		30	-	22	-	-
Total Organic Carbon		mg/L		-	2.67	< 0.5	3.06	8.36
Hardness, Calcium Carbonate		mg/L		-	20.4	14.6	13	16
Hardness, Calcium Carbonate (Dissolved)		mg/L		-	-	-	-	-
Chemical Oxygen Demand		mg/L		-	-	-	< 20	45
Depth to Water		mbtoc		-	-	-	50.41	50.58
Metals, Dissolved								
Aluminum	9500	ug/L		-	3.3	< 5	3.7	42.7
Antimony	6	ug/L		-	0.137	0.14	< 0.1	0.11
Arsenic	10	ug/L		0.23	0.286	< 0.5	0.22	0.9
Barium	1000	ug/L		7.4	5.12	< 5	14.9	8.18
Beryllium	8	ug/L		-	-	< 0.1	< 0.1	< 0.1
Bismuth		ug/L		-	-	< 0.1	< 0.05	< 0.05
Boron	5000	ug/L		-	-	< 5	< 10	< 10
Cadmium	5	ug/L		0.065	0.15	0.022	0.355	0.178
Calcium		ug/L		-	-	5040	4340	5350
Chromium	50	ug/L		-	0.029	< 0.5	0.21	0.2
Cobalt	1	ug/L		-	0.47	< 0.1	< 0.1	0.75
Copper	1500	ug/L		0.86	-	0.25	0.64	0.81
Iron	6500	ug/L		-	-	< 10	< 10	312
Lead	10	ug/L		-	-	< 0.1	< 0.05	0.12
Lithium	8	ug/L		-	-	0.51	< 1	< 1
Magnesium		ug/L		924	550	496	532	651
Manganese	1500	ug/L		4.8	3.8	< 0.2	15.3	234
Mercury	1	ug/L		-	-	< 0.02	< 0.005	< 0.005
Molybdenum	250	ug/L		-	0.096	< 0.1	0.084	0.156
Nickel	80	ug/L		-	-	0.46	< 0.5	0.56
Potassium		ug/L		-	-	330	285	323
Selenium	10	ug/L		-	0.053	< 0.5	< 0.05	< 0.05
Silicon		ug/L		4100	4740	6000	5890	5940
Silver	20	ug/L		-	-	< 0.05	< 0.01	< 0.01
Sodium	200000	ug/L		2210	1950	1760	1670	1770
Strontium	2500	ug/L		48	32.8	24.4	23.5	30.3
Sulphur (S)		ug/L		-	-	< 3000	< 500	< 500
Tellurium		ug/L		-	-	< 0.2	< 0.2	< 0.2
Thallium		ug/L		-	-	< 0.02	< 0.01	< 0.01
Thorium-232		ug/L		-	-	< 0.1	< 0.1	< 0.1
Tin	2500	ug/L		-	-	< 0.2	< 0.1	< 0.1
Titanium		ug/L		-	-	< 5	< 0.3	3.05
Uranium	20	ug/L		-	-	< 0.02	< 0.01	< 0.01
Vanadium	20	ug/L		-	0.72	< 1	< 0.5	< 0.5
Zinc	3000	ug/L		-	2.2	< 4	1.3	1.8
Zirconium		ug/L		-	-	< 0.1	< 0.06	< 0.06
Cesium		ug/L		-	-	-	< 0.01	0.012
Rubidium		ug/L		-	-	-	< 0.2	0.32
Tungsten	3	ug/L		-	-	-	< 0.1	< 0.1

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

< 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 - MW-9
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Sample Name	MW-9	MW-9	MW-9	MW-9	MW-9
			Laboratory ID	WG_E287381_43424_N	WG_E287381_43549_N	WG_E287381_43627_N	WG_E287381_43642_N	WG_E287381_44011_N
			Sample Date	2018-11-20	2019-03-25	2019-06-11	2019-06-26	2020-06-29
			QA/QC					
Anions + Nutrients								
Alkalinity, Total as CaCO3		ug/L		20900	17200	-	17800	-
Bromide (Br)		ug/L		< 50	< 50	-	< 50	-
Chloride (Cl)	250000	ug/L		< 500	< 500	-	630	-
Fluoride (F)	1.5	mg/L		0.026	0.06	-	0.034	-
Nitrate (as N)	10000	ug/L		21.5	16.9	-	22.8	-
Nitrite (as N)	1000	ug/L		< 1	< 1	-	< 1	-
Ammonia (as N)		ug/L		< 5	20.5	-	< 5	-
Total Kjeldahl Nitrogen		ug/L		-	-	-	-	-
Sulfate (SO4)	500000	ug/L		930	1210	-	1130	-
Total Nitrogen		ug/L		-	-	-	-	-
Phosphorus, dissolved		ug/L		<50	<50	-	<50	-
Field + Physical								
Dissolved Oxygen, field measured		mg/L		3.1	11.6	-	12.8	-
Conductivity, field measured		uS/cm		42	43	42	87	56
pH, field measured		pH units		6.83	7.05	-	7.95	-
pH, lab		pH		-	7.01	-	7.39	-
Specific conductivity, field measured		uS/cm		-	-	-	-	-
Temperature, field measured		deg c		5.4	5.5	5.5	6	5.8
Conductivity		uS/cm		-	-	-	-	-
Total Dissolved Solids		mg/L		-	-	-	-	-
Total Organic Carbon		mg/L		2.14	7.25	-	1.37	-
Hardness, Calcium Carbonate		mg/L		16.9	15.2	-	15.2	-
Hardness, Calcium Carbonate (Dissolved)		mg/L		-	-	-	-	-
Chemical Oxygen Demand		mg/L		< 20	23	-	< 20	-
Depth to Water		mbtoc		51.15	51.86	51.74	51.83	53.61
Metals, Dissolved								
Aluminum	9500	ug/L		6.9	18.8	-	3.4	-
Antimony	6	ug/L		0.13	< 0.1	-	< 0.1	-
Arsenic	10	ug/L		0.38	0.62	-	0.16	-
Barium	1000	ug/L		5.73	24.5	-	4.89	-
Beryllium	8	ug/L		< 0.1	< 0.1	-	< 0.1	-
Bismuth		ug/L		< 0.05	< 0.05	-	< 0.05	-
Boron	5000	ug/L		< 10	< 10	-	< 10	-
Cadmium	5	ug/L		0.771	0.155	-	0.0555	-
Calcium		ug/L		5700	5100	-	5140	-
Chromium	50	ug/L		0.19	0.17	-	0.12	-
Cobalt	1	ug/L		0.15	0.23	-	< 0.1	-
Copper	1500	ug/L		2.02	2.82	-	0.6	-
Iron	6500	ug/L		21	44	-	< 10	-
Lead	10	ug/L		< 0.05	0.157	-	< 0.05	-
Lithium	8	ug/L		< 1	< 1	-	< 1	-
Magnesium		ug/L		652	605	-	583	-
Manganese	1500	ug/L		25.8	56.5	-	0.28	-
Mercury	1	ug/L		< 0.005	< 0.005	-	< 0.005	-
Molybdenum	250	ug/L		0.057	0.093	-	0.061	-
Nickel	80	ug/L		< 0.5	< 0.5	-	< 0.5	-
Potassium		ug/L		371	364	-	334	-
Selenium	10	ug/L		< 0.05	< 0.05	-	< 0.05	-
Silicon		ug/L		5980	6120	-	5790	-
Silver	20	ug/L		< 0.01	< 0.01	-	< 0.01	-
Sodium	200000	ug/L		1840	1520	-	1670	-
Strontium	2500	ug/L		33.5	32.8	-	35.1	-
Sulphur (S)		ug/L		< 500	< 500	-	< 500	-
Tellurium		ug/L		< 0.2	< 0.2	-	< 0.2	-
Thallium		ug/L		< 0.01	< 0.01	-	< 0.01	-
Thorium-232		ug/L		< 0.1	< 0.1	-	< 0.1	-
Tin	2500	ug/L		0.91	< 0.1	-	< 0.1	-
Titanium		ug/L		< 0.3	0.61	-	< 0.3	-
Uranium	20	ug/L		< 0.01	< 0.01	-	< 0.01	-
Vanadium	20	ug/L		< 0.5	< 0.5	-	< 0.5	-
Zinc	3000	ug/L		3.2	7.5	-	1.5	-
Zirconium		ug/L		< 0.06	< 0.06	-	< 0.2	-
Cesium		ug/L		< 0.01	< 0.01	-	< 0.01	-
Rubidium		ug/L		0.25	0.33	-	< 0.2	-
Tungsten	3	ug/L		< 0.1	< 0.1	-	< 0.1	-

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
< 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 - MW-9
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

		Sample Name	MW-9	MW-9	MW-9	MW-9	MW-9	MW-9
		Laboratory ID	WG_E287381_44057_N	WG_E287381_44138_N	WG_E287381_44286_N	WG_E287381_44371_N	WG_E287381_44434_N	VA21C4924-008
		Sample Date	2020-08-14	2020-11-03	2021-03-31	2021-06-24	2021-08-26	2021-11-03
		QA/QC						
Parameter	**CSR DW**	**Unit**						
Anions + Nutrients								
Alkalinity, Total as CaCO3		ug/L	-	-	-	-	-	37500
Bromide (Br)		ug/L	-	-	-	-	-	< 50
Chloride (Cl)	250000	ug/L	-	-	-	-	-	2070
Fluoride (F)	1.5	mg/L	-	-	-	-	-	0.039
Nitrate (as N)	10000	ug/L	-	-	-	-	-	37.3
Nitrite (as N)	1000	ug/L	-	-	-	-	-	< 1
Ammonia (as N)		ug/L	-	-	-	-	-	< 5
Total Kjeldahl Nitrogen		ug/L	-	-	-	-	-	< 50
Sulfate (SO4)	500000	ug/L	-	-	-	-	-	1070
Total Nitrogen		ug/L	-	-	-	-	-	-
Phosphorus, dissolved		ug/L	-	-	-	-	-	<50
Field + Physical								
Dissolved Oxygen, field measured		mg/L	-	-	11.5	-	-	11.6
Conductivity, field measured		uS/cm	65	-	35	64	84	48.2
pH, field measured		pH units	-	-	6.7	-	-	6.94
pH, lab		pH	-	-	-	-	-	7.02
Specific conductivity, field measured		uS/cm	-	-	56	-	-	76.4
Temperature, field measured		deg c	5.5	5.5	5.4	5.7	5.7	5.7
Conductivity		uS/cm	-	-	-	-	-	76.3
Total Dissolved Solids		mg/L	-	-	-	-	-	-
Total Organic Carbon		mg/L	-	-	-	-	-	1.98
Hardness, Calcium Carbonate		mg/L	-	-	-	-	-	-
Hardness, Calcium Carbonate (Dissolved)		mg/L	-	-	-	-	-	17.9
Chemical Oxygen Demand		mg/L	-	-	-	-	-	< 20
Depth to Water		mbtoc	53.42	52.27	49.18	49.02	47.61	48.22
Metals, Dissolved								
Aluminum	9500	ug/L	-	-	-	-	-	26.6
Antimony	6	ug/L	-	-	-	-	-	< 0.1
Arsenic	10	ug/L	-	-	-	-	-	0.38
Barium	1000	ug/L	-	-	-	-	-	6.5
Beryllium	8	ug/L	-	-	-	-	-	< 0.1
Bismuth		ug/L	-	-	-	-	-	< 0.05
Boron	5000	ug/L	-	-	-	-	-	< 10
Cadmium	5	ug/L	-	-	-	-	-	0.0114
Calcium		ug/L	-	-	-	-	-	6180
Chromium	50	ug/L	-	-	-	-	-	0.52
Cobalt	1	ug/L	-	-	-	-	-	0.1
Copper	1500	ug/L	-	-	-	-	-	0.38
Iron	6500	ug/L	-	-	-	-	-	54
Lead	10	ug/L	-	-	-	-	-	0.066
Lithium	8	ug/L	-	-	-	-	-	< 1
Magnesium		ug/L	-	-	-	-	-	592
Manganese	1500	ug/L	-	-	-	-	-	7.65
Mercury	1	ug/L	-	-	-	-	-	< 0.005
Molybdenum	250	ug/L	-	-	-	-	-	< 0.05
Nickel	80	ug/L	-	-	-	-	-	< 0.5
Potassium		ug/L	-	-	-	-	-	416
Selenium	10	ug/L	-	-	-	-	-	0.057
Silicon		ug/L	-	-	-	-	-	4570
Silver	20	ug/L	-	-	-	-	-	< 0.01
Sodium	200000	ug/L	-	-	-	-	-	8970
Strontium	2500	ug/L	-	-	-	-	-	33.2
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	-	-	-	-	-	1.32
Uranium	20	ug/L	-	-	-	-	-	< 0.01
Vanadium	20	ug/L	-	-	-	-	-	< 0.5
Zinc	3000	ug/L	-	-	-	-	-	< 1
Zirconium		ug/L	-	-	-	-	-	< 0.2
Cesium		ug/L	-	-	-	-	-	< 0.01
Rubidium		ug/L	-	-	-	-	-	0.22
Tungsten	3	ug/L	-	-	-	-	-	< 0.1

Table Notes:
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QA/QC = Quality Assurance/Quality Control; FDA/FD = 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 - MW-10
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Sample Name	MW-10	MW-10	MW-10	MW-10	MW-10	MW-10	MW-10	MW-10	MW-10	MW-10
			Laboratory ID	WG_E287382_41204_N	WG_E287382_41366_N	WG_E287382_43627_N	WG_E287382_44011_N	WG_E287382_44057_N	WG_E287382_44139_N	WG_E287382_44284_N	WG_E287382_44370_N	WG_E287382_44433_N	WG_E287382_44504_N
			Sample Date	2012-10-22	2013-04-02	2019-06-11	2020-06-29	2020-08-14	2020-11-04	2021-03-29	2021-06-23	2021-08-25	2021-11-04
			QAQC										
Anions + Nutrients													
Alkalinity, Total as CaCO3		ug/L		17600	21700	-	-	-	-	-	-	-	-
Nitrate (as N)	10000	ug/L		23	38	-	-	-	-	-	-	-	-
Sulfate (SO4)	500000	ug/L		-	1590	-	-	-	-	-	-	-	-
Total Nitrogen		ug/L		622	-	-	-	-	-	-	-	-	-
Field + Physical													
pH, lab		pH		6.9	7	-	-	-	-	-	-	-	-
Conductivity, field measured		uS/cm		-	-	113	152	126	223	-	121	89	47
Temperature, field measured		deg c		-	-	6.1	6.1	5.8	5.9	-	5.7	5.8	5.7
Conductivity		uS/cm		37.1	-	-	-	-	-	-	-	-	-
Total Dissolved Solids		mg/L		17	-	-	-	-	-	-	-	-	-
Total Organic Carbon		mg/L		-	1.53	-	-	-	-	-	-	-	-
Hardness, Calcium Carbonate		mg/L		-	90.4	-	-	-	-	-	-	-	-
Depth to Water		mbtoc		-	-	29	29.04	28.66	29	26.05	28.4	23.98	24.88
Metals, Dissolved													
Aluminum	9500	ug/L		5.8	13.8	-	-	-	-	-	-	-	-
Arsenic	10	ug/L		0.21	0.167	-	-	-	-	-	-	-	-
Barium	1000	ug/L		6.9	5.41	-	-	-	-	-	-	-	-
Cadmium	5	ug/L		1.14	0.021	-	-	-	-	-	-	-	-
Chromium	50	ug/L		-	0.61	-	-	-	-	-	-	-	-
Cobalt	1	ug/L		-	0.018	-	-	-	-	-	-	-	-
Copper	1500	ug/L		2.67	0.28	-	-	-	-	-	-	-	-
Iron	6500	ug/L		10.7	26.3	-	-	-	-	-	-	-	-
Magnesium		ug/L		956	770	-	-	-	-	-	-	-	-
Manganese	1500	ug/L		3.6	1.04	-	-	-	-	-	-	-	-
Molybdenum	250	ug/L		-	0.135	-	-	-	-	-	-	-	-
Selenium	10	ug/L		0.16	0.04	-	-	-	-	-	-	-	-
Silicon		ug/L		5700	5200	-	-	-	-	-	-	-	-
Sodium	200000	ug/L		3650	1680	-	-	-	-	-	-	-	-
Strontium	2500	ug/L		39	29.5	-	-	-	-	-	-	-	-
Tin	2500	ug/L		-	0.29	-	-	-	-	-	-	-	-
Uranium	20	ug/L		0.46	0.009	-	-	-	-	-	-	-	-
Vanadium	20	ug/L		-	0.75	-	-	-	-	-	-	-	-
Zinc	3000	ug/L		6.5	-	-	-	-	-	-	-	-	-

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
< 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 - MW-11
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

		Sample Name	MW-11	MW-11	MW-11	MW-11	MW-11	MW-11	MW-11
		Laboratory ID	WG_E287383_44011_N	WG_E287383_44057_N	WG_E287383_44139_N	WG_E287383_44284_N	WG_E287383_44370_N	WG_E287383_44433_N	WG_E287383_44503_N
		Sample Date	2020-06-29	2020-08-14	2020-11-04	2021-03-29	2021-06-23	2021-08-25	2021-11-03
		QA/QC							
Parameter	**CSR DW**	**Unit**							
Field + Physical									
Conductivity, field measured		uS/cm	-	64	93	-	75	65	64
Temperature, field measured		deg c	5.6	5.6	5.4	-	5.6	5.5	5.6
Depth to Water		mbtoc	-	39.14	36.77	35.66	37.58	35.25	35.53

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 - MW-12
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

		Sample Name	MW-12	MW-12	MW-12	MW-12	MW-12	MW-12
		Laboratory ID	WG_E287384_41204_N	WG_E287384_41367_N	WG_E287384_43300_N	WG_E287384_43549_N	WG_E287384_43627_N	WG_E287384_44011_N
		Sample Date	2012-10-22	2013-04-03	2018-07-19	2019-03-25	2019-06-11	2020-06-29
		QA/QC						
Parameter	**CSR DW**	**Unit**						
Anions + Nutrients								
Alkalinity, Total as CaCO3		ug/L	72300	75500	70500	51200	-	-
Bromide (Br)		ug/L	-	-	-	< 50	-	-
Chloride (Cl)	250000	ug/L	1000	1300	< 500	< 500	-	-
Fluoride (F)	1.5	mg/L	-	-	0.059	0.046	-	-
Nitrate (as N)	10000	ug/L	26	41	27.1	24.7	-	-
Nitrite (as N)	1000	ug/L	-	-	< 1	< 1	-	-
Ammonia (as N)		ug/L	-	-	< 5	11.2	-	-
Sulfate (SO4)	500000	ug/L	-	2240	1020	1100	-	-
Total Nitrogen		ug/L	105	-	-	-	-	-
Phosphorus		ug/L	-	-	<50	<50	-	-
Field + Physical								
Dissolved Oxygen, field measured		mg/L	-	-	-	11.3	-	-
Conductivity, field measured		uS/cm	-	-	-	62.8	163	148
pH, field measured		pH units	-	-	-	6.9	-	-
pH, lab		pH	8	7.9	-	7.84	-	-
Temperature, field measured		deg c	-	-	-	5.3	5.4	5.5
Conductivity		uS/cm	140	-	-	-	-	-
Total Dissolved Solids		mg/L	66	-	-	-	-	-
Total Organic Carbon		mg/L	-	4.01	1.7	2.29	-	-
Hardness, Calcium Carbonate		mg/L	-	76.5	50.9	53.8	-	-
Chemical Oxygen Demand		mg/L	-	-	< 20	< 20	-	-
Depth to Water		mbtoc	-	-	-	43.96	43.84	44.84
Metals, Dissolved								
Aluminum	9500	ug/L	4.3	7.4	7.2	5.9	-	-
Antimony	6	ug/L	-	0.334	< 0.1	< 0.1	-	-
Arsenic	10	ug/L	-	0.142	< 0.1	0.18	-	-
Barium	1000	ug/L	14.3	15.5	15.6	15.4	-	-
Beryllium	8	ug/L	-	-	< 0.1	< 0.1	-	-
Bismuth		ug/L	-	-	< 0.05	< 0.05	-	-
Boron	5000	ug/L	-	-	< 10	< 10	-	-
Cadmium	5	ug/L	0.02	0.054	0.144	0.0165	-	-
Calcium		ug/L	-	-	18000	19300	-	-
Chromium	50	ug/L	-	1.39	0.45	0.4	-	-
Cobalt	1	ug/L	-	0.037	< 0.1	< 0.1	-	-
Copper	1500	ug/L	0.85	1.3	0.44	< 0.2	-	-
Iron	6500	ug/L	-	14.8	11	11	-	-
Lead	10	ug/L	-	-	< 0.05	< 0.05	-	-
Lithium	8	ug/L	-	0.66	< 1	< 1	-	-
Magnesium		ug/L	2000	1740	1450	1390	-	-
Manganese	1500	ug/L	1.6	3.78	2.05	5.5	-	-
Mercury	1	ug/L	-	-	< 0.005	0.0113	-	-
Molybdenum	250	ug/L	-	0.2	0.09	0.165	-	-
Nickel	80	ug/L	-	-	< 0.5	< 0.5	-	-
Potassium		ug/L	-	-	420	357	-	-
Selenium	10	ug/L	-	0.061	< 0.05	0.063	-	-
Silicon		ug/L	5910	5170	5290	5740	-	-
Silver	20	ug/L	-	-	< 0.01	< 0.01	-	-
Sodium	200000	ug/L	2110	1920	1650	1520	-	-
Strontium	2500	ug/L	75.8	78.2	75.7	80.4	-	-
Sulphur (S)		ug/L	-	-	< 500	< 500	-	-
Tellurium		ug/L	-	-	< 0.2	< 0.2	-	-
Thallium		ug/L	-	-	< 0.01	< 0.01	-	-
Thorium-232		ug/L	-	-	< 0.1	< 0.1	-	-
Tin	2500	ug/L	-	-	0.54	< 0.1	-	-
Titanium		ug/L	-	-	< 0.3	< 0.3	-	-
Uranium	20	ug/L	-	0.018	< 0.01	0.021	-	-
Vanadium	20	ug/L	-	0.68	< 0.5	< 0.5	-	-
Zinc	3000	ug/L	-	-	1.5	< 1	-	-
Zirconium		ug/L	-	-	< 0.06	< 0.06	-	-
Cesium		ug/L	-	-	< 0.01	< 0.01	-	-
Rubidium		ug/L	-	-	0.36	0.43	-	-
Tungsten	3	ug/L	-	-	< 0.1	< 0.1	-	-

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
< 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 - MW-12
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

		Sample Name	MW-12	MW-12	MW-12	MW-12	MW-12	MW-12
		Laboratory ID	WG_E287384_44057_N	WG_E287384_44139_N	WG_E287384_44284_N	WG_E287384_44370_N	WG_E287384_44433_N	WG_E287384_44504_N
		Sample Date	2020-08-14	2020-11-04	2021-03-29	2021-06-23	2021-08-25	2021-11-04
		QA/QC						
Parameter	**CSR DW**	**Unit**						
Anions + Nutrients								
Alkalinity, Total as CaCO3		ug/L	-	-	-	-	-	-
Bromide (Br)		ug/L	-	-	-	-	-	-
Chloride (Cl)	250000	ug/L	-	-	-	-	-	-
Fluoride (F)	1.5	mg/L	-	-	-	-	-	-
Nitrate (as N)	10000	ug/L	-	-	-	-	-	-
Nitrite (as N)	1000	ug/L	-	-	-	-	-	-
Ammonia (as N)		ug/L	-	-	-	-	-	-
Sulfate (SO4)	500000	ug/L	-	-	-	-	-	-
Total Nitrogen		ug/L	-	-	-	-	-	-
Phosphorus		ug/L	-	-	-	-	-	-
Field + Physical								
Dissolved Oxygen, field measured		mg/L	-	-	-	-	-	-
Conductivity, field measured		uS/cm	172	210	-	144	168	179
pH, field measured		pH units	-	-	-	-	-	-
pH, lab		pH	-	-	-	-	-	-
Temperature, field measured		deg c	5.3	5.5	-	5.5	5.5	5.4
Conductivity		uS/cm	-	-	-	-	-	-
Total Dissolved Solids		mg/L	-	-	-	-	-	-
Total Organic Carbon		mg/L	-	-	-	-	-	-
Hardness, Calcium Carbonate		mg/L	-	-	-	-	-	-
Chemical Oxygen Demand		mg/L	-	-	-	-	-	-
Depth to Water		mbtoc	43.72	44.38	41.27	39.42	39.39	40.03
Metals, Dissolved								
Aluminum	9500	ug/L	-	-	-	-	-	-
Antimony	6	ug/L	-	-	-	-	-	-
Arsenic	10	ug/L	-	-	-	-	-	-
Barium	1000	ug/L	-	-	-	-	-	-
Beryllium	8	ug/L	-	-	-	-	-	-
Bismuth		ug/L	-	-	-	-	-	-
Boron	5000	ug/L	-	-	-	-	-	-
Cadmium	5	ug/L	-	-	-	-	-	-
Calcium		ug/L	-	-	-	-	-	-
Chromium	50	ug/L	-	-	-	-	-	-
Cobalt	1	ug/L	-	-	-	-	-	-
Copper	1500	ug/L	-	-	-	-	-	-
Iron	6500	ug/L	-	-	-	-	-	-
Lead	10	ug/L	-	-	-	-	-	-
Lithium	8	ug/L	-	-	-	-	-	-
Magnesium		ug/L	-	-	-	-	-	-
Manganese	1500	ug/L	-	-	-	-	-	-
Mercury	1	ug/L	-	-	-	-	-	-
Molybdenum	250	ug/L	-	-	-	-	-	-
Nickel	80	ug/L	-	-	-	-	-	-
Potassium		ug/L	-	-	-	-	-	-
Selenium	10	ug/L	-	-	-	-	-	-
Silicon		ug/L	-	-	-	-	-	-
Silver	20	ug/L	-	-	-	-	-	-
Sodium	200000	ug/L	-	-	-	-	-	-
Strontium	2500	ug/L	-	-	-	-	-	-
Sulphur (S)		ug/L	-	-	-	-	-	-
Tellurium		ug/L	-	-	-	-	-	-
Thallium		ug/L	-	-	-	-	-	-
Thorium-232		ug/L	-	-	-	-	-	-
Tin	2500	ug/L	-	-	-	-	-	-
Titanium		ug/L	-	-	-	-	-	-
Uranium	20	ug/L	-	-	-	-	-	-
Vanadium	20	ug/L	-	-	-	-	-	-
Zinc	3000	ug/L	-	-	-	-	-	-
Zirconium		ug/L	-	-	-	-	-	-
Cesium		ug/L	-	-	-	-	-	-
Rubidium		ug/L	-	-	-	-	-	-
Tungsten	3	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
< 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 - MW-13
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Sample Name	MW-13	MW-13	MW-13	MW-13	MW-13
			Laboratory ID	WG_E287385_41204_N	WG_E287385_41367_N	WG_E287385_41437_N	WG_E287385_42830_N	WG_E287385_42922_N
			Sample Date	2012-10-22	2013-04-03	2013-06-12	2017-04-05	2017-07-06
			QA/QC					
Anions + Nutrients								
Alkalinity, Total as CaCO3		ug/L		10600	32000	56700	-	37000
Chloride (Cl)	250000	ug/L		-	-	-	1100	1400
Fluoride (F)	1.5	mg/L		-	-	-	-	< 0.1
Nitrate (as N)	10000	ug/L		47	57	-	< 10	< 10
Nitrite (as N)	1000	ug/L		5.2	-	-	-	150
Ammonia (as N)		ug/L		-	-	< 30	< 30	< 30
Sulfate (SO4)	500000	ug/L		-	1520	-	2600	2600
Total Nitrogen		ug/L		250	-	-	-	-
Phosphorus		ug/L		-	-	-	<50	<50
Field + Physical								
Dissolved Oxygen, field measured		mg/L		-	-	-	4.5	4.7
Conductivity, field measured		uS/cm		-	-	-	31	81
pH, field measured		pH units		-	-	-	6.5	7.8
pH, lab		pH		6	6.7	-	8	8
Temperature, field measured		deg c		-	-	-	-	4.3
Conductivity		uS/cm		17.2	-	-	145	-
Total Dissolved Solids		mg/L		8	-	-	82	-
Total Suspended Solids		mg/L		-	-	-	1.1	-
Total Organic Carbon		mg/L		-	-	-	-	< 0.5
Hardness, Calcium Carbonate		mg/L		-	27.3	-	-	25.5
Chemical Oxygen Demand		mg/L		-	-	-	-	-
Depth to Water		mbtoc		-	-	-	-	-
Metals, Dissolved								
Aluminum	9500	ug/L		17	9.6	-	< 5	46.8
Antimony	6	ug/L		-	0.082	-	< 0.1	0.35
Arsenic	10	ug/L		-	0.68	-	1.59	< 0.5
Barium	1000	ug/L		14.5	10.1	-	18	< 5
Beryllium	8	ug/L		-	-	-	< 0.1	< 0.1
Bismuth		ug/L		-	-	-	< 0.1	< 0.1
Boron	5000	ug/L		-	-	-	< 4	< 5
Cadmium	5	ug/L		0.053	0.127	-	< 0.01	0.08
Calcium		ug/L		-	-	-	-	8920
Chromium	50	ug/L		-	-	-	< 0.5	< 0.5
Cobalt	1	ug/L		-	0.022	-	< 0.05	< 0.1
Copper	1500	ug/L		1.2	20.2	-	< 0.2	0.33
Iron	6500	ug/L		-	-	-	< 10	< 10
Lead	10	ug/L		-	0.159	-	< 0.1	< 0.1
Lithium	8	ug/L		-	-	-	1	0.12
Magnesium		ug/L		290	860	-	1820	210
Manganese	1500	ug/L		3.6	9.37	-	0.26	2.87
Mercury	1	ug/L		-	-	-	< 0.02	< 0.02
Molybdenum	250	ug/L		-	0.059	-	0.3	4.71
Nickel	80	ug/L		-	-	-	< 0.2	0.21
Potassium		ug/L		-	-	-	-	870
Selenium	10	ug/L		-	-	-	< 0.5	< 0.5
Silicon		ug/L		2980	3210	-	4800	< 1000
Silver	20	ug/L		-	-	-	< 0.05	< 0.05
Sodium	200000	ug/L		1020	1280	-	1690	5550
Strontium	2500	ug/L		37.5	60.5	-	86.4	62.9
Sulphur (S)		ug/L		-	-	-	< 3000	< 3000
Tellurium		ug/L		-	-	-	< 0.2	< 0.2
Thallium		ug/L		-	-	-	< 0.02	< 0.02
Thorium-232		ug/L		-	-	-	< 0.1	< 0.1
Tin	2500	ug/L		-	-	-	< 0.2	9.75
Titanium		ug/L		-	-	-	-	< 5
Uranium	20	ug/L		-	0.044	-	0.1	< 0.02
Vanadium	20	ug/L		-	-	-	< 1	< 1
Zinc	3000	ug/L		-	379	-	< 4	< 4
Zirconium		ug/L		-	-	-	< 0.1	< 0.1
Tungsten	3	ug/L		-	-	-	-	-

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 - MW-13
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Sample Name	MW-13	MW-13	MW-13	MW-13	MW-13
			Laboratory ID	WG_E287385_43053_N	WG_E287385_43642_N	WG_E287385_44011_N	WG_E287385_44285_N	WG_E287385_44371_N
			Sample Date	2017-11-14	2019-06-26	2020-06-29	2021-03-30	2021-06-24
			QA/QC					
Anions + Nutrients								
Alkalinity, Total as CaCO3		ug/L		12200	-	-	-	-
Chloride (Cl)	250000	ug/L		< 500	-	-	-	-
Fluoride (F)	1.5	mg/L		0.023	-	-	-	-
Nitrate (as N)	10000	ug/L		140	-	-	-	-
Nitrite (as N)	1000	ug/L		< 1	-	-	-	-
Ammonia (as N)		ug/L		12.7	-	-	-	-
Sulfate (SO4)	500000	ug/L		480	-	-	-	-
Total Nitrogen		ug/L		-	-	-	-	-
Phosphorus		ug/L		<50	-	-	-	-
Field + Physical								
Dissolved Oxygen, field measured		mg/L		4.1	-	3.8	3.7	4.1
Conductivity, field measured		uS/cm		17.7	-	30	17.7	32
pH, field measured		pH units		5.88	-	-	5.49	-
pH, lab		pH		6.86	-	-	-	-
Temperature, field measured		deg c		11	-	-	11.2	-
Conductivity		uS/cm		-	-	-	-	-
Total Dissolved Solids		mg/L		-	-	-	-	-
Total Suspended Solids		mg/L		-	-	-	-	-
Total Organic Carbon		mg/L		1.89	-	-	-	-
Hardness, Calcium Carbonate		mg/L		11.6	-	-	-	-
Chemical Oxygen Demand		mg/L		< 20	-	-	-	-
Depth to Water		mbtoc		-	44	43.53	37.06	36.3
Metals, Dissolved								
Aluminum	9500	ug/L		30.9	-	-	-	-
Antimony	6	ug/L		< 0.1	-	-	-	-
Arsenic	10	ug/L		< 0.1	-	-	-	-
Barium	1000	ug/L		18.7	-	-	-	-
Beryllium	8	ug/L		< 0.1	-	-	-	-
Bismuth		ug/L		< 0.05	-	-	-	-
Boron	5000	ug/L		< 10	-	-	-	-
Cadmium	5	ug/L		0.0119	-	-	-	-
Calcium		ug/L		4050	-	-	-	-
Chromium	50	ug/L		< 0.1	-	-	-	-
Cobalt	1	ug/L		< 0.1	-	-	-	-
Copper	1500	ug/L		< 0.2	-	-	-	-
Iron	6500	ug/L		< 10	-	-	-	-
Lead	10	ug/L		< 0.05	-	-	-	-
Lithium	8	ug/L		< 1	-	-	-	-
Magnesium		ug/L		370	-	-	-	-
Manganese	1500	ug/L		1.21	-	-	-	-
Mercury	1	ug/L		< 0.005	-	-	-	-
Molybdenum	250	ug/L		< 0.05	-	-	-	-
Nickel	80	ug/L		< 0.5	-	-	-	-
Potassium		ug/L		225	-	-	-	-
Selenium	10	ug/L		0.076	-	-	-	-
Silicon		ug/L		2980	-	-	-	-
Silver	20	ug/L		< 0.01	-	-	-	-
Sodium	200000	ug/L		825	-	-	-	-
Strontium	2500	ug/L		51	-	-	-	-
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		< 0.3	-	-	-	-
Uranium	20	ug/L		-	-	-	-	-
Vanadium	20	ug/L		-	-	-	-	-
Zinc	3000	ug/L		-	-	-	-	-
Zirconium		ug/L		-	-	-	-	-
Tungsten	3	ug/L		< 0.1	-	-	-	-

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

< 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 - MW-13
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Sample Name	MW-13	MW-13
			Laboratory ID	WG_E287385_44433_N	WG_E287385_44504_N
			Sample Date	2021-08-25	2021-11-04
			QA/QC		
Anions + Nutrients					
Alkalinity, Total as CaCO3		ug/L		-	-
Chloride (Cl)	250000	ug/L		-	-
Fluoride (F)	1.5	mg/L		-	-
Nitrate (as N)	10000	ug/L		-	-
Nitrite (as N)	1000	ug/L		-	-
Ammonia (as N)		ug/L		-	-
Sulfate (SO4)	500000	ug/L		-	-
Total Nitrogen		ug/L		-	-
Phosphorus		ug/L		-	-
Field + Physical					
Dissolved Oxygen, field measured		mg/L		4.4	5.4
Conductivity, field measured		uS/cm		34	179
pH, field measured		pH units		-	-
pH, lab		pH		-	-
Temperature, field measured		deg c		-	-
Conductivity		uS/cm		-	-
Total Dissolved Solids		mg/L		-	-
Total Suspended Solids		mg/L		-	-
Total Organic Carbon		mg/L		-	-
Hardness, Calcium Carbonate		mg/L		-	-
Chemical Oxygen Demand		mg/L		-	-
Depth to Water		mbtoc		40.44	40.03
Metals, Dissolved					
Aluminum	9500	ug/L		-	-
Antimony	6	ug/L		-	-
Arsenic	10	ug/L		-	-
Barium	1000	ug/L		-	-
Beryllium	8	ug/L		-	-
Bismuth		ug/L		-	-
Boron	5000	ug/L		-	-
Cadmium	5	ug/L		-	-
Calcium		ug/L		-	-
Chromium	50	ug/L		-	-
Cobalt	1	ug/L		-	-
Copper	1500	ug/L		-	-
Iron	6500	ug/L		-	-
Lead	10	ug/L		-	-
Lithium	8	ug/L		-	-
Magnesium		ug/L		-	-
Manganese	1500	ug/L		-	-
Mercury	1	ug/L		-	-
Molybdenum	250	ug/L		-	-
Nickel	80	ug/L		-	-
Potassium		ug/L		-	-
Selenium	10	ug/L		-	-
Silicon		ug/L		-	-
Silver	20	ug/L		-	-
Sodium	200000	ug/L		-	-
Strontium	2500	ug/L		-	-
Sulphur (S)		ug/L		-	-
Tellurium		ug/L		-	-
Thallium		ug/L		-	-
Thorium-232		ug/L		-	-
Tin	2500	ug/L		-	-
Titanium		ug/L		-	-
Uranium	20	ug/L		-	-
Vanadium	20	ug/L		-	-
Zinc	3000	ug/L		-	-
Zirconium		ug/L		-	-
Tungsten	3	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
< 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 - MW-14
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Sample Name	Laboratory ID	Sample Date	QA/QC				
			MW-14	MW-14	MW-14	MW-14	MW-14			
			WG_E287386_44011_N	WG_E287386_44284_N	WG_E287386_44370_N	WG_E287386_44434_N	WG_E287386_44504_N			
			2020-06-29	2021-03-29	2021-06-23	2021-08-26	2021-11-04			
Field + Physical										
Conductivity, field measured		uS/cm	65	-	34	36	42			
Temperature, field measured		deg c	5.8	-	6.3	6.1	5.8			
Depth to Water		mbtoc	28.08	17.68	18.21	21.77	23.59			

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

< 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 - MW-15
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Sample Name	MW-15	MW-15	MW-15	MW-15	MW-15
			Laboratory ID	WG_302210_43010_N	WG_302210_43053_N	WG_302210_43199_N	WG_302210_43299_N	WG_302210_43425_N
			Sample Date	2017-10-02	2017-11-14	2018-04-09	2018-07-18	2018-11-21
			QA/QC					FDA
Anions + Nutrients								
Alkalinity, Total as CaCO3		ug/L		77000	78100	82400	83600	77500
Alkalinity, Hydroxide (OH) as CaCO3		ug/L		-	-	< 20000	< 20000	< 20000
Bromide (Br)		ug/L		-	-	< 50	< 50	< 50
Chloride (Cl)	250000	ug/L		< 1000	< 500	< 500	< 500	< 500
Fluoride (F)	1.5	mg/L		< 0.1	0.032	0.034	0.034	0.027
Nitrate (as N)	10000	ug/L		< 10	89	90.8	87.3	94.1
Nitrite (as N)	1000	ug/L		< 10	< 1	< 1	< 1	< 1
Ammonia (as N)		ug/L		< 30	-	5.2	< 5	< 5
Total Kjeldahl Nitrogen		ug/L		-	-	-	-	-
Sulfate (SO4)	500000	ug/L		-	1080	1030	1020	910
Total Nitrogen		ug/L		82.7	-	-	-	-
Phosphorus, dissolved		ug/L		-	-	<50	<50	<50
Field + Physical								
Dissolved Oxygen, field measured		mg/L		14.2	10.5	9.8	7.1	0.3
Conductivity, field measured		uS/cm		90.3	96.2	97.6	157	157
pH, field measured		pH units		8.39	8.29	7.8	7.51	7.9
pH, lab		pH units		7.9	8.1	8.17	-	-
Specific conductivity, field measured		uS/cm		-	-	-	-	-
Temperature, field measured		deg c		5.5	5	4.9	5.3	5.1
Conductivity		uS/cm		152	-	-	-	-
Total Dissolved Solids		mg/L		75	-	-	-	-
Total Organic Carbon		mg/L		-	< 0.5	< 0.5	< 0.5	< 0.5
Hardness, Calcium Carbonate		mg/L		-	72.9	75.7	79.5	79.2
Hardness, Calcium Carbonate (Dissolved)		mg/L		-	-	-	-	-
Depth to Water		mbtoc		-	-	44.66	43.8	45.37
Metals, Dissolved								
Aluminum	9500	ug/L		< 5	2.6	2.3	2.9	5
Antimony	6	ug/L		< 0.2	< 0.1	< 0.1	< 0.1	< 0.1
Arsenic	10	ug/L		0.72	0.82	0.74	0.78	0.7
Barium	1000	ug/L		13.9	20	16.5	16.5	16.7
Beryllium	8	ug/L		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Bismuth		ug/L		< 0.1	< 0.05	< 0.05	< 0.05	< 0.05
Boron	5000	ug/L		< 5	< 10	< 10	< 10	< 10
Cadmium	5	ug/L		< 0.01	< 0.005	0.0177	0.0149	0.229
Calcium		ug/L		-	-	28200	29600	29500
Chromium	50	ug/L		< 0.5	0.39	0.21	0.35	0.39
Cobalt	1	ug/L		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Copper	1500	ug/L		< 0.4	< 0.2	< 0.2	< 0.2	0.24
Iron	6500	ug/L		< 10	< 10	< 10	< 10	< 10
Lead	10	ug/L		< 0.2	< 0.05	< 0.05	< 0.05	< 0.05
Lithium	8	ug/L		0.79	1.1	< 1	< 1	< 1
Magnesium		ug/L		1220	1330	1270	1390	1350
Manganese	1500	ug/L		0.32	0.14	0.1	0.14	0.55
Mercury	1	ug/L		< 0.01	< 0.005	< 0.005	< 0.005	< 0.005
Molybdenum	250	ug/L		< 0.1	< 0.05	< 0.05	< 0.1	< 0.05
Nickel	80	ug/L		-	-	< 0.5	< 0.5	< 0.5
Potassium		ug/L		-	-	543	602	589
Selenium	10	ug/L		< 0.5	0.08	0.069	0.082	< 0.05
Silicon		ug/L		5700	5490	5470	5050	5680
Silver	20	ug/L		< 0.05	< 0.01	< 0.01	< 0.01	< 0.01
Sodium	200000	ug/L		1470	1390	1510	1590	1660
Strontium	2500	ug/L		79.9	85.2	94.8	89.4	93.2
Sulphur (S)		ug/L		-	-	< 500	< 500	< 500
Tellurium		ug/L		-	-	< 0.2	< 0.2	< 0.2
Thallium		ug/L		-	-	< 0.01	< 0.01	< 0.01
Thorium-232		ug/L		-	-	< 0.1	< 0.1	< 0.1
Tin	2500	ug/L		< 0.2	< 0.1	< 0.1	< 0.1	0.18
Titanium		ug/L		-	-	< 0.3	< 0.3	< 0.3
Uranium	20	ug/L		0.027	0.022	0.026	0.03	0.03
Vanadium	20	ug/L		< 1	0.82	0.75	0.77	0.72
Zinc	3000	ug/L		< 4	< 1	< 1	< 1	4.4
Zirconium		ug/L		< 0.1	< 0.06	< 0.06	< 0.06	< 0.06
Cesium		ug/L		-	-	< 0.01	< 0.01	< 0.01
Rubidium		ug/L		-	-	0.22	< 0.2	0.21
Tungsten	3	ug/L		-	-	< 0.1	< 0.1	< 0.1

Table Notes:

Standards from the Contaminated Sites Regulation (CSR) for the protection of drinking
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 - MW-15
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Sample Name	MW-15	MW-15	MW-15	MW-15	MW-15
			Laboratory ID	WG_302210_43425_FD	WG_302210_43550_N	WG_302210_43627_N	WG_302210_43642_N	WG_302210_44011_N
			Sample Date	2018-11-21	2019-03-26	2019-06-11	2019-06-26	2020-06-29
			QA/QC	FD				
Anions + Nutrients								
Alkalinity, Total as CaCO3		ug/L		87400	83400	-	85200	-
Alkalinity, Hydroxide (OH) as CaCO3		ug/L		< 20000	< 20000	-	< 20000	-
Bromide (Br)		ug/L		< 50	< 50	-	< 50	-
Chloride (Cl)	250000	ug/L		< 500	< 500	-	< 500	-
Fluoride (F)	1.5	mg/L		0.027	0.039	-	0.033	-
Nitrate (as N)	10000	ug/L		94.9	73.2	-	96	-
Nitrite (as N)	1000	ug/L		< 1	< 1	-	< 1	-
Ammonia (as N)		ug/L		< 5	< 5	-	< 5	-
Total Kjeldahl Nitrogen		ug/L		-	-	-	-	-
Sulfate (SO4)	500000	ug/L		930	1170	-	950	-
Total Nitrogen		ug/L		-	-	-	-	-
Phosphorus, dissolved		ug/L		<50	<50	-	<50	-
Field + Physical								
Dissolved Oxygen, field measured		mg/L		-	8.7	-	10.4	-
Conductivity, field measured		uS/cm		-	174	164	164	166
pH, field measured		pH units		-	6.5	-	7.67	-
pH, lab		pH units		-	8.18	-	8.22	-
Specific conductivity, field measured		uS/cm		-	-	-	-	-
Temperature, field measured		deg c		-	5.1	5.4	5.8	5.2
Conductivity		uS/cm		-	-	-	-	-
Total Dissolved Solids		mg/L		-	-	-	-	-
Total Organic Carbon		mg/L		< 0.5	0.5	-	1.11	-
Hardness, Calcium Carbonate		mg/L		80.2	82.5	-	87.4	-
Hardness, Calcium Carbonate (Dissolved)		mg/L		-	-	-	-	-
Depth to Water		mbtoc		-	44.72	45.73	45.78	44.85
Metals, Dissolved								
Aluminum	9500	ug/L		5.7	3.1	-	3.6	-
Antimony	6	ug/L		< 0.1	0.16	-	< 0.1	-
Arsenic	10	ug/L		0.7	0.81	-	0.79	-
Barium	1000	ug/L		17.6	18.3	-	17.5	-
Beryllium	8	ug/L		< 0.1	< 0.1	-	< 0.1	-
Bismuth		ug/L		< 0.05	< 0.05	-	< 0.05	-
Boron	5000	ug/L		< 10	< 10	-	< 10	-
Cadmium	5	ug/L		0.225	< 0.005	-	0.0712	-
Calcium		ug/L		29900	30500	-	32400	-
Chromium	50	ug/L		0.42	0.4	-	0.36	-
Cobalt	1	ug/L		< 0.1	< 0.1	-	< 0.1	-
Copper	1500	ug/L		0.25	< 0.2	-	0.2	-
Iron	6500	ug/L		< 10	< 10	-	< 10	-
Lead	10	ug/L		< 0.05	< 0.05	-	< 0.05	-
Lithium	8	ug/L		< 1	< 1	-	< 1	-
Magnesium		ug/L		1340	1530	-	1540	-
Manganese	1500	ug/L		0.59	0.12	-	0.25	-
Mercury	1	ug/L		< 0.005	< 0.005	-	< 0.005	-
Molybdenum	250	ug/L		< 0.05	< 0.05	-	< 0.05	-
Nickel	80	ug/L		< 0.5	< 0.5	-	< 0.5	-
Potassium		ug/L		588	579	-	622	-
Selenium	10	ug/L		< 0.05	0.074	-	0.07	-
Silicon		ug/L		5640	6100	-	5860	-
Silver	20	ug/L		< 0.01	< 0.01	-	< 0.01	-
Sodium	200000	ug/L		1650	1560	-	1660	-
Strontium	2500	ug/L		92.5	98.7	-	103	-
Sulphur (S)		ug/L		< 500	< 500	-	< 500	-
Tellurium		ug/L		< 0.2	< 0.2	-	< 0.2	-
Thallium		ug/L		< 0.01	< 0.01	-	< 0.01	-
Thorium-232		ug/L		< 0.1	< 0.1	-	< 0.1	-
Tin	2500	ug/L		0.18	< 0.1	-	< 0.1	-
Titanium		ug/L		< 0.3	< 0.3	-	< 0.3	-
Uranium	20	ug/L		0.03	0.025	-	0.027	-
Vanadium	20	ug/L		0.74	0.83	-	0.74	-
Zinc	3000	ug/L		5	< 1	-	< 1	-
Zirconium		ug/L		< 0.06	< 0.06	-	< 0.2	-
Cesium		ug/L		< 0.01	< 0.01	-	< 0.01	-
Rubidium		ug/L		0.24	0.22	-	0.24	-
Tungsten	3	ug/L		< 0.1	< 0.1	-	< 0.1	-

Table Notes:

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QA/QC = Quality Assurance/Quality Control; FDA/FD = Field Duplicate Available/Field
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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 - MW-15
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Sample Name	MW-15	MW-15	MW-15	MW-15	MW-15	MW-15
			Laboratory ID	WG_302210_44057_N	WG_302210_44138_N	WG_302210_44286_N	WG_302210_44370_N	WG_302210_44434_N	VA21C4924-009
			Sample Date	2020-08-14	2020-11-03	2021-03-31	2021-06-23	2021-08-26	2021-11-04
			QA/QC						
Anions + Nutrients									
Alkalinity, Total as CaCO3		ug/L		-	115000	-	-	-	266000
Alkalinity, Hydroxide (OH) as CaCO3		ug/L		-	< 20000	-	-	-	< 20000
Bromide (Br)		ug/L		-	-	-	-	-	< 50
Chloride (Cl)	250000	ug/L		-	2940	-	-	-	13700
Fluoride (F)	1.5	mg/L		-	0.028	-	-	-	< 0.02
Nitrate (as N)	10000	ug/L		-	278	-	-	-	1060
Nitrite (as N)	1000	ug/L		-	1.6	-	-	-	< 1
Ammonia (as N)		ug/L		-	< 5	-	-	-	< 5
Total Kjeldahl Nitrogen		ug/L		-	109	-	-	-	190
Sulfate (SO4)	500000	ug/L		-	1240	-	-	-	1800
Total Nitrogen		ug/L		-	-	-	-	-	-
Phosphorus, dissolved		ug/L		-	<50	-	-	-	<50
Field + Physical									
Dissolved Oxygen, field measured		mg/L		-	10.4	9	-	-	10.5
Conductivity, field measured		uS/cm		170	135.2	147.5	280	484	307.4
pH, field measured		pH units		-	7.75	7.96	-	-	7.34
pH, lab		pH units		-	8.17	-	-	-	7.84
Specific conductivity, field measured		uS/cm		-	215.5	239.6	-	-	490.6
Temperature, field measured		deg c		5.1	4.8	4.9	4.9	5	5.5
Conductivity		uS/cm		-	226	-	-	-	490
Total Dissolved Solids		mg/L		-	-	-	-	-	-
Total Organic Carbon		mg/L		-	0.78	-	-	-	1.39
Hardness, Calcium Carbonate		mg/L		-	-	-	-	-	-
Hardness, Calcium Carbonate (Dissolved)		mg/L		-	116	-	-	-	243
Depth to Water		mbtoc		45.09	45.84	41.1	38.21	39.52	41.06
Metals, Dissolved									
Aluminum	9500	ug/L		-	5.8	-	-	-	< 1
Antimony	6	ug/L		-	< 0.1	-	-	-	< 0.1
Arsenic	10	ug/L		-	0.55	-	-	-	0.34
Barium	1000	ug/L		-	25.6	-	-	-	64.3
Beryllium	8	ug/L		-	< 0.1	-	-	-	< 0.1
Bismuth		ug/L		-	< 0.05	-	-	-	< 0.05
Boron	5000	ug/L		-	< 10	-	-	-	< 10
Cadmium	5	ug/L		-	< 0.005	-	-	-	< 0.005
Calcium		ug/L		-	42900	-	-	-	88800
Chromium	50	ug/L		-	0.45	-	-	-	0.55
Cobalt	1	ug/L		-	< 0.1	-	-	-	< 0.1
Copper	1500	ug/L		-	0.5	-	-	-	0.32
Iron	6500	ug/L		-	12	-	-	-	< 10
Lead	10	ug/L		-	< 0.05	-	-	-	< 0.05
Lithium	8	ug/L		-	1.3	-	-	-	3.3
Magnesium		ug/L		-	2100	-	-	-	5150
Manganese	1500	ug/L		-	2.38	-	-	-	0.25
Mercury	1	ug/L		-	< 0.005	-	-	-	< 0.005
Molybdenum	250	ug/L		-	< 0.05	-	-	-	< 0.05
Nickel	80	ug/L		-	< 0.5	-	-	-	< 0.5
Potassium		ug/L		-	768	-	-	-	1090
Selenium	10	ug/L		-	0.053	-	-	-	0.09
Silicon		ug/L		-	6030	-	-	-	7880
Silver	20	ug/L		-	< 0.01	-	-	-	< 0.01
Sodium	200000	ug/L		-	1950	-	-	-	2970
Strontium	2500	ug/L		-	150	-	-	-	332
Sulphur (S)		ug/L		-	< 500	-	-	-	< 500
Tellurium		ug/L		-	< 0.2	-	-	-	< 0.2
Thallium		ug/L		-	< 0.01	-	-	-	< 0.01
Thorium-232		ug/L		-	< 0.1	-	-	-	< 0.1
Tin	2500	ug/L		-	< 0.1	-	-	-	< 0.1
Titanium		ug/L		-	< 0.3	-	-	-	< 0.3
Uranium	20	ug/L		-	0.031	-	-	-	0.044
Vanadium	20	ug/L		-	0.68	-	-	-	< 0.5
Zinc	3000	ug/L		-	< 1	-	-	-	< 1
Zirconium		ug/L		-	< 0.2	-	-	-	< 0.2
Cesium		ug/L		-	< 0.01	-	-	-	< 0.01
Rubidium		ug/L		-	0.27	-	-	-	0.43
Tungsten	3	ug/L		-	< 0.1	-	-	-	< 0.1

Table Notes:

Standards from the Contaminated Sites Regulation (CSR) for the protection of drinking
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 - MW-16
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Parameter	CSR DW	Sample Name / Laboratory ID / Sample Date / QA/QC / Unit	MW-16 / WG_E02211_42830_N / 2017-04-05	MW-16 / WG_E02211_43010_N / 2017-10-02	MW-16 / WG_E02211_43053_N / 2017-11-14	MW-16 / WG_E02211_43199_N / 2018-04-09	MW-16 / WG_E02211_43299_N / 2018-07-18
Anions + Nutrients							
Alkalinity, Total as CaCO3		ug/L	94000	80000	77800	77200	77700
Bromide (Br)		ug/L	-	-	-	< 50	< 50
Chloride (Cl)	250000	ug/L	< 1000	< 1000	< 500	< 500	< 500
Fluoride (F)	1.5	mg/L	< 0.1	< 0.1	0.036	0.039	0.039
Nitrate (as N)	10000	ug/L	28	< 10	79.3	68.6	74.7
Nitrite (as N)	1000	ug/L	< 10	< 10	< 1	< 1	< 1
Ammonia (as N)		ug/L	< 30	-	< 5	6.1	< 5
Total Kjeldahl Nitrogen		ug/L	-	-	-	-	-
Sulfate (SO4)	500000	ug/L	-	1300	1010	1020	960
Phosphorus, dissolved		ug/L	-	-	<50	<50	<50
Field + Physical							
Dissolved Oxygen, field measured		mg/L	-	14.2	9.8	12.1	7.9
Conductivity, field measured		uS/cm	124	94.3	90.7	90.3	146
pH, field measured		pH units	7.8	8.37	8.23	7.24	7.81
pH, lab		pH units	8	8	8.08	8.13	-
Specific conductivity, field measured		uS/cm	-	-	-	-	-
Temperature, field measured		deg c	-	5.8	4.6	4.8	5.6
Conductivity		uS/cm	137	-	-	-	-
Total Dissolved Solids		mg/L	81	-	-	-	-
Total Organic Carbon		mg/L	-	-	< 0.5	< 0.5	< 0.5
Hardness, Calcium Carbonate		mg/L	-	75	72.9	71.1	72.8
Hardness, Calcium Carbonate (Dissolved)		mg/L	-	-	-	-	-
Chemical Oxygen Demand		mg/L	-	-	< 20	< 20	< 20
Depth to Water		mbtoc	-	-	44.6	45.15	44.31
Metals, Dissolved							
Aluminum	9500	ug/L	10.6	< 5	5.4	3.6	2.8
Antimony	6	ug/L	< 0.1	< 0.2	< 0.1	< 0.1	< 0.1
Arsenic	10	ug/L	0.52	0.55	0.63	0.61	0.57
Barium	1000	ug/L	138	16.1	17.8	19.1	18.1
Beryllium	8	ug/L	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Bismuth		ug/L	< 0.1	< 0.1	< 0.05	< 0.05	< 0.05
Boron	5000	ug/L	14	< 5	< 10	< 10	< 10
Cadmium	5	ug/L	0.03	0.018	< 0.005	0.0261	0.0076
Calcium		ug/L	-	-	26900	26300	26900
Chromium	50	ug/L	0.5	< 0.5	0.38	0.26	0.37
Cobalt	1	ug/L	0.12	< 0.1	< 0.1	< 0.1	< 0.1
Copper	1500	ug/L	4.2	< 0.4	< 0.2	< 0.2	< 0.2
Iron	6500	ug/L	< 10	< 10	10	< 10	< 10
Lead	10	ug/L	< 0.1	< 0.2	< 0.05	< 0.05	< 0.05
Lithium	8	ug/L	0.7	0.96	1.1	< 1	< 1
Magnesium		ug/L	992	1370	1400	1290	1380
Manganese	1500	ug/L	37.1	7.52	6.51	3.14	2.11
Mercury	1	ug/L	< 0.02	< 0.01	< 0.005	< 0.005	< 0.005
Molybdenum	250	ug/L	0.27	< 0.1	0.054	0.062	< 0.1
Nickel	80	ug/L	-	-	< 0.5	< 0.5	< 0.5
Potassium		ug/L	-	-	608	625	644
Selenium	10	ug/L	< 0.5	< 0.5	0.093	0.092	0.066
Silicon		ug/L	4500	5500	5280	5460	5150
Silver	20	ug/L	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
Sodium	200000	ug/L	1750	1550	1410	1510	1610
Strontium	2500	ug/L	71.5	91.2	91.8	95.3	91.6
Sulphur (S)		ug/L	-	-	< 500	570	< 500
Tellurium		ug/L	-	-	< 0.2	< 0.2	< 0.2
Thallium		ug/L	-	-	< 0.01	< 0.01	< 0.01
Thorium-232		ug/L	-	-	< 0.1	< 0.1	< 0.1
Tin	2500	ug/L	0.49	< 0.2	< 0.1	< 0.1	< 0.1
Titanium		ug/L	-	-	< 0.3	< 0.3	< 0.3
Uranium	20	ug/L	0.05	0.059	0.036	0.04	0.038
Vanadium	20	ug/L	< 1	< 1	0.57	0.61	0.69
Zinc	3000	ug/L	15.7	< 4	< 1	1.1	< 1
Zirconium		ug/L	< 0.1	< 0.1	< 0.06	< 0.06	< 0.06
Cesium		ug/L	-	-	< 0.01	< 0.01	< 0.01
Rubidium		ug/L	-	-	0.39	0.43	0.42
Tungsten	3	ug/L	-	-	< 0.1	< 0.1	< 0.1

Table Notes:

Standards from the Contaminated Sites Regulation (CSR) for the protection of

QA/QC = Quality Assurance/Quality Control; FDA/FD = 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 - MW-16
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Parameter	CSR DW	Sample Name / Laboratory ID / Sample Date / QA/QC / Unit	MW-16 WG_E02211_43425_N 2018-11-21	MW-16 WG_E02211_43550_N 2019-03-26	MW-16 WG_E02211_43627_N 2019-06-11	MW-16 WG_E02211_43642_N 2019-06-26	MW-16 WG_E02211_44011_N 2020-06-29
Anions + Nutrients							
Alkalinity, Total as CaCO3		ug/L	77500	78000	-	84000	-
Bromide (Br)		ug/L	< 50	< 50	-	< 50	-
Chloride (Cl)	250000	ug/L	< 500	< 500	-	< 500	-
Fluoride (F)	1.5	mg/L	0.038	0.036	-	0.036	-
Nitrate (as N)	10000	ug/L	76.7	137	-	75.7	-
Nitrite (as N)	1000	ug/L	< 1	< 1	-	< 1	-
Ammonia (as N)		ug/L	< 5	< 5	-	< 5	-
Total Kjeldahl Nitrogen		ug/L	-	-	-	-	-
Sulfate (SO4)	500000	ug/L	920	610	-	880	-
Phosphorus, dissolved		ug/L	<50	<50	-	<50	-
Field + Physical							
Dissolved Oxygen, field measured		mg/L	0.3	9.9	-	14	-
Conductivity, field measured		uS/cm	147	159	154	152	235
pH, field measured		pH units	7.81	7.52	-	7.64	-
pH, lab		pH units	-	8.16	-	8.21	-
Specific conductivity, field measured		uS/cm	-	-	-	-	-
Temperature, field measured		deg c	5	5	5.3	5.9	6.2
Conductivity		uS/cm	-	-	-	-	-
Total Dissolved Solids		mg/L	-	-	-	-	-
Total Organic Carbon		mg/L	< 0.5	0.68	-	< 0.5	-
Hardness, Calcium Carbonate		mg/L	72.9	77.6	-	83.9	-
Hardness, Calcium Carbonate (Dissolved)		mg/L	-	-	-	-	-
Chemical Oxygen Demand		mg/L	< 20	< 20	-	< 20	-
Depth to Water		mbtoc	45.03	46.21	46.2	46.27	45.38
Metals, Dissolved							
Aluminum	9500	ug/L	3.7	18.1	-	2.4	-
Antimony	6	ug/L	< 0.1	0.16	-	< 0.1	-
Arsenic	10	ug/L	0.58	0.66	-	0.58	-
Barium	1000	ug/L	18.1	19.5	-	19.4	-
Beryllium	8	ug/L	< 0.1	< 0.1	-	< 0.1	-
Bismuth		ug/L	< 0.05	< 0.05	-	< 0.05	-
Boron	5000	ug/L	< 10	< 10	-	< 10	-
Cadmium	5	ug/L	0.0774	0.166	-	0.0414	-
Calcium		ug/L	27100	28600	-	30700	-
Chromium	50	ug/L	0.38	0.55	-	0.36	-
Cobalt	1	ug/L	< 0.1	< 0.1	-	< 0.1	-
Copper	1500	ug/L	< 0.2	0.56	-	< 0.2	-
Iron	6500	ug/L	< 10	15	-	< 10	-
Lead	10	ug/L	< 0.05	< 0.05	-	< 0.05	-
Lithium	8	ug/L	< 1	< 1	-	< 1	-
Magnesium		ug/L	1270	1510	-	1530	-
Manganese	1500	ug/L	1.86	2.4	-	0.46	-
Mercury	1	ug/L	< 0.005	< 0.005	-	< 0.005	-
Molybdenum	250	ug/L	0.054	0.063	-	0.062	-
Nickel	80	ug/L	< 0.5	< 0.5	-	< 0.5	-
Potassium		ug/L	602	621	-	624	-
Selenium	10	ug/L	0.098	0.094	-	0.07	-
Silicon		ug/L	5290	5540	-	5470	-
Silver	20	ug/L	< 0.01	< 0.01	-	< 0.01	-
Sodium	200000	ug/L	1600	1660	-	1670	-
Strontium	2500	ug/L	88.6	101	-	111	-
Sulphur (S)		ug/L	< 500	< 500	-	< 500	-
Tellurium		ug/L	< 0.2	< 0.2	-	< 0.2	-
Thallium		ug/L	< 0.01	< 0.01	-	< 0.01	-
Thorium-232		ug/L	< 0.1	< 0.1	-	< 0.1	-
Tin	2500	ug/L	< 0.1	< 0.1	-	< 0.1	-
Titanium		ug/L	< 0.3	< 0.3	-	< 0.3	-
Uranium	20	ug/L	0.039	0.042	-	0.036	-
Vanadium	20	ug/L	0.62	0.78	-	0.53	-
Zinc	3000	ug/L	< 1	4.6	-	< 1	-
Zirconium		ug/L	< 0.06	< 0.06	-	< 0.2	-
Cesium		ug/L	< 0.01	< 0.01	-	< 0.01	-
Rubidium		ug/L	0.42	0.41	-	0.36	-
Tungsten	3	ug/L	< 0.1	< 0.1	-	< 0.1	-

Table Notes:

Standards from the Contaminated Sites Regulation (CSR) for the protection of

QA/QC = Quality Assurance/Quality Control; FDA/FD = 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 - MW-16
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Parameter	CSR DW	Unit	Sample Name	MW-16	MW-16	MW-16	MW-16	MW-16	MW-16
			Laboratory ID	WG_E02211_44057_N	WG_E02211_44138_N	WG_E02211_44286_N	WG_E02211_44370_N	WG_E02211_44434_N	VA21C4924-010
			Sample Date	2020-08-14	2020-11-03	2021-03-31	2021-06-23	2021-08-26	2021-11-04
			QA/QC						
Anions + Nutrients									
Alkalinity, Total as CaCO3		ug/L		-	90900	-	-	-	111000
Bromide (Br)		ug/L		-	-	-	-	-	< 50
Chloride (Cl)	250000	ug/L		-	520	-	-	-	2030
Fluoride (F)	1.5	mg/L		-	0.035	-	-	-	0.031
Nitrate (as N)	10000	ug/L		-	100	-	-	-	287
Nitrite (as N)	1000	ug/L		-	< 1	-	-	-	< 1
Ammonia (as N)		ug/L		-	< 5	-	-	-	< 5
Total Kjeldahl Nitrogen		ug/L		-	84	-	-	-	56
Sulfate (SO4)	500000	ug/L		-	1110	-	-	-	1380
Phosphorus, dissolved		ug/L		-	<50	-	-	-	<50
Field + Physical									
Dissolved Oxygen, field measured		mg/L		-	10	6.9	-	-	9.8
Conductivity, field measured		uS/cm		163	106.8	110.7	180	224	128.3
pH, field measured		pH units		-	8	8.19	-	-	8.14
pH, lab		pH units		-	8.15	-	-	-	8.03
Specific conductivity, field measured		uS/cm		-	171.5	180.6	-	-	204.8
Temperature, field measured		deg c		5	4.5	4.7	5.6	4.8	5.1
Conductivity		uS/cm		-	180	-	-	-	202
Total Dissolved Solids		mg/L		-	-	-	-	-	-
Total Organic Carbon		mg/L		-	1.63	-	-	-	1.12
Hardness, Calcium Carbonate		mg/L		-	-	-	-	-	-
Hardness, Calcium Carbonate (Dissolved)		mg/L		-	89.5	-	-	-	100
Chemical Oxygen Demand		mg/L		-	27	-	-	-	< 20
Depth to Water		mbtoc		45.45	46.33	41.71	38.69	40.12	41.63
Metals, Dissolved									
Aluminum	9500	ug/L		-	2.4	-	-	-	3
Antimony	6	ug/L		-	< 0.1	-	-	-	< 0.1
Arsenic	10	ug/L		-	0.59	-	-	-	0.48
Barium	1000	ug/L		-	19.3	-	-	-	21.3
Beryllium	8	ug/L		-	< 0.1	-	-	-	< 0.1
Bismuth		ug/L		-	< 0.05	-	-	-	< 0.05
Boron	5000	ug/L		-	< 10	-	-	-	< 10
Cadmium	5	ug/L		-	< 0.005	-	-	-	0.005
Calcium		ug/L		-	33000	-	-	-	37000
Chromium	50	ug/L		-	0.4	-	-	-	< 0.5
Cobalt	1	ug/L		-	< 0.1	-	-	-	< 0.1
Copper	1500	ug/L		-	< 0.2	-	-	-	< 0.2
Iron	6500	ug/L		-	< 10	-	-	-	< 10
Lead	10	ug/L		-	< 0.05	-	-	-	< 0.05
Lithium	8	ug/L		-	1	-	-	-	1
Magnesium		ug/L		-	1700	-	-	-	1910
Manganese	1500	ug/L		-	0.59	-	-	-	0.67
Mercury	1	ug/L		-	< 0.005	-	-	-	< 0.005
Molybdenum	250	ug/L		-	< 0.05	-	-	-	< 0.05
Nickel	80	ug/L		-	< 0.5	-	-	-	< 0.5
Potassium		ug/L		-	659	-	-	-	683
Selenium	10	ug/L		-	0.077	-	-	-	0.052
Silicon		ug/L		-	5310	-	-	-	5700
Silver	20	ug/L		-	< 0.01	-	-	-	< 0.01
Sodium	200000	ug/L		-	1800	-	-	-	1920
Strontium	2500	ug/L		-	129	-	-	-	137
Sulphur (S)		ug/L		-	< 500	-	-	-	< 500
Tellurium		ug/L		-	< 0.2	-	-	-	< 0.2
Thallium		ug/L		-	< 0.01	-	-	-	< 0.01
Thorium-232		ug/L		-	< 0.1	-	-	-	< 0.1
Tin	2500	ug/L		-	< 0.1	-	-	-	< 0.1
Titanium		ug/L		-	< 0.3	-	-	-	< 0.3
Uranium	20	ug/L		-	0.039	-	-	-	0.04
Vanadium	20	ug/L		-	0.62	-	-	-	0.58
Zinc	3000	ug/L		-	< 1	-	-	-	< 1
Zirconium		ug/L		-	< 0.2	-	-	-	< 0.2
Cesium		ug/L		-	< 0.01	-	-	-	< 0.01
Rubidium		ug/L		-	0.38	-	-	-	0.38
Tungsten	3	ug/L		-	< 0.1	-	-	-	< 0.1

Table Notes:

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QA/QC = Quality Assurance/Quality Control; FDA/FD = 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***

3 - Leachate Data

Appendix C
Results of Leachate Analyses - F1 Raw Leachate
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name	F1 - RAW LEACHATE	F1 - RAW LEACHATE	F1 - RAW LEACHATE	F1 - RAW LEACHATE	F1 - RAW LEACHATE
		Laboratory ID	WL_F1_42892_N	WL_F1_42921_N	WL_F1_43238_N	WL_F1_43297_N	WL_F1_43571_N
		Sample Date	2017-06-06	2017-07-05	2018-05-18	2018-07-16	2019-04-16
		QA/QC					
Anions + Nutrients							
Alkalinity, Total as CaCO3	ug/L		860000	950000	-	2160000	1670000
Bromide (Br)	ug/L		-	-	-	3800	1500
Chloride (Cl)	ug/L		238000	242000	-	408000	237000
Fluoride (F)	mg/L		< 0.1	< 0.1	-	< 0.4	< 0.4
Nitrate (as N)	ug/L		< 10	< 10	-	< 100	< 100
Nitrite (as N)	ug/L		< 10	20	-	42	< 20
Ammonia (as N)	ug/L		51800	54100	-	160000	133000
Sulfate (SO4)	ug/L		80000	48200	-	< 6000	< 6000
Total Nitrogen	ug/L		60900	49600	-	-	-
Phosphorus, Total Orthophosphate	ug/L		-	-	-	< 20	< 1
Phosphorus, Dissolved	ug/L		480	160	-	-	-
Phosphorus, Total	ug/L		701	350	-	<1000	650
Field + Physical							
Dissolved Oxygen, field measured	mg/L		-	2.4	-	-	0.8
Conductivity, field measured	uS/cm		283	3050	3750	-	2834
pH, field measured	pH units		5.4	5.7	5.6	-	6.3
pH, lab	pH		5.6	5.6	-	6.16	6.58
Temperature, field measured	deg c		14.1	13.2	9.6	-	8.9
Conductivity	uS/cm		3040	3250	-	-	-
Total Dissolved Solids	mg/L		1500	1600	-	-	-
Total Suspended Solids	mg/L		8.7	7	-	-	-
Total Organic Carbon	mg/L		1290	1310	-	2100	922
Hardness, Calcium Carbonate	mg/L		920	990	-	2020	1130
Biochemical Oxygen Demand	mg/L		540	1120	-	3840	-
Chemical Oxygen Demand	mg/L		-	-	-	6290	2480
Metals, Dissolved							
Aluminum	ug/L		3240	222	-	-	-
Antimony	ug/L		1.73	0.94	-	-	-
Arsenic	ug/L		3.52	2.93	-	-	-
Barium	ug/L		734	1330	-	-	-
Beryllium	ug/L		0.25	0.15	-	-	-
Bismuth	ug/L		< 0.1	< 0.1	-	-	-
Boron	ug/L		734	647	-	-	-
Cadmium	ug/L		0.041	< 0.01	-	-	-
Calcium	ug/L		285000	291000	-	-	-
Chromium	ug/L		33.4	13.1	-	-	-
Cobalt	ug/L		155	122	-	-	-
Copper	ug/L		0.83	< 0.2	-	-	-
Iron	ug/L		47100	30700	106000	-	-
Lead	ug/L		0.2	< 0.1	-	-	-
Lithium	ug/L		1.37	3.14	-	-	-
Magnesium	ug/L		33300	33100	-	-	-
Manganese	ug/L		40200	99400	-	-	-
Mercury	ug/L		< 0.02	-	-	-	-
Molybdenum	ug/L		0.92	< 0.1	-	-	-
Nickel	ug/L		53.8	36.2	-	-	-
Potassium	ug/L		62400	62000	-	-	-
Selenium	ug/L		< 0.5	0.76	-	-	-
Silicon	ug/L		8800	8600	-	-	-
Silver	ug/L		< 0.05	< 0.05	-	-	-
Sodium	ug/L		203000	193000	-	-	-
Strontium	ug/L		870	899	-	-	-
Sulphur (S)	ug/L		35300	9700	-	-	-
Tellurium	ug/L		< 0.2	< 0.2	-	-	-
Thallium	ug/L		< 0.02	0.021	-	-	-
Thorium-232	ug/L		0.13	< 0.1	-	-	-
Tin	ug/L		< 0.2	< 0.2	-	-	-
Titanium	ug/L		72	< 5	-	-	-
Uranium	ug/L		0.166	0.031	-	-	-
Vanadium	ug/L		18	< 1	-	-	-
Zinc	ug/L		23.4	45.9	-	-	-
Zirconium	ug/L		1.14	0.18	-	-	-
Metals, Total							
Aluminum	ug/L		3890	1350	-	279	173
Antimony	ug/L		2.52	1.59	-	3	1.93
Arsenic	ug/L		5.35	6.05	-	12.2	12.6
Barium	ug/L		781	1490	-	2860	1280
Beryllium	ug/L		0.27	0.24	-	< 2	< 0.2
Bismuth	ug/L		< 0.1	< 0.1	-	< 1	< 0.1
Boron	ug/L		833	731	-	2100	1680
Cadmium	ug/L		0.327	0.133	-	< 0.1	0.036
Calcium	ug/L		309000	334000	-	699000	381000
Chromium	ug/L		35.3	26.6	-	28.8	16.9
Cobalt	ug/L		164	131	-	31.8	13.4
Copper	ug/L		2.8	1.23	-	< 10	1.2
Iron	ug/L		49500	62400	118000	161000	116000
Lead	ug/L		0.94	0.52	-	< 1	0.23
Lithium	ug/L		1.57	1.23	-	< 20	2.5
Magnesium	ug/L		36000	37500	-	68100	42400
Manganese	ug/L		44500	119000	-	83700	39000
Mercury	ug/L		< 0.02	< 0.02	-	< 0.005	< 0.025
Molybdenum	ug/L		1.99	0.55	-	< 1	0.67
Nickel	ug/L		57.5	39.2	-	24	17.4
Potassium	ug/L		64700	65500	-	130000	97700
Selenium	ug/L		< 0.5	0.76	-	< 1	0.34
Silicon	ug/L		9400	9900	-	10500	8070
Silver	ug/L		< 0.05	0.063	-	< 0.2	< 0.02
Sodium	ug/L		217000	215000	-	414000	257000
Strontium	ug/L		897	1050	-	2630	1610
Sulphur (S)	ug/L		37800	13000	-	< 10000	4500
Tellurium	ug/L		< 0.2	< 0.2	-	< 4	0.44
Thallium	ug/L		0.062	0.023	-	< 0.2	< 0.02
Thorium-232	ug/L		0.18	< 0.1	-	< 2	< 0.2
Tin	ug/L		0.46	0.24	-	< 2	0.35
Titanium	ug/L		104	25	-	< 13	12.8
Uranium	ug/L		0.191	0.079	-	< 0.2	0.057
Vanadium	ug/L		20	20.4	-	25	20.3
Zinc	ug/L		202	81.4	-	< 60	22
Zirconium	ug/L		1.53	1.14	-	< 1.2	1.23
Tungsten	ug/L		-	-	-	< 2	0.33
Rubidium	ug/L		-	-	-	147	116
Cesium	ug/L		-	-	-	0.69	0.677

Table Notes:
QA/QC = Quality Assurance/Quality Control, FDA/FD = Field Duplicate Available/Field Duplicate
< Indicates parameter was below laboratory equipment detection limit.
- Chemical not analyzed or criteria not defined.

Appendix C
Results of Leachate Analyses - F2 Raw Septage
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name	F2 - RAW SEPTAGE	F2 - RAW SEPTAGE	F2 - RAW SEPTAGE	F2 - RAW SEPTAGE	F2 - RAW SEPTAGE
		Laboratory ID	WL_F2 _42921_N	WL_F2 _42962_N	WL_F2 _43238_N	WL_F2 _43297_N	WL_F2 _43571_N
		Sample Date	2017-07-05	2017-08-15	2018-05-18	2018-07-16	2019-04-16
		QA/QC					
Anions + Nutrients							
Alkalinity, Total as CaCO3	ug/L		1500000	780000	-	2330000	1050000
Bromide (Br)	ug/L		-	-	-	13200	< 5000
Chloride (Cl)	ug/L		2740000	3010000	-	1430000	1120000
Fluoride (F)	mg/L		0.19	0.12	-	1.1	< 7.2
Nitrate (as N)	ug/L		< 500	380	-	260	< 500
Nitrite (as N)	ug/L		< 500	< 200	-	< 50	< 100
Ammonia (as N)	ug/L		1420000	1640000	-	922000	518000
Sulfate (SO4)	ug/L		1030000	471000	-	560000	343000
Total Nitrogen	ug/L		3210000	3890000	-	-	-
Phosphorus, Total Orthophosphate	ug/L		-	-	-	236000	197000
Phosphorous, Dissolved	ug/L		375000	461000	-	-	-
Phosphorus, Total	ug/L		489000	582000		549000	297000
Field + Physical							
Dissolved Oxygen, field measured	mg/L		1.5	12.9	-	-	2.4
Conductivity, field measured	uS/cm		-	26600	250	-	7747
pH, field measured	pH units		4.7	4.8	6.9	-	4.75
pH, lab	pH		4.8	4.6	-	4.86	4.74
Temperature, field measured	deg c		14.3	14.5	18.1	-	5.4
Conductivity	uS/cm		23000	26400	-	-	-
Total Dissolved Solids	mg/L		11000	13000	-	-	-
Total Suspended Solids	mg/L		1400	580	-	-	-
Total Organic Carbon	mg/L		36600	42000	-	20100	12200
Hardness, Calcium Carbonate	mg/L		7210	8330	-	8420	4860
Biochemical Oxygen Demand	mg/L		2230	2270	-	32300	-
Chemical Oxygen Demand	mg/L		-	-	-	54700	35900
Metals, Dissolved							
Aluminum	ug/L		9510	14700	-	-	-
Antimony	ug/L		21.6	27.2	-	-	-
Arsenic	ug/L		175	135	-	-	-
Barium	ug/L		168	246	-	-	-
Beryllium	ug/L		0.1	< 1	-	-	-
Bismuth	ug/L		< 0.1	< 1	-	-	-
Boron	ug/L		5320	2720	-	-	-
Cadmium	ug/L		24.5	14.3	-	-	-
Calcium	ug/L		2120000	2590000	-	-	-
Chromium	ug/L		111	111	-	-	-
Cobalt	ug/L		139	159	-	-	-
Copper	ug/L		201	151	-	-	-
Iron	ug/L		47600	91200	1110	-	-
Lead	ug/L		2.82	< 1	-	-	-
Lithium	ug/L		51.2	58	-	-	-
Magnesium	ug/L		463000	448000	-	-	-
Manganese	ug/L		37900	39400	-	-	-
Mercury	ug/L		-	0.052	-	-	-
Molybdenum	ug/L		88.5	120	-	-	-
Nickel	ug/L		395	382	-	-	-
Potassium	ug/L		2690000	3450000	-	-	-
Selenium	ug/L		14.7	23.2	-	-	-
Silicon	ug/L		88300	75400	-	-	-
Silver	ug/L		0.06	< 0.5	-	-	-
Sodium	ug/L		1690000	1560000	-	-	-
Strontium	ug/L		5580	4810	-	-	-
Sulphur (S)	ug/L		431000	299000	-	-	-
Tellurium	ug/L		< 0.2	< 5	-	-	-
Thallium	ug/L		0.913	0.793	-	-	-
Thorium-232	ug/L		0.19	< 1	-	-	-
Tin	ug/L		5.78	17.4	-	-	-
Titanium	ug/L		2670	2720	-	-	-
Uranium	ug/L		0.47	0.525	-	-	-
Vanadium	ug/L		118	109	-	-	-
Zinc	ug/L		6720	8540	-	-	-
Zirconium	ug/L		7.3	10.5	-	-	-
Metals, Total							
Aluminum	ug/L		31300	32400	-	25700	12300
Antimony	ug/L		20.7	12.1	-	17.6	5.2
Arsenic	ug/L		184	144	-	144	36.2
Barium	ug/L		1330	1140	-	942	614
Beryllium	ug/L		0.69	< 1	-	< 2	< 1
Bismuth	ug/L		0.26	< 1	-	< 1	2.33
Boron	ug/L		5510	3010	-	1560	640
Cadmium	ug/L		28.2	17.4	-	10.9	4.94
Calcium	ug/L		2390000	2630000	-	2620000	1590000
Chromium	ug/L		151	143	-	171	68.1
Cobalt	ug/L		146	166	-	141	38.8
Copper	ug/L		262	214	-	293	108
Iron	ug/L		172000	221000	1820	226000	60400
Lead	ug/L		24.5	15.3	-	26.7	10.7
Lithium	ug/L		59.6	71.5	-	54	35
Magnesium	ug/L		401000	464000	-	454000	214000
Manganese	ug/L		41700	41800	-	33000	23800
Mercury	ug/L		0.157	< 0.01	-	< 0.5	< 0.25
Molybdenum	ug/L		73.8	84.5	-	103	17.5
Nickel	ug/L		409	403	-	361	133
Potassium	ug/L		3000000	4220000	-	3270000	1470000
Selenium	ug/L		13.3	17.3	-	19.3	8.65
Silicon	ug/L		88200	79200	-	63100	28300
Silver	ug/L		< 0.05	< 0.5	-	0.61	0.19
Sodium	ug/L		1530000	1580000	-	1330000	834000
Strontium	ug/L		7010	5720	-	5350	3280
Sulphur (S)	ug/L		335000	303000	-	284000	118000
Tellurium	ug/L		< 0.2	< 5	-	< 4	< 2
Thallium	ug/L		1.32	1.04	-	0.53	0.36
Thorium-232	ug/L		0.8	< 1	-	< 2	< 1
Tin	ug/L		6.28	12.2	-	11	1.6
Titanium	ug/L		1480	1860	-	1820	368
Uranium	ug/L		2.91	1.96	-	1.35	0.7
Vanadium	ug/L		148	124	-	116	39.9
Zinc	ug/L		6940	9130	-	7530	3680
Zirconium	ug/L		22	20.6	-	17.8	3
Tungsten	ug/L		-	-	-	13.9	4
Rubidium	ug/L		-	-	-	2140	1000
Cesium	ug/L		-	-	-	7.31	4.39

Table Notes:

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

< Indicates parameter was below laboratory equipment detection limit.

- Chemical not analyzed or criteria not defined.

Appendix C
Results of Leachate Analyses - F3 - Aeration Pond
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name	F3 - AERATION POND	F3 - AERATION POND	F3 - AERATION POND	F3 - AERATION POND	F3 - AERATION POND	F3 - AERATION POND	F3 - AERATION POND	F3 - AERATION POND
		Laboratory ID	WL_F3_42892_N	WL_F3_42921_N	WL_F3_42962_N	WL_F3_43046_N	WL_F3_43297_N	WL_F3_43571_N	L2281807-1	L2283534-1
		Sample Date	2017-06-06	2017-07-05	2017-08-15	2017-11-07	2018-07-16	2019-04-16	2019-05-29	2019-05-31
		QA/QC								
Anions + Nutrients										
Alkalinity, Total as CaCO3	ug/L		110000	240000	140000	757000	605000	826000	-	-
Bromide (Br)	ug/L		-	-	-	< 5000	< 500	< 1000	-	-
Chloride (Cl)	ug/L		27700	38300	30900	165000	81200	121000	-	-
Fluoride (F)	mg/L		< 0.1	< 0.1	< 0.1	< 2	< 0.1	< 0.4	-	-
Nitrate (as N)	ug/L		12	11	< 10	< 500	< 25	< 100	-	-
Nitrite (as N)	ug/L		< 10	< 10	< 10	< 100	20.9	< 20	-	-
Ammonia (as N)	ug/L		16700	21800	22800	65200	41900	66400	-	-
Sulfate (SO4)	ug/L		8700	40500	10100	720	< 1500	< 6000	-	-
Total Nitrogen	ug/L		14700	28800	25300	-	-	-	-	-
Phosphorus, Total Orthophosphate	ug/L		-	-	-	69000	890	271	-	-
Phosphorus, Dissolved	ug/L		3530	466	3740	-	-	-	-	-
Phosphorus, Total	ug/L		4140	4200	4360	2080	2870	4550	940	950
Field + Physical										
Dissolved Oxygen, field measured	mg/L		-	2.8	12.2	-	-	1.4	-	-
Conductivity, field measured	uS/cm		472	720	701	-	-	1314	-	-
Oxidation Reduction Potential, field measured	mV		-	-	-	-	-	87.3	-	-
pH, field measured	pH units		5.1	6.4	5.9	-	-	6.56	-	-
pH, lab	pH		5.4	6.3	5.5	6.4	7.21	7.04	-	-
Temperature, field measured	deg c		13.8	10.6	14.1	-	-	5.4	-	-
Conductivity	uS/cm		456	680	578	-	-	-	-	-
Total Dissolved Solids	mg/L		220	300	480	-	-	-	-	-
Total Suspended Solids	mg/L		20	59	17	-	-	-	-	-
Total Organic Carbon	mg/L		171	223	294	779	200	321	-	-
Hardness, Calcium Carbonate	mg/L		96	175	102	777	370	509	307	287
Biochemical Oxygen Demand	mg/L		210	320	430	-	294	-	-	-
Chemical Oxygen Demand	mg/L		-	-	-	2420	690	942	-	-
Metals, Dissolved										
Aluminum	ug/L		117	41.9	83.4	-	-	-	-	-
Antimony	ug/L		0.4	0.14	0.38	-	-	-	-	-
Arsenic	ug/L		< 0.5	< 0.5	0.53	-	-	-	-	-
Barium	ug/L		62.8	41.7	60.3	-	-	-	-	-
Beryllium	ug/L		< 0.1	< 0.1	< 0.1	-	-	-	-	-
Bismuth	ug/L		< 0.1	< 0.1	< 0.1	-	-	-	-	-
Boron	ug/L		166	155	136	-	-	-	-	-
Cadmium	ug/L		0.098	0.023	< 0.01	-	-	-	-	-
Calcium	ug/L		29000	62100	33300	-	-	-	-	-
Chromium	ug/L		2.62	1.64	2.84	-	-	-	-	-
Cobalt	ug/L		8.52	3.11	10.1	-	-	-	-	-
Copper	ug/L		0.86	0.4	0.97	-	-	-	-	-
Iron	ug/L		2420	3350	5060	-	-	-	-	-
Lead	ug/L		< 0.1	< 0.1	< 0.2	-	-	-	-	-
Lithium	ug/L		0.69	1.46	0.82	-	-	-	-	-
Magnesium	ug/L		3830	4700	4430	-	-	-	-	-
Manganese	ug/L		3520	2850	3910	-	-	-	-	-
Mercury	ug/L		< 0.02	-	< 0.01	-	-	-	-	-
Molybdenum	ug/L		0.15	< 0.1	0.18	-	-	-	-	-
Nickel	ug/L		4.91	3.48	4.93	-	-	-	-	-
Potassium	ug/L		16500	14900	17200	-	-	-	-	-
Selenium	ug/L		< 0.5	< 0.5	< 0.5	-	-	-	-	-
Silicon	ug/L		1800	6700	1900	-	-	-	-	-
Silver	ug/L		< 0.05	< 0.05	< 0.05	-	-	-	-	-
Sodium	ug/L		22600	21200	23800	-	-	-	-	-
Strontium	ug/L		98.5	141	97.7	-	-	-	-	-
Sulphur (S)	ug/L		17000	5900	< 3000	-	-	-	-	-
Tellurium	ug/L		< 0.2	< 0.2	< 0.5	-	-	-	-	-
Thallium	ug/L		< 0.02	< 0.02	< 0.02	-	-	-	-	-
Thorium-232	ug/L		< 0.1	< 0.1	< 0.1	-	-	-	-	-
Tin	ug/L		< 0.2	< 0.2	< 0.2	-	-	-	-	-
Titanium	ug/L		6.7	< 5	5.1	-	-	-	-	-
Uranium	ug/L		< 0.02	0.021	< 0.02	-	-	-	-	-
Vanadium	ug/L		< 1	< 1	1.1	-	-	-	-	-
Zinc	ug/L		22.8	26.1	14.9	-	-	-	-	-
Zirconium	ug/L		0.2	0.12	0.16	-	-	-	-	-
Metals, Total										
Aluminum	ug/L		318	245	203	196	168	168	17.1	16.4
Antimony	ug/L		0.4	0.72	0.32	2.4	0.81	0.94	0.51	0.52
Arsenic	ug/L		0.74	1.07	0.83	8.82	2.21	4.03	2.59	2.61
Barium	ug/L		76.2	60.3	76.5	419	270	412	238	231
Beryllium	ug/L		< 0.1	< 0.1	< 0.1	< 0.2	< 0.5	< 0.1	< 0.2	< 0.2
Bismuth	ug/L		0.24	0.26	0.14	< 0.1	< 0.25	< 0.05	< 0.1	< 0.1
Boron	ug/L		186	180	144	1280	503	784	617	574
Cadmium	ug/L		0.361	0.356	0.114	0.416	0.075	0.0785	0.031	0.031
Calcium	ug/L		31600	84500	34400	272000	128000	170000	99000	91800
Chromium	ug/L		3.46	2.71	3.59	20.6	4.96	6.64	1.85	1.83
Cobalt	ug/L		10.7	5.22	11.8	22.2	3.47	4.3	2.49	2.37
Copper	ug/L		4.22	4.31	3.28	3	< 2.5	2.14	1.4	1.3
Iron	ug/L		2650	4880	5490	24500	11300	22200	3750	4310
Lead	ug/L		0.28	0.33	< 0.2	0.84	0.35	0.202	0.1	< 0.1
Lithium	ug/L		0.78	1.53	0.84	5.2	< 5	1.8	< 2	< 2
Magnesium	ug/L		4110	6240	4730	23500	12100	20300	14500	14100
Manganese	ug/L		3720	2900	4330	34800	15600	17500	6100	6990
Mercury	ug/L		< 0.02	< 0.02	< 0.01	0.027	< 0.05	< 0.025	< 0.025	< 0.005
Molybdenum	ug/L		0.72	0.76	0.54	0.85	0.57	0.513	0.31	0.3
Nickel	ug/L		5.81	4.91	5.64	19	7.1	7.9	5.6	5.3
Potassium	ug/L		17100	17800	18600	69900	41100	66100	43200	43100
Selenium	ug/L		< 0.5	< 0.5	< 0.5	0.32	< 0.25	0.214	0.1	0.11
Silicon	ug/L		1900	8600	2300	6830	3780	4270	2520	2640
Silver	ug/L		< 0.05	0.083	< 0.05	< 0.02	< 0.05	< 0.01	< 0.02	< 0.02
Sodium	ug/L		23900	23200	24900	150000	73800	122000	83900	89200
Strontium	ug/L		104	185	109	974	441	658	445	425
Sulphur (S)	ug/L		5400	5100	< 3000	31200	< 2500	3270	2200	2000
Tellurium	ug/L		< 0.2	< 0.2	< 0.5	< 0.4	< 1	< 0.2	< 0.4	< 0.4
Thallium	ug/L		< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.01	< 0.02	< 0.02
Thorium-232	ug/L		< 0.1	< 0.1	< 0.1	< 0.2	< 0.5	< 0.1	< 0.2	< 0.2
Tin	ug/L		0.34	0.38	0.26	0.68	< 0.5	0.66	< 0.2	< 0.2
Titanium	ug/L		9.6	11.6	10.8	9.17	8.1	11.1	1.29	1.37
Uranium	ug/L		0.066	0.064	0.041	0.042	< 0.05	0.028	0.035	0.034
Vanadium	ug/L		1.5	2.6	1.3	9.4	2.5	5.5	1.2	1.2
Zinc	ug/L		107	595	54	403	53	87.5	< 6	< 6
Zirconium	ug/L		0.25	0.33	0.18	0.23	< 0.3	0.282	< 0.12	< 0.12
Tungsten	ug/L		-	-	-	0.23	< 0.5	0.21	< 0.2	< 0.2
Rubidium	ug/L		-	-	-	83.2	42.2	70.6	47.7	47.2
Cesium	ug/L		-	-	-	1.74	0.615	0.778	0.611	0.618

Table Notes:

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

< Indicates parameter was below laboratory equipment detection limit.

- Chemical not analyzed or criteria not defined.

Appendix C
Results of Leachate Analyses - F4 - Sedimentation Pond
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name	F4 - SEDIMENTATION POND	F4 - SEDIMENTATION POND	F4 - SEDIMENTATION POND	F4 - SEDIMENTATION POND	F4 - SEDIMENTATION POND	F4 - SEDIMENTATION POND	F4 - SEDIMENTATION POND
		Laboratory ID	WL_F4_42892_N	WL_F4_42921_N	WL_F4_42962_N	WL_F4_43046_N	WL_F4_43238_N	WL_F4_43297_N	WL_F4_43571_N
		Sample Date	2017-06-06	2017-07-05	2017-08-15	2017-11-07	2018-05-18	2018-07-16	2019-04-16
		QA/QC							
Anions + Nutrients									
Alkalinity, Total as CaCO3	ug/L		8000	14000	22000	464000	-	489000	534000
Bromide (Br)	ug/L		-	-	-	740	-	< 250	< 500
Chloride (Cl)	ug/L		1000	3300	6000	77200	-	71500	90700
Fluoride (F)	mg/L		< 0.1	< 0.1	< 0.1	< 0.2	-	< 0.1	< 0.2
Nitrate (as N)	ug/L		< 10	< 10	< 10	< 50	-	< 25	< 50
Nitrite (as N)	ug/L		< 10	< 10	< 10	< 10	-	7.9	< 10
Ammonia (as N)	ug/L		< 30	< 30	< 30	22600	-	24600	42900
Sulfate (SO4)	ug/L		1800	3300	4400	< 5	-	< 1500	< 3000
Total Nitrogen	ug/L		288	544	1250	-	-	-	-
Phosphorus, Total Orthophosphate	ug/L		-	-	-	33400	-	4.8	920
Phosphorus, Dissolved	ug/L		< 50	< 50	< 50	-	-	-	-
Phosphorus, Total	ug/L		< 50	68	144	1650	-	360	2010
Field + Physical									
Dissolved Oxygen, field measured	mg/L		-	7.6	13.2	-	-	-	0.6
Conductivity, field measured	uS/cm		21.9	48.6	162	-	377	-	1051
pH, field measured	pH units		8.8	7.6	7.5	-	7.5	-	6.77
pH, lab	pH		8.1	7.3	8.3	7.6	-	7.46	7.63
Temperature, field measured	deg c		18.4	16.1	15.3	-	18.3	-	8.6
Conductivity	uS/cm		15.1	45.4	70.6	-	-	-	-
Total Dissolved Solids	mg/L		7	24	47	-	-	-	-
Total Suspended Solids	mg/L		9.4	13	13	-	-	-	-
Total Organic Carbon	mg/L		5.34	5.33	8.32	192	-	78.7	226
Hardness, Calcium Carbonate	mg/L		8.48	14.3	19.5	336	-	305	348
Biochemical Oxygen Demand	mg/L		< 5	< 4	5.3	-	-	124	-
Chemical Oxygen Demand	mg/L		-	-	-	676	-	276	694
Metals, Dissolved									
Aluminum	ug/L		32.8	< 5	14.1	-	-	-	-
Antimony	ug/L		< 0.1	0.12	< 0.2	-	-	-	-
Arsenic	ug/L		< 0.5	< 0.5	< 0.5	-	-	-	-
Barium	ug/L		< 5	6.4	< 5	-	-	-	-
Beryllium	ug/L		< 0.1	< 0.1	< 0.1	-	-	-	-
Bismuth	ug/L		< 0.1	< 0.1	< 0.1	-	-	-	-
Boron	ug/L		39	18.2	26.4	-	-	-	-
Cadmium	ug/L		< 0.01	< 0.01	< 0.01	-	-	-	-
Calcium	ug/L		2830	4330	6670	-	-	-	-
Chromium	ug/L		< 0.5	< 0.5	< 0.5	-	-	-	-
Cobalt	ug/L		< 0.1	< 0.1	0.25	-	-	-	-
Copper	ug/L		0.63	0.83	0.97	-	-	-	-
Iron	ug/L		< 10	< 10	< 10	-	197	-	-
Lead	ug/L		< 0.1	< 0.1	< 0.2	-	-	-	-
Lithium	ug/L		< 0.1	0.2	0.27	-	-	-	-
Magnesium	ug/L		234	422	693	-	-	-	-
Manganese	ug/L		9.35	< 0.2	8.57	-	-	-	-
Mercury	ug/L		< 0.02	-	< 0.01	-	-	-	-
Molybdenum	ug/L		0.14	0.19	0.2	-	-	-	-
Nickel	ug/L		< 0.2	0.26	0.67	-	-	-	-
Potassium	ug/L		370	1320	2370	-	-	-	-
Selenium	ug/L		< 0.5	< 0.5	< 0.5	-	-	-	-
Silicon	ug/L		< 1000	< 1000	< 1000	-	-	-	-
Silver	ug/L		< 0.05	0.107	< 0.05	-	-	-	-
Sodium	ug/L		830	2250	4040	-	-	-	-
Strontium	ug/L		22.3	26.2	28.4	-	-	-	-
Sulphur (S)	ug/L		< 3000	< 3000	< 3000	-	-	-	-
Tellurium	ug/L		< 0.2	< 0.2	< 0.5	-	-	-	-
Thallium	ug/L		< 0.02	< 0.02	< 0.02	-	-	-	-
Thorium-232	ug/L		< 0.1	< 0.1	< 0.1	-	-	-	-
Tin	ug/L		< 0.2	< 0.2	< 0.2	-	-	-	-
Titanium	ug/L		< 5	< 5	< 5	-	-	-	-
Uranium	ug/L		< 0.02	< 0.02	< 0.02	-	-	-	-
Vanadium	ug/L		< 1	< 1	< 1	-	-	-	-
Zinc	ug/L		32.9	< 4	< 4	-	-	-	-
Zirconium	ug/L		< 0.1	< 0.1	< 0.1	-	-	-	-
Metals, Total									
Aluminum	ug/L		61.4	19.2	33.7	129	-	17	73.4
Antimony	ug/L		< 0.1	< 0.1	< 0.2	1.03	-	< 0.5	0.65
Arsenic	ug/L		< 0.5	< 0.5	< 0.5	2.99	-	5.17	2.95
Barium	ug/L		5.7	8.3	5.6	184	-	498	307
Beryllium	ug/L		< 0.1	< 0.1	< 0.1	< 0.5	-	< 0.5	< 0.1
Bismuth	ug/L		< 0.1	< 0.1	< 0.1	< 0.25	-	< 0.25	< 0.05
Boron	ug/L		40	29.3	26.8	497	-	438	596
Cadmium	ug/L		0.015	0.013	< 0.01	0.192	-	0.092	0.019
Calcium	ug/L		2980	4950	7080	116000	-	105000	115000
Chromium	ug/L		< 0.5	< 0.5	< 0.5	7.22	-	1.33	4.03
Cobalt	ug/L		< 0.1	0.25	0.52	11.3	-	2.53	3.13
Copper	ug/L		0.95	1.06	1.12	< 2.5	-	9.7	1.03
Iron	ug/L		27	20	89	9450	72	12100	13500
Lead	ug/L		< 0.1	< 0.1	< 0.2	0.54	-	0.52	0.098
Lithium	ug/L		< 0.1	0.11	0.14	< 5	-	< 5	1.3
Magnesium	ug/L		251	467	794	11400	-	10600	14900
Manganese	ug/L		38.8	104	256	16700	-	20500	10600
Mercury	ug/L		< 0.02	< 0.02	< 0.01	< 0.025	-	< 0.05	< 0.005
Molybdenum	ug/L		0.13	0.2	0.25	0.51	-	0.31	0.302
Nickel	ug/L		0.24	0.33	0.72	11.3	-	4.7	6.06
Potassium	ug/L		390	1330	2730	35300	-	29200	47200
Selenium	ug/L		< 0.5	< 0.5	< 0.5	2.42	-	< 0.25	0.132
Silicon	ug/L		< 1000	< 1000	< 1000	3210	-	3840	3080
Silver	ug/L		< 0.05	0.055	< 0.05	< 0.05	-	< 0.05	< 0.01
Sodium	ug/L		830	2320	4460	73300	-	62100	90700
Strontium	ug/L		23	29.3	33.2	385	-	513	484
Sulphur (S)	ug/L		< 3000	3400	< 3000	15500	-	< 2500	1930
Tellurium	ug/L		< 0.2	< 0.2	< 0.5	< 1	-	< 1	< 0.2
Thallium	ug/L		< 0.02	< 0.02	< 0.02	< 0.05	-	< 0.05	< 0.01
Thorium-232	ug/L		< 0.1	< 0.1	< 0.1	< 0.5	-	< 0.5	< 0.1
Tin	ug/L		< 0.2	< 0.2	< 0.2	< 0.5	-	< 0.5	0.12
Titanium	ug/L		< 5	< 5	< 5	7	-	< 1.5	5.85
Uranium	ug/L		< 0.02	< 0.02	< 0.02	< 0.05	-	< 0.05	0.023
Vanadium	ug/L		< 1	< 1	< 1	3.3	-	< 2.5	3.26
Zinc	ug/L		90	30.8	24.8	164	-	60	11.8
Zirconium	ug/L		< 0.1	< 0.1	< 0.1	< 0.3	-	< 0.3	0.204
Tungsten	ug/L		-	-	-	< 0.5	-	< 0.5	0.11
Rubidium	ug/L		-	-	-	40.3	-	35.5	50.9
Cesium	ug/L		-	-	-	0.884	-	0.827	0.645

Table Notes:

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

< Indicates parameter was below laboratory equipment detection limit.

- Chemical not analyzed or criteria not defined.

Appendix C
Results of Leachate Analyses - F5 - Sand Filter
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

		Sample Name	F5 - SAND CYCLONE	F5 - SAND CYCLONE	F5 - SAND CYCLONE	F5 - SAND CYCLONE	F5 - SAND CYCLONE	F5 - SAND CYCLONE	F5 - SAND CYCLONE
		Laboratory ID	WL_F5_42892_N	WL_F5_42921_N	WL_F5_42962_N	WL_F5_43046_N	WL_F5_43215_N	WL_F5_43238_N	WL_F5_43339_N
		Sample Date	2017-06-06	2017-07-05	2017-08-15	2017-11-07	2018-04-25	2018-05-18	2018-08-27
Parameter	**OC-Forceman**	**QA/QC Unit**							
Anions + Nutrients									
Alkalinity, Total as CaCO3		ug/L	36000	41000	59000	348000	110000	-	466000
Bromide (Br)		ug/L	-	-	-	-	71	-	-
Chloride (Cl)	5000000	ug/L	< 1000	2400	2700	58400	15300	-	< 250
Fluoride (F)		mg/L	< 0.1	< 0.1	< 0.1	< 0.2	0.071	-	< 0.1
Nitrate (as N)		ug/L	< 10	23	31	< 50	71	-	44
Nitrite (as N)		ug/L	< 10	< 10	< 10	< 10	< 5	-	< 5
Ammonia (as N)	214000	ug/L	< 30	< 30	< 30	15500	18500	-	30800
Total Kjeldahl Nitrogen		ug/L	-	-	-	-	-	-	-
Sulfate (SO4)		ug/L	3400	5500	5300	13100	< 1	-	< 1500
Total Nitrogen	300000	ug/L	-	-	-	-	-	-	-
Phosphorus, Total Orthophosphate		ug/L	-	-	-	< 1	< 1	-	< 1
Phosphorus, Total		ug/L	<50	<50	<50	1320	130	-	740
Field + Physical									
Dissolved Oxygen, field measured		%	-	6.4	12.7	7.7	5.7	-	1
Dissolved Oxygen, field measured		mg/L	-	-	-	-	-	-	-
Conductivity, field measured		uS/cm	83.5	96.4	352	566	532	239	1019
Oxidation Reduction Potential, field measured		mV	-	-	-	-	105.6	-	-
pH, field measured		pH units	8.4	7.4	6.8	7.08	6.46	7.07	6.96
pH, lab	6.5 - 8.5	pH	7.4	7.4	7.6	7.57	-	-	8.02
Temperature, field measured		deg c	16.2	13.3	14.2	3.5	5	16.2	18.4
Turbidity, field measured		NTU	-	-	-	-	-	-	-
Conductivity		uS/cm	-	-	-	-	-	-	-
Total Organic Carbon		mg/L	2.14	1.39	1.57	146	42.4	-	3.2
Hardness, Calcium Carbonate		mg/L	43.2	39.8	59.3	244	213	-	227
Biochemical Oxygen Demand		mg/L	< 3	< 4	< 4	-	11.8	-	24.4
Chemical Oxygen Demand		mg/L	-	-	-	466	167	-	178
Iron		ppm	-	-	-	-	-	-	-
Metals, Total									
Aluminum		ug/L	54	49.7	18.3	38.8	29	-	26.8
Antimony		ug/L	0.21	0.27	0.22	0.59	0.41	-	0.45
Arsenic		ug/L	< 0.5	< 0.5	< 0.5	2.5	5.29	-	3.67
Barium		ug/L	51.3	34.1	43.2	241	320	-	254
Beryllium		ug/L	< 0.1	< 0.1	< 0.1	< 0.1	< 0.2	-	< 0.1
Bismuth		ug/L	< 0.1	< 0.1	< 0.1	< 0.05	< 0.1	-	< 0.05
Boron		ug/L	9	16.5	11.1	355	217	-	508
Cadmium	100	ug/L	< 0.01	0.019	< 0.01	0.0618	0.526	-	0.0512
Calcium		ug/L	15900	14600	22000	83600	72900	-	68600
Chromium		ug/L	< 0.5	< 0.5	< 0.5	4.53	0.93	-	1.46
Cobalt		ug/L	< 0.1	< 0.1	< 0.1	8.23	9.65	-	2.26
Copper		ug/L	1.55	2.03	1.77	6.5	21.5	-	3.16
Iron	6000	ug/L	86	93	52	5640	**14900**	2210	2460
Lead		ug/L	0.77	0.85	< 0.2	0.572	4.33	-	0.298
Lithium		ug/L	< 0.1	< 0.1	< 0.1	< 1	< 2	-	< 1
Magnesium		ug/L	841	806	1050	8630	7560	-	13600
Manganese		ug/L	3.55	4.83	12	16700	25000	-	7580
Mercury		ug/L	< 0.02	< 0.02	< 0.01	< 0.025	< 0.005	-	0.0087
Molybdenum		ug/L	0.58	0.68	0.74	0.64	0.7	-	0.404
Nickel		ug/L	< 0.2	< 0.2	< 0.4	6.67	5.4	-	5.38
Potassium		ug/L	890	930	1170	28500	16400	-	44600
Selenium		ug/L	< 0.5	< 0.5	< 0.5	0.108	< 0.1	-	0.09
Silicon		ug/L	2300	2100	2500	2720	3430	-	2420
Silver		ug/L	< 0.05	0.073	< 0.05	< 0.01	< 0.02	-	< 0.01
Sodium		ug/L	1280	1400	2130	54100	36100	-	84400
Strontium		ug/L	183	204	271	297	401	-	347
Sulphur (S)		ug/L	4000	3900	< 3000	6940	< 1000	-	1270
Tellurium		ug/L	< 0.2	< 0.2	< 0.5	< 0.2	< 0.4	-	< 0.2
Thallium		ug/L	< 0.02	< 0.02	< 0.02	0.018	< 0.02	-	0.011
Thorium-232		ug/L	< 0.1	< 0.1	< 0.1	< 0.1	< 0.2	-	< 0.1
Tin		ug/L	< 0.2	< 0.2	< 0.2	0.13	0.37	-	< 0.1
Titanium		ug/L	< 5	< 5	< 5	2.74	2.03	-	1.34
Uranium		ug/L	< 0.02	< 0.02	0.03	0.045	0.083	-	0.056
Vanadium		ug/L	< 1	< 1	< 1	1.86	1.7	-	1.36
Zinc	100000	ug/L	31.5	24.9	< 4	42.8	61.6	-	< 3
Zirconium		ug/L	< 0.1	< 0.1	< 0.1	0.063	< 0.12	-	0.103
Tungsten		ug/L	-	-	-	0.1	< 0.2	-	< 0.1
Rubidium		ug/L	-	-	-	32.6	25.7	-	50.6
Cesium		ug/L	-	-	-	0.63	0.529	-	0.876

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

Appendix C
Results of Leachate Analyses - F5 - Sand Filter
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

		Sample Name	F5 - SAND CYCLONE	F5 - SAND CYCLONE	F5 - SAND CYCLONE	F5 - SAND CYCLONE	F5 - SAND CYCLONE	F5 - SAND CYCLONE	F5 - SAND CYCLONE
		Laboratory ID	WL_F5_43571_N	WL_F5_43607_N	WL_F5_43613_N	WL_F5_43614_N	WL_F5_43616_N	WL_F5_43663_N	WL_F5_43678_N
		Sample Date	2019-04-16	2019-05-22	2019-05-28	2019-05-29	2019-05-31	2019-07-17	2019-08-01
Parameter	OC-Forceman	QA/QC Unit							
Anions + Nutrients									
Alkalinity, Total as CaCO3		ug/L	553000	539000	-	-	-	366000	365000
Bromide (Br)		ug/L	< 500	260	-	-	-	< 250	280
Chloride (Cl)	5000000	ug/L	88900	91800	-	-	-	79400	94200
Fluoride (F)		mg/L	< 0.2	< 0.1	-	-	-	< 0.1	< 0.1
Nitrate (as N)		ug/L	< 50	< 25	-	-	-	6870	1480
Nitrite (as N)		ug/L	< 10	5.2	-	-	-	32.3	15.7
Ammonia (as N)	214000	ug/L	36800	28100	-	-	-	21700	18300
Total Kjeldahl Nitrogen		ug/L	-	-	-	-	-	-	-
Sulfate (SO4)		ug/L	< 3000	2600	-	-	-	4700	1800
Total Nitrogen	300000	ug/L	-	-	-	-	-	-	-
Phosphorus, Total Orthophosphate		ug/L	55.4	1.7	-	-	-	5.7	4
Phosphorus, Total		ug/L	780	1110	430	580	480	521	221
Field + Physical									
Dissolved Oxygen, field measured		%	1.4	2.1	-	-	-	0.9	2.2
Dissolved Oxygen, field measured		mg/L	-	-	-	-	-	-	-
Conductivity, field measured		uS/cm	978	1056	-	-	-	858	838
Oxidation Reduction Potential, field measured		mV	-	195	-	-	-	451.6	348
pH, field measured		pH units	6.95	7	-	-	-	6.91	6.88
pH, lab	6.5 - 8.5	pH	7.29	7.48	-	-	-	8.27	8.47
Temperature, field measured		deg c	6.7	15.3	-	-	-	15.7	18.7
Turbidity, field measured		NTU	-	-	-	-	-	-	-
Conductivity		uS/cm	-	-	-	-	-	-	-
Total Organic Carbon		mg/L	219	221	-	-	-	25.4	20.5
Hardness, Calcium Carbonate		mg/L	377	304	252	254	278	210	194
Biochemical Oxygen Demand		mg/L	-	51	-	-	-	13.2	28.1
Chemical Oxygen Demand		mg/L	669	234	-	-	-	76	72
Iron		ppm	-	-	-	-	-	-	-
Metals, Total									
Aluminum		ug/L	42	94	27	21	31.3	41.9	33.9
Antimony		ug/L	0.66	0.71	0.68	< 0.5	0.54	0.58	0.49
Arsenic		ug/L	11.5	5.96	5.15	5.12	3.74	4.18	2.59
Barium		ug/L	383	405	407	497	318	355	209
Beryllium		ug/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.2	< 0.1	< 0.1
Bismuth		ug/L	< 0.25	< 0.25	< 0.25	< 0.25	< 0.1	< 0.05	< 0.05
Boron		ug/L	545	559	469	542	566	528	560
Cadmium	100	ug/L	0.429	0.091	0.05	0.048	0.466	0.724	0.166
Calcium		ug/L	125000	98400	81300	80400	87700	62500	55200
Chromium		ug/L	2.66	1.67	0.98	0.93	1.09	1.39	0.67
Cobalt		ug/L	9.31	3.91	4.54	4.85	2.66	3.93	1.95
Copper		ug/L	5.1	237	< 2.5	5.4	19	855	5.71
Iron	6000	ug/L	**25300**	**7620**	**6230**	**6520**	3680	**7670**	1150
Lead		ug/L	2.12	34.2	1.86	1.13	4.81	7.05	2.39
Lithium		ug/L	< 5	< 5	< 5	< 5	< 2	< 1	< 1
Magnesium		ug/L	16000	14300	12000	13000	14300	13100	13500
Manganese		ug/L	19200	12500	14300	17400	8580	10900	3880
Mercury		ug/L	< 0.025	0.011	-	< 0.025	0.0061	< 0.1	< 0.025
Molybdenum		ug/L	0.82	0.83	1.27	1.3	0.94	1.96	1.25
Nickel		ug/L	7.6	7.8	5.2	5.3	5.6	8.62	5.69
Potassium		ug/L	48500	43900	36900	35700	43600	40000	42300
Selenium		ug/L	< 0.25	< 0.25	< 0.25	< 0.25	0.12	0.138	0.105
Silicon		ug/L	3500	2860	2580	2810	2920	3280	3090
Silver		ug/L	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	0.013	< 0.01
Sodium		ug/L	90400	91900	80100	79400	93900	82600	89100
Strontium		ug/L	553	444	405	388	422	344	306
Sulphur (S)		ug/L	< 2500	< 2500	< 2500	< 2500	3200	2190	1470
Tellurium		ug/L	< 1	< 1	< 1	< 1	< 0.4	< 0.2	< 0.2
Thallium		ug/L	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	0.054	< 0.01
Thorium-232		ug/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.2	< 0.1	< 0.1
Tin		ug/L	< 0.5	1.16	< 0.5	< 0.5	< 0.2	0.5	0.13
Titanium		ug/L	3.2	5.8	< 1.5	< 1.5	1.89	1.03	< 0.9
Uranium		ug/L	0.206	0.082	0.059	0.066	0.093	0.111	0.12
Vanadium		ug/L	3.3	3.1	< 2.5	< 2.5	2	3.03	1.65
Zinc	100000	ug/L	19	382	< 15	< 15	9.1	63.7	8.3
Zirconium		ug/L	< 0.3	< 0.3	< 0.3	< 0.3	< 0.12	< 0.2	< 0.2
Tungsten		ug/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.2	0.11	< 0.1
Rubidium		ug/L	51	53	50.3	51.4	50.8	54	50
Cesium		ug/L	0.911	0.868	0.924	0.935	0.87	1.02	0.83

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Result exceeds applicable OC criteria **744**
Detection limit exceeds applicable OC criteria ***< 2***

Appendix C
Results of Leachate Analyses - F5 - Sand Filter
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

		Sample Name	F5 - SAND CYCLONE	F5 - SAND CYCLONE	F5 - SAND CYCLONE	F5 - SAND CYCLONE	F5 - SAND FILTER (MANHOLE)	F5 DUP	SAND FILTER CULVERT (MANHOLE)
		Laboratory ID	VA20A7415-001	WL_F5_44078_N	WL_F5_44134_N	VA21A1066-001	VA21A4846-001	VA21A4846-002	VA21A6678-001
		Sample Date	2020-05-27	2020-09-04	2020-10-30	2021-01-19	2021-03-15	2021-03-15	2021-04-09
		QA/QC					FDA	FD	FDA
Parameter	**OC-Forceman**	**Unit**							
Anions + Nutrients									
Alkalinity, Total as CaCO3		ug/L	169000	-	-	1800	< 1000	< 1000	531000
Bromide (Br)		ug/L	99	-	-	-	< 50	< 50	-
Chloride (Cl)	5000000	ug/L	42300	-	-	< 500	< 500	< 500	100000
Fluoride (F)		mg/L	0.045	-	-	< 0.02	< 0.02	< 0.02	< 0.1
Nitrate (as N)		ug/L	466	-	-	17.9	25	25	< 25
Nitrite (as N)		ug/L	54	-	-	< 1	< 1	< 1	< 5
Ammonia (as N)	214000	ug/L	2110	-	-	8.9	15.9	18.9	35300
Total Kjeldahl Nitrogen		ug/L	3420	-	-	50	142	208	39000
Sulfate (SO4)		ug/L	3880	-	-	< 300	320	310	2420
Total Nitrogen	300000	ug/L	-	-	-	68	141	194	41500
Phosphorus, Total Orthophosphate		ug/L	33.9	-	-	3.9	< 1	< 1	136
Phosphorus, Total		ug/L	198	-	-	<50	<50	<50	717
Field + Physical									
Dissolved Oxygen, field measured		%	-	-	-	-	-	-	-
Dissolved Oxygen, field measured		mg/L	3	4.2	1.4	-	12.5	12.5	2.6
Conductivity, field measured		uS/cm	315.9	946	902	-	3.1	3.1	1376
Oxidation Reduction Potential, field measured		mV	152.7	-	-	-	277.6	277.6	139.7
pH, field measured		pH units	7.15	6.88	7.45	-	6.52	6.52	7.42
pH, lab	6.5 - 8.5	pH	8.19	-	-	-	**5.55**	**5.57**	8.1
Temperature, field measured		deg c	8.6	17.3	7.5	-	0.1	0.1	2.7
Turbidity, field measured		NTU	0.6	18.36	11.6	-	1.08	1.08	24.5
Conductivity		uS/cm	459	-	-	3	2.2	2.5	1270
Total Organic Carbon		mg/L	7.72	-	-	0.92	0.61	0.76	72.4
Hardness, Calcium Carbonate		mg/L	95.6	-	-	1.33	< 0.6	< 0.6	302
Biochemical Oxygen Demand		mg/L	2.6	-	-	< 2	< 2	< 2	96.7
Chemical Oxygen Demand		mg/L	34	-	-	< 20	< 20	< 20	233
Iron		ppm	1.5	-	-	-	< 0.5	< 0.5	5
Metals, Total									
Aluminum		ug/L	10.2	-	-	56.7	17.6	18.4	26.2
Antimony		ug/L	0.18	-	-	< 0.1	< 0.1	< 0.1	0.56
Arsenic		ug/L	1.49	-	-	< 0.1	< 0.1	< 0.1	2.98
Barium		ug/L	91	-	-	2.6	0.4	0.42	286
Beryllium		ug/L	< 0.1	-	-	< 0.1	< 0.1	< 0.1	< 0.1
Bismuth		ug/L	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05
Boron		ug/L	224	-	-	< 10	< 10	< 10	745
Cadmium	100	ug/L	0.365	-	-	0.0277	0.0263	0.0237	0.247
Calcium		ug/L	30100	-	-	443	123	114	95300
Chromium		ug/L	0.54	-	-	< 0.1	0.11	0.15	2.07
Cobalt		ug/L	1.13	-	-	< 0.1	< 0.1	< 0.1	1.8
Copper		ug/L	12.5	-	-	0.78	3.7	4.52	5.99
Iron	6000	ug/L	868	-	-	109	41	45	3820
Lead		ug/L	0.755	-	-	0.196	0.287	0.305	0.381
Lithium		ug/L	< 1	-	-	< 1	< 1	< 1	< 1
Magnesium		ug/L	4940	-	-	55.3	17.6	15.9	15500
Manganese		ug/L	2880	-	-	47.6	2.36	2.4	5810
Mercury		ug/L	< 0.005	-	-	< 0.005	< 0.005	< 0.005	0.0076
Molybdenum		ug/L	0.825	-	-	< 0.05	< 0.05	0.127	0.517
Nickel		ug/L	2.63	-	-	< 0.5	< 0.5	< 0.5	5.15
Potassium		ug/L	18600	-	-	65	169	223	41600
Selenium		ug/L	< 0.05	-	-	< 0.05	< 0.05	< 0.05	0.112
Silicon		ug/L	1800	-	-	< 100	< 100	< 100	2440
Silver		ug/L	< 0.01	-	-	< 0.01	< 0.01	< 0.01	0.01
Sodium		ug/L	36600	-	-	200	122	152	95000
Strontium		ug/L	149	-	-	1.47	0.61	0.55	467
Sulphur (S)		ug/L	1770	-	-	< 500	< 500	< 500	1760
Tellurium		ug/L	< 0.2	-	-	< 0.2	< 0.2	< 0.2	< 0.2
Thallium		ug/L	0.016	-	-	< 0.01	< 0.01	< 0.01	0.033
Thorium-232		ug/L	< 0.1	-	-	< 0.1	< 0.1	< 0.1	< 0.1
Tin		ug/L	< 0.1	-	-	< 0.1	< 0.1	0.12	0.12
Titanium		ug/L	0.47	-	-	1.68	0.46	0.55	2.14
Uranium		ug/L	0.061	-	-	< 0.01	< 0.01	< 0.01	0.08
Vanadium		ug/L	0.65	-	-	< 0.5	< 0.5	< 0.5	1.55
Zinc	100000	ug/L	10	-	-	< 3	11.4	13.7	35.2
Zirconium		ug/L	< 0.2	-	-	< 0.2	< 0.2	< 0.2	0.22
Tungsten		ug/L	< 0.1	-	-	< 0.1	< 0.1	< 0.1	< 0.1
Rubidium		ug/L	18.7	-	-	< 0.2	< 0.2	0.28	43.8
Cesium		ug/L	0.163	-	-	< 0.01	< 0.01	< 0.01	0.603

Table Notes:
Criteria from the Forceman Landfill Operational Certificate (OC) No. 17227, administered by the BC Ministry of Environment and Climate Change (ENV), last updated 24 November 2021.
QA/QC = Quality Assurance/Quality Control, FDA/FD = Field Duplicate Available/Field Duplicate
< Indicates parameter was below laboratory equipment detection limit.
- Chemical not analyzed or criteria not defined.
Result exceeds applicable OC criteria **744**
Detection limit exceeds applicable OC criteria ***< 2***

Appendix C
Results of Leachate Analyses - F5 - Sand Filter
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Parameter	OC-Forceman	Unit	Sample Name	F5 DUP	F5 - SAND CYCLONE	F5 DUP	SAND FILTER CULVERT (MANHOLE)	F5 DUP
			Laboratory ID	VA21A6678-002	VA21B8594-001	VA21B8594-002	VA21C6526-001	VA21C6526-002
			Sample Date	2021-04-09	2021-08-30	2021-08-30	2021-11-25	2021-11-25
			QA/QC	FD	FDA	FD	FDA	FD
Anions + Nutrients								
Alkalinity, Total as CaCO3		ug/L		533000	373000	374000	42200	43000
Bromide (Br)		ug/L		-	-	-	-	-
Chloride (Cl)	5000000	ug/L		101000	140000	139000	1740	1820
Fluoride (F)		mg/L		< 0.1	< 0.1	< 0.1	0.033	0.032
Nitrate (as N)		ug/L		69.8	29	< 25	1280	1340
Nitrite (as N)		ug/L		5.5	9.3	9.2	30.2	32.3
Ammonia (as N)	214000	ug/L		37100	15300	15500	148	146
Total Kjeldahl Nitrogen		ug/L		40300	17300	17600	470	451
Sulfate (SO4)		ug/L		4510	< 1500	< 1500	2260	2280
Total Nitrogen	300000	ug/L		41400	17700	17600	1490	1490
Phosphorus, Total Orthophosphate		ug/L		92.8	95	117	15.5	16.2
Phosphorus, Total		ug/L		733	389	844	<50	<50
Field + Physical								
Dissolved Oxygen, field measured		%		-	-	-	-	-
Dissolved Oxygen, field measured		mg/L		2.6	2.2	2.2	12	12
Conductivity, field measured		uS/cm		1376	926	926	69.2	69.2
Oxidation Reduction Potential, field measured		mV		139.7	165.6	165.6	196.6	196.6
pH, field measured		pH units		7.42	7.75	7.75	7.27	7.27
pH, lab	6.5 - 8.5	pH		8.1	8.21	8.17	7.72	7.74
Temperature, field measured		deg c		2.7	14.3	14.3	5.8	5.8
Turbidity, field measured		NTU		24.5	6.07	6.07	0.25	0.25
Conductivity		uS/cm		1270	1150	1150	107	110
Total Organic Carbon		mg/L		74.6	23.9	24.3	1.38	1.12
Hardness, Calcium Carbonate		mg/L		303	174	161	30.1	30.1
Biochemical Oxygen Demand		mg/L		94.3	9.3	11	< 2	< 2
Chemical Oxygen Demand		mg/L		304	94	90	< 20	< 20
Iron		ppm		5	2.5	2.5	0	0
Metals, Total								
Aluminum		ug/L		26.7	26	99.4	12.1	12.6
Antimony		ug/L		0.57	0.47	0.52	0.14	0.14
Arsenic		ug/L		3.06	3.72	4	0.25	0.24
Barium		ug/L		296	134	139	16.6	16.6
Beryllium		ug/L		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Bismuth		ug/L		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Boron		ug/L		756	1220	1200	78	83
Cadmium	100	ug/L		0.253	0.0576	0.0851	0.0072	0.009
Calcium		ug/L		95300	40300	37500	9930	9920
Chromium		ug/L		2.21	0.81	1.04	< 0.5	< 0.5
Cobalt		ug/L		1.86	0.92	1.02	< 0.1	< 0.1
Copper		ug/L		6.14	5.86	3.88	1.06	1.1
Iron	6000	ug/L		3880	2020	1430	19	18
Lead		ug/L		0.385	3.9	0.592	< 0.05	< 0.05
Lithium		ug/L		< 1	< 1	< 1	< 1	< 1
Magnesium		ug/L		15800	17700	16400	1280	1300
Manganese		ug/L		5980	1960	1900	54.1	54.3
Mercury		ug/L		0.0059	< 0.005	< 0.005	< 0.005	< 0.005
Molybdenum		ug/L		0.528	0.575	0.679	0.149	0.152
Nickel		ug/L		5.19	7.35	7.08	< 0.5	0.52
Potassium		ug/L		43000	51500	48600	4730	4780
Selenium		ug/L		0.113	0.12	0.135	< 0.05	< 0.05
Silicon		ug/L		2480	2980	3120	2360	2340
Silver		ug/L		0.011	< 0.01	0.012	< 0.01	< 0.01
Sodium		ug/L		96600	141000	135000	6040	6100
Strontium		ug/L		476	315	340	46.1	47.1
Sulphur (S)		ug/L		2000	920	1370	610	820
Tellurium		ug/L		< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Thallium		ug/L		0.03	< 0.01	< 0.01	< 0.01	< 0.01
Thorium-232		ug/L		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Tin		ug/L		0.11	0.32	0.14	< 0.1	< 0.1
Titanium		ug/L		1.8	0.79	< 3	< 0.3	< 0.3
Uranium		ug/L		0.079	0.035	0.066	< 0.01	< 0.01
Vanadium		ug/L		1.6	0.81	0.99	0.61	0.65
Zinc	100000	ug/L		36.5	18.7	3.7	16.9	16.7
Zirconium		ug/L		0.21	< 0.2	< 0.2	< 0.2	< 0.2
Tungsten		ug/L		< 0.1	0.17	0.3	< 0.1	< 0.1
Rubidium		ug/L		45.5	42.2	42.2	2.88	2.88
Cesium		ug/L		0.607	0.403	0.443	0.013	0.014

Table Notes:
Criteria from the Forceman Landfill Operational Certificate (OC) No. 17227, administered by the BC Ministry of Environment and Climate Change (ENV), last updated 24 November 2021.
QA/QC = Quality Assurance/Quality Control, FDA/FD = Field Duplicate Available/Field Duplicate
< Indicates parameter was below laboratory equipment detection limit.
- Chemical not analyzed or criteria not defined.
Result exceeds applicable OC criteria **744**
Detection limit exceeds applicable OC criteria ***< 2***

Appendix C
Results of Leachate Analyses - F6 - Compost
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Parameter	Unit	Sample Name: F6 - COMPOST	F6 - COMPOST	F6 - COMPOST
		Laboratory ID: WL_F6_43046_N	WL_F6_43238_N	WL_F6_43571_N
		Sample Date: 2017-11-07	2018-05-18	2019-04-16
		QA/QC:		
Anions + Nutrients				
Alkalinity, Total as CaCO3	ug/L	483000	-	1580000
Bromide (Br)	ug/L	17100	-	13600
Chloride (Cl)	ug/L	1470000	-	1760000
Fluoride (F)	mg/L	< 23	-	< 6
Nitrate (as N)	ug/L	< 500	-	< 500
Nitrite (as N)	ug/L	< 100	-	< 100
Ammonia (as N)	ug/L	586000	-	791000
Sulfate (SO4)	ug/L	3.9	-	439000
Phosphorus, Total Orthophosphate	ug/L	247000	-	299000
Phosphorus, Total	ug/L	387000	-	472000
Field + Physical				
Dissolved Oxygen, field measured	mg/L	-	-	5.6
Conductivity, field measured	uS/cm	-	15220	11930
pH, field measured	pH units	-	4.8	4.76
pH, lab	pH	4.6	-	4.73
Temperature, field measured	deg c	-	8	7.5
Total Organic Carbon	mg/L	15100	-	21800
Hardness, Calcium Carbonate	mg/L	4550	-	6880
Chemical Oxygen Demand	mg/L	42800	-	71500
Metals, Total				
Aluminum	ug/L	11600	-	19700
Antimony	ug/L	7	-	8.4
Arsenic	ug/L	61.3	-	62.1
Barium	ug/L	582	-	745
Beryllium	ug/L	< 1	-	< 1
Bismuth	ug/L	< 0.5	-	< 0.5
Boron	ug/L	900	-	930
Cadmium	ug/L	5.44	-	7.38
Calcium	ug/L	1420000	-	2230000
Chromium	ug/L	60.8	-	99.5
Cobalt	ug/L	53.5	-	55.7
Copper	ug/L	110	-	118
Iron	ug/L	86100	109000	96300
Lead	ug/L	7.85	-	14.8
Lithium	ug/L	43	-	55
Magnesium	ug/L	243000	-	318000
Manganese	ug/L	25000	-	29300
Mercury	ug/L	< 0.5	-	0.3
Molybdenum	ug/L	28	-	27.6
Nickel	ug/L	172	-	201
Potassium	ug/L	2190000	-	2100000
Selenium	ug/L	8.67	-	13.7
Silicon	ug/L	40400	-	41200
Silver	ug/L	0.15	-	0.29
Sodium	ug/L	918000	-	1220000
Strontium	ug/L	3170	-	4460
Sulphur (S)	ug/L	175000	-	195000
Tellurium	ug/L	< 2	-	< 2
Thallium	ug/L	0.41	-	0.64
Thorium-232	ug/L	< 1	-	< 1
Tin	ug/L	2.9	-	2.5
Titanium	ug/L	341	-	438
Uranium	ug/L	0.56	-	1.12
Vanadium	ug/L	66.6	-	64.8
Zinc	ug/L	3260	-	5570
Zirconium	ug/L	4.53	-	7.36
Tungsten	ug/L	4.3	-	6.3
Rubidium	ug/L	1520	-	1600
Cesium	ug/L	7.6	-	6.76

Table Notes:

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

< Indicates parameter was below laboratory equipment detection limit.

- Chemical not analyzed or criteria not defined.

4 - Soil Data

Appendix C
Results of Soil Analyses - Phytoremediation Stand
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Parameter	CSR IL	MCS Name	Unit	Sample Name	COMP 2-3-7-9	PHYTO	PHYTO	SITE 11	SITE 11 DUP	SITE A	SITE B	SITE C	SITE D
				Laboratory ID	COMP 2-3-7-9_2020-05-07_N	PHYTO _2018-04-25_N	PHYTO _2019-05-22_N	VA21A7964-001	VA21A7964-002	SITE A_2017-08-22_N	SITE B_2017-08-22_N	SITE C_2017-08-22_N	SITE D_2017-08-22_N
				Sample Date	2020-05-07	2018-04-25	2019-05-22	2021-04-27	2021-04-27	2017-08-22	2017-08-22	2017-08-22	2017-08-22
				QA/QC				FDA	FD				
Anions + Nutrients													
Chloride (Cl), Ion			mg/L		5.5	-	-	< 20	< 20	-	-	-	-
Chloride (Cl), Ion	100	DW	mg/kg		4.3	1.4	10.3	< 13.8	< 13.6	1.57	1.44	3	2.8
Physical													
Saturation			%		79	50.6	61.6	68.9	68.2	35.5	39	54.2	53.8
pH (1:2 CACL2)			pH units		5.61	5.24	5.47	6.03	6.02	5.74	5.35	5.16	5.13
Metals													
Aluminum	250000	HH	mg/kg		29900	25500	35800	35800	29800	-	-	-	-
Antimony	40	EH	mg/kg		0.38	0.37	0.36	0.43	0.36	0.5	0.4	0.41	0.41
Arsenic	10	AW-F	mg/kg		5.01	5.67	5.79	6.76	6.05	7.98	6.71	6.51	5.86
Barium	350	DW	mg/kg		41.3	51.1	51.4	59.4	53.6	71.9	54.6	43.8	43.7
Beryllium	1	AW-F	mg/kg		0.29	0.29	0.41	0.38	0.33	0.4	0.37	0.36	0.36
Bismuth			mg/kg		< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	-	-	-	-
Boron	1000000	HH	mg/kg		< 5	< 5	< 5	< 5	< 5	-	-	-	-
Cadmium	1	AW-F	mg/kg		0.057	0.067	0.055	0.073	0.061	0.108	0.067	0.058	< 0.05
Calcium			mg/kg		1280	1620	1280	2410	2180	-	-	-	-
Chromium	60	AW-F	mg/kg		27.4	27.1	30.7	32.8	27.4	33.1	29.1	29.6	27.6
Cobalt	25	AW-F	mg/kg		6.92	8.69	8.38	8.8	7.63	14.2	11	9.19	7.73
Copper	75	AW-F	mg/kg		17.1	23.1	20.3	25.3	20.1	41.7	29.5	26.4	18.2
Iron	150000	HH	mg/kg		37600	34400	39300	44600	38800	-	-	-	-
Lead	120	DW	mg/kg		6.58	6.15	6.91	7.02	6.34	7.09	6.61	7.14	8.16
Lithium	450	HH	mg/kg		12.1	12.5	13.5	14.2	13.3	-	-	-	-
Magnesium			mg/kg		5960	6200	6220	6380	5650	-	-	-	-
Manganese	2000	DW	mg/kg		444	564	479	588	518	-	-	-	-
Mercury	75	T	mg/kg		0.0561	< 0.05	0.056	0.0567	0.0522	< 0.05	< 0.05	< 0.05	< 0.05
Molybdenum	15	DW	mg/kg		0.79	0.67	0.9	0.93	0.77	0.61	0.62	0.79	0.77
Nickel	70	DW	mg/kg		14.5	18.2	18.2	18.8	16.4	31.5	24.6	18.8	16.5
Phosphorus			mg/kg		1160	1020	1140	1270	986	-	-	-	-
Potassium			mg/kg		520	610	610	750	690	-	-	-	-
Selenium	1	AW-F	mg/kg		0.23	0.27	0.27	0.34	0.3	< 0.2	0.23	0.32	0.29
Silver	40	EH	mg/kg		0.14	0.11	0.13	0.14	0.13	< 0.1	< 0.1	0.14	0.13
Sodium			mg/kg		< 5	< 1	5.9	4	3.68	< 1	< 1	< 1	1
Strontium	150000	HH	mg/kg		14.1	14.6	14	21	18.8	-	-	-	-
Sulphur (H2S)			mg/kg		< 1000	< 1000	< 1000	< 1000	< 1000	-	-	-	-
Thallium	25	EH	mg/kg		0.062	0.063	0.072	0.07	0.061	0.065	0.066	0.066	0.076
Tin	300	EH	mg/kg		< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Titanium			mg/kg		1050	1090	1260	1190	975	-	-	-	-
Tungsten	200	HH	mg/kg		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	-	-	-	-
Uranium	30	DW	mg/kg		0.382	0.423	0.518	0.5	0.445	0.622	0.574	0.492	0.529
Vanadium	100	DW	mg/kg		79.7	77.3	83.3	96	79.5	83.5	76.1	83.2	81.3
Zinc	150	AW-F	mg/kg		62	71.8	74.3	73.5	63.4	92	78.2	70.4	66.4
Zirconium			mg/kg		11.9	9.8	17.5	12.2	10.6	-	-	-	-

Table Notes:

Standards from the Contaminated Sites Regulation (CSR) for Industrial Land Use (IL), updated April 2022.

AW-F (Freshwater Aquatic Life), DW (Drinking Water), T (Toxicity to soil invertebrates and plants), HH (Human Health), EH (Ecologicall Health)

MCS = Most Conservative Standard; 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***

5 - QAQC Data

Appendix C
Results of Quality Assurance and Quality Control
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Sample Name Sample Collection Date	Units	RDL	SITE 11 2021-04-27	SITE 11 DUP 2021-04-27	RPD (%)	DF (unitless)
Anions + Nutrients						
Chloride (Cl)	mg/L	2.0	< 20	< 20	0	n/c
Chloride (Cl)	mg/kg	1.0	< 13.8	< 13.6	1	n/c
Physical						
pH (1:2 CACL2)	pH units	0.1	6.03	6.02	0	n/c
Saturation	%	1.0	68.9	68.2	1	n/c
Metals						
Aluminum	mg/kg	50	35800	29800	18	n/c
Antimony	mg/kg	0.1	0.43	0.36	n/c	0.70
Arsenic	mg/kg	0.1	6.76	6.05	11	n/c
Barium	mg/kg	0.5	59.4	53.6	10	n/c
Beryllium	mg/kg	0.1	0.38	0.33	n/c	0.50
Bismuth	mg/kg	0.2	< 0.2	< 0.2	n/c	0.0
Boron	mg/kg	5	< 5	< 5	n/c	0.0
Cadmium	mg/kg	0.02	0.073	0.061	n/c	0.60
Calcium	mg/kg	50	2410	2180	10	n/c
Chromium	mg/kg	0.5	32.8	27.4	18	n/c
Cobalt	mg/kg	0.1	8.8	7.63	14	n/c
Copper	mg/kg	0.5	25.3	20.1	23	n/c
Iron	mg/kg	50	44600	38800	14	n/c
Lead	mg/kg	0.5	7.02	6.34	10	n/c
Lithium	mg/kg	2	14.2	13.3	7	n/c
Magnesium	mg/kg	20	6380	5650	12	n/c
Manganese	mg/kg	1	588	518	13	n/c
Mercury	mg/kg	0.05	0.0567	0.0522	n/c	0.090
Molybdenum	mg/kg	0.1	0.93	0.77	19	n/c
Nickel	mg/kg	0.5	18.8	16.4	14	n/c
Phosphorus	mg/kg	50	1270	986	25	n/c
Potassium	mg/kg	100	750	690	8	n/c
Selenium	mg/kg	0.2	0.34	0.3	n/c	0.20
Silver	mg/kg	0.1	0.14	0.13	n/c	0.10
Sodium	mg/kg	50	4	3.68	n/c	0.0064
Strontium	mg/kg	0.5	21	18.8	11	n/c
Sulphur (H2S)	mg/kg	1000	< 1000	< 1000	n/c	0.0
Thallium	mg/kg	0.05	0.07	0.061	n/c	0.18
Tin	mg/kg	2	< 2	< 2	n/c	0.0
Titanium	mg/kg	1	1190	975	20	n/c
Tungsten	mg/kg	0.5	< 0.5	< 0.5	n/c	0.0
Uranium	mg/kg	0.05	0.5	0.445	12	n/c
Vanadium	mg/kg	0.2	96	79.5	19	n/c
Zinc	mg/kg	2	73.5	63.4	15	n/c
Zirconium	mg/kg	1	12.2	10.6	14	n/c

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.
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RPD or DF exceeds Golder's data quality objectives **20**

Appendix C
Results of Quality Assurance and Quality Control
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Sample Name Sample Collection Date	Units	RDL	F5 - SAND FILTER (MANHOLE) 2021-03-15	F5 DUP 2021-03-15	RPD (%)	DF (unitless)
Anions + Nutrients						
Alkalinity, Total as CaCO3	mg/L	1.0	<1	<1	n/c	0.0
Ammonia (as N)	mg/L	0.005	0.0159	0.0189	n/c	0.60
Bromide (Br)	mg/L	0.05	<0.05	<0.05	n/c	0.0
Chloride (Cl)	mg/L	0.5	<0.5	<0.5	n/c	0.0
Fluoride (F)	mg/L	0.02	<0.00002	<0.00002	n/c	0.0
Nitrate (as N)	mg/L	0.005	0.025	0.025	n/c	0.0
Nitrite (as N)	mg/L	0.001	<0.001	<0.001	n/c	0.0
Phosphorus, Total Orthophosphate	mg/L	0.001	<0.001	<0.001	n/c	0.0
Sulfate (SO4)	mg/L	0.3	0.32	0.31	n/c	0.033
Total Kjeldahl Nitrogen	mg/L	0.05	0.142	0.208	n/c	1.32
Total Nitrogen	mg/L	0.03	0.141	0.194	**32**	n/c
Total Phosphorus	mg/L	0.05	<0.05	<0.05	n/c	0.0
Physical						
Biochemical Oxygen Demand	mg/L	2.0	<0.002	<0.002	n/c	0.0
Chemical Oxygen Demand	mg/L	20	<0.02	<0.02	n/c	0.0
Conductivity	uS/cm	2.0	2.2	2.5	n/c	0.15
Hardness, Calcium Carbonate	mg/L	0.6	<0.6	<0.6	n/c	0.0
pH, lab	pH Units	0.1	5.55	5.57	0	n/c
Total Organic Carbon	mg/L	0.5	0.61	0.76	n/c	0.30
Metals, Total						
Aluminum	mg/L	0.003	0.0176	0.0184	4	n/c
Antimony	mg/L	0.0001	<0.0001	<0.0001	n/c	0.0
Arsenic	mg/L	0.0001	<0.0001	<0.0001	n/c	0.0
Barium	mg/L	0.0001	0.0004	0.00042	n/c	0.20
Beryllium	mg/L	0.0001	<0.0001	<0.0001	n/c	0.0
Bismuth	mg/L	0.00005	<0.00005	<0.00005	n/c	0.0
Boron	mg/L	0.01	<0.01	<0.01	n/c	0.0
Cadmium	mg/L	0.000005	0.0000263	0.0000237	10	n/c
Calcium	mg/L	0.05	0.123	0.114	n/c	0.18
Cesium	mg/L	0.00001	<0.00001	<0.00001	0	n/c
Chromium	mg/L	0.0001	0.00011	0.00015	n/c	0.40
Cobalt	mg/L	0.0001	<0.0001	<0.0001	0	n/c
Copper	mg/L	0.0005	0.0037	0.00452	20	n/c
Iron	mg/L	0.01	0.041	0.045	n/c	0.40
Lead	mg/L	0.00005	0.000287	0.000305	6	n/c
Lithium	mg/L	0.001	<0.001	<0.001	0	n/c
Magnesium	mg/L	0.005	0.0176	0.0159	n/c	0.34
Manganese	mg/L	0.0001	0.00236	0.0024	n/c	0.40
Mercury	mg/L	0.000005	<0.000005	<0.000005	0	n/c
Molybdenum	mg/L	0.00005	<0.00005	0.000127	**87**	n/c
Nickel	mg/L	0.0005	<0.0005	<0.0005	0	n/c
Potassium	mg/L	0.05	0.169	0.223	n/c	1.08
Rubidium	mg/L	0.0002	<0.0002	0.00028	n/c	0.40
Selenium	mg/L	0.00005	<0.00005	<0.00005	0	n/c
Silicon	mg/L	0.1	<0.1	<0.1	n/c	0.0
Silver	mg/L	0.00001	<0.00001	<0.00001	0	n/c
Sodium	mg/L	0.05	0.122	0.152	n/c	0.60
Strontium	mg/L	0.0002	0.00061	0.00055	10	n/c
Sulphur (S)	mg/L	0.5	<0.5	<0.5	n/c	0.0
Tellurium	mg/L	0.0002	<0.0002	<0.0002	n/c	0.0
Thallium	mg/L	0.00001	<0.00001	<0.00001	0	n/c
Thorium-232	mg/L	0.0001	<0.0001	<0.0001	n/c	0.0
Tin	mg/L	0.0001	<0.0001	0.00012	18	n/c
Titanium	mg/L	0.0003	0.00046	0.00055	n/c	0.30
Tungsten	mg/L	0.0001	<0.0001	<0.0001	n/c	0.0
Uranium	mg/L	0.00001	<0.00001	<0.00001	0	n/c
Vanadium	mg/L	0.0005	<0.0005	<0.0005	0	n/c
Zinc	mg/L	0.003	0.0114	0.0137	n/c	0.77
Zirconium	mg/L	0.0002	<0.0002	<0.0002	n/c	n/c

Notes:
RPD = Relative percent difference; the difference between two values divided by the mean of the two values.
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RPD or DF exceeds Golder's data quality objectives **20**

Appendix C
Results of Quality Assurance and Quality Control
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Sample Name Sample Collection Date	Units	RDL	SAND FILTER CULVERT (MANHOLE) 2021-04-09	F5 DUP 2021-04-09	RPD (%)	DF (unitless)
Anions + Nutrients						
Alkalinity, Total as CaCO3	mg/L	1	531	533	0	n/c
Ammonia (as N)	mg/L	0.005	35.3	37.1	5	n/c
Chloride (Cl)	mg/L	0.5	100	101	1	n/c
Fluoride (F)	mg/L	0.02	<0.10	<0.10	n/c	0
Nitrate (as N)	mg/L	0.005	<0.025	0.0698	**95**	n/c
Nitrite (as N)	mg/L	0.001	<0.005	0.0055	10	n/c
Phosphorus, Total Orthophosphate	mg/L	0.001	0.136	0.0928	**38**	n/c
Sulfate (SO4)	mg/L	0.3	2.42	4.51	60	n/c
Total Kjeldahl Nitrogen	mg/L	0.05	39.6	40.3	2	n/c
Total Nitrogen	mg/L	0.03	41.5	41.4	0	n/c
Total Phosphorus	mg/L	0.05	0.717	0.733	2	n/c
Physical						
Biochemical Oxygen Demand	mg/L	2	96.7	94.3	3	n/c
Chemical Oxygen Demand	mg/L	20	233	304	26	n/c
Conductivity	uS/cm	2	1270	1270	0	n/c
Hardness, Calcium Carbonate	mg/L	0.6	302	303	0	n/c
pH, lab	pH Units	0.1	8.1	8.1	0	n/c
Total Organic Carbon	mg/L	0.5	72.4	74.6	3	n/c
Metals, Total						
Aluminum	mg/L	0.003	0.0262	0.0267	2	n/c
Antimony	mg/L	0.0001	0.00056	0.00057	2	n/c
Arsenic	mg/L	0.0001	0.00298	0.00306	3	n/c
Barium	mg/L	0.0001	0.286	0.296	3	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	0.745	0.756	1	n/c
Cadmium	mg/L	0.000005	0.000247	0.000256	4	n/c
Calcium	mg/L	0.05	95.3	95.3	0	n/c
Cesium	mg/L	0.00001	0.000603	0.000607	1	n/c
Chromium	mg/L	0.0001	0.00207	0.00221	7	n/c
Cobalt	mg/L	0.0001	0.0018	0.00186	3	n/c
Copper	mg/L	0.0005	0.00599	0.00614	2	n/c
Iron	mg/L	0.01	3.82	3.88	2	n/c
Lead	mg/L	0.00005	0.000381	0.000385	1	n/c
Lithium	mg/L	0.001	<0.001	<0.001	n/c	0
Magnesium	mg/L	0.005	15.5	15.8	2	n/c
Manganese	mg/L	0.0001	5.81	5.98	3	n/c
Mercury	mg/L	0.000005	0.0000076	0.0000059	n/c	0.34
Molybdenum	mg/L	0.00005	0.000517	0.000528	2	n/c
Nickel	mg/L	0.0005	0.00515	0.00519	1	n/c
Potassium	mg/L	0.05	41.6	43	3	n/c
Rubidium	mg/L	0.0002	0.0438	0.0455	4	n/c
Selenium	mg/L	0.00005	0.000112	0.000113	1	n/c
Silicon	mg/L	0.1	2.44	2.48	n/c	0.4
Silver	mg/L	0.00001	0.00001	0.000011	10	n/c
Sodium	mg/L	0.05	95	96.9	n/c	38
Strontium	mg/L	0.0002	0.467	0.476	2	n/c
Sulphur (S)	mg/L	0.5	1.76	2	n/c	0.48
Tellurium	mg/L	0.0002	<0.0002	<0.0002	0	n/c
Thallium	mg/L	0.00001	0.000033	0.00003	10	n/c
Thorium-232	mg/L	0.0001	<0.0001	<0.0001	n/c	0
Tin	mg/L	0.0001	0.00012	0.00011	n/c	0.1
Titanium	mg/L	0.0003	0.00214	0.0018	n/c	1.13
Tungsten	mg/L	0.0001	<0.0001	<0.0001	n/c	0
Uranium	mg/L	0.00001	0.00008	0.000079	1	n/c
Vanadium	mg/L	0.0005	0.00155	0.0016	n/c	0.1
Zinc	mg/L	0.003	0.0352	0.0365	4	n/c
Zirconium	mg/L	0.0002	0.00022	0.00021	n/c	0.05

Notes:
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RPD or DF exceeds Golder's data quality objectives **20**

Appendix C
Results of Quality Assurance and Quality Control
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Sample Name Sample Collection Date	Units	RDL	F5 - SAND CYCLONE 2021-08-30	F5 DUP 2021-08-30	RPD (%)	DF (unitless)
Anions + Nutrients						
Alkalinity, Total as CaCO3	mg/L	1	373	374	0	n/c
Ammonia (as N)	mg/L	0.005	15.3	15.5	1	n/c
Chloride (Cl)	mg/L	0.5	140	139	1	n/c
Fluoride (F)	mg/L	0.02	< 0.1	< 0.1	n/c	0
Nitrate (as N)	mg/L	0.005	0.029	<0.025	15	n/c
Nitrite (as N)	mg/L	0.001	0.0093	0.0092	1	n/c
Phosphorus, Total Orthophosphate	mg/L	0.001	0.095	0.117	**21**	n/c
Sulfate (SO4)	mg/L	1.5	< 1.5	< 1.5	n/c	0
Total Kjeldahl Nitrogen	mg/L	0.05	17.3	17.6	2	n/c
Total Nitrogen	mg/L	0.03	17.7	17.6	1	n/c
Total Phosphorus	mg/L	0.05	0.389	0.844	**74**	n/c
Physical						
Biochemical Oxygen Demand	mg/L	2	9.3	11	17	n/c
Chemical Oxygen Demand	mg/L	20	94	90	n/c	0.2
Conductivity	uS/cm	2	1150	1150	0	n/c
Hardness, Calcium Carbonate	mg/L	0.6	174	161	8	n/c
pH, lab	pH Units	0.1	8.21	8.17	0	n/c
Total Organic Carbon	mg/L	0.5	23.9	24.3	2	n/c
Metals, Total						
Aluminum	mg/L	0.003	0.026	0.0994	**117**	n/c
Antimony	mg/L	0.0001	0.00047	0.00052	10	n/c
Arsenic	mg/L	0.0001	0.00372	0.004	7	n/c
Barium	mg/L	0.0001	0.134	0.139	4	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	1.22	1.2	2	n/c
Cadmium	mg/L	0.000005	0.0000576	0.0000851	**39**	n/c
Calcium	mg/L	0.05	40.3	37.5	7	n/c
Cesium	mg/L	0.00001	0.000403	0.000443	9	n/c
Chromium	mg/L	0.0005	0.00081	0.00104	n/c	0.46
Cobalt	mg/L	0.0001	0.00092	0.00102	10	n/c
Copper	mg/L	0.0005	0.00586	0.00388	**41**	n/c
Iron	mg/L	0.01	2.02	1.43	**34**	n/c
Lead	mg/L	0.00005	0.0039	0.000592	**147**	n/c
Lithium	mg/L	0.001	< 0.001	< 0.001	n/c	0
Magnesium	mg/L	0.005	17.7	16.4	8	n/c
Manganese	mg/L	0.0001	1.96	1.9	3	n/c
Mercury	mg/L	0.000005	< 0.000005	< 0.000005	n/c	0
Molybdenum	mg/L	0.00005	0.000575	0.000679	17	n/c
Nickel	mg/L	0.0005	0.00735	0.00708	4	n/c
Potassium	mg/L	0.05	51.5	48.6	6	n/c
Rubidium	mg/L	0.0002	0.0422	0.0422	0	n/c
Selenium	mg/L	0.00005	0.00012	0.000135	n/c	0.3
Silicon	mg/L	0.1	2.98	3.12	5	n/c
Silver	mg/L	0.00001	< 0.00001	0.000012	n/c	0.2
Sodium	mg/L	0.05	141	135	4	n/c
Strontium	mg/L	0.0002	0.315	0.34	8	n/c
Sulphur (S)	mg/L	0.5	0.92	1.37	n/c	0.9
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	0.00032	0.00014	n/c	1.8
Titanium	mg/L	0.0003	0.00079	< 0.003	**117**	n/c
Tungsten	mg/L	0.0001	0.00017	0.0003	n/c	1.3
Uranium	mg/L	0.00001	0.000035	0.000066	**61**	n/c
Vanadium	mg/L	0.0005	0.00081	0.00099	n/c	0.36
Zinc	mg/L	0.003	0.0187	0.0037	**134**	n/c
Zirconium	mg/L	0.0002	< 0.0002	< 0.0002	n/c	0

Notes:
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Results of Quality Assurance and Quality Control
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Sample Name Sample Collection Date	Units	RDL	MW-2 2021-11-03	MW-2 FD 2021-11-03	RPD (%)	DF (unitless)
Anions + Nutrients						
Alkalinity, Total as CaCO3	mg/L	1	31.4	32.5	3	n/c
Ammonia (as N)	mg/L	0.005	0.0066	0.0055	n/c	0.22
Bromide (Br)	mg/L	0.05	< 0.05	<0.05	n/c	n/c
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	0.023	0.022	n/c	0.05
Nitrate (as N)	mg/L	0.005	0.369	0.371	1	n/c
Nitrite (as N)	mg/L	0.001	< 0.001	< 0.001	n/c	0
Sulfate (SO4)	mg/L	0.3	0.82	0.82	n/c	0
Total Kjeldahl Nitrogen	mg/L	0.05	0.18	0.139	n/c	0.82
Physical						
Chemical Oxygen Demand	mg/L	20	41	39	n/c	0.1
Conductivity	uS/cm	2	57.2	58.5	2	n/c
Hardness, Calcium Carbonate (Dissolved)	mg/L	0.6	23.1	24.2	5	n/c
pH, lab	pH Units	0.1	6.66	6.54	2	n/c
Total Organic Carbon	mg/L	0.5	9.16	7.24	**23**	n/c
Metals, Dissolved						
Aluminum	mg/L	0.001	0.0038	0.0035	n/c	0.3
Antimony	mg/L	0.0001	< 0.0001	< 0.0001	n/c	0
Arsenic	mg/L	0.0001	< 0.0001	< 0.0001	n/c	0
Barium	mg/L	0.0001	0.0108	0.00964	11	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	0.0000198	0.0000251	**24**	n/c
Calcium	mg/L	0.05	7.87	8.29	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	0.00024	0.00025	n/c	0.1
Copper	mg/L	0.0002	0.00234	0.00037	**145**	n/c
Iron	mg/L	0.01	0.072	0.054	**29**	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	0.843	0.853	1	n/c
Manganese	mg/L	0.0001	0.0456	0.0469	3	n/c
Mercury	mg/L	0.000005	< 0.000005	< 0.000005	n/c	0
Molybdenum	mg/L	0.00005	< 0.00005	< 0.00005	n/c	0
Nickel	mg/L	0.0005	0.00053	0.0005	n/c	0.06
Potassium	mg/L	0.05	0.423	0.436	3	n/c
Rubidium	mg/L	0.0002	0.0005	0.00047	n/c	0.15
Selenium	mg/L	0.00005	< 0.00005	< 0.00005	n/c	0
Silicon	mg/L	0.05	5.83	5.96	2	n/c
Silver	mg/L	0.00001	< 0.00001	< 0.00001	n/c	0
Sodium	mg/L	0.05	1.85	1.84	1	n/c
Strontium	mg/L	0.0002	0.0635	0.067	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	n/c
Titanium	mg/L	0.0003	< 0.0003	< 0.0003	n/c	0
Tungsten	mg/L	0.0001	< 0.0001	< 0.0001	n/c	0
Uranium	mg/L	0.00001	< 0.00001	< 0.00001	n/c	0
Vanadium	mg/L	0.0005	< 0.0005	< 0.0005	n/c	0
Zinc	mg/L	0.001	0.0037	0.0033	n/c	n/c
Zirconium	mg/L	0.0002	< 0.0002	< 0.0002	n/c	0

Notes:
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Appendix C
Results of Quality Assurance and Quality Control
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Sample Name Sample Collection Date	Units	RDL	SW-05 2021-11-08	SW-05 FD 2021-11-08	RPD (%)	DF (unitless)
Anions + Nutrients						
Ammonia (as N)	mg/L	0.005	< 0.005	< 0.005	n/c	0
Bromide (Br)	mg/L	0.05	< 0.05	< 0.05	n/c	n/c
Chloride (Cl)	mg/L	0.5	1.22	1.22	n/c	0
Dissolved Phosphorus	mg/L	0.05	< 0.05	< 0.05	n/c	0
Fluoride (F)	mg/L	0.02	0.051	0.048	n/c	0.15
Nitrate (as N)	mg/L	0.005	0.014	0.0143	n/c	0.06
Nitrite (as N)	mg/L	0.001	< 0.001	< 0.001	n/c	0
Sulfate (SO4)	mg/L	0.3	2.69	2.69	0	n/c
Total Phosphorus, Unknown	mg/L	0.05	< 0.05	< 0.05	n/c	0
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	158	160	1	n/c
Hardness, Calcium Carbonate	mg/L	0.6	73.6	72.9	1	n/c
pH, lab	pH Units	0.1	8.09	8.09	0	n/c
Metals, Dissolved						
Aluminum	mg/L	0.001	0.0036	0.0047	n/c	1.1
Antimony	mg/L	0.0001	< 0.0001	< 0.0001	n/c	0
Arsenic	mg/L	0.0001	0.00173	0.00171	1	n/c
Barium	mg/L	0.0001	0.0221	0.0217	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	25.4	25.6	1	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	0.00090	0.00063	n/c	1.35
Iron	mg/L	0.01	< 0.01	< 0.01	n/c	0
Lead	mg/L	0.00005	< 0.00005	< 0.00005	n/c	0
Lithium	mg/L	0.001	0.0012	0.0012	n/c	0
Magnesium	mg/L	0.005	2.22	2.19	1	n/c
Manganese	mg/L	0.0001	0.00056	0.00056	0	n/c
Mercury	mg/L	0.000005	< 0.000005	< 0.000005	n/c	0
Molybdenum	mg/L	0.00005	0.000341	0.000328	4	n/c
Nickel	mg/L	0.0005	< 0.0005	< 0.0005	n/c	0
Potassium	mg/L	0.05	0.895	0.881	2	n/c
Rubidium	mg/L	0.0002	0.00032	0.00032	n/c	0
Selenium	mg/L	0.00005	0.000135	0.000139	n/c	0.08
Silicon	mg/L	0.05	4.67	4.64	1	n/c
Silver	mg/L	0.00001	< 0.00001	< 0.00001	n/c	0
Sodium	mg/L	0.05	2.08	2.04	2	n/c
Strontium	mg/L	0.0002	0.101	0.0985	3	n/c
Sulphur (S)	mg/L	0.5	0.82	0.95	n/c	0.26
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	< 0.0003	< 0.0003	n/c	0
Tungsten	mg/L	0.0001	< 0.0001	< 0.0001	n/c	0
Uranium	mg/L	0.00001	0.000141	0.000134	5	n/c
Vanadium	mg/L	0.0005	0.00087	0.00085	n/c	0.04
Zinc	mg/L	0.001	0.0010	< 0.001	n/c	0
Zirconium	mg/L	0.0002	< 0.0002	< 0.0002	n/c	0
Metals, Total						
Aluminum	mg/L	0.003	0.0091	0.0100	n/c	0.3
Antimony	mg/L	0.0001	< 0.0001	< 0.0001	n/c	0
Arsenic	mg/L	0.0001	0.00180	0.00183	2	n/c
Barium	mg/L	0.0001	0.0209	0.0216	3	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	25.9	26.5	2	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	< 0.0005	< 0.0005	n/c	0
Iron	mg/L	0.01	0.011	0.011	n/c	0
Lead	mg/L	0.00005	< 0.00005	< 0.00005	n/c	0
Lithium	mg/L	0.001	0.0012	0.0012	n/c	0
Magnesium	mg/L	0.005	2.18	2.21	1	n/c
Manganese	mg/L	0.0001	0.00182	0.00127	36	n/c
Mercury	mg/L	0.000005	< 0.000005	< 0.000005	n/c	0
Molybdenum	mg/L	0.00005	0.000338	0.000356	5	n/c
Nickel	mg/L	0.0005	< 0.0005	< 0.0005	n/c	0
Potassium	mg/L	0.05	0.911	0.906	1	n/c
Rubidium	mg/L	0.0002	0.00033	0.00035	n/c	0.1
Selenium	mg/L	0.00005	0.000146	0.000156	n/c	0.2
Silicon	mg/L	0.1	5.19	5.19	0	n/c
Silver	mg/L	0.00001	< 0.00001	< 0.00001	n/c	0
Sodium	mg/L	0.05	2.08	2.09	0	n/c
Strontium	mg/L	0.0002	0.0971	0.0974	0	n/c
Sulphur (S)	mg/L	0.5	0.87	1.00	n/c	0.26
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	< 0.0003	< 0.0003	n/c	0
Tungsten	mg/L	0.0001	< 0.0001	< 0.0001	n/c	0
Uranium	mg/L	0.00001	0.000147	0.000148	1	n/c
Vanadium	mg/L	0.0005	0.00092	0.00093	n/c	0.02
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

Results of Quality Assurance and Quality Control
Forceman Ridge Waste Management Facility
Regional District of Kitimat Stikine

Sample Name Sample Collection Date	Units	RDL	F5 DUP 2021-11-25	SAND FILTER CULVERT (MANHOLE) 2021-11-25	RPD (%)	DF (unitless)
Anions + Nutrients						
Alkalinity, Total as CaCO3	mg/L	1	43	42.2	2	n/c
Ammonia (as N)	mg/L	0.005	0.146	0.148	1	n/c
Chloride (Cl)	mg/L	0.5	1.82	1.74	n/c	0.16
Fluoride (F)	mg/L	0.02	0.032	0.033	n/c	0.05
Nitrate (as N)	mg/L	0.005	1.34	1.28	5	n/c
Nitrite (as N)	mg/L	0.001	0.0323	0.0302	7	n/c
Phosphorus, Total Orthophosphate	mg/L	0.001	0.0162	0.0155	4	n/c
Sulfate (SO4)	mg/L	0.3	2.28	2.26	1	n/c
Total Kjeldahl Nitrogen	mg/L	0.05	0.451	0.47	4	n/c
Total Nitrogen	mg/L	0.03	1.49	1.49	0	n/c
Total Phosphorus, Unknown	mg/L	0.05	< 0.05	< 0.05	n/c	0
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	110	107	3	n/c
Hardness, Calcium Carbonate	mg/L	0.6	30.1	30.1	0	n/c
pH	pH Units	0.1	7.74	7.72	0	n/c
Total Organic Carbon	mg/L	0.5	1.12	1.38	n/c	0.52
Metals, Total						
Aluminum	mg/L	0.003	0.0126	0.0121	n/c	0.166666667
Antimony	mg/L	0.0001	0.00014	0.00014	n/c	0
Arsenic	mg/L	0.0001	0.00024	0.00025	n/c	0.1
Barium	mg/L	0.0001	0.0166	0.0166	0	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	0.083	0.078	6	n/c
Cadmium	mg/L	0.000005	0.000009	0.0000072	n/c	0.36
Calcium	mg/L	0.05	9.92	9.93	0	n/c
Cesium	mg/L	0.00001	0.000014	0.000013	n/c	0.1
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	0.0011	0.00106	n/c	0.08
Iron	mg/L	0.01	0.018	0.019	n/c	0.1
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	1.3	1.28	2	n/c
Manganese	mg/L	0.0001	0.0543	0.0541	0	n/c
Mercury	mg/L	0.000005	< 0.000005	< 0.000005	n/c	0
Molybdenum	mg/L	0.00005	0.000152	0.000149	n/c	0.06
Nickel	mg/L	0.0005	0.00052	< 0.0005	n/c	n/c
Potassium	mg/L	0.05	4.78	4.73	1	n/c
Rubidium	mg/L	0.0002	0.00288	0.00288	0	n/c
Selenium	mg/L	0.00005	< 0.00005	< 0.00005	n/c	0
Silicon	mg/L	0.1	2.34	2.36	1	n/c
Silver	mg/L	0.00001	< 0.00001	< 0.00001	n/c	0
Sodium	mg/L	0.05	6.1	6.04	1	n/c
Strontium	mg/L	0.0002	0.0471	0.0461	2	n/c
Sulphur (S)	mg/L	0.5	0.82	0.61	n/c	0.42
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	< 0.0003	< 0.0003	n/c	0
Tungsten	mg/L	0.0001	< 0.0001	< 0.0001	n/c	0
Uranium	mg/L	0.00001	< 0.00001	< 0.00001	n/c	0
Vanadium	mg/L	0.0005	0.00065	0.00061	n/c	0.08
Zinc	mg/L	0.003	0.0167	0.0169	1	n/c
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 D

Laboratory Reports

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **VA21A1066**	Page	: 1 of 4
Amendment	: **1**		
Client	: **Regional District of Kitimat-Stikine**	Laboratory	: Vancouver - Environmental
Contact	: N Veikle	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	: ----	Date Samples Received	: 20-Jan-2021 12:30
PO	: ----	Date Analysis Commenced	: 20-Jan-2021
C-O-C number	: ----	Issue Date	: 28-Jan-2021 12:11
Sampler	: ----		
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*
Cristina Alexandre	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
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*
µS/cm	Microsiemens per centimetre
mg/L	milligrams per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

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

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

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

Workorder Comments

Amended COA(1): Total Nitrogen data is included.

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	Pump 5 - Forcemen	----	----	----	----
					Client sampling date / time	19-Jan-2021 13:00	----	----	----	----
						VA21A1066-001	--------	--------	--------	--------
						Result	----	----	----	----
Physical Tests										
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		1.8 RRV	----	----	----	----
conductivity	----	E100	2.0	µS/cm		3.0 RRV	----	----	----	----
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L		1.33	----	----	----	----
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		0.0089	----	----	----	----
chloride	16887-00-6	E235.Cl	0.50	mg/L		<0.50	----	----	----	----
fluoride	16984-48-8	E235.F	0.020	mg/L		<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		0.0179	----	----	----	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		<0.0010	----	----	----	----
nitrogen, total	7727-37-9	EC368	0.050	mg/L		0.068	----	----	----	----
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L		0.0039	----	----	----	----
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		<0.30	----	----	----	----
Organic / Inorganic Carbon										
carbon, total organic [TOC]	----	E355-L	0.50	mg/L		0.92	----	----	----	----
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		0.0567	----	----	----	----
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		0.00260	----	----	----	----
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		0.0000277	----	----	----	----
calcium, total	7440-70-2	E420	0.050	mg/L		0.443	----	----	----	----
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		0.00078	----	----	----	----
iron, total	7439-89-6	E420	0.010	mg/L		0.109	----	----	----	----

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	Pump 5 - Forcemen	----	----	----	----
					Client sampling date / time	19-Jan-2021 13:00	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA21A1066-001	--------	--------	--------	--------
						Result	----	----	----	----
Total Metals										
lead, total	7439-92-1	E420	0.000050	mg/L		0.000196	----	----	----	----
lithium, total	7439-93-2	E420	0.0010	mg/L		<0.0010	----	----	----	----
magnesium, total	7439-95-4	E420	0.0050	mg/L		0.0553	----	----	----	----
manganese, total	7439-96-5	E420	0.00010	mg/L		0.0476	----	----	----	----
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		0.065	----	----	----	----
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	----	----	----	----
silver, total	7440-22-4	E420	0.000010	mg/L		<0.000010	----	----	----	----
sodium, total	17341-25-2	E420	0.050	mg/L		0.200	----	----	----	----
strontium, total	7440-24-6	E420	0.00020	mg/L		0.00147	----	----	----	----
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		0.00168	----	----	----	----
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	: **VA21A1066**	Page	: 1 of 9
Amendment	: 1		
Client	: **Regional District of Kitimat-Stikine**	Laboratory	: Vancouver - Environmental
Contact	: N Veikle	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	: ----	Date Samples Received	: 20-Jan-2021 12:30
PO	: ----	Issue Date	: 28-Jan-2021 12:11
C-O-C number	: ----		
Sampler	: ----		
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)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD]										
Pump 5 - Forcemen	E550	19-Jan-2021	----	----	----		20-Jan-2021	3 days	1 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
Pump 5 - Forcemen	E559	19-Jan-2021	----	----	----		24-Jan-2021	28 days	4 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
Pump 5 - Forcemen	E298	19-Jan-2021	----	----	----		21-Jan-2021	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
Pump 5 - Forcemen	E235.Cl	19-Jan-2021	----	----	----		21-Jan-2021	28 days	1 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE										
Pump 5 - Forcemen	E378-U	19-Jan-2021	----	----	----		21-Jan-2021	3 days	1 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
Pump 5 - Forcemen	E235.F	19-Jan-2021	----	----	----		21-Jan-2021	28 days	1 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
Pump 5 - Forcemen	E235.NO3-L	19-Jan-2021	----	----	----		21-Jan-2021	3 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 : Nitrite in Water by IC (Low Level)										
HDPE										
Pump 5 - Forcemen	E235.NO2-L	19-Jan-2021	----	----	----		21-Jan-2021	3 days	1 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
Pump 5 - Forcemen	E235.SO4	19-Jan-2021	----	----	----		21-Jan-2021	28 days	1 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
Pump 5 - Forcemen	E318	19-Jan-2021	21-Jan-2021	28 days	1 days	✓	25-Jan-2021	26 days	3 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
Pump 5 - Forcemen	E355-L	19-Jan-2021	----	----	----		21-Jan-2021	28 days	1 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
Pump 5 - Forcemen	E290	19-Jan-2021	----	----	----		21-Jan-2021	14 days	1 days	✓
Physical Tests : Conductivity in Water										
HDPE										
Pump 5 - Forcemen	E100	19-Jan-2021	----	----	----		21-Jan-2021	28 days	1 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid)										
Pump 5 - Forcemen	E420.Cr-L	19-Jan-2021	----	----	----		21-Jan-2021	180 days	2 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
Pump 5 - Forcemen	E508	19-Jan-2021	----	----	----		22-Jan-2021	28 days	2 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
Pump 5 - Forcemen	E420	19-Jan-2021	----	----	----		21-Jan-2021	180 days	2 days	✓

Legend & Qualifier Definitions

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	143206	1	12	8.3	5.0	✓
Ammonia by Fluorescence	E298	143300	1	20	5.0	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	143049	1	8	12.5	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	144384	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	143199	1	16	6.2	5.0	✓
Conductivity in Water	E100	143205	1	12	8.3	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	143207	1	7	14.2	5.0	✓
Fluoride in Water by IC	E235.F	143198	1	16	6.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	143201	1	16	6.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	143202	1	16	6.2	5.0	✓
Sulfate in Water by IC	E235.SO4	143203	1	16	6.2	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	143302	1	17	5.8	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	143293	1	12	8.3	5.0	✓
Total Mercury in Water by CVAAS	E508	143785	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	143301	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	143364	1	19	5.2	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	143206	1	12	8.3	5.0	✓
Ammonia by Fluorescence	E298	143300	1	20	5.0	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	143049	1	8	12.5	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	144384	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	143199	1	16	6.2	5.0	✓
Conductivity in Water	E100	143205	1	12	8.3	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	143207	1	7	14.2	5.0	✓
Fluoride in Water by IC	E235.F	143198	1	16	6.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	143201	1	16	6.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	143202	1	16	6.2	5.0	✓
Sulfate in Water by IC	E235.SO4	143203	1	16	6.2	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	143302	1	17	5.8	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	143293	1	12	8.3	5.0	✓
Total Mercury in Water by CVAAS	E508	143785	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	143301	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	143364	1	19	5.2	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	143206	1	12	8.3	5.0	✓
Ammonia by Fluorescence	E298	143300	1	20	5.0	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	143049	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*
Method Blanks (MB) - Continued							
Chemical Oxygen Demand by Colourimetry	E559	144384	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	143199	1	16	6.2	5.0	✓
Conductivity in Water	E100	143205	1	12	8.3	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	143207	1	7	14.2	5.0	✓
Fluoride in Water by IC	E235.F	143198	1	16	6.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	143201	1	16	6.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	143202	1	16	6.2	5.0	✓
Sulfate in Water by IC	E235.SO4	143203	1	16	6.2	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	143302	1	17	5.8	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	143293	1	12	8.3	5.0	✓
Total Mercury in Water by CVAAS	E508	143785	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	143301	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	143364	1	19	5.2	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	143300	1	20	5.0	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	144384	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	143199	1	16	6.2	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	143207	1	7	14.2	5.0	✓
Fluoride in Water by IC	E235.F	143198	1	16	6.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	143201	1	16	6.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	143202	1	16	6.2	5.0	✓
Sulfate in Water by IC	E235.SO4	143203	1	16	6.2	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	143302	1	17	5.8	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	143293	1	12	8.3	5.0	✓
Total Mercury in Water by CVAAS	E508	143785	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	143301	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	143364	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.
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).
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.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Vancouver - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
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.
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.
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.
Total Nitrogen (calculation)	EC368 Vancouver - Environmental	Water	BC MOE LABORATORY MANUAL (2005)	Total Nitrogen is a calculated parameter. Total Nitrogen = Total Kjeldahl Nitrogen + [Nitrate and Nitrite (as N)].

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
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.

QUALITY CONTROL REPORT

Work Order	: **VA21A1066**	Page	: 1 of 14
Amendment	: **1**		

Client	: Regional District of Kitimat-Stikine	Laboratory	: Vancouver - Environmental
Contact	: N Veikle	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	: ----	Date Samples Received	: 20-Jan-2021 12:30
PO	: ----	Date Analysis Commenced	: 20-Jan-2021
C-O-C number	: ----	Issue Date	: 28-Jan-2021 12:11
Sampler	: ----		
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*
Cristina Alexandre	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
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: 143205)											
VA21A1105-018	Anonymous	conductivity	----	E100	2.0	µS/cm	38.5	39.0	0.5	Diff <2x LOR	----
Physical Tests (QC Lot: 143206)											
VA21A1105-018	Anonymous	alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	12.2	12.4	1.63%	20%	----
Anions and Nutrients (QC Lot: 143198)											
KS2100166-001	Anonymous	fluoride	16984-48-8	E235.F	0.100	mg/L	0.114	0.113	0.001	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 143199)											
KS2100166-001	Anonymous	chloride	16887-00-6	E235.Cl	2.50	mg/L	26.4	26.4	0.0713%	20%	----
Anions and Nutrients (QC Lot: 143201)											
KS2100166-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.0250	mg/L	0.393	0.395	0.514%	20%	----
Anions and Nutrients (QC Lot: 143202)											
KS2100166-001	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 143203)											
KS2100166-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	1.50	mg/L	144	143	0.694%	20%	----
Anions and Nutrients (QC Lot: 143207)											
VA21A1047-001	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	0.0210	0.0209	0.537%	20%	----
Anions and Nutrients (QC Lot: 143293)											
VA21A1051-001	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	0.241	0.297	0.056	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 143300)											
VA21A1039-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 143364)											
VA21A1010-001	Anonymous	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	0.95	0.98	0.04	Diff <2x LOR	----
Total Metals (QC Lot: 143301)											
YL2100041-001	Anonymous	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0105	0.0098	0.0007	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00016	0.00016	0.000005	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.198	0.189	4.28%	20%	----
		beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	0.812	0.770	5.26%	20%	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.0000365	0.0000336	0.0000029	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	0.050	mg/L	90.4	85.4	5.77%	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: 143301) - continued											
YL2100041-001	Anonymous	cesium, total	7440-46-2	E420	0.000010	mg/L	0.000062	0.000060	0.000001	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	0.00023	0.00023	0.00000005	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	0.00053	0.00054	0.00001	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	0.015	0.015	0.0005	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	0.0185	0.0175	5.70%	20%	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	23.9	23.9	0.0436%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.0521	0.0507	2.70%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00209	0.00211	1.05%	20%	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	0.00490	0.00491	0.000006	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	16.4	16.6	1.16%	20%	----
		rubidium, total	7440-17-7	E420	0.00020	mg/L	0.0196	0.0198	0.896%	20%	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		silicon, total	7440-21-3	E420	0.10	mg/L	1.20	1.15	4.36%	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	64.4	65.0	0.963%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	1.35	1.37	1.21%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	19.1	19.0	0.704%	20%	----
		tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	0.00021	0.000010	Diff <2x LOR	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	0.000044	0.000040	0.000003	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	0.00091	0.00090	0.00001	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	0.000904	0.000902	0.180%	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	<0.0030	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: 143302)											
YL2100041-001	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: 143785)											
KS2100180-001	Anonymous	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Aggregate Organics (QC Lot: 143049)											
VA21A1052-001	Anonymous	biochemical oxygen demand [BOD]	----	E550	2000	mg/L	2100 µg/L	2.3	9.09%	30%	----

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: 144384)											
VA21A1052-001	Anonymous	chemical oxygen demand [COD]	----	E559	20000	mg/L	<20000 µg/L	<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: 143205)						
conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 143206)						
alkalinity, total (as CaCO3)	----	E290	1	mg/L	1.4	----
Anions and Nutrients (QCLot: 143198)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 143199)						
chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 143201)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 143202)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 143203)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 143207)						
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 143293)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 143300)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Organic / Inorganic Carbon (QCLot: 143364)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 143301)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 143301) - continued						
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: 143302)						
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	<0.00010	----
Total Metals (QCLot: 143785)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Aggregate Organics (QCLot: 143049)						
biochemical oxygen demand [BOD]	----	E550	2	mg/L	<2.0	----
Aggregate Organics (QCLot: 144384)						
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: 143205)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	97.1	90.0	110	----
Physical Tests (QCLot: 143206)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	99.3	85.0	115	----
Anions and Nutrients (QCLot: 143198)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	99.8	90.0	110	----
Anions and Nutrients (QCLot: 143199)									
chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 143201)									
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: 143202)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	99.5	90.0	110	----
Anions and Nutrients (QCLot: 143203)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 143207)									
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	95.8	80.0	120	----
Anions and Nutrients (QCLot: 143293)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 143300)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.12 mg/L	98.1	85.0	115	----
Organic / Inorganic Carbon (QCLot: 143364)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	102	80.0	120	----
Total Metals (QCLot: 143301)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	93.6	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	106	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	94.8	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	92.4	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	101	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	119	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	94.2	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	95.1	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: 143301) - continued									
cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	104	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	95.0	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	92.9	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	98.0	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	99.7	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	92.0	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	94.2	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	98.6	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	93.9	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	104	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	93.8	80.0	120	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	97.2	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	95.1	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	96.8	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	93.3	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	102	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	104	80.0	120	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	102	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	100	80.0	120	----
thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	93.2	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	97.0	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	91.1	80.0	120	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	96.4	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	102	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	97.4	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	94.8	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	96.2	80.0	120	----
Total Metals (QCLot: 143302)									
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	0.25 mg/L	94.7	80.0	120	----
Total Metals (QCLot: 143785)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	109	80.0	120	----
Aggregate Organics (QCLot: 143049)									
biochemical oxygen demand [BOD]	----	E550	2	mg/L	198 mg/L	98.6	85.0	115	----
Aggregate Organics (QCLot: 144384)									

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Aggregate Organics (QCLot: 144384) - continued									
chemical oxygen demand [COD]	----	E559	20	mg/L	750 mg/L	96.8	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: 143198)										
VA21A1105-018	Anonymous	fluoride	16984-48-8	E235.F	1.03 mg/L	1 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 143199)										
VA21A1105-018	Anonymous	chloride	16887-00-6	E235.Cl	103 mg/L	100 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 143201)										
VA21A1105-018	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	2.56 mg/L	2.5 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 143202)										
VA21A1105-018	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.503 mg/L	0.5 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 143203)										
VA21A1105-018	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	102 mg/L	100 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 143207)										
VA21A1066-001	Pump 5 - Forcemen	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0321 mg/L	0.03 mg/L	107	70.0	130	----
Anions and Nutrients (QCLot: 143293)										
VA21A1051-002	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	2.54 mg/L	2.5 mg/L	102	70.0	130	----
Anions and Nutrients (QCLot: 143300)										
VA21A1041-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.184 mg/L	0.2 mg/L	91.8	75.0	125	----
Organic / Inorganic Carbon (QCLot: 143364)										
VA21A1010-002	Anonymous	carbon, total organic [TOC]	----	E355-L	5.24 mg/L	5 mg/L	105	70.0	130	----
Total Metals (QCLot: 143301)										
YL2100041-001	Anonymous	aluminum, total	7429-90-5	E420	0.184 mg/L	0.2 mg/L	92.0	70.0	130	----
		antimony, total	7440-36-0	E420	0.0211 mg/L	0.02 mg/L	106	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0191 mg/L	0.02 mg/L	95.6	70.0	130	----
		barium, total	7440-39-3	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0390 mg/L	0.04 mg/L	97.5	70.0	130	----
		bismuth, total	7440-69-9	E420	0.00914 mg/L	0.01 mg/L	91.4	70.0	130	----
		boron, total	7440-42-8	E420	ND mg/L	0.1 mg/L	ND	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00375 mg/L	0.004 mg/L	93.8	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	0.0109 mg/L	0.01 mg/L	109	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0181 mg/L	0.02 mg/L	90.6	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: 143301) - continued										
YL2100041-001	Anonymous	copper, total	7440-50-8	E420	0.0176 mg/L	0.02 mg/L	88.1	70.0	130	----
		iron, total	7439-89-6	E420	1.89 mg/L	2 mg/L	94.4	70.0	130	----
		lead, total	7439-92-1	E420	0.0186 mg/L	0.02 mg/L	93.1	70.0	130	----
		lithium, total	7439-93-2	E420	0.0953 mg/L	0.1 mg/L	95.3	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0197 mg/L	0.02 mg/L	98.5	70.0	130	----
		nickel, total	7440-02-0	E420	0.0355 mg/L	0.04 mg/L	88.7	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	ND mg/L	4 mg/L	ND	70.0	130	----
		rubidium, total	7440-17-7	E420	0.0183 mg/L	0.02 mg/L	91.4	70.0	130	----
		selenium, total	7782-49-2	E420	0.0384 mg/L	0.04 mg/L	96.0	70.0	130	----
		silicon, total	7440-21-3	E420	8.60 mg/L	10 mg/L	86.0	70.0	130	----
		silver, total	7440-22-4	E420	0.00394 mg/L	0.004 mg/L	98.6	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	19.9 mg/L	20 mg/L	99.7	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	0.00356 mg/L	0.004 mg/L	89.0	70.0	130	----
		thorium, total	7440-29-1	E420	0.0211 mg/L	0.02 mg/L	105	70.0	130	----
		tin, total	7440-31-5	E420	0.0196 mg/L	0.02 mg/L	97.8	70.0	130	----
		titanium, total	7440-32-6	E420	0.0374 mg/L	0.04 mg/L	93.4	70.0	130	----
		tungsten, total	7440-33-7	E420	0.0188 mg/L	0.02 mg/L	93.9	70.0	130	----
		uranium, total	7440-61-1	E420	0.00399 mg/L	0.004 mg/L	99.7	70.0	130	----
		vanadium, total	7440-62-2	E420	0.0985 mg/L	0.1 mg/L	98.5	70.0	130	----
		zinc, total	7440-66-6	E420	0.369 mg/L	0.4 mg/L	92.2	70.0	130	----
		zirconium, total	7440-67-7	E420	0.0411 mg/L	0.04 mg/L	103	70.0	130	----
Total Metals (QCLot: 143302)										
YL2100041-001	Anonymous	chromium, total	7440-47-3	E420.Cr-L	0.0374 mg/L	0.04 mg/L	93.6	70.0	130	----
Total Metals (QCLot: 143785)										
KS2100189-001	Anonymous	mercury, total	7439-97-6	E508	0.000107 mg/L	0.0001 mg/L	107	70.0	130	----
Aggregate Organics (QCLot: 144384)										
VA21A1052-002	Anonymous	chemical oxygen demand [COD]	----	E559	466 mg/L	500 mg/L	93.3	75.0	125	----

Chain of Custody (COC) / Analytical Request Form

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:	Nicki Veikle / Chris Kerr.
Phone:	(250) 615-6100
	Company address below will appear on the final report
Street:	4545 Lazelle Ave
City/Province:	Terrace, BC
Postal Code:	V8G 4E1
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	Regional Dist of Kitimat-Stikine
Contact:	Anne-Maries@rdks.bc.ca

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	NHaley@rdks.bc.ca
Email 2	NVeikle@rdks.bc.ca
Email 3	MTress@rdks.bc.ca
Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	Anne-Maries@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%] ☐	EMERGENCY: 1 Business day [E - 100%] ☐
3 day [P3-25%] ☐	Same Day, Weekend or Statutory holiday [E2 -200% (Laboratory opening fees may apply)] ☐
2 day [P2-50%] ☐	
Date and Time Required for all E&P TATs:	dd-mmm-yy hh:mm
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 #:		Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (lab use only):		ALS Contact:	Sampler:

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	NUMBER OF CONTAINERS	Total metals	Alkalinity/Conductivity	Chloride	Fluoride	Sulphate	Hardness	Ammonia	Nitrate	Nitrite	TOC	Orthophosphorus	COD	BOD	Total Kjeldahl Nitrogen	SAMPLES ON HOLD	SUSPECTED HAZARD (see Special Instructions)
	Pump 5 - Foreman.	19-01-2021	1:00	Leachate		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		

Environmental Division
Vancouver
Work Order Reference
VA21A1066

Telephone : +1 604 253 4188

Terrace Shipping
1 Coolers
___ Carbouys

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Spe	p-down list below
Are samples taken from a Regulated DW System? ☐ YES ☑ NO		
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				2			

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
	JAN 19 21	2:15	Chris	19 Jan 21	1415	Ice pack	JAN 20 2021	1230pm

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

NOV 2018 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	: **VA21A4846**	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	: Forceman Facility F5 Sand Cyclone	Date Samples Received	: 16-Mar-2021 10:45
PO	: ----	Date Analysis Commenced	: 17-Mar-2021
C-O-C number	: ----	Issue Date	: 29-Mar-2021 14:44
Sampler	: HS		
Site	:		
Quote number	: Q62338		
No. of samples received	: 4		
No. of samples analysed	: 4		

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*
Gloria Chan	Lab 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	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*
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: F5 - Sand Cyclone	DUP	Field Blank	Travel Blank	----
					Client sampling date / time: 15-Mar-2021 10:54	15-Mar-2021 12:00	15-Mar-2021 11:04	15-Mar-2021	----
					VA21A4846-001	VA21A4846-002	VA21A4846-003	VA21A4846-004	--------
					Result	Result	Result	Result	----
Physical Tests									
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	----
conductivity	----	E100	2.0	µS/cm	2.2 RRV	2.5 RRV	<2.0	<2.0	----
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L	<0.60	<0.60	<0.60	<0.60	----
pH	----	E108	0.10	pH units	5.55	5.57	5.45	5.40	----
Anions and Nutrients									
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0159	0.0189	<0.0050	<0.0050	----
bromide	24959-67-9	E235.Br-L	0.050	mg/L	<0.050	<0.050	<0.050	----	----
chloride	16887-00-6	E235.Cl	0.50	mg/L	<0.50	<0.50	<0.50	----	----
fluoride	16984-48-8	E235.F	0.020	mg/L	<0.020	<0.020	<0.020	----	----
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	0.142	0.208	<0.050	<0.050	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.0250	0.0250	<0.0050	----	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0010	<0.0010	<0.0010	----	----
nitrogen, total	7727-37-9	E366	0.030	mg/L	0.141	0.194	<0.030	----	----
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	----
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	0.32	0.31	<0.30	----	----
Organic / Inorganic Carbon									
carbon, total organic [TOC]	----	E355-L	0.50	mg/L	0.61	0.76	<0.50	----	----
Total Metals									
aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0176	0.0184	<0.0030	----	----
antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	----	----
arsenic, total	7440-38-2	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	----	----
barium, total	7440-39-3	E420	0.00010	mg/L	0.00040	0.00042	<0.00010	----	----
beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	<0.000100	----	----
bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	----	----
boron, total	7440-42-8	E420	0.010	mg/L	<0.010	<0.010	<0.010	----	----
cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.0000263	0.0000237	<0.0000050	----	----
calcium, total	7440-70-2	E420	0.050	mg/L	0.123	0.114	<0.050	<0.050	----
cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	----	----
chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L	0.00011	0.00015	<0.00010	----	----
cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	----	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID: F5 - Sand Cyclone	DUP	Field Blank	Travel Blank	----
					Client sampling date / time: 15-Mar-2021 10:54	15-Mar-2021 12:00	15-Mar-2021 11:04	15-Mar-2021	----
					VA21A4846-001	VA21A4846-002	VA21A4846-003	VA21A4846-004	--------
					Result	Result	Result	Result	----
Total Metals									
copper, total	7440-50-8	E420	0.00050	mg/L	0.00370	0.00452	<0.00050	----	----
iron, total	7439-89-6	E420	0.010	mg/L	0.041	0.045	<0.010	----	----
lead, total	7439-92-1	E420	0.000050	mg/L	0.000287	0.000305	<0.000050	----	----
lithium, total	7439-93-2	E420	0.0010	mg/L	<0.0010	<0.0010	<0.0010	----	----
magnesium, total	7439-95-4	E420	0.0050	mg/L	0.0176	0.0159	<0.0050	<0.0050	----
manganese, total	7439-96-5	E420	0.00010	mg/L	0.00236	0.00240	<0.00010	----	----
mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	----	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L	<0.000050	0.000127	<0.000050	----	----
nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	<0.00050	<0.00050	----	----
phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	<0.050	<0.050	----	----
potassium, total	7440-09-7	E420	0.050	mg/L	0.169	0.223	<0.050	----	----
rubidium, total	7440-17-7	E420	0.00020	mg/L	<0.00020	0.00028	<0.00020	----	----
selenium, total	7782-49-2	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	----	----
silicon, total	7440-21-3	E420	0.10	mg/L	<0.10	<0.10	<0.10	----	----
silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	----	----
sodium, total	17341-25-2	E420	0.050	mg/L	0.122	0.152	<0.050	----	----
strontium, total	7440-24-6	E420	0.00020	mg/L	0.00061	0.00055	<0.00020	----	----
sulfur, total	7704-34-9	E420	0.50	mg/L	<0.50	<0.50	<0.50	----	----
tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	<0.00020	----	----
thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	----	----
thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	----	----
tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	0.00012	<0.00010	----	----
titanium, total	7440-32-6	E420	0.00030	mg/L	0.00046	0.00055	<0.00030	----	----
tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	----	----
uranium, total	7440-61-1	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	----	----
vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	<0.00050	----	----
zinc, total	7440-66-6	E420	0.0030	mg/L	0.0114	0.0137	<0.0030	----	----
zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	<0.00020	----	----
Aggregate Organics									
biochemical oxygen demand [BOD]	----	E550	2.0	mg/L	<2.0	<2.0	<2.0	----	----
chemical oxygen demand [COD]	----	E559	20	mg/L	<20	<20	<20	----	----

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA21A4846**	Page	: 1 of 15
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	: Forceman Facility F5 Sand Cyclone	Date Samples Received	: 16-Mar-2021 10:45
PO	: ----	Issue Date	: 29-Mar-2021 14:44
C-O-C number	: ----		
Sampler	: HS		
Site	:		
Quote number	: Q62338		
No. of samples received	: 4		
No. of samples analysed	: 4		

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

Key

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

Summary of Outliers

Outliers : Quality Control Samples

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

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

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

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times 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	15-Mar-2021	----	----	----		17-Mar-2021	3 days	2 days	✓
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT 3d] F5 - Sand Cyclone	E550	15-Mar-2021	----	----	----		17-Mar-2021	3 days	2 days	✓
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT 3d] Field Blank	E550	15-Mar-2021	----	----	----		17-Mar-2021	3 days	2 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid) DUP	E559	15-Mar-2021	----	----	----		19-Mar-2021	28 days	4 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid) F5 - Sand Cyclone	E559	15-Mar-2021	----	----	----		19-Mar-2021	28 days	4 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid) Field Blank	E559	15-Mar-2021	----	----	----		19-Mar-2021	28 days	4 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) DUP	E298	15-Mar-2021	17-Mar-2021	28 days	2 days	✓	17-Mar-2021	25 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 : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
F5 - Sand Cyclone	E298	15-Mar-2021	17-Mar-2021	28 days	2 days	✓	17-Mar-2021	25 days	0 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
Field Blank	E298	15-Mar-2021	17-Mar-2021	28 days	2 days	✓	17-Mar-2021	25 days	0 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (lab preserved)										
Travel Blank	E298	15-Mar-2021	17-Mar-2021	3 days	1 days	✓	17-Mar-2021	28 days	0 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
DUP	E235.Br-L	15-Mar-2021	----	----	----		17-Mar-2021	28 days	2 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
F5 - Sand Cyclone	E235.Br-L	15-Mar-2021	----	----	----		17-Mar-2021	28 days	2 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
Field Blank	E235.Br-L	15-Mar-2021	----	----	----		17-Mar-2021	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
DUP	E235.Cl	15-Mar-2021	----	----	----		17-Mar-2021	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
F5 - Sand Cyclone	E235.Cl	15-Mar-2021	----	----	----		17-Mar-2021	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
Field Blank	E235.Cl	15-Mar-2021	----	----	----		17-Mar-2021	28 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times 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 DUP	E378-U	15-Mar-2021	----	----	----		17-Mar-2021	3 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE F5 - Sand Cyclone	E378-U	15-Mar-2021	----	----	----		17-Mar-2021	3 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE Field Blank	E378-U	15-Mar-2021	----	----	----		17-Mar-2021	3 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE Travel Blank	E378-U	15-Mar-2021	----	----	----		17-Mar-2021	3 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE DUP	E235.F	15-Mar-2021	----	----	----		17-Mar-2021	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE F5 - Sand Cyclone	E235.F	15-Mar-2021	----	----	----		17-Mar-2021	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE Field Blank	E235.F	15-Mar-2021	----	----	----		17-Mar-2021	28 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE DUP	E235.NO3-L	15-Mar-2021	----	----	----		17-Mar-2021	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE F5 - Sand Cyclone	E235.NO3-L	15-Mar-2021	----	----	----		17-Mar-2021	3 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times 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										
Field Blank	E235.NO3-L	15-Mar-2021	----	----	----		17-Mar-2021	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
DUP	E235.NO2-L	15-Mar-2021	----	----	----		17-Mar-2021	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
F5 - Sand Cyclone	E235.NO2-L	15-Mar-2021	----	----	----		17-Mar-2021	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
Field Blank	E235.NO2-L	15-Mar-2021	----	----	----		17-Mar-2021	3 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
DUP	E235.SO4	15-Mar-2021	----	----	----		17-Mar-2021	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
F5 - Sand Cyclone	E235.SO4	15-Mar-2021	----	----	----		17-Mar-2021	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
Field Blank	E235.SO4	15-Mar-2021	----	----	----		17-Mar-2021	28 days	2 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
DUP	E318	15-Mar-2021	25-Mar-2021	28 days	9 days	✓	27-Mar-2021	18 days	1 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
F5 - Sand Cyclone	E318	15-Mar-2021	25-Mar-2021	28 days	9 days	✓	27-Mar-2021	18 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)										
Field Blank	E318	15-Mar-2021	25-Mar-2021	28 days	9 days	✓	27-Mar-2021	18 days	1 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (lab preserved)										
Travel Blank	E318	15-Mar-2021	25-Mar-2021	3 days	9 days	× EHT	27-Mar-2021	28 days	1 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
DUP	E366	15-Mar-2021	17-Mar-2021	28 days	2 days	✓	18-Mar-2021	25 days	0 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
F5 - Sand Cyclone	E366	15-Mar-2021	17-Mar-2021	28 days	2 days	✓	18-Mar-2021	25 days	0 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
Field Blank	E366	15-Mar-2021	17-Mar-2021	28 days	2 days	✓	18-Mar-2021	25 days	0 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
DUP	E355-L	15-Mar-2021	17-Mar-2021	28 days	2 days	✓	17-Mar-2021	25 days	0 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
F5 - Sand Cyclone	E355-L	15-Mar-2021	17-Mar-2021	28 days	2 days	✓	17-Mar-2021	25 days	0 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
Field Blank	E355-L	15-Mar-2021	17-Mar-2021	28 days	2 days	✓	17-Mar-2021	25 days	0 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
DUP	E290	15-Mar-2021	----	----	----		18-Mar-2021	14 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Alkalinity Species by Titration										
HDPE F5 - Sand Cyclone	E290	15-Mar-2021	----	----	----		18-Mar-2021	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE Field Blank	E290	15-Mar-2021	----	----	----		18-Mar-2021	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE Travel Blank	E290	15-Mar-2021	----	----	----		18-Mar-2021	14 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE DUP	E100	15-Mar-2021	----	----	----		18-Mar-2021	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE F5 - Sand Cyclone	E100	15-Mar-2021	----	----	----		18-Mar-2021	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE Field Blank	E100	15-Mar-2021	----	----	----		18-Mar-2021	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE Travel Blank	E100	15-Mar-2021	----	----	----		18-Mar-2021	28 days	2 days	✓
Physical Tests : pH by Meter										
HDPE Travel Blank	E108	15-Mar-2021	----	----	----		18-Mar-2021	0.25 hrs	67 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE DUP	E108	15-Mar-2021	----	----	----		18-Mar-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 F5 - Sand Cyclone	E108	15-Mar-2021	----	----	----		18-Mar-2021	0.25 hrs	71 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE Field Blank	E108	15-Mar-2021	----	----	----		18-Mar-2021	0.25 hrs	71 hrs	× EHTR-FM
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid) DUP	E420.Cr-L	15-Mar-2021	----	----	----		18-Mar-2021	180 days	2 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid) F5 - Sand Cyclone	E420.Cr-L	15-Mar-2021	----	----	----		18-Mar-2021	180 days	3 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid) Field Blank	E420.Cr-L	15-Mar-2021	----	----	----		18-Mar-2021	180 days	3 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) DUP	E508	15-Mar-2021	----	----	----		18-Mar-2021	28 days	2 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) F5 - Sand Cyclone	E508	15-Mar-2021	----	----	----		18-Mar-2021	28 days	2 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) Field Blank	E508	15-Mar-2021	----	----	----		18-Mar-2021	28 days	2 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) DUP	E420	15-Mar-2021	----	----	----		18-Mar-2021	180 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times 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 (lab preserved)										
Travel Blank	E420	15-Mar-2021	----	----	----		18-Mar-2021	180 days	2 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
F5 - Sand Cyclone	E420	15-Mar-2021	----	----	----		18-Mar-2021	180 days	3 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
Field Blank	E420	15-Mar-2021	----	----	----		18-Mar-2021	180 days	3 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	164810	1	17	5.8	5.0	✓
Ammonia by Fluorescence	E298	164770	1	6	16.6	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	164912	1	11	9.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	164817	1	7	14.2	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	166187	1	7	14.2	5.0	✓
Chloride in Water by IC	E235.Cl	164812	1	16	6.2	5.0	✓
Conductivity in Water	E100	164809	1	17	5.8	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	164819	1	12	8.3	5.0	✓
Fluoride in Water by IC	E235.F	164815	1	10	10.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	164813	1	15	6.6	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	164814	1	16	6.2	5.0	✓
pH by Meter	E108	164808	1	17	5.8	5.0	✓
Sulfate in Water by IC	E235.SO4	164811	1	16	6.2	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	165092	1	16	6.2	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	168659	1	10	10.0	5.0	✓
Total Mercury in Water by CVAAS	E508	165125	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	165091	1	20	5.0	5.0	✓
Total Nitrogen by Colourimetry	E366	164768	1	7	14.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	164775	1	3	33.3	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	164810	1	17	5.8	5.0	✓
Ammonia by Fluorescence	E298	164770	1	6	16.6	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	164912	1	11	9.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	164817	1	7	14.2	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	166187	1	7	14.2	5.0	✓
Chloride in Water by IC	E235.Cl	164812	1	16	6.2	5.0	✓
Conductivity in Water	E100	164809	1	17	5.8	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	164819	1	12	8.3	5.0	✓
Fluoride in Water by IC	E235.F	164815	1	10	10.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	164813	1	15	6.6	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	164814	1	16	6.2	5.0	✓
pH by Meter	E108	164808	1	17	5.8	5.0	✓
Sulfate in Water by IC	E235.SO4	164811	1	16	6.2	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	165092	1	16	6.2	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	168659	1	10	10.0	5.0	✓
Total Mercury in Water by CVAAS	E508	165125	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	165091	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*
Laboratory Control Samples (LCS) - Continued							
Total Nitrogen by Colourimetry	E366	164768	1	7	14.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	164775	1	3	33.3	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	164810	1	17	5.8	5.0	✓
Ammonia by Fluorescence	E298	164770	1	6	16.6	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	164912	1	11	9.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	164817	1	7	14.2	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	166187	1	7	14.2	5.0	✓
Chloride in Water by IC	E235.Cl	164812	1	16	6.2	5.0	✓
Conductivity in Water	E100	164809	1	17	5.8	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	164819	1	12	8.3	5.0	✓
Fluoride in Water by IC	E235.F	164815	1	10	10.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	164813	1	15	6.6	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	164814	1	16	6.2	5.0	✓
Sulfate in Water by IC	E235.SO4	164811	1	16	6.2	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	165092	1	16	6.2	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	168659	1	10	10.0	5.0	✓
Total Mercury in Water by CVAAS	E508	165125	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	165091	1	20	5.0	5.0	✓
Total Nitrogen by Colourimetry	E366	164768	1	7	14.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	164775	1	3	33.3	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	164770	1	6	16.6	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	164817	1	7	14.2	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	166187	1	7	14.2	5.0	✓
Chloride in Water by IC	E235.Cl	164812	1	16	6.2	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	164819	1	12	8.3	5.0	✓
Fluoride in Water by IC	E235.F	164815	1	10	10.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	164813	1	15	6.6	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	164814	1	16	6.2	5.0	✓
Sulfate in Water by IC	E235.SO4	164811	1	16	6.2	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	165092	1	16	6.2	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	168659	1	10	10.0	5.0	✓
Total Mercury in Water by CVAAS	E508	165125	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	165091	1	20	5.0	5.0	✓
Total Nitrogen by Colourimetry	E366	164768	1	7	14.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	164775	1	3	33.3	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.
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.
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 Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Vancouver - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Total Nitrogen by Colourimetry	E366 Vancouver - Environmental	Water	APHA 4500-P J (mod)	Total Nitrogen 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.
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.
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.
Preparation for Total Organic Carbon by Combustion	EP355 Vancouver - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Digestion for Total Nitrogen in water	EP366 Vancouver - Environmental	Water	APHA 4500-P J (mod)	Samples are heated with a persulfate digestion reagent.

QUALITY CONTROL REPORT

Work Order	: **VA21A4846**	Page	: 1 of 14
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	: Forceman Facility F5 Sand Cyclone	Date Samples Received	: 16-Mar-2021 10:45
PO	: ----	Date Analysis Commenced	: 17-Mar-2021
C-O-C number	: ----	Issue Date	: 29-Mar-2021 14:44
Sampler	: HS		
Site	:		
Quote number	: Q62338		
No. of samples received	: 4		
No. of samples analysed	: 4		

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*
Gloria Chan	Lab 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	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: 164808)											
VA21A4846-001	F5 - Sand Cyclone	pH	----	E108	0.10	pH units	5.55	5.58	0.539%	4%	----
Physical Tests (QC Lot: 164809)											
VA21A4846-001	F5 - Sand Cyclone	conductivity	----	E100	2.0	µS/cm	2.2	2.2	0.03	Diff <2x LOR	----
Physical Tests (QC Lot: 164810)											
VA21A4846-001	F5 - Sand Cyclone	alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 164768)											
VA21A4846-001	F5 - Sand Cyclone	nitrogen, total	7727-37-9	E366	0.030	mg/L	0.141	0.140	0.001	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 164770)											
VA21A4846-001	F5 - Sand Cyclone	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0159	0.0162	0.0003	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 164811)											
VA21A4846-001	F5 - Sand Cyclone	sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	0.32	0.35	0.02	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 164812)											
VA21A4846-001	F5 - Sand Cyclone	chloride	16887-00-6	E235.Cl	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 164813)											
VA21A4846-001	F5 - Sand Cyclone	nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.0250	0.0298	0.0048	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 164814)											
VA21A4846-001	F5 - Sand Cyclone	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: 164815)											
VA21A4846-001	F5 - Sand Cyclone	fluoride	16984-48-8	E235.F	0.020	mg/L	<0.020	<0.020	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 164817)											
VA21A4846-001	F5 - Sand Cyclone	bromide	24959-67-9	E235.Br-L	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 164819)											
KS2100741-001	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	0.0015	0.0015	0.000006	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 168659)											
KS2100824-001	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	3.47	3.54	1.90%	20%	----
Organic / Inorganic Carbon (QC Lot: 164775)											
VA21A4846-001	F5 - Sand Cyclone	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	0.61	0.53	0.08	Diff <2x LOR	----
Total Metals (QC Lot: 165091)											
CG2100383-004	Anonymous	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0097	0.0107	0.0010	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	0.00019	0.00019	0.0000010	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00129	0.00132	2.04%	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: 165091) - continued											
CG2100383-004	Anonymous	barium, total	7440-39-3	E420	0.00010	mg/L	0.0140	0.0134	4.95%	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	0.058	0.058	0.0003	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0050	mg/L	0.273 µg/L	0.000264	3.37%	20%	----
		calcium, total	7440-70-2	E420	0.050	mg/L	321	320	0.465%	20%	----
		cesium, total	7440-46-2	E420	0.000010	mg/L	0.000107	0.000109	1.35%	20%	----
		cobalt, total	7440-48-4	E420	0.10	mg/L	26.6 µg/L	0.0270	1.17%	20%	----
		copper, total	7440-50-8	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	0.844	0.870	3.06%	20%	----
		lead, total	7439-92-1	E420	0.000050	mg/L	0.000118	0.000117	0.0000003	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	0.160	0.159	0.728%	20%	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	178	180	1.40%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.648	0.656	1.21%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.0144	0.0145	0.521%	20%	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	0.0908	0.0920	1.22%	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	7.40	7.48	1.10%	20%	----
		rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00794	0.00790	0.538%	20%	----
		selenium, total	7782-49-2	E420	0.050	mg/L	3.81 µg/L	0.00386	1.54%	20%	----
		silicon, total	7440-21-3	E420	0.10	mg/L	3.35	3.29	2.06%	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	30.9	31.5	1.94%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.612	0.611	0.0895%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	377	379	0.562%	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	0.000119	0.000118	0.604%	20%	----
		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	0.0170	0.0166	1.98%	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	0.0314	0.0318	1.10%	20%	----
		zirconium, total	7440-67-7	E420	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*
Total Metals (QC Lot: 165092)											
CG2100383-004	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: 165125)											
VA21A4809-004	Anonymous	mercury, total	7439-97-6	E508	0.0000050	mg/L	0.0000198	0.0000201	0.0000003	Diff <2x LOR	----
Aggregate Organics (QC Lot: 164912)											
VA21A4846-001	F5 - Sand Cyclone	biochemical oxygen demand [BOD]	----	E550	2.0	mg/L	<2.0	<2.0	0.00%	30%	----
Aggregate Organics (QC Lot: 166187)											
VA21A4846-001	F5 - Sand Cyclone	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: 164809)						
conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 164810)						
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Anions and Nutrients (QCLot: 164768)						
nitrogen, total	7727-37-9	E366	0.03	mg/L	<0.030	----
Anions and Nutrients (QCLot: 164770)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 164811)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 164812)						
chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 164813)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 164814)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 164815)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 164817)						
bromide	24959-67-9	E235.Br-L	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 164819)						
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 168659)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Organic / Inorganic Carbon (QCLot: 164775)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 165091)						
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	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 165091) - continued						
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: 165092)						
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	<0.00010	----
Total Metals (QCLot: 165125)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Aggregate Organics (QCLot: 164912)						

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Aggregate Organics (QCLot: 164912) - continued						
biochemical oxygen demand [BOD]	----	E550	2	mg/L	<2.0	----
Aggregate Organics (QCLot: 166187)						
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: 164808)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 164809)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	97.8	90.0	110	----
Physical Tests (QCLot: 164810)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	100	85.0	115	----
Anions and Nutrients (QCLot: 164768)									
nitrogen, total	7727-37-9	E366	0.03	mg/L	0.5 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 164770)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.12 mg/L	96.3	85.0	115	----
Anions and Nutrients (QCLot: 164811)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 164812)									
chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 164813)									
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: 164814)									
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: 164815)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 164817)									
bromide	24959-67-9	E235.Br-L	0.05	mg/L	0.5 mg/L	102	85.0	115	----
Anions and Nutrients (QCLot: 164819)									
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	98.4	80.0	120	----
Anions and Nutrients (QCLot: 168659)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	104	75.0	125	----
Organic / Inorganic Carbon (QCLot: 164775)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	99.3	80.0	120	----
Total Metals (QCLot: 165091)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	96.2	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	97.3	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: 165091) - continued									
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	103	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	93.8	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	103	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	87.2	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	95.8	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	97.0	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	96.1	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	95.2	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	93.6	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	99.1	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	97.4	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	97.8	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	93.4	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	103	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	96.8	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	97.4	80.0	120	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	97.9	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	95.2	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	95.6	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	97.8	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	107	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	95.2	80.0	120	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	92.3	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	96.0	80.0	120	----
thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	93.9	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	95.3	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	91.6	80.0	120	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	94.4	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	97.4	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	97.6	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	94.3	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	98.5	80.0	120	----
Total Metals (QCLot: 165092)									
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	0.25 mg/L	96.4	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: 165125)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	97.2	80.0	120	----
Aggregate Organics (QCLot: 164912)									
biochemical oxygen demand [BOD]	----	E550	2	mg/L	198 mg/L	103	85.0	115	----
Aggregate Organics (QCLot: 166187)									
chemical oxygen demand [COD]	----	E559	20	mg/L	750 mg/L	110	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: 164768)										
VA21A4846-002	DUP	nitrogen, total	7727-37-9	E366	0.389 mg/L	0.4 mg/L	97.3	70.0	130	----
Anions and Nutrients (QCLot: 164770)										
VA21A4846-002	DUP	ammonia, total (as N)	7664-41-7	E298	0.205 mg/L	0.2 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 164811)										
VA21A4846-002	DUP	sulfate (as SO4)	14808-79-8	E235.SO4	104 mg/L	100 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 164812)										
VA21A4846-002	DUP	chloride	16887-00-6	E235.Cl	102 mg/L	100 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 164813)										
VA21A4846-002	DUP	nitrate (as N)	14797-55-8	E235.NO3-L	2.55 mg/L	2.5 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 164814)										
VA21A4846-002	DUP	nitrite (as N)	14797-65-0	E235.NO2-L	0.508 mg/L	0.5 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 164815)										
VA21A4846-002	DUP	fluoride	16984-48-8	E235.F	1.03 mg/L	1 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 164817)										
VA21A4846-002	DUP	bromide	24959-67-9	E235.Br-L	0.509 mg/L	0.5 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 164819)										
VA21A4846-001	F5 - Sand Cyclone	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0340 mg/L	0.03 mg/L	113	70.0	130	----
Anions and Nutrients (QCLot: 168659)										
KS2100824-002	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	ND mg/L	2.5 mg/L	ND	70.0	130	----
Organic / Inorganic Carbon (QCLot: 164775)										
VA21A4846-002	DUP	carbon, total organic [TOC]	----	E355-L	4.84 mg/L	5 mg/L	96.8	70.0	130	----
Total Metals (QCLot: 165091)										
CG2100383-004	Anonymous	aluminum, total	7429-90-5	E420	0.220 mg/L	0.2 mg/L	110	70.0	130	----
		antimony, total	7440-36-0	E420	0.0209 mg/L	0.02 mg/L	104	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0222 mg/L	0.02 mg/L	111	70.0	130	----
		barium, total	7440-39-3	E420	0.0204 mg/L	0.02 mg/L	102	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0421 mg/L	0.04 mg/L	105	70.0	130	----
		bismuth, total	7440-69-9	E420	0.00849 mg/L	0.01 mg/L	84.9	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: 165091) - continued										
CG2100383-004	Anonymous	boron, total	7440-42-8	E420	0.094 mg/L	0.1 mg/L	93.7	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00385 mg/L	0.004 mg/L	96.3	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	0.0108 mg/L	0.01 mg/L	108	70.0	130	----
		cobalt, total	7440-48-4	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		copper, total	7440-50-8	E420	0.0181 mg/L	0.02 mg/L	90.6	70.0	130	----
		iron, total	7439-89-6	E420	2.11 mg/L	2 mg/L	106	70.0	130	----
		lead, total	7439-92-1	E420	0.0170 mg/L	0.02 mg/L	84.8	70.0	130	----
		lithium, total	7439-93-2	E420	ND mg/L	0.1 mg/L	ND	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	0.0224 mg/L	0.02 mg/L	112	70.0	130	----
		nickel, total	7440-02-0	E420	ND mg/L	0.04 mg/L	ND	70.0	130	----
		phosphorus, total	7723-14-0	E420	12.8 mg/L	10 mg/L	128	70.0	130	----
		potassium, total	7440-09-7	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		rubidium, total	7440-17-7	E420	0.0225 mg/L	0.02 mg/L	112	70.0	130	----
		selenium, total	7782-49-2	E420	0.0508 mg/L	0.04 mg/L	127	70.0	130	----
		silicon, total	7440-21-3	E420	10.8 mg/L	10 mg/L	108	70.0	130	----
		silver, total	7440-22-4	E420	0.00372 mg/L	0.004 mg/L	92.9	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	0.0374 mg/L	0.04 mg/L	93.6	70.0	130	----
		thallium, total	7440-28-0	E420	0.00345 mg/L	0.004 mg/L	86.2	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	0.0200 mg/L	0.02 mg/L	100	70.0	130	----
		titanium, total	7440-32-6	E420	0.0470 mg/L	0.04 mg/L	117	70.0	130	----
		tungsten, total	7440-33-7	E420	0.0189 mg/L	0.02 mg/L	94.7	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	0.116 mg/L	0.1 mg/L	116	70.0	130	----
		zinc, total	7440-66-6	E420	0.365 mg/L	0.4 mg/L	91.2	70.0	130	----
		zirconium, total	7440-67-7	E420	0.0456 mg/L	0.04 mg/L	114	70.0	130	----
Total Metals (QCLot: 165092)										
CG2100383-004	Anonymous	chromium, total	7440-47-3	E420.Cr-L	0.0443 mg/L	0.04 mg/L	111	70.0	130	----
Total Metals (QCLot: 165125)										
VA21A4809-005	Anonymous	mercury, total	7439-97-6	E508	0.0000973 mg/L	0.0001 mg/L	97.3	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
Aggregate Organics (QCLot: 166187)										
VA21A4846-002	DUP	chemical oxygen demand [COD]	----	E559	538 mg/L	500 mg/L	108	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:	250-641-4141
	Company address below will appear on the final report
Street:	4545 Lazelle Avenue
City/Province:	Terrace/BC
Postal Code:	V8G4E1
Invoice To	Same as Report To ☐ YES ☑ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	Regional District of Kitimat-Stikine
Contact:	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
Email 2	nveikle@rdks.bc.ca; mglover@rdks.bc.ca
Email 3	mhaley@rdks.bc.ca;
Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	anne-maries@rdks.bc.ca
Email 2	mhaley@rdks.bc.ca

Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)	
Regular [R]	☑ Standard TAT if received by 3 pm - business days - no surcharges apply
PRIORITY (Business Days)	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 #:	Forceman Facility F5 Sand Cyclone	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 and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Total Metals	Alkalinity / Conductivity	Chloride, Fluoride	Total Nitrogen	Sulphate	Hardness	Ammonia	Nitrate	Nitrite	TOC	Orthophosphorus	COD	BOD	pH	Total Kjeldahl Nitrogen	SAMPLES ON HOLD	Sample is hazardous (please provide further detail)	NUMBER OF CONTAINERS
					P						P			P		P			P			
	F5 - sand cyclone	15-03-21	10:54	Effluent	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			
	DUP	15-03-21	12:00	Effluent	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			
	Field Blank	15-03-21	11:04	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			
	Travel Blank	15-03-21	—	Water		R				R	R				R			R				

Environmental Division
Vancouver
Work Order Reference
VA21A4846

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			
4.7				8°C			

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Hannah Shinton	Date:	Time:	Received by: Chris	Date: 15 Mar 21	Time: 1300	Received by: JB	Date: 16/03/2021	Time: 1045

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	: **VA21A6678**	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	: Forceman Facility Sand Cyclone	Date Samples Received	: 10-Apr-2021 11:05
PO	: ----	Date Analysis Commenced	: 10-Apr-2021
C-O-C number	: ----	Issue Date	: 21-Apr-2021 11:00
Sampler	: H. Shinton		
Site	:		
Quote number	: Q62338		
No. of samples received	: 4		
No. of samples analysed	: 4		

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
Cindy Tang	Team Leader - Inorganics	Inorganics, Burnaby, British Columbia
David Stewart	Analyst - Chemistry	Inorganics, Burnaby, British Columbia
Dee Lee	Analyst	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	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*
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.*

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID: F5 - sand cyclone	DUP	----	----	----
					Client sampling date / time: 09-Apr-2021 12:23	09-Apr-2021 12:00	----	----	----
					VA21A6678-001	VA21A6678-002	--------	--------	--------
					Result	Result	----	----	----
Physical Tests									
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	531	533	----	----	----
conductivity	----	E100	2.0	µS/cm	1270	1270	----	----	----
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L	302	303	----	----	----
pH	----	E108	0.10	pH units	8.10	8.10	----	----	----
Anions and Nutrients									
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	35.3	37.1	----	----	----
chloride	16887-00-6	E235.Cl	0.50	mg/L	100	101	----	----	----
fluoride	16984-48-8	E235.F	0.020	mg/L	<0.100 DLDS	<0.100 DLDS	----	----	----
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	39.6	40.3	----	----	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	<0.0250 DLDS	0.0698	----	----	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0050 DLDS	0.0055	----	----	----
nitrogen, total	7727-37-9	E366	0.030	mg/L	41.5	41.4	----	----	----
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	0.136	0.0928	----	----	----
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	2.42	4.51	----	----	----
Organic / Inorganic Carbon									
carbon, total organic [TOC]	----	E355-L	0.50	mg/L	72.4	74.6	----	----	----
Total Metals									
aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0262	0.0267	----	----	----
antimony, total	7440-36-0	E420	0.00010	mg/L	0.00056	0.00057	----	----	----
arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00298	0.00306	----	----	----
barium, total	7440-39-3	E420	0.00010	mg/L	0.286	0.296	----	----	----
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	0.745	0.756	----	----	----
cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.000247	0.000253	----	----	----
calcium, total	7440-70-2	E420	0.050	mg/L	95.3	95.3	----	----	----
cesium, total	7440-46-2	E420	0.000010	mg/L	0.000603	0.000607	----	----	----
chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L	0.00207	0.00221	----	----	----
cobalt, total	7440-48-4	E420	0.00010	mg/L	0.00180	0.00186	----	----	----
copper, total	7440-50-8	E420	0.00050	mg/L	0.00599	0.00614	----	----	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID: F5 - sand cyclone	DUP	----	----	----
					Client sampling date / time: 09-Apr-2021 12:23	09-Apr-2021 12:00	----	----	----
					VA21A6678-001	VA21A6678-002	--------	--------	--------
					Result	Result	----	----	----
Total Metals									
iron, total	7439-89-6	E420	0.010	mg/L	3.82	3.88	----	----	----
lead, total	7439-92-1	E420	0.000050	mg/L	0.000381	0.000385	----	----	----
lithium, total	7439-93-2	E420	0.0010	mg/L	<0.0010	<0.0010	----	----	----
magnesium, total	7439-95-4	E420	0.0050	mg/L	15.5	15.8	----	----	----
manganese, total	7439-96-5	E420	0.00010	mg/L	5.81	5.98	----	----	----
mercury, total	7439-97-6	E508	0.0000050	mg/L	0.0000076	0.0000059	----	----	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000517	0.000528	----	----	----
nickel, total	7440-02-0	E420	0.00050	mg/L	0.00515	0.00519	----	----	----
phosphorus, total	7723-14-0	E420	0.050	mg/L	0.717	0.733	----	----	----
potassium, total	7440-09-7	E420	0.050	mg/L	41.6	43.0	----	----	----
rubidium, total	7440-17-7	E420	0.00020	mg/L	0.0438	0.0455	----	----	----
selenium, total	7782-49-2	E420	0.000050	mg/L	0.000112	0.000113	----	----	----
silicon, total	7440-21-3	E420	0.10	mg/L	2.44	2.48	----	----	----
silver, total	7440-22-4	E420	0.000010	mg/L	0.000010	0.000011	----	----	----
sodium, total	17341-25-2	E420	0.050	mg/L	95.0	96.6	----	----	----
strontium, total	7440-24-6	E420	0.00020	mg/L	0.467	0.476	----	----	----
sulfur, total	7704-34-9	E420	0.50	mg/L	1.76	2.00	----	----	----
tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	----	----	----
thallium, total	7440-28-0	E420	0.000010	mg/L	0.000033	0.000030	----	----	----
thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	----	----	----
tin, total	7440-31-5	E420	0.00010	mg/L	0.00012	0.00011	----	----	----
titanium, total	7440-32-6	E420	0.00030	mg/L	0.00214	0.00180	----	----	----
tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	----	----	----
uranium, total	7440-61-1	E420	0.000010	mg/L	0.000080	0.000079	----	----	----
vanadium, total	7440-62-2	E420	0.00050	mg/L	0.00155	0.00160	----	----	----
zinc, total	7440-66-6	E420	0.0030	mg/L	0.0352	0.0365	----	----	----
zirconium, total	7440-67-7	E420	0.00020	mg/L	0.00022	0.00021	----	----	----
Aggregate Organics									
biochemical oxygen demand [BOD]	----	E550	2.0	mg/L	96.7	94.3	----	----	----
chemical oxygen demand [COD]	----	E559	20	mg/L	233	304	----	----	----

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	09-Apr-2021 12:16	09-Apr-2021	----	----	----
						VA21A6678-003	VA21A6678-004	--------	--------	--------
						Result	Result	----	----	----
Physical Tests										
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		<1.0	<1.0	----	----	----
conductivity	----	E100	2.0	µS/cm		<2.0	<2.0	----	----	----
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L		<0.60	<0.60	----	----	----
pH	----	E108	0.10	pH units		5.93	5.65	----	----	----
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		<0.0050	<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	----	----	----	----
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	----	----	----	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		<0.0010	----	----	----	----
nitrogen, total	7727-37-9	E366	0.030	mg/L		<0.030	----	----	----	----
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L		<0.0010	<0.0010	----	----	----
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		<0.30	----	----	----	----
Organic / Inorganic Carbon										
carbon, total organic [TOC]	----	E355-L	0.50	mg/L		<0.50	----	----	----	----
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	<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	----	----	----	----

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	Field Blank	Travel Blank	----	----	----
					Client sampling date / time	09-Apr-2021 12:16	09-Apr-2021	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA21A6678-003	VA21A6678-004	--------	--------	--------
						Result	Result	----	----	----
Total Metals										
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	<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	----	----	----	----
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	: **VA21A6678**	Page	: 1 of 15
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	: Forceman Facility Sand Cyclone	Date Samples Received	: 10-Apr-2021 11:05
PO	: ----	Issue Date	: 21-Apr-2021 11:00
C-O-C number	: ----		
Sampler	: H. Shinton		
Site	:		
Quote number	: Q62338		
No. of samples received	: 4		
No. of samples analysed	: 4		

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 Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- Duplicate 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
Duplicate (DUP) RPDs								
Anions and Nutrients	Anonymous	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	25.1 % DUP-H	20%	Duplicate RPD does not meet the DQO for this test.

Result Qualifiers

Qualifier	Description
DUP-H	*Duplicate results outside ALS DQO, due to sample heterogeneity.*

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 : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT 3d]										
DUP	E550	09-Apr-2021	----	----	----		10-Apr-2021	3 days	0 days	✓
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT 3d]										
F5 - sand cyclone	E550	09-Apr-2021	----	----	----		10-Apr-2021	3 days	0 days	✓
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT 3d]										
Field Blank	E550	09-Apr-2021	----	----	----		10-Apr-2021	3 days	0 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
DUP	E559	09-Apr-2021	----	----	----		11-Apr-2021	28 days	1 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
F5 - sand cyclone	E559	09-Apr-2021	----	----	----		11-Apr-2021	28 days	1 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
Field Blank	E559	09-Apr-2021	----	----	----		11-Apr-2021	28 days	1 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
DUP	E298	09-Apr-2021	16-Apr-2021	28 days	7 days	✓	16-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 : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
F5 - sand cyclone	E298	09-Apr-2021	16-Apr-2021	28 days	7 days	✓	16-Apr-2021	20 days	0 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
Field Blank	E298	09-Apr-2021	16-Apr-2021	28 days	7 days	✓	16-Apr-2021	20 days	0 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
Travel Blank	E298	09-Apr-2021	16-Apr-2021	28 days	7 days	✓	16-Apr-2021	20 days	0 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
DUP	E235.Cl	09-Apr-2021	----	----	----		11-Apr-2021	28 days	1 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
F5 - sand cyclone	E235.Cl	09-Apr-2021	----	----	----		11-Apr-2021	28 days	1 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
Field Blank	E235.Cl	09-Apr-2021	----	----	----		11-Apr-2021	28 days	1 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE										
F5 - sand cyclone	E378-U	09-Apr-2021	----	----	----		11-Apr-2021	3 days	1 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE										
Field Blank	E378-U	09-Apr-2021	----	----	----		11-Apr-2021	3 days	1 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE										
DUP	E378-U	09-Apr-2021	----	----	----		11-Apr-2021	3 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times 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										
Travel Blank	E378-U	09-Apr-2021	----	----	----		11-Apr-2021	3 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
DUP	E235.F	09-Apr-2021	----	----	----		11-Apr-2021	28 days	1 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
F5 - sand cyclone	E235.F	09-Apr-2021	----	----	----		11-Apr-2021	28 days	1 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
Field Blank	E235.F	09-Apr-2021	----	----	----		11-Apr-2021	28 days	1 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
DUP	E235.NO3-L	09-Apr-2021	----	----	----		11-Apr-2021	3 days	1 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
F5 - sand cyclone	E235.NO3-L	09-Apr-2021	----	----	----		11-Apr-2021	3 days	1 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
Field Blank	E235.NO3-L	09-Apr-2021	----	----	----		11-Apr-2021	3 days	1 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
DUP	E235.NO2-L	09-Apr-2021	----	----	----		11-Apr-2021	3 days	1 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
F5 - sand cyclone	E235.NO2-L	09-Apr-2021	----	----	----		11-Apr-2021	3 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 : Nitrite in Water by IC (Low Level)										
HDPE										
Field Blank	E235.NO2-L	09-Apr-2021	----	----	----		11-Apr-2021	3 days	1 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
DUP	E235.SO4	09-Apr-2021	----	----	----		11-Apr-2021	28 days	1 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
F5 - sand cyclone	E235.SO4	09-Apr-2021	----	----	----		11-Apr-2021	28 days	1 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
Field Blank	E235.SO4	09-Apr-2021	----	----	----		11-Apr-2021	28 days	1 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
DUP	E318	09-Apr-2021	15-Apr-2021	28 days	6 days	✓	17-Apr-2021	21 days	1 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
F5 - sand cyclone	E318	09-Apr-2021	15-Apr-2021	28 days	6 days	✓	17-Apr-2021	21 days	1 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
Field Blank	E318	09-Apr-2021	15-Apr-2021	28 days	6 days	✓	17-Apr-2021	21 days	1 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
DUP	E366	09-Apr-2021	16-Apr-2021	28 days	7 days	✓	19-Apr-2021	20 days	2 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
F5 - sand cyclone	E366	09-Apr-2021	16-Apr-2021	28 days	7 days	✓	19-Apr-2021	20 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
Field Blank	E366	09-Apr-2021	16-Apr-2021	28 days	7 days	✓	19-Apr-2021	20 days	2 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
DUP	E355-L	09-Apr-2021	16-Apr-2021	28 days	7 days	✓	16-Apr-2021	20 days	0 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
F5 - sand cyclone	E355-L	09-Apr-2021	16-Apr-2021	28 days	7 days	✓	16-Apr-2021	20 days	0 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
Field Blank	E355-L	09-Apr-2021	16-Apr-2021	28 days	7 days	✓	16-Apr-2021	20 days	0 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
DUP	E290	09-Apr-2021	----	----	----		13-Apr-2021	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
F5 - sand cyclone	E290	09-Apr-2021	----	----	----		13-Apr-2021	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
Field Blank	E290	09-Apr-2021	----	----	----		13-Apr-2021	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
Travel Blank	E290	09-Apr-2021	----	----	----		13-Apr-2021	14 days	4 days	✓
Physical Tests : Conductivity in Water										
HDPE										
DUP	E100	09-Apr-2021	----	----	----		13-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
Physical Tests : Conductivity in Water										
HDPE F5 - sand cyclone	E100	09-Apr-2021	----	----	----		13-Apr-2021	28 days	3 days	✓
Physical Tests : Conductivity in Water										
HDPE Field Blank	E100	09-Apr-2021	----	----	----		13-Apr-2021	28 days	3 days	✓
Physical Tests : Conductivity in Water										
HDPE Travel Blank	E100	09-Apr-2021	----	----	----		13-Apr-2021	28 days	4 days	✓
Physical Tests : pH by Meter										
HDPE Travel Blank	E108	09-Apr-2021	----	----	----		13-Apr-2021	0.25 hrs	107 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE DUP	E108	09-Apr-2021	----	----	----		13-Apr-2021	0.25 hrs	95 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE F5 - sand cyclone	E108	09-Apr-2021	----	----	----		13-Apr-2021	0.25 hrs	95 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE Field Blank	E108	09-Apr-2021	----	----	----		13-Apr-2021	0.25 hrs	95 hrs	× EHTR-FM
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid) DUP	E420.Cr-L	09-Apr-2021	----	----	----		12-Apr-2021	180 days	3 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid) F5 - sand cyclone	E420.Cr-L	09-Apr-2021	----	----	----		12-Apr-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
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid) Field Blank	E420.Cr-L	09-Apr-2021	----	----	----		12-Apr-2021	180 days	3 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) DUP	E508	09-Apr-2021	----	----	----		15-Apr-2021	28 days	5 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) F5 - sand cyclone	E508	09-Apr-2021	----	----	----		15-Apr-2021	28 days	5 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) Field Blank	E508	09-Apr-2021	----	----	----		15-Apr-2021	28 days	5 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) DUP	E420	09-Apr-2021	----	----	----		12-Apr-2021	180 days	3 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) F5 - sand cyclone	E420	09-Apr-2021	----	----	----		12-Apr-2021	180 days	3 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) Field Blank	E420	09-Apr-2021	----	----	----		12-Apr-2021	180 days	3 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) Travel Blank	E420	09-Apr-2021	----	----	----		12-Apr-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	176808	2	24	8.3	5.0	✓
Ammonia by Fluorescence	E298	180043	1	14	7.1	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	176736	1	10	10.0	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	176852	1	13	7.6	5.0	✓
Chloride in Water by IC	E235.Cl	176812	1	13	7.6	5.0	✓
Conductivity in Water	E100	176809	2	25	8.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	176818	2	21	9.5	5.0	✓
Fluoride in Water by IC	E235.F	176811	1	13	7.6	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	176814	1	11	9.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	176815	1	13	7.6	5.0	✓
pH by Meter	E108	176807	2	29	6.9	5.0	✓
Sulfate in Water by IC	E235.SO4	176816	1	13	7.6	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	176863	1	16	6.2	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	179684	1	5	20.0	5.0	✓
Total Mercury in Water by CVAAS	E508	179292	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	176862	1	20	5.0	5.0	✓
Total Nitrogen by Colourimetry	E366	180044	1	7	14.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	180042	1	13	7.6	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	176808	2	24	8.3	5.0	✓
Ammonia by Fluorescence	E298	180043	1	14	7.1	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	176736	1	10	10.0	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	176852	1	13	7.6	5.0	✓
Chloride in Water by IC	E235.Cl	176812	1	13	7.6	5.0	✓
Conductivity in Water	E100	176809	2	25	8.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	176818	2	21	9.5	5.0	✓
Fluoride in Water by IC	E235.F	176811	1	13	7.6	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	176814	1	11	9.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	176815	1	13	7.6	5.0	✓
pH by Meter	E108	176807	2	29	6.9	5.0	✓
Sulfate in Water by IC	E235.SO4	176816	1	13	7.6	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	176863	1	16	6.2	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	179684	1	5	20.0	5.0	✓
Total Mercury in Water by CVAAS	E508	179292	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	176862	1	20	5.0	5.0	✓
Total Nitrogen by Colourimetry	E366	180044	1	7	14.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	180042	1	13	7.6	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)							
Alkalinity Species by Titration	E290	176808	2	24	8.3	5.0	✓
Ammonia by Fluorescence	E298	180043	1	14	7.1	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	176736	1	10	10.0	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	176852	1	13	7.6	5.0	✓
Chloride in Water by IC	E235.Cl	176812	1	13	7.6	5.0	✓
Conductivity in Water	E100	176809	2	25	8.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	176818	2	21	9.5	5.0	✓
Fluoride in Water by IC	E235.F	176811	1	13	7.6	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	176814	1	11	9.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	176815	1	13	7.6	5.0	✓
Sulfate in Water by IC	E235.SO4	176816	1	13	7.6	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	176863	1	16	6.2	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	179684	1	5	20.0	5.0	✓
Total Mercury in Water by CVAAS	E508	179292	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	176862	1	20	5.0	5.0	✓
Total Nitrogen by Colourimetry	E366	180044	1	7	14.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	180042	1	13	7.6	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	180043	1	14	7.1	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	176852	1	13	7.6	5.0	✓
Chloride in Water by IC	E235.Cl	176812	1	13	7.6	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	176818	2	21	9.5	5.0	✓
Fluoride in Water by IC	E235.F	176811	1	13	7.6	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	176814	1	11	9.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	176815	1	13	7.6	5.0	✓
Sulfate in Water by IC	E235.SO4	176816	1	13	7.6	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	176863	1	16	6.2	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	179684	1	5	20.0	5.0	✓
Total Mercury in Water by CVAAS	E508	179292	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	176862	1	20	5.0	5.0	✓
Total Nitrogen by Colourimetry	E366	180044	1	7	14.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	180042	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.
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).
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.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Vancouver - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Total Nitrogen by Colourimetry	E366 Vancouver - Environmental	Water	APHA 4500-P J (mod)	Total Nitrogen 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.
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.
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 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.
Preparation for Total Organic Carbon by Combustion	EP355 Vancouver - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Digestion for Total Nitrogen in water	EP366 Vancouver - Environmental	Water	APHA 4500-P J (mod)	Samples are heated with a persulfate digestion reagent.

QUALITY CONTROL REPORT

Work Order	: **VA21A6678**	Page	: 1 of 14
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	: Forceman Facility Sand Cyclone	Date Samples Received	: 10-Apr-2021 11:05
PO	: ----	Date Analysis Commenced	: 10-Apr-2021
C-O-C number	: ----	Issue Date	: 21-Apr-2021 11:00
Sampler	: H. Shinton		
Site	:		
Quote number	: Q62338		
No. of samples received	: 4		
No. of samples analysed	: 4		

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
Cindy Tang	Team Leader - Inorganics	Inorganics, Burnaby, British Columbia
David Stewart	Analyst - Chemistry	Inorganics, Burnaby, British Columbia
Dee Lee	Analyst	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	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: 176807)											
VA21A6637-004	Anonymous	pH	----	E108	0.10	pH units	8.37	8.37	0.00%	4%	----
Physical Tests (QC Lot: 176808)											
VA21A6637-004	Anonymous	alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	197	200	1.56%	20%	----
Physical Tests (QC Lot: 176809)											
VA21A6637-004	Anonymous	conductivity	----	E100	2.0	µS/cm	401	403	0.498%	10%	----
Physical Tests (QC Lot: 176837)											
VA21A6519-003	Anonymous	pH	----	E108	0.10	pH units	7.19	7.20	0.139%	4%	----
Physical Tests (QC Lot: 176838)											
VA21A6519-003	Anonymous	alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	10.0	10.3	2.96%	20%	----
Physical Tests (QC Lot: 176839)											
VA21A6519-003	Anonymous	conductivity	----	E100	2.0	µS/cm	39.3	39.0	0.3	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 176811)											
VA21A6637-004	Anonymous	fluoride	16984-48-8	E235.F	0.020	mg/L	0.108	0.106	0.002	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 176812)											
VA21A6637-004	Anonymous	chloride	16887-00-6	E235.Cl	0.50	mg/L	8.88	8.87	0.0766%	20%	----
Anions and Nutrients (QC Lot: 176814)											
VA21A6637-004	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.0081	0.0081	0.00002	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 176815)											
VA21A6637-004	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	0.0013	0.0012	0.00008	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 176816)											
VA21A6637-004	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	13.0	13.0	0.241%	20%	----
Anions and Nutrients (QC Lot: 176818)											
VA21A6637-004	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	0.0192	0.0192	0.0656%	20%	----
Anions and Nutrients (QC Lot: 176847)											
VA21A6519-001	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: 179684)											
VA21A6671-001	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	0.613	0.476	25.1%	20%	DUP-H
Anions and Nutrients (QC Lot: 180043)											
VA21A6678-001	F5 - sand cyclone	ammonia, total (as N)	7664-41-7	E298	0.250	mg/L	35.3	33.0	6.74%	20%	----
Anions and Nutrients (QC Lot: 180044)											
VA21A6678-001	F5 - sand cyclone	nitrogen, total	7727-37-9	E366	1.50	mg/L	41.5	41.3	0.489%	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*
Organic / Inorganic Carbon (QC Lot: 180042)											
VA21A6678-001	F5 - sand cyclone	carbon, total organic [TOC]	----	E355-L	2.50	mg/L	72.4	73.2	1.16%	20%	----
Total Metals (QC Lot: 176862)											
CG2100737-011	Anonymous	aluminum, total	7429-90-5	E420	0.0060	mg/L	<0.0060	<0.0060	0	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00020	mg/L	0.00107	0.00108	0.000005	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00020	mg/L	0.0112	0.0114	2.40%	20%	----
		beryllium, total	7440-41-7	E420	0.040	mg/L	<0.040 µg/L	<0.000040	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.020	mg/L	0.064	0.054	0.009	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0100	mg/L	0.271 µg/L	0.000244	10.4%	20%	----
		calcium, total	7440-70-2	E420	0.100	mg/L	275	267	2.95%	20%	----
		cesium, total	7440-46-2	E420	0.000020	mg/L	0.000087	0.000089	0.000002	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.20	mg/L	21.5 µg/L	0.0217	0.568%	20%	----
		copper, total	7440-50-8	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.020	mg/L	0.670	0.664	0.867%	20%	----
		lead, total	7439-92-1	E420	0.000100	mg/L	0.000176	0.000190	0.000014	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0020	mg/L	0.118	0.117	0.611%	20%	----
		magnesium, total	7439-95-4	E420	0.0100	mg/L	159	162	1.58%	20%	----
		manganese, total	7439-96-5	E420	0.00020	mg/L	0.610	0.628	2.98%	20%	----
		molybdenum, total	7439-98-7	E420	0.000100	mg/L	0.00471	0.00462	1.92%	20%	----
		nickel, total	7440-02-0	E420	0.00100	mg/L	0.0727	0.0738	1.40%	20%	----
		phosphorus, total	7723-14-0	E420	0.100	mg/L	<0.100	<0.100	0	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.100	mg/L	6.12	6.20	1.25%	20%	----
		rubidium, total	7440-17-7	E420	0.00040	mg/L	0.00622	0.00609	2.12%	20%	----
		selenium, total	7782-49-2	E420	0.100	mg/L	1.10 µg/L	0.000992	10.1%	20%	----
		silicon, total	7440-21-3	E420	0.20	mg/L	2.81	2.75	2.06%	20%	----
		silver, total	7440-22-4	E420	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		sodium, total	17341-25-2	E420	0.100	mg/L	20.5	20.8	1.36%	20%	----
		strontium, total	7440-24-6	E420	0.00040	mg/L	0.539	0.536	0.635%	20%	----
		sulfur, total	7704-34-9	E420	1.00	mg/L	298	290	2.66%	20%	----
		tellurium, total	13494-80-9	E420	0.00040	mg/L	<0.00040	<0.00040	0	Diff <2x LOR	----
		thallium, total	7440-28-0	E420	0.000020	mg/L	0.000101	0.000100	0.000001	Diff <2x LOR	----
		thorium, total	7440-29-1	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00060	mg/L	<0.00060	<0.00060	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: 176862) - continued											
CG2100737-011	Anonymous	tungsten, total	7440-33-7	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000020	mg/L	0.0157	0.0154	2.18%	20%	----
		vanadium, total	7440-62-2	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0060	mg/L	0.0286	0.0287	0.00009	Diff <2x LOR	----
		zirconium, total	7440-67-7	E420	0.00040	mg/L	<0.00040	<0.00040	0	Diff <2x LOR	----
Total Metals (QC Lot: 176863)											
CG2100737-011	Anonymous	chromium, total	7440-47-3	E420.Cr-L	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
Total Metals (QC Lot: 179292)											
CG2100756-001	Anonymous	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Aggregate Organics (QC Lot: 176736)											
VA21A6678-003	Field Blank	biochemical oxygen demand [BOD]	----	E550	2.0	mg/L	<2.0	<2.0	0.00%	30%	----
Aggregate Organics (QC Lot: 176852)											
VA21A6543-002	Anonymous	chemical oxygen demand [COD]	----	E559	20	mg/L	26	24	2	Diff <2x LOR	----

Qualifiers

Qualifier	*Description*
DUP-H	*Duplicate results outside ALS DQO, due to sample heterogeneity.*

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: 176808)						
alkalinity, total (as CaCO3)	----	E290	1	mg/L	1.1	----
Physical Tests (QCLot: 176809)						
conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 176838)						
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 176839)						
conductivity	----	E100	1	µS/cm	<1.0	----
Anions and Nutrients (QCLot: 176811)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 176812)						
chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 176814)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 176815)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 176816)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 176818)						
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 176847)						
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 179684)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 180043)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 180044)						
nitrogen, total	7727-37-9	E366	0.03	mg/L	<0.030	----
Organic / Inorganic Carbon (QCLot: 180042)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 176862)						
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: 176862) - continued						
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	<0.00020	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	17341-25-2	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	<0.00020	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
thorium, total	7440-29-1	E420	0.0001	mg/L	<0.00010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----
Total Metals (QCLot: 176863)						

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 176863) - continued						
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	<0.00010	----
Total Metals (QCLot: 179292)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Aggregate Organics (QCLot: 176736)						
biochemical oxygen demand [BOD]	----	E550	2	mg/L	<2.0	----
Aggregate Organics (QCLot: 176852)						
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: 176807)									
pH	----	E108	----	pH units	7 pH units	99.8	98.0	102	----
Physical Tests (QCLot: 176808)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	101	85.0	115	----
Physical Tests (QCLot: 176809)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	101	90.0	110	----
Physical Tests (QCLot: 176837)									
pH	----	E108	----	pH units	7 pH units	99.8	98.0	102	----
Physical Tests (QCLot: 176838)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	102	85.0	115	----
Physical Tests (QCLot: 176839)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	102	90.0	110	----
Anions and Nutrients (QCLot: 176811)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	98.7	90.0	110	----
Anions and Nutrients (QCLot: 176812)									
chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	104	90.0	110	----
Anions and Nutrients (QCLot: 176814)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	104	90.0	110	----
Anions and Nutrients (QCLot: 176815)									
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: 176816)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	106	90.0	110	----
Anions and Nutrients (QCLot: 176818)									
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	100	80.0	120	----
Anions and Nutrients (QCLot: 176847)									
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	99.9	80.0	120	----
Anions and Nutrients (QCLot: 179684)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	91.7	75.0	125	----
Anions and Nutrients (QCLot: 180043)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	101	85.0	115	----
Anions and Nutrients (QCLot: 180044)									
nitrogen, total	7727-37-9	E366	0.03	mg/L	0.5 mg/L	102	75.0	125	----

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
Organic / Inorganic Carbon (QCLot: 180042)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	108	80.0	120	----
Total Metals (QCLot: 176862)									
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	97.5	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	93.5	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	89.8	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	91.8	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	92.8	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	88.8	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	92.9	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	94.8	80.0	120	----
cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	94.2	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	93.6	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	92.6	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	93.0	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	94.2	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	93.9	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	99.9	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	95.2	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	95.4	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	93.3	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	99.6	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	96.1	80.0	120	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	94.0	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	93.8	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	91.1	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	93.4	80.0	120	----
sodium, total	17341-25-2	E420	0.05	mg/L	50 mg/L	102	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	95.5	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	86.3	80.0	120	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	95.3	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	94.7	80.0	120	----
thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	88.4	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	93.9	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	97.5	80.0	120	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	89.4	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	92.6	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: 176862) - continued									
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	93.7	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	95.1	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	89.3	80.0	120	----
Total Metals (QCLot: 176863)									
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	0.25 mg/L	93.6	80.0	120	----
Total Metals (QCLot: 179292)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	101	80.0	120	----
Aggregate Organics (QCLot: 176736)									
biochemical oxygen demand [BOD]	----	E550	2	mg/L	198 mg/L	92.6	85.0	115	----
Aggregate Organics (QCLot: 176852)									
chemical oxygen demand [COD]	----	E559	20	mg/L	750 mg/L	99.4	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: 176811)										
VA21A6644-001	Anonymous	fluoride	16984-48-8	E235.F	21.4 mg/L	20 mg/L	107	75.0	125	----
Anions and Nutrients (QCLot: 176812)										
VA21A6644-001	Anonymous	chloride	16887-00-6	E235.Cl	2080 mg/L	2000 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 176814)										
VA21A6644-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	ND mg/L	50 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 176815)										
VA21A6644-001	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	ND mg/L	10 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 176816)										
VA21A6644-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	2120 mg/L	2000 mg/L	106	75.0	125	----
Anions and Nutrients (QCLot: 176818)										
VA21A6644-001	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.313 mg/L	0.3 mg/L	104	70.0	130	----
Anions and Nutrients (QCLot: 176847)										
VA21A6519-002	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0295 mg/L	0.03 mg/L	98.3	70.0	130	----
Anions and Nutrients (QCLot: 179684)										
VA21A6678-001	F5 - sand cyclone	Kjeldahl nitrogen, total [TKN]	----	E318	59.7 mg/L	2.5 mg/L	95.5	70.0	130	----
Anions and Nutrients (QCLot: 180043)										
VA21A6678-002	DUP	ammonia, total (as N)	7664-41-7	E298	37.2 mg/L	40 mg/L	93.0	75.0	125	----
Anions and Nutrients (QCLot: 180044)										
VA21A6678-002	DUP	nitrogen, total	7727-37-9	E366	ND mg/L	20 mg/L	ND	70.0	130	----
Organic / Inorganic Carbon (QCLot: 180042)										
VA21A6678-002	DUP	carbon, total organic [TOC]	----	E355-L	ND mg/L	5 mg/L	ND	70.0	130	----
Total Metals (QCLot: 176862)										
CG2100737-011	Anonymous	aluminum, total	7429-90-5	E420	0.366 mg/L	0.4 mg/L	91.6	70.0	130	----
		antimony, total	7440-36-0	E420	0.0352 mg/L	0.04 mg/L	88.1	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0366 mg/L	0.04 mg/L	91.6	70.0	130	----
		barium, total	7440-39-3	E420	0.0340 mg/L	0.04 mg/L	85.1	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0719 mg/L	0.08 mg/L	89.8	70.0	130	----
		bismuth, total	7440-69-9	E420	0.0168 mg/L	0.02 mg/L	83.8	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: 176862) - continued										
CG2100737-011	Anonymous	boron, total	7440-42-8	E420	0.165 mg/L	0.2 mg/L	82.7	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00686 mg/L	0.008 mg/L	85.7	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	0.0182 mg/L	0.02 mg/L	91.1	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0335 mg/L	0.04 mg/L	83.8	70.0	130	----
		copper, total	7440-50-8	E420	0.0344 mg/L	0.04 mg/L	86.0	70.0	130	----
		iron, total	7439-89-6	E420	3.32 mg/L	4 mg/L	83.1	70.0	130	----
		lead, total	7439-92-1	E420	0.0338 mg/L	0.04 mg/L	84.4	70.0	130	----
		lithium, total	7439-93-2	E420	0.177 mg/L	0.2 mg/L	88.4	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	0.0365 mg/L	0.04 mg/L	91.3	70.0	130	----
		nickel, total	7440-02-0	E420	0.0641 mg/L	0.08 mg/L	80.1	70.0	130	----
		phosphorus, total	7723-14-0	E420	19.1 mg/L	20 mg/L	95.3	70.0	130	----
		potassium, total	7440-09-7	E420	7.11 mg/L	8 mg/L	88.9	70.0	130	----
		rubidium, total	7440-17-7	E420	0.0356 mg/L	0.04 mg/L	89.1	70.0	130	----
		selenium, total	7782-49-2	E420	0.0726 mg/L	0.08 mg/L	90.7	70.0	130	----
		silicon, total	7440-21-3	E420	15.8 mg/L	20 mg/L	79.3	70.0	130	----
		silver, total	7440-22-4	E420	0.00694 mg/L	0.008 mg/L	86.7	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	0.0733 mg/L	0.08 mg/L	91.6	70.0	130	----
		thallium, total	7440-28-0	E420	0.00679 mg/L	0.008 mg/L	84.9	70.0	130	----
		thorium, total	7440-29-1	E420	0.0374 mg/L	0.04 mg/L	93.6	70.0	130	----
		tin, total	7440-31-5	E420	0.0359 mg/L	0.04 mg/L	89.8	70.0	130	----
		titanium, total	7440-32-6	E420	0.0774 mg/L	0.08 mg/L	96.7	70.0	130	----
		tungsten, total	7440-33-7	E420	0.0348 mg/L	0.04 mg/L	86.9	70.0	130	----
		uranium, total	7440-61-1	E420	ND mg/L	0.008 mg/L	ND	70.0	130	----
		vanadium, total	7440-62-2	E420	0.186 mg/L	0.2 mg/L	92.9	70.0	130	----
		zinc, total	7440-66-6	E420	0.712 mg/L	0.8 mg/L	89.0	70.0	130	----
		zirconium, total	7440-67-7	E420	0.0759 mg/L	0.08 mg/L	94.9	70.0	130	----
Total Metals (QCLot: 176863)										
CG2100737-011	Anonymous	chromium, total	7440-47-3	E420.Cr-L	0.0740 mg/L	0.08 mg/L	92.4	70.0	130	----
Total Metals (QCLot: 179292)										
CG2100756-002	Anonymous	mercury, total	7439-97-6	E508	0.000115 mg/L	0.0001 mg/L	115	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: 176852)										
VA21A6543-003	Anonymous	chemical oxygen demand [COD]	----	E559	533 mg/L	500 mg/L	106	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:	250-641-4141
	Company address below will appear on the final report
Street:	4545 Lazelle Avenue
City/Province:	Terrace/BC
Postal Code:	V8G4E1
Invoice To	Same as Report To ☐ YES ☑ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	Regional District of Kitimat-Stikine
Contact:	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
Email 2	nveikle@rdks.bc.ca;
Email 3	mhaley@rdks.bc.ca; 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

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 #:	Forceman Facility Sand Cyclone
PO / AFE:	
LSD:	

Oil and Gas Required Fields (client use)

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

ALS Lab Work Order # (lab use only):

ALS Contact:

Sampler: H.Shinton

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	Total Metals (P)	Alkalinity / Conductivity	Chloride, Fluoride	Total Nitrogen	Sulphate (P)	Hardness	Ammonia (P)	Nitrate	Nitrite (P)	TOC (P)	Orthophosphorus	COD (P)	BOD	pH	Total Kjeldahl Nitrogen (P)	SAMPLES ON HOLD	Sample is hazardous (please provide further detail)	NUMBER OF CONTAINERS
	F5 - sand cyclone	09-Apr-21	12:25	Effluent	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			
	DUP	09-Apr-21	12:00	Effluent	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			
	Field Blank	09-Apr-21	12:18	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			
	Travel Blank	09-Apr-21	—	Water		R				R	R				R			R				

Environmental Division Vancouver
Work Order Reference
VA21A6678

Telephone : +1 604 253 4188

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

...ify 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			
6.6				3.4			

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
Hannah Shinton	April 9, 2021	

INITIAL SHIPMENT RECEPTION (lab use only)

Received by:	Date:	Time:
Chris	9 Apr 21	1415

FINAL SHIPMENT RECEPTION (lab use only)

Received by:	Date:	Time:
JG	11 APRil	12:05

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	: **VA21A7964**	Page	: 1 of 4
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	: Forceman Soil-Phyto-Remediation	Date Samples Received	: 28-Apr-2021 13:44
PO	: ----	Date Analysis Commenced	: 04-May-2021
C-O-C number	: ----	Issue Date	: 05-May-2021 18:09
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*
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	Inorganics, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	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*
%	percent
mg/kg	milligrams per kilogram
mg/L	milligrams per litre
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

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

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

Analytical Results

Sub-Matrix: **Soil**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	Phytoremediation	DUP	----	----	----
					Client sampling date / time	27-Apr-2021 11:00	27-Apr-2021 12:00	----	----	----
						VA21A7964-001	VA21A7964-002	--------	--------	--------
						Result	Result	----	----	----
Physical Tests										
% saturation	----	E141	1.0	%		68.9	68.2	----	----	----
pH (1:2 soil:water)	----	E108	0.10	pH units		6.03	6.02	----	----	----
Saturated Paste Extractables										
chloride, soluble ion content	16887-00-6	EC239A.Cl	1.0	mg/kg		<13.8	<13.6	----	----	----
chloride, soluble ion content	16887-00-6	E239.Cl	2.0	mg/L		<20.0	<20.0	----	----	----
sodium, soluble ion content	17341-25-2	EC442	1.00	mg/kg		4.00	3.68	----	----	----
sodium, soluble ion content	17341-25-2	E442	2.0	mg/L		5.8	5.4	----	----	----
Metals										
aluminum	7429-90-5	E440	50	mg/kg		35800	29800	----	----	----
antimony	7440-36-0	E440	0.10	mg/kg		0.43	0.36	----	----	----
arsenic	7440-38-2	E440	0.10	mg/kg		6.76	6.05	----	----	----
barium	7440-39-3	E440	0.50	mg/kg		59.4	53.6	----	----	----
beryllium	7440-41-7	E440	0.10	mg/kg		0.38	0.33	----	----	----
bismuth	7440-69-9	E440	0.20	mg/kg		<0.20	<0.20	----	----	----
boron	7440-42-8	E440	5.0	mg/kg		<5.0	<5.0	----	----	----
cadmium	7440-43-9	E440	0.020	mg/kg		0.073	0.061	----	----	----
calcium	7440-70-2	E440	50	mg/kg		2410	2180	----	----	----
chromium	7440-47-3	E440	0.50	mg/kg		32.8	27.4	----	----	----
cobalt	7440-48-4	E440	0.10	mg/kg		8.80	7.63	----	----	----
copper	7440-50-8	E440	0.50	mg/kg		25.3	20.1	----	----	----
iron	7439-89-6	E440	50	mg/kg		44600	38800	----	----	----
lead	7439-92-1	E440	0.50	mg/kg		7.02	6.34	----	----	----
lithium	7439-93-2	E440	2.0	mg/kg		14.2	13.3	----	----	----
magnesium	7439-95-4	E440	20	mg/kg		6380	5650	----	----	----
manganese	7439-96-5	E440	1.0	mg/kg		588	518	----	----	----
mercury	7439-97-6	E510	0.0500	mg/kg		0.0567	0.0522	----	----	----
molybdenum	7439-98-7	E440	0.10	mg/kg		0.93	0.77	----	----	----
nickel	7440-02-0	E440	0.50	mg/kg		18.8	16.4	----	----	----
phosphorus	7723-14-0	E440	50	mg/kg		1270	986	----	----	----
potassium	7440-09-7	E440	100	mg/kg		750	690	----	----	----

Analytical Results

Sub-Matrix: **Soil**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID: Phytoremediation	Client sample ID: DUP	Client sample ID: ----	Client sample ID: ----	Client sample ID: ----
					Client sampling date / time: 27-Apr-2021 11:00	Client sampling date / time: 27-Apr-2021 12:00	----	----	----
					VA21A7964-001	VA21A7964-002	--------	--------	--------
					Result	Result	----	----	----
Metals									
selenium	7782-49-2	E440	0.20	mg/kg	0.34	0.30	----	----	----
silver	7440-22-4	E440	0.10	mg/kg	0.14	0.13	----	----	----
sodium	7440-23-5	E440	50	mg/kg	115	92	----	----	----
strontium	7440-24-6	E440	0.50	mg/kg	21.0	18.8	----	----	----
sulfur	7704-34-9	E440	1000	mg/kg	<1000	<1000	----	----	----
thallium	7440-28-0	E440	0.050	mg/kg	0.070	0.061	----	----	----
tin	7440-31-5	E440	2.0	mg/kg	<2.0	<2.0	----	----	----
titanium	7440-32-6	E440	1.0	mg/kg	1190	975	----	----	----
tungsten	7440-33-7	E440	0.50	mg/kg	<0.50	<0.50	----	----	----
uranium	7440-61-1	E440	0.050	mg/kg	0.500	0.445	----	----	----
vanadium	7440-62-2	E440	0.20	mg/kg	96.0	79.5	----	----	----
zinc	7440-66-6	E440	2.0	mg/kg	73.5	63.4	----	----	----
zirconium	7440-67-7	E440	1.0	mg/kg	12.2	10.6	----	----	----

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA21A7964**	Page	: 1 of 6
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	: Forceman Soil-Phyto-Remediation	Date Samples Received	: 28-Apr-2021 13:44
PO	: ----	Issue Date	: 05-May-2021 18:09
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 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)

- No Analysis Holding Time Outliers exist.

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: **Soil/Solid**

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
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag DUP	E510	27-Apr-2021	05-May-2021	----	8 days	✓	05-May-2021	28 days	1 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag Phytoremediation	E510	27-Apr-2021	05-May-2021	----	8 days	✓	05-May-2021	28 days	1 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag DUP	E440	27-Apr-2021	05-May-2021	----	8 days	✓	05-May-2021	180 days	1 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag Phytoremediation	E440	27-Apr-2021	05-May-2021	----	8 days	✓	05-May-2021	180 days	1 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag DUP	E108	27-Apr-2021	05-May-2021	----	8 days	✓	05-May-2021	30 days	1 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag Phytoremediation	E108	27-Apr-2021	05-May-2021	----	8 days	✓	05-May-2021	30 days	1 days	✓
Physical Tests : Saturation Percentage										
LDPE bag DUP	E141	27-Apr-2021	----	----	----		04-May-2021	28 days	8 days	✓

Matrix: **Soil/Solid**

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 : Saturation Percentage										
LDPE bag Phytoremediation	E141	27-Apr-2021	----	----	----		04-May-2021	28 days	8 days	✓
Saturated Paste Extractables : Ca, K, Mg, and Na by CRC ICPMS (Saturated Paste, mg/L)										
LDPE bag DUP	E442	27-Apr-2021	----	----	----		04-May-2021	365 days	8 days	✓
Saturated Paste Extractables : Ca, K, Mg, and Na by CRC ICPMS (Saturated Paste, mg/L)										
LDPE bag Phytoremediation	E442	27-Apr-2021	----	----	----		04-May-2021	365 days	8 days	✓
Saturated Paste Extractables : Chloride by IC (Saturated Paste)										
LDPE bag DUP	E239.Cl	27-Apr-2021	----	----	----		05-May-2021	365 days	8 days	✓
Saturated Paste Extractables : Chloride by IC (Saturated Paste)										
LDPE bag Phytoremediation	E239.Cl	27-Apr-2021	----	----	----		05-May-2021	365 days	8 days	✓

Legend & Qualifier Definitions

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: **Soil/Solid**

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)							
Ca, K, Mg, and Na by CRC ICPMS (Saturated Paste, mg/L)	E442	190401	1	8	12.5	5.0	✓
Chloride by IC (Saturated Paste)	E239.Cl	190399	1	8	12.5	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	190404	1	7	14.2	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	190405	1	7	14.2	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	190406	1	7	14.2	5.0	✓
Saturation Percentage	E141	190400	1	8	12.5	5.0	✓
Laboratory Control Samples (LCS)							
Ca, K, Mg, and Na by CRC ICPMS (Saturated Paste, mg/L)	E442	190401	2	8	25.0	10.0	✓
Chloride by IC (Saturated Paste)	E239.Cl	190399	2	8	25.0	10.0	✓
Mercury in Soil/Solid by CVAAS	E510	190404	2	7	28.5	10.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	190405	2	7	28.5	10.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	190406	1	7	14.2	5.0	✓
Saturation Percentage	E141	190400	2	8	25.0	10.0	✓
Method Blanks (MB)							
Ca, K, Mg, and Na by CRC ICPMS (Saturated Paste, mg/L)	E442	190401	1	8	12.5	5.0	✓
Chloride by IC (Saturated Paste)	E239.Cl	190399	1	8	12.5	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	190404	1	7	14.2	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	190405	1	7	14.2	5.0	✓
Saturation Percentage	E141	190400	1	8	12.5	5.0	✓

Methodology References and Summaries

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

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
pH by Meter (1:2 Soil:Water Extraction)	E108 Vancouver - Environmental	Soil/Solid	BC Lab Manual	pH is determined by potentiometric measurement with a pH electrode at ambient laboratory temperature (normally 20 ± 5°C), and is carried out in accordance with procedures described in the BC Lab Manual (prescriptive method). The procedure involves mixing the dried (at <60 ºC) and sieved (10mesh/2mm) sample with ultra pure water at a 1:2 ratio of sediment to water. The pH is then measured by a standard pH probe.
Saturation Percentage	E141 Vancouver - Environmental	Soil/Solid	CSSS Ch. 18 (mod)/AER D50	Saturation Percentage (SP) is determined as the total volume of water present in a saturated paste (in mL) divided by the dry weight of the sample (in grams), expressed as a percentage.
Chloride by IC (Saturated Paste)	E239.Cl Vancouver - Environmental	Soil/Solid	CSSS Ch. 15 (mod)/EPA 300.1 (mod)	Inorganic anions are analyzed by obtaining a soil extract produced by the saturated paste extraction procedure which is then analyzed by Ion Chromatography with conductivity and/or UV detection.
Metals in Soil/Solid by CRC ICPMS	E440 Vancouver - Environmental	Soil/Solid	EPA 6020B (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO3 and HCl. This method is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.
Ca, K, Mg, and Na by CRC ICPMS (Saturated Paste, mg/L)	E442 Vancouver - Environmental	Soil/Solid	CSSS CH15/EPA 6020B (mod)	A soil extract produced by the saturated paste extraction procedure is analyzed for Calcium, Magnesium, Potassium and Sodium by Collision/Reaction Cell ICPMS as per "Soil Sampling Methods of Analysis" By M Carter.
Mercury in Soil/Solid by CVAAS	E510 Vancouver - Environmental	Soil/Solid	EPA 200.2/1631 Appendix (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO3 and HCl, followed by CVAAS analysis.
Chloride by IC (Saturated Paste) (mg/kg)	EC239A.Cl Vancouver - Environmental	Soil/Solid	CSSS Ch. 15 (mod)/EPA 300.1 (mod)	Inorganic anions are analyzed by obtaining a soil extract produced by the saturated paste extraction procedure which is then analyzed by Ion Chromatography with conductivity and/or UV detection.
Ca, K, Mg, Na by ICPMS (Saturated Paste, mg/kg)	EC442 Vancouver - Environmental	Soil/Solid	CSSS CH15/EPA 6020B (mod)	A soil extract produced by the saturated paste extraction procedure is analyzed for Calcium, Magnesium, Potassium, Sodium by ICPMS.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Leach 1:2 Soil:Water for pH/EC	EP108 Vancouver - Environmental	Soil/Solid	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL	The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Digestion for Metals and Mercury	EP440 Vancouver - Environmental	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO_3 and HCl. This method is intended to liberate metals that may be environmentally available.

QUALITY CONTROL REPORT

Work Order	: **VA21A7964**	Page	: 1 of 10
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	: Forceman Soil-Phyto-Remediation	Date Samples Received	: 28-Apr-2021 13:44
PO	: ----	Date Analysis Commenced	: 04-May-2021
C-O-C number	: ----	Issue Date	: 05-May-2021 18:09
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*
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	Inorganics, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	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: **Soil/Solid**

					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: 190406)											
VA21A7964-001	Phytoremediation	pH (1:2 soil:water)	----	E108	0.10	pH units	6.03	5.99	0.7%	5%	----
Saturated Paste Extractables (QC Lot: 190399)											
VA21A7964-001	Phytoremediation	chloride, soluble ion content	16887-00-6	E239.Cl	20.0	mg/L	<20.0	<20.0	0	Diff <2x LOR	----
Saturated Paste Extractables (QC Lot: 190400)											
VA21A7964-001	Phytoremediation	% saturation	----	E141	1.0	%	68.9	70.7	2.55%	20%	----
Saturated Paste Extractables (QC Lot: 190401)											
VA21A7964-001	Phytoremediation	sodium, soluble ion content	17341-25-2	E442	2.0	mg/L	5.8	5.5	0.2	Diff <2x LOR	----
Metals (QC Lot: 190404)											
VA21A7964-001	Phytoremediation	mercury	7439-97-6	E510	0.0500	mg/kg	0.0567	0.0523	0.0044	Diff <2x LOR	----
Metals (QC Lot: 190405)											
VA21A7964-001	Phytoremediation	aluminum	7429-90-5	E440	50	mg/kg	35800	30200	16.8%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	0.43	0.36	0.07	Diff <2x LOR	----
		arsenic	7440-38-2	E440	0.10	mg/kg	6.76	5.88	13.8%	30%	----
		barium	7440-39-3	E440	0.50	mg/kg	59.4	48.3	20.6%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.38	0.34	0.05	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		boron	7440-42-8	E440	5.0	mg/kg	<5.0	<5.0	0	Diff <2x LOR	----
		cadmium	7440-43-9	E440	0.020	mg/kg	0.073	0.066	0.007	Diff <2x LOR	----
		calcium	7440-70-2	E440	50	mg/kg	2410	2150	11.3%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	32.8	28.5	14.1%	30%	----
		cobalt	7440-48-4	E440	0.10	mg/kg	8.80	8.14	7.89%	30%	----
		copper	7440-50-8	E440	0.50	mg/kg	25.3	21.4	16.4%	30%	----
		iron	7439-89-6	E440	50	mg/kg	44600	39600	11.9%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	7.02	6.37	9.79%	40%	----
		lithium	7439-93-2	E440	2.0	mg/kg	14.2	13.3	7.04%	30%	----
		magnesium	7439-95-4	E440	20	mg/kg	6380	6170	3.33%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	588	539	8.78%	30%	----
		molybdenum	7439-98-7	E440	0.10	mg/kg	0.93	0.80	15.7%	40%	----
		nickel	7440-02-0	E440	0.50	mg/kg	18.8	17.1	9.60%	30%	----
		phosphorus	7723-14-0	E440	50	mg/kg	1270	1040	20.0%	30%	----
		potassium	7440-09-7	E440	100	mg/kg	750	680	9.88%	40%	----

Sub-Matrix: **Soil/Solid**

					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*
Metals (QC Lot: 190405) - continued											
VA21A7964-001	Phytoremediation	selenium	7782-49-2	E440	0.20	mg/kg	0.34	0.29	0.04	Diff <2x LOR	----
		silver	7440-22-4	E440	0.10	mg/kg	0.14	0.13	0.01	Diff <2x LOR	----
		sodium	7440-23-5	E440	50	mg/kg	115	113	2	Diff <2x LOR	----
		strontium	7440-24-6	E440	0.50	mg/kg	21.0	18.8	11.2%	40%	----
		sulfur	7704-34-9	E440	1000	mg/kg	<1000	<1000	0	Diff <2x LOR	----
		thallium	7440-28-0	E440	0.050	mg/kg	0.070	0.065	0.005	Diff <2x LOR	----
		tin	7440-31-5	E440	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		titanium	7440-32-6	E440	1.0	mg/kg	1190	1000	17.2%	40%	----
		tungsten	7440-33-7	E440	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		uranium	7440-61-1	E440	0.050	mg/kg	0.500	0.447	11.2%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	96.0	83.0	14.6%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	73.5	67.5	8.58%	30%	----
		zirconium	7440-67-7	E440	1.0	mg/kg	12.2	11.0	9.47%	30%	----

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: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Saturated Paste Extractables (QCLot: 190399)						
chloride, soluble ion content	16887-00-6	E239.Cl	2	mg/L	<2.0	----
Saturated Paste Extractables (QCLot: 190400)						
% saturation	----	E141	1	%	50.0	----
Saturated Paste Extractables (QCLot: 190401)						
sodium, soluble ion content	17341-25-2	E442	2	mg/L	<2.0	----
Metals (QCLot: 190404)						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 190405)						
aluminum	7429-90-5	E440	50	mg/kg	<50	----
antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
bismuth	7440-69-9	E440	0.2	mg/kg	<0.20	----
boron	7440-42-8	E440	5	mg/kg	<5.0	----
cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
calcium	7440-70-2	E440	50	mg/kg	<50	----
chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
iron	7439-89-6	E440	50	mg/kg	<50	----
lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
lithium	7439-93-2	E440	2	mg/kg	<2.0	----
magnesium	7439-95-4	E440	20	mg/kg	<20	----
manganese	7439-96-5	E440	1	mg/kg	<1.0	----
molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
phosphorus	7723-14-0	E440	50	mg/kg	<50	----
potassium	7440-09-7	E440	100	mg/kg	<100	----
selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
sodium	7440-23-5	E440	50	mg/kg	<50	----
strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 190405) - continued						
sulfur	7704-34-9	E440	1000	mg/kg	<1000	----
thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
tin	7440-31-5	E440	2	mg/kg	<2.0	----
titanium	7440-32-6	E440	1	mg/kg	<1.0	----
tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
zinc	7440-66-6	E440	2	mg/kg	<2.0	----
zirconium	7440-67-7	E440	1	mg/kg	<1.0	----

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: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 190406)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	99.7	95.0	105	----
Saturated Paste Extractables (QCLot: 190399)									
chloride, soluble ion content	16887-00-6	E239.Cl	2	mg/L	100 mg/L	103	80.0	120	----
Saturated Paste Extractables (QCLot: 190400)									
% saturation	----	E141	1	%	100 %	100	90.0	110	----
Saturated Paste Extractables (QCLot: 190401)									
sodium, soluble ion content	17341-25-2	E442	2	mg/L	50 mg/L	103	80.0	120	----
Metals (QCLot: 190404)									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	101	80.0	120	----
Metals (QCLot: 190405)									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	102	80.0	120	----
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	97.6	80.0	120	----
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	98.9	80.0	120	----
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	93.5	80.0	120	----
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	94.5	80.0	120	----
bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	97.6	80.0	120	----
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	97.0	80.0	120	----
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	98.3	80.0	120	----
calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	97.8	80.0	120	----
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	95.8	80.0	120	----
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	95.5	80.0	120	----
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	93.8	80.0	120	----
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	102	80.0	120	----
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	95.8	80.0	120	----
lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	96.6	80.0	120	----
magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	96.4	80.0	120	----
manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	95.8	80.0	120	----
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	96.9	80.0	120	----
nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	93.1	80.0	120	----
phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	100	80.0	120	----
potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	98.2	80.0	120	----
selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	114	80.0	120	----

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 190405) - continued									
silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	93.5	80.0	120	----
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	97.3	80.0	120	----
strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	98.4	80.0	120	----
sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	112	80.0	120	----
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	96.1	80.0	120	----
tin	7440-31-5	E440	2	mg/kg	50 mg/kg	95.2	80.0	120	----
titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	92.9	80.0	120	----
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	97.3	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	99.1	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	97.7	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	94.9	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	94.8	80.0	120	----

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix: **Soil/Solid**

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Saturated Paste Extractables (QCLot: 190399)									
QC-190399-003	RM	chloride, soluble ion content	16887-00-6	E239.Cl	994 mg/L	90.0	70.0	130	----
Saturated Paste Extractables (QCLot: 190400)									
QC-190400-003	RM	% saturation	----	E141	50.2 %	101	80.0	120	----
Saturated Paste Extractables (QCLot: 190401)									
QC-190401-003	RM	sodium, soluble ion content	17341-25-2	E442	610 mg/L	92.5	70.0	130	----
Metals (QCLot: 190404)									
QC-190404-003	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	99.4	70.0	130	----
Metals (QCLot: 190405)									
QC-190405-003	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	106	70.0	130	----
QC-190405-003	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	100	70.0	130	----
QC-190405-003	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	111	70.0	130	----
QC-190405-003	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	95.3	70.0	130	----
QC-190405-003	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	108	70.0	130	----
QC-190405-003	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	125	40.0	160	----
QC-190405-003	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	108	70.0	130	----
QC-190405-003	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	103	70.0	130	----
QC-190405-003	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	106	70.0	130	----
QC-190405-003	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	99.6	70.0	130	----
QC-190405-003	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	97.9	70.0	130	----
QC-190405-003	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	103	70.0	130	----
QC-190405-003	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	94.3	70.0	130	----
QC-190405-003	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	111	70.0	130	----
QC-190405-003	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	102	70.0	130	----
QC-190405-003	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	105	70.0	130	----
QC-190405-003	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	103	70.0	130	----
QC-190405-003	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	98.1	70.0	130	----
QC-190405-003	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	97.5	70.0	130	----
QC-190405-003	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	110	70.0	130	----
QC-190405-003	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	103	70.0	130	----

Sub-Matrix: **Soil/Solid**

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 190405) - continued									
QC-190405-003	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	103	70.0	130	----
QC-190405-003	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	95.6	40.0	160	----
QC-190405-003	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	97.4	70.0	130	----
QC-190405-003	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	109	70.0	130	----
QC-190405-003	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	102	70.0	130	----
QC-190405-003	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	104	70.0	130	----
QC-190405-003	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	96.4	70.0	130	----
QC-190405-003	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	104	70.0	130	----

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

Email 2: nveikle@rdks.bc.ca

Email 3: mhaley@rdks.bc.ca, mglover@rdks.bc.ca

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

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

Email 2: nveikle@rdks.bc.ca; mhaley@rdks.bc.ca

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

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

PRIORITY (Business Days): 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 #:	Forceman Soil - Phyto-Remediation
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): 7964

ALS Contact: Amber Springer Sampler: H.Shinton

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	Metals	Salinity	SAMPLES ON HOLD	Sample is hazardous (please provide further detail)	NUMBER OF CONTAINERS
	Phytoremediation	27-Apr-21	11:00 am	Soil	R	R			1
	Dup	27-Apr-21	12:00 pm	Soil	R	R			

Environmental Division Vancouver

Work Order Reference

VA21A7964

Telephone : +1 604 253 4188

Terrace Shipping

1 Coolers Ground ☐

___ Carbouys Air ☑

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

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

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

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

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

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

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

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
7.2					3.5

SHIPMENT RELEASE (client use)

Released by: Hannah Shinton Date: April 27th, 2021 Time:

INITIAL SHIPMENT RECEPTION (lab use only)

Received by: Chris Date: 27 Apr 21 Time: 1405

FINAL SHIPMENT RECEPTION (lab use only)

Received by: cm Date: 28 April 2021 Time: 12:35pm

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	: **VA21B8594**	Page	: 1 of 5
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	: Forceman Facility Sand Cyclone	Date Samples Received	: 30-Aug-2021 21:15
PO	: ----	Date Analysis Commenced	: 31-Aug-2021
C-O-C number	: ----	Issue Date	: 13-Sep-2021 14:33
Sampler	: Hannah Shinton		
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*
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Cindy Tang	Team Leader - Inorganics	Inorganics, Burnaby, British Columbia
Dan Gebert	Laboratory Analyst	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
Miles Gropen	Department Manager - Inorganics	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*
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	F5-sand cyclone	DUP	Field Blank	Travel Blank	Sand Filter
					Client sampling date / time	30-Aug-2021 10:22	30-Aug-2021 12:00	30-Aug-2021 10:55	30-Aug-2021	30-Aug-2021 09:53
						VA21B8594-001	VA21B8594-002	VA21B8594-003	VA21B8594-004	VA21B8594-005
						Result	Result	Result	Result	Result
Physical Tests										
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		373	374	<1.0	<1.0	375
conductivity	----	E100	2.0	µS/cm		1150	1150	<2.0	<2.0	1150
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L		174	161	<0.60	<0.60	159
pH	----	E108	0.10	pH units		8.21	8.17	5.34	5.35	8.18
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		15.3	15.5	<0.0050	<0.0050	15.4
chloride	16887-00-6	E235.Cl	0.50	mg/L		140	139	<0.50	----	136
fluoride	16984-48-8	E235.F	0.020	mg/L		<0.100 DLDS	<0.100 DLDS	<0.020	----	<0.100 DLDS
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L		17.3	17.6	<0.050	----	17.7
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		0.0290	<0.0250 DLDS	<0.0050	----	0.0361
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		0.0093	0.0092	<0.0010	----	0.0079
nitrogen, total	7727-37-9	E366	0.030	mg/L		17.7	17.6	<0.030	----	16.5
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L		0.0950	0.117	<0.0010	<0.0010	0.118
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		<1.50 DLDS	<1.50 DLDS	<0.30	----	<1.50 DLDS
Organic / Inorganic Carbon										
carbon, total organic [TOC]	----	E355-L	0.50	mg/L		23.9	24.3	<0.50	----	22.3
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		0.0260	0.0994	<0.0030	----	0.0330
antimony, total	7440-36-0	E420	0.00010	mg/L		0.00047	0.00052	<0.00010	----	0.00047
arsenic, total	7440-38-2	E420	0.00010	mg/L		0.00372	0.00400	<0.00010	----	0.00364
barium, total	7440-39-3	E420	0.00010	mg/L		0.134	0.139	<0.00010	----	0.131
beryllium, total	7440-41-7	E420	0.000100	mg/L		<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
boron, total	7440-42-8	E420	0.010	mg/L		1.22	1.20	<0.010	----	1.18
cadmium, total	7440-43-9	E420	0.0000050	mg/L		0.0000576	0.0000851	<0.0000050	----	0.0000322
calcium, total	7440-70-2	E420	0.050	mg/L		40.3	37.5	<0.050	<0.050	37.2
cesium, total	7440-46-2	E420	0.000010	mg/L		0.000403	0.000443	<0.000010	----	0.000416
chromium, total	7440-47-3	E420	0.00050	mg/L		0.00081	0.00104	<0.00050	----	0.00075
cobalt, total	7440-48-4	E420	0.00010	mg/L		0.00092	0.00102	<0.00010	----	0.00083
copper, total	7440-50-8	E420	0.00050	mg/L		0.00586	0.00388	<0.00050	----	0.00134

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	F5-sand cyclone	DUP	Field Blank	Travel Blank	Sand Filter
					Client sampling date / time	30-Aug-2021 10:22	30-Aug-2021 12:00	30-Aug-2021 10:55	30-Aug-2021	30-Aug-2021 09:53
						VA21B8594-001	VA21B8594-002	VA21B8594-003	VA21B8594-004	VA21B8594-005
						Result	Result	Result	Result	Result
Total Metals										
iron, total	7439-89-6	E420	0.010	mg/L		2.02	1.43	<0.010	----	1.26
lead, total	7439-92-1	E420	0.000050	mg/L		0.00390	0.000592	<0.000050	----	0.000344
lithium, total	7439-93-2	E420	0.0010	mg/L		<0.0010	<0.0010	<0.0010	----	<0.0010
magnesium, total	7439-95-4	E420	0.0050	mg/L		17.7	16.4	<0.0050	<0.0050	16.1
manganese, total	7439-96-5	E420	0.00010	mg/L		1.96	1.90	<0.00010	----	1.92
mercury, total	7439-97-6	E508	0.0000050	mg/L		<0.0000050	<0.0000050	<0.0000050	----	<0.0000050
molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.000575	0.000679	<0.000050	----	0.000466
nickel, total	7440-02-0	E420	0.00050	mg/L		0.00735	0.00708	<0.00050	----	0.00652
phosphorus, total	7723-14-0	E420	0.050	mg/L		0.389	0.844	<0.050	----	0.346
potassium, total	7440-09-7	E420	0.050	mg/L		51.5	48.6	<0.050	----	46.9
rubidium, total	7440-17-7	E420	0.00020	mg/L		0.0422	0.0422	<0.00020	----	0.0406
selenium, total	7782-49-2	E420	0.000050	mg/L		0.000120	0.000135	<0.000050	----	0.000099
silicon, total	7440-21-3	E420	0.10	mg/L		2.98	3.12	<0.10	----	2.94
silver, total	7440-22-4	E420	0.000010	mg/L		<0.000010	0.000012	<0.000010	----	<0.000010
sodium, total	17341-25-2	E420	0.050	mg/L		141	135	<0.050	----	133
strontium, total	7440-24-6	E420	0.00020	mg/L		0.315	0.340	<0.00020	----	0.329
sulfur, total	7704-34-9	E420	0.50	mg/L		0.92	1.37	<0.50	----	1.04
tellurium, total	13494-80-9	E420	0.00020	mg/L		<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
thorium, total	7440-29-1	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	----	<0.00010
tin, total	7440-31-5	E420	0.00010	mg/L		0.00032	0.00014	<0.00010	----	0.00011
titanium, total	7440-32-6	E420	0.00030	mg/L		0.00079	<0.00300 DLM	<0.00030	----	0.00062
tungsten, total	7440-33-7	E420	0.00010	mg/L		0.00017	0.00030	<0.00010	----	0.00015
uranium, total	7440-61-1	E420	0.000010	mg/L		0.000035	0.000066	<0.000010	----	0.000035
vanadium, total	7440-62-2	E420	0.00050	mg/L		0.00081	0.00099	<0.00050	----	0.00083
zinc, total	7440-66-6	E420	0.0030	mg/L		0.0187	0.0037	<0.0030	----	<0.0030
zirconium, total	7440-67-7	E420	0.00020	mg/L		<0.00020	<0.00020	<0.00020	----	<0.00020
Aggregate Organics										
biochemical oxygen demand [BOD]	----	E550	2.0	mg/L		9.3	11.0	<2.0	----	8.1
chemical oxygen demand [COD]	----	E559	20	mg/L		94	90	<20	----	86

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA21B8594**	Page	: 1 of 15
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	: Forceman Facility Sand Cyclone	Date Samples Received	: 30-Aug-2021 21:15
PO	: ----	Issue Date	: 13-Sep-2021 14:33
C-O-C number	: ----		
Sampler	: Hannah Shinton		
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 : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT 3d] DUP	E550	30-Aug-2021	----	----	----		31-Aug-2021	3 days	1 days	✓
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT 3d] F5-sand cyclone	E550	30-Aug-2021	----	----	----		31-Aug-2021	3 days	1 days	✓
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT 3d] Field Blank	E550	30-Aug-2021	----	----	----		31-Aug-2021	3 days	1 days	✓
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT 3d] Sand Filter	E550	30-Aug-2021	----	----	----		31-Aug-2021	3 days	1 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid) DUP	E559	30-Aug-2021	----	----	----		07-Sep-2021	28 days	8 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid) F5-sand cyclone	E559	30-Aug-2021	----	----	----		07-Sep-2021	28 days	8 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid) Field Blank	E559	30-Aug-2021	----	----	----		07-Sep-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
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
Sand Filter	E559	30-Aug-2021	----	----	----		07-Sep-2021	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
DUP	E298	30-Aug-2021	05-Sep-2021	----	----		06-Sep-2021	28 days	7 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
F5-sand cyclone	E298	30-Aug-2021	05-Sep-2021	----	----		06-Sep-2021	28 days	7 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
Field Blank	E298	30-Aug-2021	05-Sep-2021	----	----		06-Sep-2021	28 days	7 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
Sand Filter	E298	30-Aug-2021	05-Sep-2021	----	----		06-Sep-2021	28 days	7 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
Travel Blank	E298	30-Aug-2021	05-Sep-2021	----	----		06-Sep-2021	28 days	7 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
DUP	E235.Cl	30-Aug-2021	----	----	----		01-Sep-2021	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
F5-sand cyclone	E235.Cl	30-Aug-2021	----	----	----		01-Sep-2021	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
Field Blank	E235.Cl	30-Aug-2021	----	----	----		01-Sep-2021	28 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Chloride in Water by IC										
HDPE										
Sand Filter	E235.Cl	30-Aug-2021	----	----	----		01-Sep-2021	28 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE										
DUP	E378-U	30-Aug-2021	----	----	----		01-Sep-2021	3 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE										
F5-sand cyclone	E378-U	30-Aug-2021	----	----	----		01-Sep-2021	3 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE										
Field Blank	E378-U	30-Aug-2021	----	----	----		01-Sep-2021	3 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE										
Sand Filter	E378-U	30-Aug-2021	----	----	----		01-Sep-2021	3 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE										
Travel Blank	E378-U	30-Aug-2021	----	----	----		01-Sep-2021	3 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
DUP	E235.F	30-Aug-2021	----	----	----		01-Sep-2021	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
F5-sand cyclone	E235.F	30-Aug-2021	----	----	----		01-Sep-2021	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
Field Blank	E235.F	30-Aug-2021	----	----	----		01-Sep-2021	28 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
Sand Filter	E235.F	30-Aug-2021	----	----	----		01-Sep-2021	28 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
DUP	E235.NO3-L	30-Aug-2021	----	----	----		01-Sep-2021	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
F5-sand cyclone	E235.NO3-L	30-Aug-2021	----	----	----		01-Sep-2021	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
Field Blank	E235.NO3-L	30-Aug-2021	----	----	----		01-Sep-2021	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
Sand Filter	E235.NO3-L	30-Aug-2021	----	----	----		01-Sep-2021	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
DUP	E235.NO2-L	30-Aug-2021	----	----	----		01-Sep-2021	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
F5-sand cyclone	E235.NO2-L	30-Aug-2021	----	----	----		01-Sep-2021	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
Field Blank	E235.NO2-L	30-Aug-2021	----	----	----		01-Sep-2021	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
Sand Filter	E235.NO2-L	30-Aug-2021	----	----	----		01-Sep-2021	3 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Sulfate in Water by IC										
HDPE DUP	E235.SO4	30-Aug-2021	----	----	----		01-Sep-2021	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE F5-sand cyclone	E235.SO4	30-Aug-2021	----	----	----		01-Sep-2021	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE Field Blank	E235.SO4	30-Aug-2021	----	----	----		01-Sep-2021	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE Sand Filter	E235.SO4	30-Aug-2021	----	----	----		01-Sep-2021	28 days	2 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) DUP	E318	30-Aug-2021	05-Sep-2021	----	----		10-Sep-2021	28 days	11 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) F5-sand cyclone	E318	30-Aug-2021	05-Sep-2021	----	----		10-Sep-2021	28 days	11 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) Field Blank	E318	30-Aug-2021	05-Sep-2021	----	----		10-Sep-2021	28 days	11 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) Sand Filter	E318	30-Aug-2021	05-Sep-2021	----	----		10-Sep-2021	28 days	11 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) DUP	E366	30-Aug-2021	05-Sep-2021	----	----		08-Sep-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 Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
F5-sand cyclone	E366	30-Aug-2021	05-Sep-2021	----	----		08-Sep-2021	28 days	9 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
Field Blank	E366	30-Aug-2021	05-Sep-2021	----	----		08-Sep-2021	28 days	9 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
Sand Filter	E366	30-Aug-2021	05-Sep-2021	----	----		08-Sep-2021	28 days	9 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
DUP	E355-L	30-Aug-2021	05-Sep-2021	----	----		07-Sep-2021	28 days	8 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
F5-sand cyclone	E355-L	30-Aug-2021	05-Sep-2021	----	----		07-Sep-2021	28 days	8 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
Field Blank	E355-L	30-Aug-2021	05-Sep-2021	----	----		07-Sep-2021	28 days	8 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
Sand Filter	E355-L	30-Aug-2021	05-Sep-2021	----	----		07-Sep-2021	28 days	8 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
DUP	E290	30-Aug-2021	----	----	----		01-Sep-2021	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
F5-sand cyclone	E290	30-Aug-2021	----	----	----		01-Sep-2021	14 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Alkalinity Species by Titration										
HDPE										
Field Blank	E290	30-Aug-2021	----	----	----		01-Sep-2021	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
Sand Filter	E290	30-Aug-2021	----	----	----		01-Sep-2021	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
Travel Blank	E290	30-Aug-2021	----	----	----		01-Sep-2021	14 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE										
DUP	E100	30-Aug-2021	----	----	----		01-Sep-2021	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE										
F5-sand cyclone	E100	30-Aug-2021	----	----	----		01-Sep-2021	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE										
Field Blank	E100	30-Aug-2021	----	----	----		01-Sep-2021	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE										
Sand Filter	E100	30-Aug-2021	----	----	----		01-Sep-2021	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE										
Travel Blank	E100	30-Aug-2021	----	----	----		01-Sep-2021	28 days	2 days	✓
Physical Tests : pH by Meter										
HDPE										
Travel Blank	E108	30-Aug-2021	----	----	----		01-Sep-2021	0.25 hrs	50 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	30-Aug-2021	----	----	----		01-Sep-2021	0.25 hrs	53 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE Field Blank	E108	30-Aug-2021	----	----	----		01-Sep-2021	0.25 hrs	54 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE F5-sand cyclone	E108	30-Aug-2021	----	----	----		01-Sep-2021	0.25 hrs	55 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE Sand Filter	E108	30-Aug-2021	----	----	----		01-Sep-2021	0.25 hrs	55 hrs	× EHTR-FM
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) DUP	E508	30-Aug-2021	----	----	----		04-Sep-2021	28 days	5 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) F5-sand cyclone	E508	30-Aug-2021	----	----	----		04-Sep-2021	28 days	5 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) Field Blank	E508	30-Aug-2021	----	----	----		04-Sep-2021	28 days	5 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) Sand Filter	E508	30-Aug-2021	----	----	----		04-Sep-2021	28 days	5 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) DUP	E420	30-Aug-2021	----	----	----		05-Sep-2021	180 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
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
Field Blank	E420	30-Aug-2021	----	----	----		05-Sep-2021	180 days	6 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
Sand Filter	E420	30-Aug-2021	----	----	----		05-Sep-2021	180 days	6 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
Travel Blank	E420	30-Aug-2021	----	----	----		05-Sep-2021	180 days	6 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
F5-sand cyclone	E420	30-Aug-2021	----	----	----		06-Sep-2021	180 days	7 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	281523	1	16	6.2	5.0	✓
Ammonia by Fluorescence	E298	284983	1	16	6.2	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	280726	1	18	5.5	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	285387	2	34	5.8	5.0	✓
Chloride in Water by IC	E235.Cl	281527	1	16	6.2	5.0	✓
Conductivity in Water	E100	281525	1	11	9.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	281533	1	14	7.1	5.0	✓
Fluoride in Water by IC	E235.F	281526	1	16	6.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	281528	1	14	7.1	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	281529	1	16	6.2	5.0	✓
pH by Meter	E108	281524	1	16	6.2	5.0	✓
Sulfate in Water by IC	E235.SO4	281530	1	16	6.2	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	284986	1	11	9.0	5.0	✓
Total Mercury in Water by CVAAS	E508	284376	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	282914	2	38	5.2	5.0	✓
Total Nitrogen by Colourimetry	E366	284984	1	6	16.6	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	284987	1	13	7.6	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	281523	1	16	6.2	5.0	✓
Ammonia by Fluorescence	E298	284983	1	16	6.2	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	280726	1	18	5.5	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	285387	2	34	5.8	5.0	✓
Chloride in Water by IC	E235.Cl	281527	1	16	6.2	5.0	✓
Conductivity in Water	E100	281525	1	11	9.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	281533	1	14	7.1	5.0	✓
Fluoride in Water by IC	E235.F	281526	1	16	6.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	281528	1	14	7.1	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	281529	1	16	6.2	5.0	✓
pH by Meter	E108	281524	1	16	6.2	5.0	✓
Sulfate in Water by IC	E235.SO4	281530	1	16	6.2	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	284986	1	11	9.0	5.0	✓
Total Mercury in Water by CVAAS	E508	284376	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	282914	2	38	5.2	5.0	✓
Total Nitrogen by Colourimetry	E366	284984	1	6	16.6	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	284987	1	13	7.6	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	281523	1	16	6.2	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*
Method Blanks (MB) - Continued							
Ammonia by Fluorescence	E298	284983	1	16	6.2	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	280726	1	18	5.5	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	285387	2	34	5.8	5.0	✓
Chloride in Water by IC	E235.Cl	281527	1	16	6.2	5.0	✓
Conductivity in Water	E100	281525	1	11	9.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	281533	1	14	7.1	5.0	✓
Fluoride in Water by IC	E235.F	281526	1	16	6.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	281528	1	14	7.1	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	281529	1	16	6.2	5.0	✓
Sulfate in Water by IC	E235.SO4	281530	1	16	6.2	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	284986	1	11	9.0	5.0	✓
Total Mercury in Water by CVAAS	E508	284376	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	282914	2	38	5.2	5.0	✓
Total Nitrogen by Colourimetry	E366	284984	1	6	16.6	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	284987	1	13	7.6	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	284983	1	16	6.2	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	285387	2	34	5.8	5.0	✓
Chloride in Water by IC	E235.Cl	281527	1	16	6.2	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	281533	1	14	7.1	5.0	✓
Fluoride in Water by IC	E235.F	281526	1	16	6.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	281528	1	14	7.1	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	281529	1	16	6.2	5.0	✓
Sulfate in Water by IC	E235.SO4	281530	1	16	6.2	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	284986	1	11	9.0	5.0	✓
Total Mercury in Water by CVAAS	E508	284376	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	282914	2	38	5.2	5.0	✓
Total Nitrogen by Colourimetry	E366	284984	1	6	16.6	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	284987	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.
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).
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.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Vancouver - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Total Nitrogen by Colourimetry	E366 Vancouver - Environmental	Water	APHA 4500-P J (mod)	Total Nitrogen 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 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.
Hardness (Calculated) from Total Ca/Mg	EC100A Vancouver - Environmental	Water	APHA 2340B	“Hardness (as $CaCO_3$), from total Ca/Mg” is calculated from the sum of total Calcium and Magnesium concentrations, expressed in $CaCO_3$ equivalents. “Total Hardness” refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.

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

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
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.
Preparation for Total Organic Carbon by Combustion	EP355 Vancouver - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Digestion for Total Nitrogen in water	EP366 Vancouver - Environmental	Water	APHA 4500-P J (mod)	Samples are heated with a persulfate digestion reagent.

QUALITY CONTROL REPORT

Work Order	: **VA21B8594**	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	: Forceman Facility Sand Cyclone	Date Samples Received	: 30-Aug-2021 21:15
PO	: ----	Date Analysis Commenced	: 31-Aug-2021
C-O-C number	: ----	Issue Date	: 13-Sep-2021 14:33
Sampler	: Hannah Shinton		
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*
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Cindy Tang	Team Leader - Inorganics	Inorganics, Burnaby, British Columbia
Dan Gebert	Laboratory Analyst	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
Miles Gropen	Department Manager - Inorganics	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: 281523)											
VA21B8594-001	F5-sand cyclone	alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	373	373	0.00%	20%	----
Physical Tests (QC Lot: 281524)											
VA21B8594-001	F5-sand cyclone	pH	----	E108	0.10	pH units	8.21	8.13	0.930%	4%	----
Physical Tests (QC Lot: 281525)											
VA21B8594-001	F5-sand cyclone	conductivity	----	E100	2.0	µS/cm	1150	1140	0.262%	10%	----
Anions and Nutrients (QC Lot: 281526)											
FJ2100830-001	Anonymous	fluoride	16984-48-8	E235.F	0.100	mg/L	0.181	0.174	0.007	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 281527)											
FJ2100830-001	Anonymous	chloride	16887-00-6	E235.Cl	2.50	mg/L	30.2	30.1	0.328%	20%	----
Anions and Nutrients (QC Lot: 281528)											
FJ2100830-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.0250	mg/L	<0.0250	<0.0250	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 281529)											
FJ2100830-001	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 281530)											
FJ2100830-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	1.50	mg/L	200	200	0.134%	20%	----
Anions and Nutrients (QC Lot: 281533)											
VA21B8594-001	F5-sand cyclone	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0100	mg/L	0.0950	0.107	12.1%	20%	----
Anions and Nutrients (QC Lot: 284983)											
FJ2100830-006	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.234	0.234	0.00200%	20%	----
Anions and Nutrients (QC Lot: 284984)											
FJ2100840-001	Anonymous	nitrogen, total	7727-37-9	E366	0.030	mg/L	0.301	0.310	2.89%	20%	----
Anions and Nutrients (QC Lot: 284986)											
FJ2100843-001	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	0.238	0.239	0.002	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 284987)											
FJ2100843-001	Anonymous	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	4.24	4.29	0.05	Diff <2x LOR	----
Total Metals (QC Lot: 282914)											
KS2102758-001	Anonymous	aluminum, total	7429-90-5	E420	0.0100	mg/L	<0.0100	<0.0100	0	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	0.00175	0.00183	4.53%	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	----

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: 282914) - continued											
KS2102758-001	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	0.100	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	38.1	37.2	2.38%	20%	----
		cesium, total	7440-46-2	E420	0.000010	mg/L	0.000052	0.000057	0.000004	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	0.00695	0.00690	0.00005	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	0.00244	0.00246	0.000010	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	0.0015	0.0014	0.00004	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	0.100	mg/L	38.5	39.4	2.16%	20%	----
		manganese, total	7439-96-5	E420	0.00200	mg/L	0.00328	0.00310	0.00018	Diff <2x LOR	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.0167	0.0172	2.69%	20%	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.100	mg/L	6.86	7.11	3.64%	20%	----
		rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00113	0.00104	0.00010	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	7.78	7.78	0.0303%	20%	----
		sodium, total	17341-25-2	E420	2.00	mg/L	55.6	55.6	0.100%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.281	0.291	3.66%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	43.3	43.6	0.596%	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	0.00021	0.00021	0.000002	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000100	mg/L	0.00547	0.00550	0.608%	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	0.0500	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	----
Total Metals (QC Lot: 282915)											
VA21B8575-001	Anonymous	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.195	0.192	1.42%	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: 282915) - continued											
VA21B8575-001	Anonymous	antimony, total	7440-36-0	E420	0.00010	mg/L	0.00044	0.00044	0.000010	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00783	0.00748	4.69%	20%	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.0350	0.0346	1.08%	20%	----
		beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.0000180	0.0000179	0.00000005	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	0.050	mg/L	29.5	29.4	0.157%	20%	----
		cesium, total	7440-46-2	E420	0.000010	mg/L	0.000047	0.000051	0.000004	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	0.00029	0.00029	0.000001	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	0.00122	0.00120	0.00003	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	0.443	0.426	4.12%	20%	----
		lead, total	7439-92-1	E420	0.000050	mg/L	0.000333	0.000314	0.000019	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	0.0041	0.0040	0.00005	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	0.100	mg/L	9.58	9.26	3.41%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.0400	0.0389	2.65%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000335	0.000352	0.000017	Diff <2x LOR	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	0.00150	0.00149	0.000010	Diff <2x LOR	----
		phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.100	mg/L	0.804	0.788	0.016	Diff <2x LOR	----
		rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00097	0.00105	0.00008	Diff <2x LOR	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	0.000147	0.000161	0.000015	Diff <2x LOR	----
		silicon, total	7440-21-3	E420	0.10	mg/L	4.32	4.36	0.866%	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	1.52	1.50	0.919%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.144	0.146	0.886%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	15.5	15.6	1.08%	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	0.00863	0.00792	8.63%	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	0.000605	0.000627	3.53%	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: 282915) - continued											
VA21B8575-001	Anonymous	vanadium, total	7440-62-2	E420	0.00050	mg/L	0.00054	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	0.00024	0.00025	0.00001	Diff <2x LOR	----
Total Metals (QC Lot: 284376)											
VA21B8567-001	Anonymous	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Aggregate Organics (QC Lot: 280726)											
FJ2100820-001	Anonymous	biochemical oxygen demand [BOD]	----	E550	2.0	mg/L	<2.0	<2.0	0.0%	30%	----
Aggregate Organics (QC Lot: 285387)											
KS2102785-001	Anonymous	chemical oxygen demand [COD]	----	E559	20	mg/L	106	105	1	Diff <2x LOR	----
Aggregate Organics (QC Lot: 285388)											
VA21B8594-002	DUP	chemical oxygen demand [COD]	----	E559	20	mg/L	90	96	5	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: 281523)						
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 281525)						
conductivity	----	E100	1	µS/cm	1.1	----
Anions and Nutrients (QCLot: 281526)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 281527)						
chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 281528)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 281529)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 281530)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 281533)						
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 284983)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 284984)						
nitrogen, total	7727-37-9	E366	0.03	mg/L	<0.030	----
Anions and Nutrients (QCLot: 284986)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Organic / Inorganic Carbon (QCLot: 284987)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 282914)						
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: 282914) - 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: 282915)						
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: 282915) - 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	----
Total Metals (QCLot: 284376)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Aggregate Organics (QCLot: 280726)						
biochemical oxygen demand [BOD]	----	E550	2	mg/L	<2.0	----
Aggregate Organics (QCLot: 285387)						
chemical oxygen demand [COD]	----	E559	20	mg/L	<20	----
Aggregate Organics (QCLot: 285388)						
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: 281523)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	99.6	85.0	115	----
Physical Tests (QCLot: 281524)									
pH	----	E108	----	pH units	7 pH units	99.7	98.0	102	----
Physical Tests (QCLot: 281525)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	99.8	90.0	110	----
Anions and Nutrients (QCLot: 281526)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	96.9	90.0	110	----
Anions and Nutrients (QCLot: 281527)									
chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 281528)									
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: 281529)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	95.7	90.0	110	----
Anions and Nutrients (QCLot: 281530)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 281533)									
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	101	80.0	120	----
Anions and Nutrients (QCLot: 284983)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	94.8	85.0	115	----
Anions and Nutrients (QCLot: 284984)									
nitrogen, total	7727-37-9	E366	0.03	mg/L	0.5 mg/L	98.2	75.0	125	----
Anions and Nutrients (QCLot: 284986)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	92.6	75.0	125	----
Organic / Inorganic Carbon (QCLot: 284987)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	98.5	80.0	120	----
Total Metals (QCLot: 282914)									
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	99.5	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	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: 282914) - continued									
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	96.5	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	99.6	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	103	80.0	120	----
cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	104	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	98.8	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	98.4	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	96.9	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	101	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	106	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	99.6	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	99.6	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	105	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	99.9	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	113	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	104	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	95.2	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	100	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	103	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	112	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	95.8	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	102	80.0	120	----
thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	95.7	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	98.0	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	93.8	80.0	120	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	95.0	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	102	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	99.4	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	99.5	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	104	80.0	120	----
Total Metals (QCLot: 282915)									
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	110	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: 282915) - continued									
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	106	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	100.0	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	100	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	96.2	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	102	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	100	80.0	120	----
cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	101	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	106	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	100	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	95.9	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	92.8	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	104	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	104	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	105	80.0	120	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	109	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	101	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	99.6	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	101	80.0	120	----
sodium, total	17341-25-2	E420	0.05	mg/L	50 mg/L	112	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	102	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	98.6	80.0	120	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	98.0	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	98.3	80.0	120	----
thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	89.1	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	98.7	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	106	80.0	120	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	96.3	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	105	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	98.4	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: 284376)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	88.5	80.0	120	----
Aggregate Organics (QCLot: 280726)									
biochemical oxygen demand [BOD]	----	E550	2	mg/L	198 mg/L	91.9	85.0	115	----
Aggregate Organics (QCLot: 285387)									
chemical oxygen demand [COD]	----	E559	20	mg/L	100 mg/L	105	85.0	115	----
Aggregate Organics (QCLot: 285388)									
chemical oxygen demand [COD]	----	E559	20	mg/L	100 mg/L	105	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: 281526)										
FJ2100830-002	Anonymous	fluoride	16984-48-8	E235.F	4.83 mg/L	5 mg/L	96.7	75.0	125	----
Anions and Nutrients (QCLot: 281527)										
FJ2100830-002	Anonymous	chloride	16887-00-6	E235.Cl	498 mg/L	500 mg/L	99.5	75.0	125	----
Anions and Nutrients (QCLot: 281528)										
FJ2100830-002	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	12.5 mg/L	12.5 mg/L	99.9	75.0	125	----
Anions and Nutrients (QCLot: 281529)										
FJ2100830-002	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	2.33 mg/L	2.5 mg/L	93.1	75.0	125	----
Anions and Nutrients (QCLot: 281530)										
FJ2100830-002	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	497 mg/L	500 mg/L	99.4	75.0	125	----
Anions and Nutrients (QCLot: 281533)										
VA21B8594-002	DUP	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	ND mg/L	0.03 mg/L	ND	70.0	130	----
Anions and Nutrients (QCLot: 284983)										
FJ2100835-007	Anonymous	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: 284984)										
VA21B8593-001	Anonymous	nitrogen, total	7727-37-9	E366	0.400 mg/L	0.4 mg/L	99.9	70.0	130	----
Anions and Nutrients (QCLot: 284986)										
KS2102771-001	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	2.49 mg/L	2.5 mg/L	99.5	70.0	130	----
Organic / Inorganic Carbon (QCLot: 284987)										
KS2102771-001	Anonymous	carbon, total organic [TOC]	----	E355-L	4.94 mg/L	5 mg/L	98.7	70.0	130	----
Total Metals (QCLot: 282914)										
VA21B8594-002	DUP	aluminum, total	7429-90-5	E420	0.193 mg/L	0.2 mg/L	96.5	70.0	130	----
		antimony, total	7440-36-0	E420	0.0208 mg/L	0.02 mg/L	104	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0198 mg/L	0.02 mg/L	99.2	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	0.0409 mg/L	0.04 mg/L	102	70.0	130	----
		bismuth, total	7440-69-9	E420	0.00928 mg/L	0.01 mg/L	92.8	70.0	130	----
		boron, total	7440-42-8	E420	ND mg/L	0.1 mg/L	ND	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00389 mg/L	0.004 mg/L	97.3	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: 282914) - continued										
VA21B8594-002	DUP	calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		cesium, total	7440-46-2	E420	0.0107 mg/L	0.01 mg/L	107	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	0.0184 mg/L	0.02 mg/L	91.9	70.0	130	----
		iron, total	7439-89-6	E420	1.81 mg/L	2 mg/L	90.5	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	0.0964 mg/L	0.1 mg/L	96.4	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0216 mg/L	0.02 mg/L	108	70.0	130	----
		nickel, total	7440-02-0	E420	0.0376 mg/L	0.04 mg/L	94.0	70.0	130	----
		phosphorus, total	7723-14-0	E420	11.2 mg/L	10 mg/L	112	70.0	130	----
		potassium, total	7440-09-7	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		rubidium, total	7440-17-7	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		selenium, total	7782-49-2	E420	0.0389 mg/L	0.04 mg/L	97.2	70.0	130	----
		silicon, total	7440-21-3	E420	9.92 mg/L	10 mg/L	99.2	70.0	130	----
		silver, total	7440-22-4	E420	0.00397 mg/L	0.004 mg/L	99.3	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	21.1 mg/L	20 mg/L	105	70.0	130	----
		tellurium, total	13494-80-9	E420	0.0401 mg/L	0.04 mg/L	100	70.0	130	----
		thallium, total	7440-28-0	E420	0.00374 mg/L	0.004 mg/L	93.6	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	0.0199 mg/L	0.02 mg/L	99.5	70.0	130	----
		titanium, total	7440-32-6	E420	0.0390 mg/L	0.04 mg/L	97.5	70.0	130	----
		tungsten, total	7440-33-7	E420	0.0193 mg/L	0.02 mg/L	96.6	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	0.101 mg/L	0.1 mg/L	101	70.0	130	----
		zinc, total	7440-66-6	E420	0.383 mg/L	0.4 mg/L	95.6	70.0	130	----
		zirconium, total	7440-67-7	E420	0.0447 mg/L	0.04 mg/L	112	70.0	130	----
Total Metals (QCLot: 282915)										
VA21B8575-002	Anonymous	aluminum, total	7429-90-5	E420	0.191 mg/L	0.2 mg/L	95.4	70.0	130	----
		antimony, total	7440-36-0	E420	0.0202 mg/L	0.02 mg/L	101	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0194 mg/L	0.02 mg/L	97.2	70.0	130	----
		barium, total	7440-39-3	E420	ND mg/L	0.02 mg/L	ND	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: 282915) - continued										
VA21B8575-002	Anonymous	beryllium, total	7440-41-7	E420	0.0401 mg/L	0.04 mg/L	100	70.0	130	----
		bismuth, total	7440-69-9	E420	0.0100 mg/L	0.01 mg/L	100	70.0	130	----
		boron, total	7440-42-8	E420	0.100 mg/L	0.1 mg/L	100	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00397 mg/L	0.004 mg/L	99.2	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	0.0100 mg/L	0.01 mg/L	100	70.0	130	----
		chromium, total	7440-47-3	E420	0.0393 mg/L	0.04 mg/L	98.2	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0197 mg/L	0.02 mg/L	98.4	70.0	130	----
		copper, total	7440-50-8	E420	0.0206 mg/L	0.02 mg/L	103	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	0.0194 mg/L	0.02 mg/L	96.9	70.0	130	----
		lithium, total	7439-93-2	E420	0.0978 mg/L	0.1 mg/L	97.8	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	0.0199 mg/L	0.02 mg/L	99.5	70.0	130	----
		nickel, total	7440-02-0	E420	0.0387 mg/L	0.04 mg/L	96.6	70.0	130	----
		phosphorus, total	7723-14-0	E420	10.2 mg/L	10 mg/L	102	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	0.0198 mg/L	0.02 mg/L	99.1	70.0	130	----
		selenium, total	7782-49-2	E420	0.0403 mg/L	0.04 mg/L	101	70.0	130	----
		silicon, total	7440-21-3	E420	9.53 mg/L	10 mg/L	95.3	70.0	130	----
		silver, total	7440-22-4	E420	0.00392 mg/L	0.004 mg/L	98.1	70.0	130	----
		sodium, total	17341-25-2	E420	1.91 mg/L	2 mg/L	95.7	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	20.3 mg/L	20 mg/L	102	70.0	130	----
		tellurium, total	13494-80-9	E420	0.0398 mg/L	0.04 mg/L	99.4	70.0	130	----
		thallium, total	7440-28-0	E420	0.00372 mg/L	0.004 mg/L	92.9	70.0	130	----
		thorium, total	7440-29-1	E420	0.0223 mg/L	0.02 mg/L	112	70.0	130	----
		tin, total	7440-31-5	E420	0.0198 mg/L	0.02 mg/L	99.0	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	0.0200 mg/L	0.02 mg/L	99.9	70.0	130	----
		uranium, total	7440-61-1	E420	0.00416 mg/L	0.004 mg/L	104	70.0	130	----
		vanadium, total	7440-62-2	E420	0.0982 mg/L	0.1 mg/L	98.2	70.0	130	----
		zinc, total	7440-66-6	E420	0.390 mg/L	0.4 mg/L	97.6	70.0	130	----
		zirconium, total	7440-67-7	E420	0.0425 mg/L	0.04 mg/L	106	70.0	130	----
Total Metals (QCLot: 284376)										

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: 284376) - continued										
VA21B8567-002	Anonymous	mercury, total	7439-97-6	E508	0.000101 mg/L	0.0001 mg/L	101	70.0	130	----
Aggregate Organics (QCLot: 285387)										
KS2102785-002	Anonymous	chemical oxygen demand [COD]	----	E559	100 mg/L	100 mg/L	100	75.0	125	----
Aggregate Organics (QCLot: 285388)										
VA21B8594-003	Field Blank	chemical oxygen demand [COD]	----	E559	112 mg/L	100 mg/L	112	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 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%] ☐ / 3 day [P3-25%] ☐ / 2 day [P2-50%] ☐
Phone:	250-641-4141	☐ 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 below will appear on the final report~~	Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX	Date and Time Required for all E&P TATs:
Street:	4545 Lazelle Avenue	Email 1 or Fax hshinton@rdks.bc.ca	For tests that can not be performed according to the service level selected, you will be contacted.
City/Province:	Terrace/BC	Email 2 nveikle@rdks.bc.ca;	
Postal Code:	V8G4E1	Email 3 eblaney@rdks.bc.ca	

Invoice To	Same as Report To ☐ YES ☑ NO	Invoice Distribution
	Copy of Invoice with Report ☑ YES ☐ NO	Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
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 #:	Forceman Facilty Sand Cyclone	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 and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Total Metals (P)	Alkalinity / Conductivity	Chloride, Fluoride	Total Nitrogen	Sulphate	Hardness	Ammonia (P)	Nitrate	Nitrite	TOC (P)	Orthophosphorus	COD (P)	BOD	pH	Total Kjeldahl Nitrogen (P)	SAMPLES ON HOLD	Sample is hazardous (please provide further detail)	NUMBER OF CONTAINERS
	F5 - sand cyclone	30 Aug 21	10:22	Effluent	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			
	DUP	30 Aug 21	12:00	Effluent	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			
	Field Blank	30 Aug 21	10:55	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			
	Travel Blank			Water		R				R	R				R			R				
	Sand Filter	30 Aug 21	9:53	Effluent	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			

Environmental Division Vancouver
Work Order Reference
VA21B8594

Telephone : +1 604 253 4188

Terrace Shipping
#1 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			
				5			

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Hannah Shinton	Date: August 30th, 2021	Time:	Received by:	Date: Aug 30/21	Time: 12:05	Received by: TC	Date: AUG 30 2021	Time: 9 15

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	: **VA21C4924**	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	: Foreceman Ridge Groundwater	Date Samples Received	: 05-Nov-2021 21:20
PO	: ----	Date Analysis Commenced	: 12-Nov-2021
C-O-C number	: ----	Issue Date	: 22-Nov-2021 13:05
Sampler	: Hannah Shinton		
Site	:		
Quote number	: Q62338		
No. of samples received	: 13		
No. of samples analysed	: 13		

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*
Cindy Tang	Team Leader - Inorganics	Inorganics, 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
Saron Kim	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.

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	MW-2	MW-13	MW-01	MW-03	MW-04
					Client sampling date / time	03-Nov-2021 13:09	03-Nov-2021 12:15	04-Nov-2021 11:25	04-Nov-2021 13:20	03-Nov-2021 09:31
						VA21C4924-001	VA21C4924-002	VA21C4924-003	VA21C4924-004	VA21C4924-005
						Result	Result	Result	Result	Result
Physical Tests										
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		31.4	11.3	14.9	66.0	44.3
conductivity	----	E100	2.0	µS/cm		57.2	24.1	32.8	120	69.5
hardness (as CaCO3), dissolved	----	EC100	0.60	mg/L		23.1	9.39	12.2	55.6	27.1
pH	----	E108	0.10	pH units		6.66	6.50	6.50	7.96	8.10
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		0.0066	<0.0050	<0.0050	<0.0050	0.0292
bromide	24959-67-9	E235.Br-L	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	<0.050
chloride	16887-00-6	E235.Cl	0.50	mg/L		<0.50	<0.50	<0.50	<0.50	<0.50
fluoride	16984-48-8	E235.F	0.020	mg/L		0.023	0.029	0.044	0.056	0.083
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L		0.180	0.084	0.072	<0.050	0.178
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		0.369	0.0778	0.176	0.0338	0.0316
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		0.82	0.65	1.14	1.33	1.13
Organic / Inorganic Carbon										
carbon, total organic [TOC]	----	E355-L	0.50	mg/L		9.16	2.13	3.49	1.06	6.71
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L		0.0038	0.0294	0.0035	0.0028	0.0143
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	<0.00010	<0.00010	0.00113	<0.00010
barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.0108	0.0148	0.00398	0.00980	0.00629
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	<0.010	<0.010	<0.010	<0.010
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L		0.0000198	0.0000842	0.0000175	<0.0000050	0.0000168
calcium, dissolved	7440-70-2	E421	0.050	mg/L		7.87	3.28	4.26	20.1	9.40
cesium, dissolved	7440-46-2	E421	0.000010	mg/L		<0.000010	<0.000010	<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		0.00024	0.00012	<0.00010	<0.00010	<0.00010
copper, dissolved	7440-50-8	E421	0.00020	mg/L		0.00234	0.00038	0.00067	0.00113	0.00088
iron, dissolved	7439-89-6	E421	0.010	mg/L		0.072	0.011	<0.010	<0.010	0.819

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	MW-2	MW-13	MW-01	MW-03	MW-04
					Client sampling date / time	03-Nov-2021 13:09	03-Nov-2021 12:15	04-Nov-2021 11:25	04-Nov-2021 13:20	03-Nov-2021 09:31
						VA21C4924-001	VA21C4924-002	VA21C4924-003	VA21C4924-004	VA21C4924-005
						Result	Result	Result	Result	Result
Dissolved Metals										
lead, dissolved	7439-92-1	E421	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	0.000090
lithium, dissolved	7439-93-2	E421	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L		0.843	0.291	0.393	1.31	0.884
manganese, dissolved	7439-96-5	E421	0.00010	mg/L		0.0456	0.00235	0.00123	0.00328	0.0129
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		<0.000050	<0.000050	<0.000050	0.000054	0.000051
nickel, dissolved	7440-02-0	E421	0.00050	mg/L		0.00053	<0.00050	<0.00050	<0.00050	<0.00050
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	<0.050
potassium, dissolved	7440-09-7	E421	0.050	mg/L		0.423	0.239	0.245	0.522	0.893
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L		0.00050	0.00050	0.00034	0.00030	0.00024
selenium, dissolved	7782-49-2	E421	0.000050	mg/L		<0.000050	<0.000050	0.000066	0.000084	<0.000050
silicon, dissolved	7440-21-3	E421	0.050	mg/L		5.83	2.90	5.05	4.98	1.96
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		1.85	0.920	1.37	1.67	1.89
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		0.0635	0.0409	0.0408	0.0801	0.0603
sulfur, dissolved	7704-34-9	E421	0.50	mg/L		<0.50	<0.50	<0.50	<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	<0.000010	<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	0.00012
titanium, dissolved	7440-32-6	E421	0.00030	mg/L		<0.00030	0.00038	<0.00030	<0.00030	0.00034
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	0.00013	<0.00010
uranium, dissolved	7440-61-1	E421	0.000010	mg/L		<0.000010	0.000074	<0.000010	0.000020	<0.000010
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		<0.00050	<0.00050	<0.00050	0.00098	<0.00050
zinc, dissolved	7440-66-6	E421	0.0010	mg/L		0.0037	0.0033	<0.0010	0.0035	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		41	<20	<20	<20	81

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	MW-07	MW-08	MW-09	MW-15	MW-16
					Client sampling date / time	03-Nov-2021 14:34	03-Nov-2021 15:15	03-Nov-2021 10:39	04-Nov-2021 14:03	04-Nov-2021 15:21
						VA21C4924-006	VA21C4924-007	VA21C4924-008	VA21C4924-009	VA21C4924-010
						Result	Result	Result	Result	Result
Physical Tests										
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		31.6	20.4	37.5	266	111
conductivity	----	E100	2.0	µS/cm		60.9	38.1	76.3	490	202
hardness (as CaCO3), dissolved	----	EC100	0.60	mg/L		26.3	13.7	17.9	243	100
pH	----	E108	0.10	pH units		7.87	6.89	7.02	7.84	8.03
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
bromide	24959-67-9	E235.Br-L	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	<0.050
chloride	16887-00-6	E235.Cl	0.50	mg/L		<0.50	0.57	2.07	13.7	2.03
fluoride	16984-48-8	E235.F	0.020	mg/L		0.033	0.031	0.039	<0.020	0.031
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L		<0.050	<0.050	<0.050	0.190	0.056
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		0.0099	0.0628	0.0373	1.06	0.287
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		1.24	0.52	1.07	1.80	1.38
Organic / Inorganic Carbon										
carbon, total organic [TOC]	----	E355-L	0.50	mg/L		1.48	1.23	1.98	1.39	1.12
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L		0.0139	0.0018	0.0266	<0.0010	0.0030
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		0.00097	0.00013	0.00038	0.00034	0.00048
barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.00664	0.00450	0.00650	0.0643	0.0213
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	<0.010	<0.010	<0.010	<0.010
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L		<0.0000050	0.0000169	0.0000114	<0.0000050	0.0000050
calcium, dissolved	7440-70-2	E421	0.050	mg/L		9.98	4.85	6.18	88.8	37.0
cesium, dissolved	7440-46-2	E421	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
chromium, dissolved	7440-47-3	E421	0.00050	mg/L		<0.00050	<0.00050	0.00052	0.00055	<0.00050
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L		<0.00010	<0.00010	0.00010	<0.00010	<0.00010
copper, dissolved	7440-50-8	E421	0.00020	mg/L		0.00126	0.00036	0.00038	0.00032	<0.00020
iron, dissolved	7439-89-6	E421	0.010	mg/L		0.012	<0.010	0.054	<0.010	<0.010
lead, dissolved	7439-92-1	E421	0.000050	mg/L		0.000067	<0.000050	0.000066	<0.000050	<0.000050

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	MW-07	MW-08	MW-09	MW-15	MW-16
					Client sampling date / time	03-Nov-2021 14:34	03-Nov-2021 15:15	03-Nov-2021 10:39	04-Nov-2021 14:03	04-Nov-2021 15:21
						VA21C4924-006	VA21C4924-007	VA21C4924-008	VA21C4924-009	VA21C4924-010
						Result	Result	Result	Result	Result
Dissolved Metals										
lithium, dissolved	7439-93-2	E421	0.0010	mg/L		<0.0010	<0.0010	<0.0010	0.0033	0.0010
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L		0.345	0.390	0.592	5.15	1.91
manganese, dissolved	7439-96-5	E421	0.00010	mg/L		0.00085	0.00098	0.00765	0.00025	0.00067
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		0.000188	<0.000050	<0.000050	<0.000050	<0.000050
nickel, dissolved	7440-02-0	E421	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	<0.050
potassium, dissolved	7440-09-7	E421	0.050	mg/L		0.348	0.252	0.416	1.09	0.683
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L		<0.00020	0.00032	0.00022	0.00043	0.00038
selenium, dissolved	7782-49-2	E421	0.000050	mg/L		0.000052	0.000065	0.000057	0.000090	0.000052
silicon, dissolved	7440-21-3	E421	0.050	mg/L		4.02	6.11	4.57	7.88	5.70
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		1.19	1.90	8.97	2.97	1.92
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		0.0322	0.0473	0.0332	0.332	0.137
sulfur, dissolved	7704-34-9	E421	0.50	mg/L		<0.50	<0.50	<0.50	<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	<0.000010	<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		<0.00030	<0.00030	0.00132	<0.00030	<0.00030
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		0.000018	<0.000010	<0.000010	0.000044	0.000040
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		0.00088	<0.00050	<0.00050	<0.00050	0.00058
zinc, dissolved	7440-66-6	E421	0.0010	mg/L		0.0015	<0.0010	<0.0010	<0.0010	<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	<20	<20	<20	<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: DUP	Field Blank	Travel Blank	----	----
					Client sampling date / time: 03-Nov-2021 12:00	03-Nov-2021 14:30	04-Nov-2021	----	----
					VA21C4924-011	VA21C4924-012	VA21C4924-013	--------	--------
					Result	Result	Result	----	----
Physical Tests									
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	32.5	<1.0	<1.0	----	----
conductivity	----	E100	2.0	µS/cm	58.5	<2.0	<2.0	----	----
hardness (as CaCO3), dissolved	----	EC100	0.60	mg/L	24.2	<0.60	<0.60	----	----
pH	----	E108	0.10	pH units	6.54	5.37	5.41	----	----
Anions and Nutrients									
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0055	<0.0050	<0.0050	----	----
bromide	24959-67-9	E235.Br-L	0.050	mg/L	<0.050	----	----	----	----
chloride	16887-00-6	E235.Cl	0.50	mg/L	<0.50	----	----	----	----
fluoride	16984-48-8	E235.F	0.020	mg/L	0.022	----	----	----	----
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	0.139	----	----	----	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.371	<0.0050	<0.0050	----	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0010	----	----	----	----
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	0.82	----	----	----	----
Organic / Inorganic Carbon									
carbon, total organic [TOC]	----	E355-L	0.50	mg/L	7.24	----	----	----	----
Dissolved Metals									
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0035	<0.0010	<0.0010	----	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	----	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.00964	<0.00010	<0.00010	----	----
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<0.000100	<0.000100	----	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	<0.000050	----	----
boron, dissolved	7440-42-8	E421	0.010	mg/L	<0.010	<0.010	<0.010	----	----
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.0000251	<0.0000050	<0.0000050	----	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L	8.29	<0.050	<0.050	----	----
cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.000010	<0.000010	<0.000010	----	----
chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	<0.00050	----	----
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	0.00025	<0.00010	<0.00010	----	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00037	<0.00020	<0.00020	----	----
iron, dissolved	7439-89-6	E421	0.010	mg/L	0.054	<0.010	<0.010	----	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	<0.000050	----	----

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	DUP	Field Blank	Travel Blank	----	----
					Client sampling date / time	03-Nov-2021 12:00	03-Nov-2021 14:30	04-Nov-2021	----	----
Analyte	CAS Number	Method	LOR	Unit		VA21C4924-011	VA21C4924-012	VA21C4924-013	--------	--------
						Result	Result	Result	----	----
Dissolved Metals										
lithium, dissolved	7439-93-2	E421	0.0010	mg/L		<0.0010	<0.0010	<0.0010	----	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L		0.853	<0.0050	<0.0050	----	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L		0.0469	<0.00010	<0.00010	----	----
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L		<0.0000050	<0.0000050	<0.0000050	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		<0.000050	<0.000050	<0.000050	----	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L		0.00050	<0.00050	<0.00050	----	----
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L		<0.050	<0.050	<0.050	----	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L		0.436	<0.050	<0.050	----	----
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L		0.00047	<0.00020	<0.00020	----	----
selenium, dissolved	7782-49-2	E421	0.000050	mg/L		<0.000050	<0.000050	<0.000050	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L		5.96	<0.050	<0.050	----	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L		<0.000010	<0.000010	<0.000010	----	----
sodium, dissolved	17341-25-2	E421	0.050	mg/L		1.84	<0.050	<0.050	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		0.0670	<0.00020	<0.00020	----	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L		<0.50	<0.50	<0.50	----	----
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L		<0.00020	<0.00020	<0.00020	----	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L		<0.000010	<0.000010	<0.000010	----	----
thorium, dissolved	7440-29-1	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	----	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	----	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L		<0.00030	<0.00030	<0.00030	----	----
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L		<0.000010	<0.000010	<0.000010	----	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		<0.00050	<0.00050	<0.00050	----	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L		<0.0010	<0.0010	<0.0010	----	----
zirconium, dissolved	7440-67-7	E421	0.00020	mg/L		<0.00020	<0.00020	<0.00020	----	----
dissolved mercury filtration location	----	EP509	-	-		Field	Field	Field	----	----
dissolved metals filtration location	----	EP421	-	-		Field	Field	Field	----	----
Aggregate Organics										
chemical oxygen demand [COD]	----	E559	20	mg/L		39	----	----	----	----

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA21C4924**	Page	: 1 of 27
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	: Foreceman Ridge Groundwater	Date Samples Received	: 05-Nov-2021 21:20
PO	: ----	Issue Date	: 22-Nov-2021 13:05
C-O-C number	: ----		
Sampler	: Hannah Shinton		
Site	:		
Quote number	: Q62338		
No. of samples received	: 13		
No. of samples analysed	: 13		

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)										
MW-01	E559	04-Nov-2021	----	----	----		17-Nov-2021	28 days	13 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
MW-03	E559	04-Nov-2021	----	----	----		17-Nov-2021	28 days	13 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
MW-15	E559	04-Nov-2021	----	----	----		17-Nov-2021	28 days	13 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
MW-16	E559	04-Nov-2021	----	----	----		17-Nov-2021	28 days	13 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
DUP	E559	03-Nov-2021	----	----	----		17-Nov-2021	28 days	14 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
MW-04	E559	03-Nov-2021	----	----	----		17-Nov-2021	28 days	14 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
MW-07	E559	03-Nov-2021	----	----	----		17-Nov-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
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
MW-08	E559	03-Nov-2021	----	----	----		17-Nov-2021	28 days	14 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
MW-09	E559	03-Nov-2021	----	----	----		17-Nov-2021	28 days	14 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
MW-13	E559	03-Nov-2021	----	----	----		17-Nov-2021	28 days	14 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
MW-2	E559	03-Nov-2021	----	----	----		17-Nov-2021	28 days	14 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
MW-01	E298	04-Nov-2021	16-Nov-2021	----	----		17-Nov-2021	28 days	13 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
MW-03	E298	04-Nov-2021	16-Nov-2021	----	----		17-Nov-2021	28 days	13 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
MW-15	E298	04-Nov-2021	16-Nov-2021	----	----		17-Nov-2021	28 days	13 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
MW-16	E298	04-Nov-2021	16-Nov-2021	----	----		17-Nov-2021	28 days	13 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
Travel Blank	E298	04-Nov-2021	16-Nov-2021	----	----		17-Nov-2021	28 days	13 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) DUP	E298	03-Nov-2021	16-Nov-2021	----	----		17-Nov-2021	28 days	14 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) Field Blank	E298	03-Nov-2021	16-Nov-2021	----	----		17-Nov-2021	28 days	14 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) MW-04	E298	03-Nov-2021	16-Nov-2021	----	----		17-Nov-2021	28 days	14 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) MW-07	E298	03-Nov-2021	16-Nov-2021	----	----		17-Nov-2021	28 days	14 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) MW-08	E298	03-Nov-2021	16-Nov-2021	----	----		17-Nov-2021	28 days	14 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) MW-09	E298	03-Nov-2021	16-Nov-2021	----	----		17-Nov-2021	28 days	14 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) MW-13	E298	03-Nov-2021	16-Nov-2021	----	----		17-Nov-2021	28 days	14 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) MW-2	E298	03-Nov-2021	16-Nov-2021	----	----		17-Nov-2021	28 days	14 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE DUP	E235.Br-L	03-Nov-2021	----	----	----		13-Nov-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
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE MW-04	E235.Br-L	03-Nov-2021	----	----	----		13-Nov-2021	28 days	10 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE MW-07	E235.Br-L	03-Nov-2021	----	----	----		13-Nov-2021	28 days	10 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE MW-08	E235.Br-L	03-Nov-2021	----	----	----		13-Nov-2021	28 days	10 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE MW-09	E235.Br-L	03-Nov-2021	----	----	----		13-Nov-2021	28 days	10 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE MW-13	E235.Br-L	03-Nov-2021	----	----	----		13-Nov-2021	28 days	10 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE MW-2	E235.Br-L	03-Nov-2021	----	----	----		13-Nov-2021	28 days	10 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE MW-01	E235.Br-L	04-Nov-2021	----	----	----		13-Nov-2021	28 days	9 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE MW-03	E235.Br-L	04-Nov-2021	----	----	----		13-Nov-2021	28 days	9 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE MW-15	E235.Br-L	04-Nov-2021	----	----	----		13-Nov-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 : Bromide in Water by IC (Low Level)										
HDPE										
MW-16	E235.Br-L	04-Nov-2021	----	----	----		13-Nov-2021	28 days	9 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
DUP	E235.Cl	03-Nov-2021	----	----	----		13-Nov-2021	28 days	10 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
MW-04	E235.Cl	03-Nov-2021	----	----	----		13-Nov-2021	28 days	10 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
MW-07	E235.Cl	03-Nov-2021	----	----	----		13-Nov-2021	28 days	10 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
MW-08	E235.Cl	03-Nov-2021	----	----	----		13-Nov-2021	28 days	10 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
MW-09	E235.Cl	03-Nov-2021	----	----	----		13-Nov-2021	28 days	10 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
MW-13	E235.Cl	03-Nov-2021	----	----	----		13-Nov-2021	28 days	10 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
MW-2	E235.Cl	03-Nov-2021	----	----	----		13-Nov-2021	28 days	10 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
MW-01	E235.Cl	04-Nov-2021	----	----	----		13-Nov-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 : Chloride in Water by IC										
HDPE MW-03	E235.Cl	04-Nov-2021	----	----	----		13-Nov-2021	28 days	9 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE MW-15	E235.Cl	04-Nov-2021	----	----	----		13-Nov-2021	28 days	9 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE MW-16	E235.Cl	04-Nov-2021	----	----	----		13-Nov-2021	28 days	9 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE DUP	E235.F	03-Nov-2021	----	----	----		13-Nov-2021	28 days	10 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE MW-04	E235.F	03-Nov-2021	----	----	----		13-Nov-2021	28 days	10 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE MW-07	E235.F	03-Nov-2021	----	----	----		13-Nov-2021	28 days	10 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE MW-08	E235.F	03-Nov-2021	----	----	----		13-Nov-2021	28 days	10 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE MW-09	E235.F	03-Nov-2021	----	----	----		13-Nov-2021	28 days	10 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE MW-13	E235.F	03-Nov-2021	----	----	----		13-Nov-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
Anions and Nutrients : Fluoride in Water by IC										
HDPE MW-2	E235.F	03-Nov-2021	----	----	----		13-Nov-2021	28 days	10 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE MW-01	E235.F	04-Nov-2021	----	----	----		13-Nov-2021	28 days	9 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE MW-03	E235.F	04-Nov-2021	----	----	----		13-Nov-2021	28 days	9 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE MW-15	E235.F	04-Nov-2021	----	----	----		13-Nov-2021	28 days	9 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE MW-16	E235.F	04-Nov-2021	----	----	----		13-Nov-2021	28 days	9 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE DUP	E235.NO3-L	03-Nov-2021	----	----	----		13-Nov-2021	3 days	10 days	× EHTL
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE Field Blank	E235.NO3-L	03-Nov-2021	----	----	----		13-Nov-2021	3 days	10 days	× EHTL
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE MW-04	E235.NO3-L	03-Nov-2021	----	----	----		13-Nov-2021	3 days	10 days	× EHTL
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE MW-07	E235.NO3-L	03-Nov-2021	----	----	----		13-Nov-2021	3 days	10 days	× EHTL

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 MW-08	E235.NO3-L	03-Nov-2021	----	----	----		13-Nov-2021	3 days	10 days	× EHTL
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE MW-09	E235.NO3-L	03-Nov-2021	----	----	----		13-Nov-2021	3 days	10 days	× EHTL
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE MW-13	E235.NO3-L	03-Nov-2021	----	----	----		13-Nov-2021	3 days	10 days	× EHTL
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE MW-2	E235.NO3-L	03-Nov-2021	----	----	----		13-Nov-2021	3 days	10 days	× EHTL
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE MW-01	E235.NO3-L	04-Nov-2021	----	----	----		13-Nov-2021	3 days	9 days	× EHT
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE MW-03	E235.NO3-L	04-Nov-2021	----	----	----		13-Nov-2021	3 days	9 days	× EHT
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE MW-15	E235.NO3-L	04-Nov-2021	----	----	----		13-Nov-2021	3 days	9 days	× EHT
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE MW-16	E235.NO3-L	04-Nov-2021	----	----	----		13-Nov-2021	3 days	9 days	× EHT
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE Travel Blank	E235.NO3-L	04-Nov-2021	----	----	----		13-Nov-2021	3 days	9 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 DUP	E235.NO2-L	03-Nov-2021	----	----	----		13-Nov-2021	3 days	10 days	× EHTL
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE MW-04	E235.NO2-L	03-Nov-2021	----	----	----		13-Nov-2021	3 days	10 days	× EHTL
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE MW-07	E235.NO2-L	03-Nov-2021	----	----	----		13-Nov-2021	3 days	10 days	× EHTL
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE MW-08	E235.NO2-L	03-Nov-2021	----	----	----		13-Nov-2021	3 days	10 days	× EHTL
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE MW-09	E235.NO2-L	03-Nov-2021	----	----	----		13-Nov-2021	3 days	10 days	× EHTL
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE MW-13	E235.NO2-L	03-Nov-2021	----	----	----		13-Nov-2021	3 days	10 days	× EHTL
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE MW-2	E235.NO2-L	03-Nov-2021	----	----	----		13-Nov-2021	3 days	10 days	× EHTL
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE MW-01	E235.NO2-L	04-Nov-2021	----	----	----		13-Nov-2021	3 days	9 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE MW-03	E235.NO2-L	04-Nov-2021	----	----	----		13-Nov-2021	3 days	9 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 MW-15	E235.NO2-L	04-Nov-2021	----	----	----		13-Nov-2021	3 days	9 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE MW-16	E235.NO2-L	04-Nov-2021	----	----	----		13-Nov-2021	3 days	9 days	× EHT
Anions and Nutrients : Sulfate in Water by IC										
HDPE DUP	E235.SO4	03-Nov-2021	----	----	----		13-Nov-2021	28 days	10 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE MW-04	E235.SO4	03-Nov-2021	----	----	----		13-Nov-2021	28 days	10 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE MW-07	E235.SO4	03-Nov-2021	----	----	----		13-Nov-2021	28 days	10 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE MW-08	E235.SO4	03-Nov-2021	----	----	----		13-Nov-2021	28 days	10 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE MW-09	E235.SO4	03-Nov-2021	----	----	----		13-Nov-2021	28 days	10 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE MW-13	E235.SO4	03-Nov-2021	----	----	----		13-Nov-2021	28 days	10 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE MW-2	E235.SO4	03-Nov-2021	----	----	----		13-Nov-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
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
MW-01	E235.SO4	04-Nov-2021	----	----	----		13-Nov-2021	28 days	9 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
MW-03	E235.SO4	04-Nov-2021	----	----	----		13-Nov-2021	28 days	9 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
MW-15	E235.SO4	04-Nov-2021	----	----	----		13-Nov-2021	28 days	9 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
MW-16	E235.SO4	04-Nov-2021	----	----	----		13-Nov-2021	28 days	9 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
MW-01	E318	04-Nov-2021	16-Nov-2021	----	----		19-Nov-2021	28 days	15 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
MW-03	E318	04-Nov-2021	16-Nov-2021	----	----		19-Nov-2021	28 days	15 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
MW-15	E318	04-Nov-2021	16-Nov-2021	----	----		19-Nov-2021	28 days	15 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
MW-16	E318	04-Nov-2021	16-Nov-2021	----	----		19-Nov-2021	28 days	15 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
DUP	E318	03-Nov-2021	16-Nov-2021	----	----		19-Nov-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 Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
MW-04	E318	03-Nov-2021	16-Nov-2021	----	----		19-Nov-2021	28 days	16 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
MW-07	E318	03-Nov-2021	16-Nov-2021	----	----		19-Nov-2021	28 days	16 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
MW-08	E318	03-Nov-2021	16-Nov-2021	----	----		19-Nov-2021	28 days	16 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
MW-09	E318	03-Nov-2021	16-Nov-2021	----	----		19-Nov-2021	28 days	16 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
MW-13	E318	03-Nov-2021	16-Nov-2021	----	----		19-Nov-2021	28 days	16 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
MW-2	E318	03-Nov-2021	16-Nov-2021	----	----		19-Nov-2021	28 days	16 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
DUP	E509	03-Nov-2021	13-Nov-2021	----	----		13-Nov-2021	28 days	10 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
Field Blank	E509	03-Nov-2021	13-Nov-2021	----	----		13-Nov-2021	28 days	10 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
MW-04	E509	03-Nov-2021	13-Nov-2021	----	----		13-Nov-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
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
MW-07	E509	03-Nov-2021	13-Nov-2021	----	----		13-Nov-2021	28 days	10 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
MW-08	E509	03-Nov-2021	13-Nov-2021	----	----		13-Nov-2021	28 days	10 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
MW-09	E509	03-Nov-2021	13-Nov-2021	----	----		13-Nov-2021	28 days	10 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
MW-13	E509	03-Nov-2021	13-Nov-2021	----	----		13-Nov-2021	28 days	10 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
MW-2	E509	03-Nov-2021	13-Nov-2021	----	----		13-Nov-2021	28 days	10 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
MW-01	E509	04-Nov-2021	13-Nov-2021	----	----		13-Nov-2021	28 days	9 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
MW-03	E509	04-Nov-2021	13-Nov-2021	----	----		13-Nov-2021	28 days	9 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
MW-15	E509	04-Nov-2021	13-Nov-2021	----	----		13-Nov-2021	28 days	9 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
MW-16	E509	04-Nov-2021	13-Nov-2021	----	----		13-Nov-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) Travel Blank	E509	04-Nov-2021	13-Nov-2021	----	----		13-Nov-2021	28 days	9 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) MW-01	E421	04-Nov-2021	16-Nov-2021	----	----		16-Nov-2021	180 days	12 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) MW-03	E421	04-Nov-2021	16-Nov-2021	----	----		16-Nov-2021	180 days	12 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) MW-15	E421	04-Nov-2021	16-Nov-2021	----	----		16-Nov-2021	180 days	12 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) MW-16	E421	04-Nov-2021	16-Nov-2021	----	----		16-Nov-2021	180 days	12 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) Travel Blank	E421	04-Nov-2021	16-Nov-2021	----	----		16-Nov-2021	180 days	12 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) DUP	E421	03-Nov-2021	16-Nov-2021	----	----		16-Nov-2021	180 days	13 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) Field Blank	E421	03-Nov-2021	16-Nov-2021	----	----		16-Nov-2021	180 days	13 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) MW-04	E421	03-Nov-2021	16-Nov-2021	----	----		16-Nov-2021	180 days	13 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) MW-07	E421	03-Nov-2021	16-Nov-2021	----	----		16-Nov-2021	180 days	13 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) MW-08	E421	03-Nov-2021	16-Nov-2021	----	----		16-Nov-2021	180 days	13 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) MW-09	E421	03-Nov-2021	16-Nov-2021	----	----		16-Nov-2021	180 days	13 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) MW-13	E421	03-Nov-2021	16-Nov-2021	----	----		16-Nov-2021	180 days	13 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) MW-2	E421	03-Nov-2021	16-Nov-2021	----	----		16-Nov-2021	180 days	13 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) MW-01	E355-L	04-Nov-2021	16-Nov-2021	----	----		16-Nov-2021	28 days	12 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) MW-03	E355-L	04-Nov-2021	16-Nov-2021	----	----		16-Nov-2021	28 days	12 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) MW-15	E355-L	04-Nov-2021	16-Nov-2021	----	----		16-Nov-2021	28 days	12 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) MW-16	E355-L	04-Nov-2021	16-Nov-2021	----	----		16-Nov-2021	28 days	12 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
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) DUP	E355-L	03-Nov-2021	16-Nov-2021	----	----		16-Nov-2021	28 days	13 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) MW-04	E355-L	03-Nov-2021	16-Nov-2021	----	----		16-Nov-2021	28 days	13 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) MW-07	E355-L	03-Nov-2021	16-Nov-2021	----	----		16-Nov-2021	28 days	13 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) MW-08	E355-L	03-Nov-2021	16-Nov-2021	----	----		16-Nov-2021	28 days	13 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) MW-09	E355-L	03-Nov-2021	16-Nov-2021	----	----		16-Nov-2021	28 days	13 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) MW-13	E355-L	03-Nov-2021	16-Nov-2021	----	----		16-Nov-2021	28 days	13 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) MW-2	E355-L	03-Nov-2021	16-Nov-2021	----	----		16-Nov-2021	28 days	13 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE MW-01	E290	04-Nov-2021	----	----	----		12-Nov-2021	14 days	8 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE MW-03	E290	04-Nov-2021	----	----	----		12-Nov-2021	14 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
Physical Tests : Alkalinity Species by Titration										
HDPE MW-15	E290	04-Nov-2021	----	----	----		12-Nov-2021	14 days	8 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE MW-16	E290	04-Nov-2021	----	----	----		12-Nov-2021	14 days	8 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE Travel Blank	E290	04-Nov-2021	----	----	----		12-Nov-2021	14 days	8 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE DUP	E290	03-Nov-2021	----	----	----		12-Nov-2021	14 days	9 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE Field Blank	E290	03-Nov-2021	----	----	----		12-Nov-2021	14 days	9 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE MW-04	E290	03-Nov-2021	----	----	----		12-Nov-2021	14 days	9 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE MW-07	E290	03-Nov-2021	----	----	----		12-Nov-2021	14 days	9 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE MW-08	E290	03-Nov-2021	----	----	----		12-Nov-2021	14 days	9 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE MW-09	E290	03-Nov-2021	----	----	----		12-Nov-2021	14 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
Physical Tests : Alkalinity Species by Titration										
HDPE										
MW-13	E290	03-Nov-2021	----	----	----		12-Nov-2021	14 days	9 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
MW-2	E290	03-Nov-2021	----	----	----		12-Nov-2021	14 days	9 days	✓
Physical Tests : Conductivity in Water										
HDPE										
MW-01	E100	04-Nov-2021	----	----	----		12-Nov-2021	28 days	8 days	✓
Physical Tests : Conductivity in Water										
HDPE										
MW-03	E100	04-Nov-2021	----	----	----		12-Nov-2021	28 days	8 days	✓
Physical Tests : Conductivity in Water										
HDPE										
MW-15	E100	04-Nov-2021	----	----	----		12-Nov-2021	28 days	8 days	✓
Physical Tests : Conductivity in Water										
HDPE										
MW-16	E100	04-Nov-2021	----	----	----		12-Nov-2021	28 days	8 days	✓
Physical Tests : Conductivity in Water										
HDPE										
Travel Blank	E100	04-Nov-2021	----	----	----		12-Nov-2021	28 days	8 days	✓
Physical Tests : Conductivity in Water										
HDPE										
DUP	E100	03-Nov-2021	----	----	----		12-Nov-2021	28 days	9 days	✓
Physical Tests : Conductivity in Water										
HDPE										
Field Blank	E100	03-Nov-2021	----	----	----		12-Nov-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
Physical Tests : Conductivity in Water										
HDPE MW-04	E100	03-Nov-2021	----	----	----		12-Nov-2021	28 days	9 days	✓
Physical Tests : Conductivity in Water										
HDPE MW-07	E100	03-Nov-2021	----	----	----		12-Nov-2021	28 days	9 days	✓
Physical Tests : Conductivity in Water										
HDPE MW-08	E100	03-Nov-2021	----	----	----		12-Nov-2021	28 days	9 days	✓
Physical Tests : Conductivity in Water										
HDPE MW-09	E100	03-Nov-2021	----	----	----		12-Nov-2021	28 days	9 days	✓
Physical Tests : Conductivity in Water										
HDPE MW-13	E100	03-Nov-2021	----	----	----		12-Nov-2021	28 days	9 days	✓
Physical Tests : Conductivity in Water										
HDPE MW-2	E100	03-Nov-2021	----	----	----		12-Nov-2021	28 days	9 days	✓
Physical Tests : pH by Meter										
HDPE MW-16	E108	04-Nov-2021	----	----	----		12-Nov-2021	0.25 hrs	192 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE Travel Blank	E108	04-Nov-2021	----	----	----		12-Nov-2021	0.25 hrs	192 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE MW-15	E108	04-Nov-2021	----	----	----		12-Nov-2021	0.25 hrs	193 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 MW-03	E108	04-Nov-2021	----	----	----		12-Nov-2021	0.25 hrs	194 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE MW-01	E108	04-Nov-2021	----	----	----		12-Nov-2021	0.25 hrs	195 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE Field Blank	E108	03-Nov-2021	----	----	----		12-Nov-2021	0.25 hrs	216 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE MW-07	E108	03-Nov-2021	----	----	----		12-Nov-2021	0.25 hrs	216 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE MW-08	E108	03-Nov-2021	----	----	----		12-Nov-2021	0.25 hrs	216 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE MW-2	E108	03-Nov-2021	----	----	----		12-Nov-2021	0.25 hrs	218 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE DUP	E108	03-Nov-2021	----	----	----		12-Nov-2021	0.25 hrs	219 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE MW-13	E108	03-Nov-2021	----	----	----		12-Nov-2021	0.25 hrs	219 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE MW-09	E108	03-Nov-2021	----	----	----		12-Nov-2021	0.25 hrs	220 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										
MW-04	E108	03-Nov-2021	----	----	----		12-Nov-2021	0.25 hrs	221 hrs	× EHTR-FM

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.

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	343196	1	13	7.6	5.0	✓
Ammonia by Fluorescence	E298	345803	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	343200	1	11	9.0	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	346433	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	343199	1	11	9.0	5.0	✓
Conductivity in Water	E100	343197	1	13	7.6	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	344405	2	26	7.6	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	345962	1	15	6.6	5.0	✓
Fluoride in Water by IC	E235.F	343198	1	11	9.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	343201	1	13	7.6	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	343202	1	11	9.0	5.0	✓
pH by Meter	E108	343195	1	13	7.6	5.0	✓
Sulfate in Water by IC	E235.SO4	343203	1	11	9.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	345801	1	11	9.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	345802	1	17	5.8	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	343196	1	13	7.6	5.0	✓
Ammonia by Fluorescence	E298	345803	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	343200	1	11	9.0	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	346433	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	343199	1	11	9.0	5.0	✓
Conductivity in Water	E100	343197	1	13	7.6	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	344405	2	26	7.6	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	345962	1	15	6.6	5.0	✓
Fluoride in Water by IC	E235.F	343198	1	11	9.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	343201	1	13	7.6	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	343202	1	11	9.0	5.0	✓
pH by Meter	E108	343195	1	13	7.6	5.0	✓
Sulfate in Water by IC	E235.SO4	343203	1	11	9.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	345801	1	11	9.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	345802	1	17	5.8	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	343196	1	13	7.6	5.0	✓
Ammonia by Fluorescence	E298	345803	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	343200	1	11	9.0	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	346433	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	343199	1	11	9.0	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							
Conductivity in Water	E100	343197	1	13	7.6	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	344405	2	26	7.6	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	345962	1	15	6.6	5.0	✓
Fluoride in Water by IC	E235.F	343198	1	11	9.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	343201	1	13	7.6	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	343202	1	11	9.0	5.0	✓
Sulfate in Water by IC	E235.SO4	343203	1	11	9.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	345801	1	11	9.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	345802	1	17	5.8	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	345803	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	343200	1	11	9.0	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	346433	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	343199	1	11	9.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	344405	2	26	7.6	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	345962	1	15	6.6	5.0	✓
Fluoride in Water by IC	E235.F	343198	1	11	9.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	343201	1	13	7.6	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	343202	1	11	9.0	5.0	✓
Sulfate in Water by IC	E235.SO4	343203	1	11	9.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	345801	1	11	9.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	345802	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.
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.
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 Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Vancouver - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
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 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.

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.
Preparation for Total Organic Carbon by Combustion	EP355 Vancouver - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Dissolved Metals Water Filtration	EP421	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
	Vancouver - Environmental			
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	: **VA21C4924**	Page	: 1 of 13
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	: Foreceman Ridge Groundwater	Date Samples Received	: 05-Nov-2021 21:20
PO	: ----	Date Analysis Commenced	: 12-Nov-2021
C-O-C number	: ----	Issue Date	: 22-Nov-2021 13:05
Sampler	: Hannah Shinton		
Site	:		
Quote number	: Q62338		
No. of samples received	: 13		
No. of samples analysed	: 13		

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*
Cindy Tang	Team Leader - Inorganics	Inorganics, 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
Saron Kim	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: 343195)											
VA21C4924-001	MW-2	pH	----	E108	0.10	pH units	6.66	6.71	0.748%	4%	----
Physical Tests (QC Lot: 343196)											
VA21C4924-001	MW-2	alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	31.4	30.8	1.93%	20%	----
Physical Tests (QC Lot: 343197)											
VA21C4924-001	MW-2	conductivity	----	E100	2.0	µS/cm	57.2	57.2	0.00%	10%	----
Anions and Nutrients (QC Lot: 343198)											
VA21C4924-001	MW-2	fluoride	16984-48-8	E235.F	0.020	mg/L	0.023	0.023	0.0002	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 343199)											
VA21C4924-001	MW-2	chloride	16887-00-6	E235.Cl	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 343200)											
VA21C4924-001	MW-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: 343201)											
VA21C4924-001	MW-2	nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.369	0.370	0.328%	20%	----
Anions and Nutrients (QC Lot: 343202)											
VA21C4924-001	MW-2	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: 343203)											
VA21C4924-001	MW-2	sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	0.82	0.81	0.01	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 345801)											
VA21C4924-001	MW-2	Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	0.180	0.226	0.046	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 345803)											
VA21C4924-001	MW-2	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0066	0.0063	0.0003	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 345802)											
VA21C4924-001	MW-2	carbon, total organic [TOC]	----	E355-L	1.00	mg/L	9.16	9.38	0.22	Diff <2x LOR	----
Dissolved Metals (QC Lot: 344405)											
VA21C4922-001	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 344406)											
VA21C4924-009	MW-15	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 345962)											
VA21C4924-009	MW-15	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	<0.0010	<0.0010	0	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	0.00034	0.00034	0.000002	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: 345962) - continued											
VA21C4924-009	MW-15	barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0643	0.0616	4.18%	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	<0.010	<0.010	0	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	88.8	86.3	2.88%	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	0.00055	0.00060	0.00005	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	0.00032	0.00033	0.000007	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	0.0033	0.0032	0.00010	Diff <2x LOR	----
		magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	5.15	5.24	1.81%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00025	0.00022	0.00003	Diff <2x LOR	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		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	1.09	1.08	1.62%	20%	----
		rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00043	0.00039	0.00004	Diff <2x LOR	----
		selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.000090	0.000071	0.000020	Diff <2x LOR	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	7.88	7.69	2.38%	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	2.97	2.96	0.519%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.332	0.329	0.836%	20%	----
		sulfur, dissolved	7704-34-9	E421	0.50	mg/L	<0.50	<0.50	0	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	0.000044	0.000043	0.000001	Diff <2x LOR	----
		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	<0.0010	<0.0010	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: 345962) - continued											
VA21C4924-009	MW-15	zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
Aggregate Organics (QC Lot: 346433)											
VA21C4924-002	MW-13	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: 343196)						
alkalinity, total (as CaCO3)	----	E290	1	mg/L	1.0	----
Physical Tests (QCLot: 343197)						
conductivity	----	E100	1	µS/cm	<1.0	----
Anions and Nutrients (QCLot: 343198)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 343199)						
chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 343200)						
bromide	24959-67-9	E235.Br-L	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 343201)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 343202)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 343203)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 345801)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 345803)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Organic / Inorganic Carbon (QCLot: 345802)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Dissolved Metals (QCLot: 344405)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 344406)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 345962)						
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	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 345962) - continued						
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	----
Aggregate Organics (QCLot: 346433)						
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: 343195)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 343196)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	108	85.0	115	----
Physical Tests (QCLot: 343197)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	98.1	90.0	110	----
Anions and Nutrients (QCLot: 343198)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	99.6	90.0	110	----
Anions and Nutrients (QCLot: 343199)									
chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 343200)									
bromide	24959-67-9	E235.Br-L	0.05	mg/L	0.5 mg/L	101	85.0	115	----
Anions and Nutrients (QCLot: 343201)									
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: 343202)									
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: 343203)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	103	90.0	110	----
Anions and Nutrients (QCLot: 345801)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	96.0	75.0	125	----
Anions and Nutrients (QCLot: 345803)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	97.1	85.0	115	----
Organic / Inorganic Carbon (QCLot: 345802)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	103	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	104	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	106	80.0	120	----
Dissolved Metals (QCLot: 345962)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	94.1	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	95.6	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	94.7	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	96.9	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 345962) - continued									
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	98.8	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	91.8	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	92.8	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	98.9	80.0	120	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	95.9	80.0	120	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	94.5	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	94.6	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	94.4	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	98.2	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	98.1	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	93.6	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	98.5	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	92.9	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	101	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	94.8	80.0	120	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	103	80.0	120	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	99.1	80.0	120	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	95.8	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	96.8	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	94.1	80.0	120	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	90.0	80.0	120	----
sodium, dissolved	17341-25-2	E421	0.05	mg/L	50 mg/L	99.7	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	98.6	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	92.1	80.0	120	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	96.4	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	97.9	80.0	120	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	90.5	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	94.3	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	95.0	80.0	120	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	93.6	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	99.2	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	95.8	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	94.7	80.0	120	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	94.3	80.0	120	----
Aggregate Organics (QCLot: 346433)									
chemical oxygen demand [COD]	----	E559	20	mg/L	100 mg/L	104	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: 343198)										
VA21C4924-002	MW-13	fluoride	16984-48-8	E235.F	1.05 mg/L	1 mg/L	105	75.0	125	----
Anions and Nutrients (QCLot: 343199)										
VA21C4924-002	MW-13	chloride	16887-00-6	E235.Cl	105 mg/L	100 mg/L	105	75.0	125	----
Anions and Nutrients (QCLot: 343200)										
VA21C4924-002	MW-13	bromide	24959-67-9	E235.Br-L	0.520 mg/L	0.5 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 343201)										
VA21C4924-002	MW-13	nitrate (as N)	14797-55-8	E235.NO3-L	2.63 mg/L	2.5 mg/L	105	75.0	125	----
Anions and Nutrients (QCLot: 343202)										
VA21C4924-002	MW-13	nitrite (as N)	14797-65-0	E235.NO2-L	0.513 mg/L	0.5 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 343203)										
VA21C4924-002	MW-13	sulfate (as SO4)	14808-79-8	E235.SO4	107 mg/L	100 mg/L	107	75.0	125	----
Anions and Nutrients (QCLot: 345801)										
VA21C4924-002	MW-13	Kjeldahl nitrogen, total [TKN]	----	E318	2.52 mg/L	2.5 mg/L	101	70.0	130	----
Anions and Nutrients (QCLot: 345803)										
VA21C4924-002	MW-13	ammonia, total (as N)	7664-41-7	E298	0.0966 mg/L	0.1 mg/L	96.6	75.0	125	----
Organic / Inorganic Carbon (QCLot: 345802)										
VA21C4924-002	MW-13	carbon, total organic [TOC]	----	E355-L	5.79 mg/L	5 mg/L	116	70.0	130	----
Dissolved Metals (QCLot: 344405)										
VA21C4922-002	Anonymous	mercury, dissolved	7439-97-6	E509	0.000102 mg/L	0.0001 mg/L	102	70.0	130	----
Dissolved Metals (QCLot: 344406)										
VA21C4924-010	MW-16	mercury, dissolved	7439-97-6	E509	0.0000925 mg/L	0.0001 mg/L	92.5	70.0	130	----
Dissolved Metals (QCLot: 345962)										
VA21C4924-010	MW-16	aluminum, dissolved	7429-90-5	E421	0.188 mg/L	0.2 mg/L	94.1	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.0192 mg/L	0.02 mg/L	96.0	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.0197 mg/L	0.02 mg/L	98.6	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	0.0373 mg/L	0.04 mg/L	93.2	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.00835 mg/L	0.01 mg/L	83.5	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: 345962) - continued										
VA21C4924-010	MW-16	boron, dissolved	7440-42-8	E421	0.085 mg/L	0.1 mg/L	85.0	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.00384 mg/L	0.004 mg/L	96.0	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	0.00940 mg/L	0.01 mg/L	94.0	70.0	130	----
		chromium, dissolved	7440-47-3	E421	0.0382 mg/L	0.04 mg/L	95.4	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.0189 mg/L	0.02 mg/L	94.5	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.0188 mg/L	0.02 mg/L	94.2	70.0	130	----
		iron, dissolved	7439-89-6	E421	1.94 mg/L	2 mg/L	96.9	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.0191 mg/L	0.02 mg/L	95.6	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.0911 mg/L	0.1 mg/L	91.1	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	0.0191 mg/L	0.02 mg/L	95.4	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.0194 mg/L	0.02 mg/L	97.0	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.0374 mg/L	0.04 mg/L	93.6	70.0	130	----
		phosphorus, dissolved	7723-14-0	E421	10.2 mg/L	10 mg/L	102	70.0	130	----
		potassium, dissolved	7440-09-7	E421	3.94 mg/L	4 mg/L	98.4	70.0	130	----
		rubidium, dissolved	7440-17-7	E421	0.0195 mg/L	0.02 mg/L	97.5	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.0393 mg/L	0.04 mg/L	98.3	70.0	130	----
		silicon, dissolved	7440-21-3	E421	8.37 mg/L	10 mg/L	83.7	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.00374 mg/L	0.004 mg/L	93.4	70.0	130	----
		sodium, dissolved	17341-25-2	E421	1.81 mg/L	2 mg/L	90.5	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	19.5 mg/L	20 mg/L	97.7	70.0	130	----
		tellurium, dissolved	13494-80-9	E421	0.0404 mg/L	0.04 mg/L	101	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.00367 mg/L	0.004 mg/L	91.7	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	0.0186 mg/L	0.02 mg/L	92.8	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.0386 mg/L	0.04 mg/L	96.6	70.0	130	----
		tungsten, dissolved	7440-33-7	E421	0.0184 mg/L	0.02 mg/L	92.2	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.00395 mg/L	0.004 mg/L	98.7	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.0967 mg/L	0.1 mg/L	96.7	70.0	130	----
		zinc, dissolved	7440-66-6	E421	0.398 mg/L	0.4 mg/L	99.5	70.0	130	----
		zirconium, dissolved	7440-67-7	E421	0.0400 mg/L	0.04 mg/L	100	70.0	130	----
Aggregate Organics (QCLot: 346433)										
VA21C4924-001	MW-2	chemical oxygen demand [COD]	----	E559	102 mg/L	100 mg/L	102	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 -

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Report To	Contact and company name below will appear on the final report
Company:	Regional District of Kitimat-Stikine
Contact:	Hannah Shinton
Phone:	250-641-4141
	Company address below will appear on the final report
Street:	4545 Lazelle Avenue
City/Province:	Terrace/BC
Postal Code:	V8G4E1
Invoice To	Same as Report To ☐ YES ☑ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	Regional District of Kitimat-Stikine
Contact:	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	nveikle@rdks.bc.ca
Email 2	hshinton@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
Email 2	nveikle@rdks.bc.ca

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

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

ALS Lab Work Order # (lab use only):

ALS Contact:

Sampler: H.Shinton

Environmental Division
Vancouver
Work Order Reference
VA21C4924

Telephone : +1 604 253 4188

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

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

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

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

Date and Time Required for all E&P TATs:

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

Analysis Request

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

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Dissolved metals F/P	alkalinity	chloride	fluoride P	sulphate	hardness	ammonia P	nitrate P	nitrite P	TOC P	COD P	Conductivity	pH	Total Kjedahl Nitrogen		SAMPLES ON HOLD	Sample is hazardous (please provide further detail)	NUMBER OF CONTAINERS
	MW-2	3-Nov-21	1:09	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R				
	MW-13	3-Nov-21	12:15	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R				
	MW-01	4-Nov-21	11:25	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R				
	MW-03	4-Nov-21	1:20	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R				
	MW-04	3-Nov-21	9:31	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R				
	MW-07	3-Nov-21	2:34	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R				
	MW-08	3-Nov-21	3:15	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R				
	MW-09	3-Nov-21	10:39	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R				
	MW-15	4-Nov-21	2:03	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R				
	MW-16	4-Nov-21	3:21	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R				
	DUP	3-Nov-21	12:00	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R				
	Field Blank	3-Nov-21	2:30	Water	R	R					R	R				R	R					

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

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

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

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

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

SAMPLE CONDITION AS RECEIVED (lab use only)

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

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
7.6	4.0	7.5				5	

SHIPMENT RELEASE (client use)		
Released by: Hannah Shinton	Date: November 11th, 2021	Time:

INITIAL SHIPMENT RECEPTION (lab use only)		
Received by: Chris	Date: 5 Nov 21	Time: 1235

FINAL SHIPMENT RECEPTION (lab use only)		
Received by: PD	Date: NOV 05 2021	Time: 21:20

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**.

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:	250-641-4141
	Company address below will appear on the final report
Street:	4545 Lazelle Avenue
City/Province:	Terrace/BC
Postal Code:	V8G4E1
Invoice To	Same as Report To ☐ YES ☑ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	Regional District of Kitimat-Stikine
Contact:	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	eblaney@rdks.bc.ca
Email 3	nveikle@rdks.bc.ca

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax	anne-maries@rdks.bc.ca
Email 2	nveikle@rdks.bc.ca

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

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

PRIORITY (Business Days): 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 #:	Forceman Ridge Groundwater
PO / AFE:	
LSD:	

Oil and Gas Required Fields (client use)

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

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

Analysis Request

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

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	F/P			P			P	P	P	P	P					SAMPLES ON HOLD	Sample is hazardous (please provide further detail)	NUMBER OF CONTAINERS
					Dissolved metals	alkalinity	chloride	fluoride	sulphate	hardness	ammonia	nitrate	nitrite	TOC	COD	Conductivity	pH		Total Kjedahl Nitrogen			
	Travel Blank	4-Nov-21	-	Water	R	R					R	R				R	R					
	Field Blank																					

Terrace Shipping

2 Coolers

___ Carbouys

Ground ☐

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			
						5	

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Hannah Shinton	Date: November 11th 2021	Time:	Received by:	Date:	Time:	Received by: PD	Date: NOV 05 2021	Time: 21:20

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

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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	: **VA21C5115**	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	: Foreceman Ridge Surface Water	Date Samples Received	: 09-Nov-2021 21:30
PO	: ----	Date Analysis Commenced	: 10-Nov-2021
C-O-C number	: ----	Issue Date	: 23-Nov-2021 16:48
Sampler	: H. Shinton		
Site	:		
Quote number	: Q62338		
No. of samples received	: 8		
No. of samples analysed	: 8		

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*
Caleb Deroche	Lab Analyst	Metals, Burnaby, British Columbia
Ilnaz Badbezanchi	Team Leader - Metals preparation	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
Owen Cheng		Metals, Burnaby, British Columbia
Ruby Pham	Lab Assistant	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*
DTC	*Dissolved concentration exceeds total. Results were confirmed by re-analysis.*

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SW-01	SW-02	SW-03	SW-04	SW-05
					Client sampling date / time	08-Nov-2021 12:03	08-Nov-2021 10:52	08-Nov-2021 09:57	08-Nov-2021 01:27	08-Nov-2021 12:43
						VA21C5115-001	VA21C5115-002	VA21C5115-003	VA21C5115-004	VA21C5115-005
						Result	Result	Result	Result	Result
Physical Tests										
conductivity	----	E100	2.0	µS/cm		43.6	161	157	88.7	158
hardness (as CaCO3), dissolved	----	EC100	0.60	mg/L		5.26	78.0	72.0	33.0	72.6
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L		5.46	76.3	74.4	35.8	73.6
pH	----	E108	0.10	pH units		6.70	8.11	8.08	7.78	8.09
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
bromide	24959-67-9	E235.Br-L	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	<0.050
chloride	16887-00-6	E235.Cl	0.50	mg/L		9.89	0.88	1.00	1.36	1.22
fluoride	16984-48-8	E235.F	0.020	mg/L		0.024	0.053	0.048	0.039	0.051
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L		0.133	<0.050	<0.050	<0.050	<0.050
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		0.0060	<0.0050	0.0075	<0.0050	0.0140
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		0.70	2.46	2.64	1.55	2.69
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		0.0089	0.0034	0.0040	0.0348	0.0091
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		0.00014	0.00188	0.00171	0.00221	0.00180
barium, total	7440-39-3	E420	0.00010	mg/L		0.0135	0.0233	0.0223	0.0113	0.0209
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	<0.010	<0.010	<0.010	<0.010
cadmium, total	7440-43-9	E420	0.0000050	mg/L		0.0000059	<0.0000050	<0.0000050	<0.0000050	<0.0000050
calcium, total	7440-70-2	E420	0.050	mg/L		1.80	27.2	26.5	12.9	25.9
cesium, total	7440-46-2	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
chromium, total	7440-47-3	E420	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
cobalt, total	7440-48-4	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
copper, total	7440-50-8	E420	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
iron, total	7439-89-6	E420	0.010	mg/L		0.061	<0.010	<0.010	0.063	0.011
lead, total	7439-92-1	E420	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
lithium, total	7439-93-2	E420	0.0010	mg/L		<0.0010	0.0013	0.0012	<0.0010	0.0012

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SW-01	SW-02	SW-03	SW-04	SW-05
					Client sampling date / time	08-Nov-2021 12:03	08-Nov-2021 10:52	08-Nov-2021 09:57	08-Nov-2021 01:27	08-Nov-2021 12:43
						VA21C5115-001	VA21C5115-002	VA21C5115-003	VA21C5115-004	VA21C5115-005
						Result	Result	Result	Result	Result
Total Metals										
magnesium, total	7439-95-4	E420	0.0050	mg/L		0.235	2.04	1.99	0.860	2.18
manganese, total	7439-96-5	E420	0.00010	mg/L		0.0811	0.00065	0.00087	0.0177	0.00182
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		<0.000050	0.000274	0.000289	0.000187	0.000338
nickel, total	7440-02-0	E420	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
phosphorus, total	7723-14-0	E420	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	<0.050
potassium, total	7440-09-7	E420	0.050	mg/L		0.221	0.858	0.838	0.522	0.911
rubidium, total	7440-17-7	E420	0.00020	mg/L		0.00039	0.00036	0.00032	0.00034	0.00033
selenium, total	7782-49-2	E420	0.000050	mg/L		0.000056	0.000158	0.000147	0.000087	0.000146
silicon, total	7440-21-3	E420	0.10	mg/L		0.46	5.48	5.35	4.73	5.19
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		5.45	1.87	1.88	2.74	2.08
strontium, total	7440-24-6	E420	0.00020	mg/L		0.0147	0.0969	0.0962	0.0491	0.0971
sulfur, total	7704-34-9	E420	0.50	mg/L		<0.50	0.86	0.84	0.63	0.87
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	<0.00010	<0.00010	<0.00010	<0.00010
titanium, total	7440-32-6	E420	0.00030	mg/L		<0.00030	<0.00030	<0.00030	0.00079	<0.00030
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		<0.000010	0.000110	0.000114	0.000054	0.000147
vanadium, total	7440-62-2	E420	0.00050	mg/L		<0.00050	0.00105	0.00094	0.00085	0.00092
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	<0.00020	<0.00020	<0.00020	<0.00020
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L		0.0035	0.0028	0.0023	0.0110	0.0036
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		0.00018	0.00184	0.00169	0.00210	0.00173
barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.0143	0.0242	0.0226	0.0125	0.0221
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L		<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SW-01	SW-02	SW-03	SW-04	SW-05
					Client sampling date / time	08-Nov-2021 12:03	08-Nov-2021 10:52	08-Nov-2021 09:57	08-Nov-2021 01:27	08-Nov-2021 12:43
						VA21C5115-001	VA21C5115-002	VA21C5115-003	VA21C5115-004	VA21C5115-005
						Result	Result	Result	Result	Result
Dissolved Metals										
boron, dissolved	7440-42-8	E421	0.010	mg/L		<0.010	<0.010	<0.010	<0.010	<0.010
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L		0.0000054	<0.0000050	<0.0000050	<0.0000050	<0.0000050
calcium, dissolved	7440-70-2	E421	0.050	mg/L		1.71	27.8	25.6	11.8	25.4
cesium, dissolved	7440-46-2	E421	0.000010	mg/L		<0.000010	<0.000010	<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	<0.00010	<0.00010	<0.00010	<0.00010
copper, dissolved	7440-50-8	E421	0.00020	mg/L		0.00165 DTC	0.0101 DTC	0.0136 DTC	0.00222 DTC	0.00090 DTC
iron, dissolved	7439-89-6	E421	0.010	mg/L		0.017	<0.010	<0.010	0.024	<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		<0.0010	0.0013	0.0012	<0.0010	0.0012
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L		0.240	2.08	1.96	0.859	2.22
manganese, dissolved	7439-96-5	E421	0.00010	mg/L		0.0740	0.00041	0.00079	0.00716	0.00056
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		0.000054	0.000326	0.000322	0.000196	0.000341
nickel, dissolved	7440-02-0	E421	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	<0.050
potassium, dissolved	7440-09-7	E421	0.050	mg/L		0.240	0.841	0.792	0.516	0.895
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L		0.00037	0.00034	0.00029	0.00035	0.00032
selenium, dissolved	7782-49-2	E421	0.000050	mg/L		<0.000050	0.000113	0.000141	0.000062	0.000135
silicon, dissolved	7440-21-3	E421	0.050	mg/L		0.399	4.99	4.74	4.04	4.67
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		5.67	1.91	1.86	2.75	2.08
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		0.0149	0.0983	0.0951	0.0479	0.101
sulfur, dissolved	7704-34-9	E421	0.50	mg/L		<0.50	0.70	0.86	0.59	0.82
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		<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
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		<0.000010	0.000106	0.000101	0.000040	0.000141

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SW-01	SW-02	SW-03	SW-04	SW-05
					Client sampling date / time	08-Nov-2021 12:03	08-Nov-2021 10:52	08-Nov-2021 09:57	08-Nov-2021 01:27	08-Nov-2021 12:43
						VA21C5115-001	VA21C5115-002	VA21C5115-003	VA21C5115-004	VA21C5115-005
						Result	Result	Result	Result	Result
Dissolved Metals										
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		<0.00050	0.00098	0.00091	0.00073	0.00087
zinc, dissolved	7440-66-6	E421	0.0010	mg/L		0.0014	0.0011	0.0013	0.0023	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										
biochemical oxygen demand [BOD]	----	E550	2.0	mg/L		<2.0	<2.0	<2.0	<2.0	<2.0
chemical oxygen demand [COD]	----	E559	20	mg/L		<20	<20	<20	<20	<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: DUP	Field Blank	Travel Blank	----	----
					Client sampling date / time: 08-Nov-2021 12:00	08-Nov-2021 01:46	08-Nov-2021	----	----
					VA21C5115-006	VA21C5115-007	VA21C5115-008	--------	--------
					Result	Result	Result	----	----
Physical Tests									
conductivity	----	E100	2.0	µS/cm	160	<2.0	----	----	----
hardness (as CaCO3), dissolved	----	EC100	0.60	mg/L	72.9	----	----	----	----
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L	75.3	<0.60	<0.60	----	----
pH	----	E108	0.10	pH units	8.09	5.33	----	----	----
Anions and Nutrients									
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	<0.0050	<0.0050	<0.0050	----	----
bromide	24959-67-9	E235.Br-L	0.050	mg/L	<0.050	----	----	----	----
chloride	16887-00-6	E235.Cl	0.50	mg/L	1.22	<0.50	<0.50	----	----
fluoride	16984-48-8	E235.F	0.020	mg/L	0.048	----	----	----	----
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	<0.050	----	----	----	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.0143	----	----	----	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0010	----	----	----	----
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	2.69	----	----	----	----
Total Metals									
aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0100	<0.0030	<0.0030	----	----
antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	----	----
arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00183	<0.00010	<0.00010	----	----
barium, total	7440-39-3	E420	0.00010	mg/L	0.0216	<0.00010	<0.00010	----	----
beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	<0.000100	----	----
bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	----	----
boron, total	7440-42-8	E420	0.010	mg/L	<0.010	<0.010	<0.010	----	----
cadmium, total	7440-43-9	E420	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	----	----
calcium, total	7440-70-2	E420	0.050	mg/L	26.5	<0.050	<0.050	----	----
cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	----	----
chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	<0.00050	----	----
cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	----	----
copper, total	7440-50-8	E420	0.00050	mg/L	<0.00050	<0.00050	<0.00050	----	----
iron, total	7439-89-6	E420	0.010	mg/L	0.011	<0.010	<0.010	----	----
lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	----	----
lithium, total	7439-93-2	E420	0.0010	mg/L	0.0012	<0.0010	<0.0010	----	----
magnesium, total	7439-95-4	E420	0.0050	mg/L	2.21	<0.0050	<0.0050	----	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID: DUP	Field Blank	Travel Blank	----	----
					Client sampling date / time: 08-Nov-2021 12:00	08-Nov-2021 01:46	08-Nov-2021	----	----
					VA21C5115-006	VA21C5115-007	VA21C5115-008	--------	--------
					Result	Result	Result	----	----
Total Metals									
manganese, total	7439-96-5	E420	0.00010	mg/L	0.00127	<0.00010	<0.00010	----	----
mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	----	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000356	<0.000050	<0.000050	----	----
nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	<0.00050	<0.00050	----	----
phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	<0.050	<0.050	----	----
potassium, total	7440-09-7	E420	0.050	mg/L	0.906	<0.050	<0.050	----	----
rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00035	<0.00020	<0.00020	----	----
selenium, total	7782-49-2	E420	0.000050	mg/L	0.000156	<0.000050	<0.000050	----	----
silicon, total	7440-21-3	E420	0.10	mg/L	5.19	<0.10	<0.10	----	----
silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	----	----
sodium, total	17341-25-2	E420	0.050	mg/L	2.09	<0.050	<0.050	----	----
strontium, total	7440-24-6	E420	0.00020	mg/L	0.0974	<0.00020	<0.00020	----	----
sulfur, total	7704-34-9	E420	0.50	mg/L	1.00	<0.50	<0.50	----	----
tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	<0.00020	----	----
thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	----	----
thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	----	----
tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	----	----
titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	<0.00030	----	----
tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	----	----
uranium, total	7440-61-1	E420	0.000010	mg/L	0.000148	<0.000010	<0.000010	----	----
vanadium, total	7440-62-2	E420	0.00050	mg/L	0.00093	<0.00050	<0.00050	----	----
zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	<0.0030	----	----
zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	<0.00020	----	----
Dissolved Metals									
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0047	----	----	----	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00010	----	----	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00171	----	----	----	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0217	----	----	----	----
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	----	----	----	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	----	----	----	----
boron, dissolved	7440-42-8	E421	0.010	mg/L	<0.010	----	----	----	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID: DUP	Field Blank	Travel Blank	----	----
					Client sampling date / time: 08-Nov-2021 12:00	08-Nov-2021 01:46	08-Nov-2021	----	----
					VA21C5115-006	VA21C5115-007	VA21C5115-008	--------	--------
					Result	Result	Result	----	----
Dissolved Metals									
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0000050	----	----	----	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L	25.6	----	----	----	----
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	0.00063	----	----	----	----
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	0.0012	----	----	----	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	2.19	----	----	----	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00056	----	----	----	----
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	----	----	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000328	----	----	----	----
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	0.881	----	----	----	----
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00032	----	----	----	----
selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.000139	----	----	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L	4.64	----	----	----	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	----	----	----	----
sodium, dissolved	17341-25-2	E421	0.050	mg/L	2.04	----	----	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.0985	----	----	----	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L	0.95	----	----	----	----
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	0.000134	----	----	----	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	0.00085	----	----	----	----

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	DUP	Field Blank	Travel Blank	----	----
					Client sampling date / time	08-Nov-2021 12:00	08-Nov-2021 01:46	08-Nov-2021	----	----
Analyte	CAS Number	Method	LOR	Unit		VA21C5115-006	VA21C5115-007	VA21C5115-008	--------	--------
						Result	Result	Result	----	----
Dissolved Metals										
zinc, dissolved	7440-66-6	E421	0.0010	mg/L		<0.0010	----	----	----	----
zirconium, dissolved	7440-67-7	E421	0.00020	mg/L		<0.00020	----	----	----	----
dissolved mercury filtration location	----	EP509	-	-		Field	----	----	----	----
dissolved metals filtration location	----	EP421	-	-		Field	----	----	----	----
Aggregate Organics										
biochemical oxygen demand [BOD]	----	E550	2.0	mg/L		<2.0	----	----	----	----
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	: **VA21C5115**	Page	: 1 of 19
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	: Foreceman Ridge Surface Water	Date Samples Received	: 09-Nov-2021 21:30
PO	: ----	Issue Date	: 23-Nov-2021 16:48
C-O-C number	: ----		
Sampler	: H. Shinton		
Site	:		
Quote number	: Q62338		
No. of samples received	: 8		
No. of samples analysed	: 8		

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

Key

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

Summary of Outliers

Outliers : Quality Control Samples

- No 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 3d]										
DUP	E550	08-Nov-2021	----	----	----		10-Nov-2021	3 days	2 days	✓
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT 3d]										
SW-01	E550	08-Nov-2021	----	----	----		10-Nov-2021	3 days	2 days	✓
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT 3d]										
SW-02	E550	08-Nov-2021	----	----	----		10-Nov-2021	3 days	2 days	✓
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT 3d]										
SW-03	E550	08-Nov-2021	----	----	----		10-Nov-2021	3 days	2 days	✓
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT 3d]										
SW-05	E550	08-Nov-2021	----	----	----		10-Nov-2021	3 days	2 days	✓
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT 3d]										
SW-04	E550	08-Nov-2021	----	----	----		10-Nov-2021	3 days	3 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
DUP	E559	08-Nov-2021	----	----	----		20-Nov-2021	28 days	12 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-01	E559	08-Nov-2021	----	----	----		20-Nov-2021	28 days	12 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
SW-02	E559	08-Nov-2021	----	----	----		20-Nov-2021	28 days	12 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
SW-03	E559	08-Nov-2021	----	----	----		20-Nov-2021	28 days	12 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
SW-04	E559	08-Nov-2021	----	----	----		20-Nov-2021	28 days	12 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
SW-05	E559	08-Nov-2021	----	----	----		20-Nov-2021	28 days	12 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
DUP	E298	08-Nov-2021	20-Nov-2021	----	----		20-Nov-2021	28 days	12 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
Field Blank	E298	08-Nov-2021	20-Nov-2021	----	----		20-Nov-2021	28 days	12 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
SW-01	E298	08-Nov-2021	20-Nov-2021	----	----		20-Nov-2021	28 days	12 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
SW-02	E298	08-Nov-2021	20-Nov-2021	----	----		20-Nov-2021	28 days	12 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-03	E298	08-Nov-2021	20-Nov-2021	----	----		20-Nov-2021	28 days	12 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) SW-04	E298	08-Nov-2021	20-Nov-2021	----	----		20-Nov-2021	28 days	12 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) SW-05	E298	08-Nov-2021	20-Nov-2021	----	----		20-Nov-2021	28 days	12 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) Travel Blank	E298	08-Nov-2021	20-Nov-2021	----	----		20-Nov-2021	28 days	12 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE DUP	E235.Br-L	08-Nov-2021	----	----	----		10-Nov-2021	28 days	2 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE SW-01	E235.Br-L	08-Nov-2021	----	----	----		10-Nov-2021	28 days	2 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE SW-02	E235.Br-L	08-Nov-2021	----	----	----		10-Nov-2021	28 days	2 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE SW-03	E235.Br-L	08-Nov-2021	----	----	----		10-Nov-2021	28 days	2 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE SW-05	E235.Br-L	08-Nov-2021	----	----	----		10-Nov-2021	28 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times 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-04	E235.Br-L	08-Nov-2021	----	----	----		10-Nov-2021	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE DUP	E235.Cl	08-Nov-2021	----	----	----		10-Nov-2021	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE SW-01	E235.Cl	08-Nov-2021	----	----	----		10-Nov-2021	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE SW-02	E235.Cl	08-Nov-2021	----	----	----		10-Nov-2021	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE SW-03	E235.Cl	08-Nov-2021	----	----	----		10-Nov-2021	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE SW-05	E235.Cl	08-Nov-2021	----	----	----		10-Nov-2021	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE Travel Blank	E235.Cl	08-Nov-2021	----	----	----		10-Nov-2021	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE Field Blank	E235.Cl	08-Nov-2021	----	----	----		10-Nov-2021	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE SW-04	E235.Cl	08-Nov-2021	----	----	----		10-Nov-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 DUP	E235.F	08-Nov-2021	----	----	----		10-Nov-2021	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE SW-01	E235.F	08-Nov-2021	----	----	----		10-Nov-2021	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE SW-02	E235.F	08-Nov-2021	----	----	----		10-Nov-2021	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE SW-03	E235.F	08-Nov-2021	----	----	----		10-Nov-2021	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE SW-05	E235.F	08-Nov-2021	----	----	----		10-Nov-2021	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE SW-04	E235.F	08-Nov-2021	----	----	----		10-Nov-2021	28 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE DUP	E235.NO3-L	08-Nov-2021	----	----	----		10-Nov-2021	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE SW-01	E235.NO3-L	08-Nov-2021	----	----	----		10-Nov-2021	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE SW-02	E235.NO3-L	08-Nov-2021	----	----	----		10-Nov-2021	3 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times 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-03	E235.NO3-L	08-Nov-2021	----	----	----		10-Nov-2021	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE SW-05	E235.NO3-L	08-Nov-2021	----	----	----		10-Nov-2021	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE SW-04	E235.NO3-L	08-Nov-2021	----	----	----		10-Nov-2021	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE DUP	E235.NO2-L	08-Nov-2021	----	----	----		10-Nov-2021	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE SW-01	E235.NO2-L	08-Nov-2021	----	----	----		10-Nov-2021	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE SW-02	E235.NO2-L	08-Nov-2021	----	----	----		10-Nov-2021	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE SW-03	E235.NO2-L	08-Nov-2021	----	----	----		10-Nov-2021	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE SW-05	E235.NO2-L	08-Nov-2021	----	----	----		10-Nov-2021	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE SW-04	E235.NO2-L	08-Nov-2021	----	----	----		10-Nov-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										
DUP	E235.SO4	08-Nov-2021	----	----	----		10-Nov-2021	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
SW-01	E235.SO4	08-Nov-2021	----	----	----		10-Nov-2021	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
SW-02	E235.SO4	08-Nov-2021	----	----	----		10-Nov-2021	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
SW-03	E235.SO4	08-Nov-2021	----	----	----		10-Nov-2021	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
SW-05	E235.SO4	08-Nov-2021	----	----	----		10-Nov-2021	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
SW-04	E235.SO4	08-Nov-2021	----	----	----		10-Nov-2021	28 days	3 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
SW-01	E318	08-Nov-2021	19-Nov-2021	----	----		19-Nov-2021	28 days	11 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
SW-02	E318	08-Nov-2021	19-Nov-2021	----	----		19-Nov-2021	28 days	11 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
DUP	E318	08-Nov-2021	20-Nov-2021	----	----		22-Nov-2021	28 days	15 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times 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-03	E318	08-Nov-2021	20-Nov-2021	----	----		22-Nov-2021	28 days	15 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
SW-04	E318	08-Nov-2021	20-Nov-2021	----	----		22-Nov-2021	28 days	15 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
SW-05	E318	08-Nov-2021	20-Nov-2021	----	----		22-Nov-2021	28 days	15 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
SW-01	E509	08-Nov-2021	19-Nov-2021	----	----		19-Nov-2021	28 days	11 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
DUP	E509	08-Nov-2021	20-Nov-2021	----	----		20-Nov-2021	28 days	12 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
SW-02	E509	08-Nov-2021	20-Nov-2021	----	----		20-Nov-2021	28 days	12 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
SW-03	E509	08-Nov-2021	20-Nov-2021	----	----		20-Nov-2021	28 days	12 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
SW-04	E509	08-Nov-2021	20-Nov-2021	----	----		20-Nov-2021	28 days	12 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
SW-05	E509	08-Nov-2021	20-Nov-2021	----	----		20-Nov-2021	28 days	12 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) DUP	E421	08-Nov-2021	15-Nov-2021	----	----		15-Nov-2021	180 days	7 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) SW-01	E421	08-Nov-2021	15-Nov-2021	----	----		15-Nov-2021	180 days	7 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) SW-02	E421	08-Nov-2021	15-Nov-2021	----	----		15-Nov-2021	180 days	7 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) SW-03	E421	08-Nov-2021	15-Nov-2021	----	----		15-Nov-2021	180 days	7 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) SW-05	E421	08-Nov-2021	15-Nov-2021	----	----		15-Nov-2021	180 days	7 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) SW-04	E421	08-Nov-2021	15-Nov-2021	----	----		15-Nov-2021	180 days	8 days	✓
Physical Tests : Conductivity in Water										
HDPE DUP	E100	08-Nov-2021	----	----	----		10-Nov-2021	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE SW-01	E100	08-Nov-2021	----	----	----		10-Nov-2021	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE SW-02	E100	08-Nov-2021	----	----	----		10-Nov-2021	28 days	2 days	✓

Matrix: **Water**

Evaluation: ✖ = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Conductivity in Water										
HDPE SW-03	E100	08-Nov-2021	----	----	----		10-Nov-2021	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE SW-05	E100	08-Nov-2021	----	----	----		10-Nov-2021	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE Field Blank	E100	08-Nov-2021	----	----	----		10-Nov-2021	28 days	3 days	✓
Physical Tests : Conductivity in Water										
HDPE SW-04	E100	08-Nov-2021	----	----	----		10-Nov-2021	28 days	3 days	✓
Physical Tests : pH by Meter										
HDPE SW-05	E108	08-Nov-2021	----	----	----		10-Nov-2021	0.25 hrs	55 hrs	✖ EHTR-FM
Physical Tests : pH by Meter										
HDPE DUP	E108	08-Nov-2021	----	----	----		10-Nov-2021	0.25 hrs	56 hrs	✖ EHTR-FM
Physical Tests : pH by Meter										
HDPE SW-01	E108	08-Nov-2021	----	----	----		10-Nov-2021	0.25 hrs	56 hrs	✖ EHTR-FM
Physical Tests : pH by Meter										
HDPE SW-02	E108	08-Nov-2021	----	----	----		10-Nov-2021	0.25 hrs	57 hrs	✖ EHTR-FM
Physical Tests : pH by Meter										
HDPE SW-03	E108	08-Nov-2021	----	----	----		10-Nov-2021	0.25 hrs	58 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										
Field Blank	E108	08-Nov-2021	----	----	----		10-Nov-2021	0.25 hrs	66 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE										
SW-04	E108	08-Nov-2021	----	----	----		10-Nov-2021	0.25 hrs	67 hrs	× EHTR-FM
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
DUP	E508	08-Nov-2021	----	----	----		16-Nov-2021	28 days	8 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
SW-01	E508	08-Nov-2021	----	----	----		16-Nov-2021	28 days	8 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
SW-02	E508	08-Nov-2021	----	----	----		16-Nov-2021	28 days	8 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
SW-03	E508	08-Nov-2021	----	----	----		16-Nov-2021	28 days	8 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
SW-05	E508	08-Nov-2021	----	----	----		16-Nov-2021	28 days	8 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
Travel Blank	E508	08-Nov-2021	----	----	----		16-Nov-2021	28 days	8 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
Field Blank	E508	08-Nov-2021	----	----	----		16-Nov-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
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) SW-04	E508	08-Nov-2021	----	----	----		16-Nov-2021	28 days	9 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) Travel Blank	E420	08-Nov-2021	----	----	----		20-Nov-2021	180 days	12 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) DUP	E420	08-Nov-2021	----	----	----		16-Nov-2021	180 days	8 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) Field Blank	E420	08-Nov-2021	----	----	----		16-Nov-2021	180 days	8 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) SW-01	E420	08-Nov-2021	----	----	----		16-Nov-2021	180 days	8 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) SW-02	E420	08-Nov-2021	----	----	----		16-Nov-2021	180 days	8 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) SW-03	E420	08-Nov-2021	----	----	----		16-Nov-2021	180 days	8 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) SW-04	E420	08-Nov-2021	----	----	----		16-Nov-2021	180 days	8 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) SW-05	E420	08-Nov-2021	----	----	----		16-Nov-2021	180 days	8 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)							
Ammonia by Fluorescence	E298	348989	1	19	5.2	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	342376	1	12	8.3	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	342418	1	14	7.1	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	349145	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	342417	1	18	5.5	5.0	✓
Conductivity in Water	E100	342410	1	14	7.1	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	348710	2	22	9.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	344997	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	342416	1	16	6.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	342414	1	17	5.8	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	342415	1	18	5.5	5.0	✓
pH by Meter	E108	342411	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	342413	1	16	6.2	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	348761	2	17	11.7	5.0	✓
Total Mercury in Water by CVAAS	E508	346142	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	345373	2	33	6.0	5.0	✓
Laboratory Control Samples (LCS)							
Ammonia by Fluorescence	E298	348989	1	19	5.2	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	342376	1	12	8.3	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	342418	1	14	7.1	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	349145	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	342417	1	18	5.5	5.0	✓
Conductivity in Water	E100	342410	1	14	7.1	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	348710	2	22	9.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	344997	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	342416	1	16	6.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	342414	1	17	5.8	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	342415	1	18	5.5	5.0	✓
pH by Meter	E108	342411	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	342413	1	16	6.2	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	348761	2	17	11.7	5.0	✓
Total Mercury in Water by CVAAS	E508	346142	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	345373	2	33	6.0	5.0	✓
Method Blanks (MB)							
Ammonia by Fluorescence	E298	348989	1	19	5.2	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	342376	1	12	8.3	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	342418	1	14	7.1	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							
Chemical Oxygen Demand by Colourimetry	E559	349145	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	342417	1	18	5.5	5.0	✓
Conductivity in Water	E100	342410	1	14	7.1	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	348710	2	22	9.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	344997	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	342416	1	16	6.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	342414	1	17	5.8	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	342415	1	18	5.5	5.0	✓
Sulfate in Water by IC	E235.SO4	342413	1	16	6.2	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	348761	2	17	11.7	5.0	✓
Total Mercury in Water by CVAAS	E508	346142	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	345373	2	33	6.0	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	348989	1	19	5.2	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	342418	1	14	7.1	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	349145	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	342417	1	18	5.5	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	348710	2	22	9.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	344997	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	342416	1	16	6.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	342414	1	17	5.8	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	342415	1	18	5.5	5.0	✓
Sulfate in Water by IC	E235.SO4	342413	1	16	6.2	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	348761	2	17	11.7	5.0	✓
Total Mercury in Water by CVAAS	E508	346142	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	345373	2	33	6.0	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.
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.
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.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
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 $CaCO_3$ 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.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
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.
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	: **VA21C5115**	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	: Foreceman Ridge Surface Water	Date Samples Received	: 09-Nov-2021 21:30
PO	: ----	Date Analysis Commenced	: 10-Nov-2021
C-O-C number	: ----	Issue Date	: 23-Nov-2021 16:48
Sampler	: H. Shinton		
Site	:		
Quote number	: Q62338		
No. of samples received	: 8		
No. of samples analysed	: 8		

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*
Caleb Deroche	Lab Analyst	Metals, Burnaby, British Columbia
Ilnaz Badbezanchi	Team Leader - Metals preparation	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
Owen Cheng		Metals, Burnaby, British Columbia
Ruby Pham	Lab Assistant	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: 342410)											
YL2101652-001	Anonymous	conductivity	----	E100	1.0	µS/cm	168	169	0.356%	10%	----
Physical Tests (QC Lot: 342411)											
YL2101652-001	Anonymous	pH	----	E108	0.10	pH units	7.93	7.94	0.113%	4%	----
Anions and Nutrients (QC Lot: 342413)											
VA21C5102-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	6.00	mg/L	596	600	0.621%	20%	----
Anions and Nutrients (QC Lot: 342414)											
VA21C5102-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.100	mg/L	134	135	0.279%	20%	----
Anions and Nutrients (QC Lot: 342415)											
VA21C5102-001	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.0200	mg/L	4.26	4.39	2.95%	20%	----
Anions and Nutrients (QC Lot: 342416)											
VA21C5102-001	Anonymous	fluoride	16984-48-8	E235.F	0.400	mg/L	2.30	2.24	0.067	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 342417)											
VA21C5102-001	Anonymous	chloride	16887-00-6	E235.Cl	10.0	mg/L	55.2	54.8	0.38	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 342418)											
VA21C5102-001	Anonymous	bromide	24959-67-9	E235.Br-L	1.00	mg/L	<1.00	<1.00	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 348761)											
VA21C5115-001	SW-01	Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	0.133	0.122	0.011	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 348989)											
VA21C5115-001	SW-01	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: 348990)											
VA21C5115-003	SW-03	Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
Total Metals (QC Lot: 345373)											
VA21C5085-001	Anonymous	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0116	0.0085	0.0031	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	0.0298	0.0311	4.20%	20%	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00192	0.00193	0.358%	20%	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.0255	0.0266	4.40%	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	0.178	0.184	3.07%	20%	----
		cadmium, total	7440-43-9	E420	0.0000200	mg/L	<0.0000200	<0.0000200	0	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	0.050	mg/L	54.5	55.8	2.45%	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: 345373) - continued											
VA21C5085-001	Anonymous	cesium, total	7440-46-2	E420	0.000010	mg/L	0.00835	0.00870	4.04%	20%	----
		chromium, total	7440-47-3	E420	0.00050	mg/L	0.00115	0.00118	0.00003	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	0.00038	0.00039	0.00002	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	0.073	0.073	0.0004	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000050	mg/L	0.000164	0.000168	0.000004	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	0.485	0.497	2.33%	20%	----
		magnesium, total	7439-95-4	E420	0.100	mg/L	5.93	6.06	2.16%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.0245	0.0252	2.86%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.0309	0.0319	3.24%	20%	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	0.00084	0.00082	0.00002	Diff <2x LOR	----
		phosphorus, total	7723-14-0	E420	0.300	mg/L	<0.300	<0.300	0	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.050	mg/L	47.9	48.9	2.04%	20%	----
		rubidium, total	7440-17-7	E420	0.00020	mg/L	0.0701	0.0720	2.74%	20%	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	0.00442	0.00467	5.57%	20%	----
		silicon, total	7440-21-3	E420	0.10	mg/L	1.54	1.55	0.649%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	0.000013	0.000013	0.0000002	Diff <2x LOR	----
		sodium, total	17341-25-2	E420	0.050	mg/L	198	198	0.174%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	1.07	1.11	3.82%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	160	165	3.06%	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	0.000090	0.000092	0.000003	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	0.0100	mg/L	<0.0100	<0.0100	0	Diff <2x LOR	----
		tungsten, total	7440-33-7	E420	0.00010	mg/L	0.00597	0.00610	2.19%	20%	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	0.000759	0.000769	1.32%	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	0.0034	0.0031	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: 346142)											
VA21C5115-001	SW-01	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Total Metals (QC Lot: 347926)											
KS2103697-001	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	<0.00010	<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: 347926) - continued											
KS2103697-001	Anonymous	arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00156	0.00144	7.94%	20%	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.00593	0.00690	15.1%	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	0.067	0.072	0.005	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	56.0	57.0	1.75%	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	0.00144	0.00143	0.00002	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	0.00167	0.00195	0.00028	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	0.0019	0.0021	0.0003	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	44.8	52.6	16.0%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.00033	0.00036	0.00004	Diff <2x LOR	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00237	0.00251	5.71%	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	0.063	<0.050	0.013	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.050	mg/L	4.46	5.15	14.3%	20%	----
		rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00218	0.00213	2.44%	20%	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	0.00254	0.00225	11.9%	20%	----
		silicon, total	7440-21-3	E420	0.10	mg/L	9.05	9.19	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	0.050	mg/L	38.1	43.1	12.3%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.222	0.260	15.9%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	28.3	26.0	8.50%	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	0.00020	0.00020	0.0000003	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	0.00183	0.00211	14.1%	20%	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	0.00269	0.00303	0.00035	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: 347926) - continued											
KS2103697-001	Anonymous	zinc, total	7440-66-6	E420	0.0030	mg/L	0.0032	0.0081	0.0048	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: 344997)											
CG2105558-001	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00037	0.00036	0.000009	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00017	0.00017	0.000001	Diff <2x LOR	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0544	0.0540	0.714%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.020	mg/L	<0.020 µg/L	<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	0.047	0.048	0.0004	Diff <2x LOR	----
		cadmium, dissolved	7440-43-9	E421	0.0050	mg/L	<0.0050 µg/L	<0.0000050	0	Diff <2x LOR	----
		calcium, dissolved	7440-70-2	E421	0.050	mg/L	86.9	86.8	0.185%	20%	----
		cesium, dissolved	7440-46-2	E421	0.000010	mg/L	0.000034	0.000035	0.0000009	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	0.10	mg/L	5.50 µg/L	0.00543	1.27%	20%	----
		copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00020	<0.00020	0	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	0.103	0.103	0.116%	20%	----
		magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	47.4	46.4	2.25%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.0703	0.0703	0.0254%	20%	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00255	0.00253	0.598%	20%	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.0193	0.0193	0.348%	20%	----
		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	3.08	3.02	1.74%	20%	----
		rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00447	0.00418	6.71%	20%	----
		selenium, dissolved	7782-49-2	E421	0.050	mg/L	6.96 µg/L	0.00710	2.02%	20%	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	1.83	1.86	1.44%	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	19.0	18.6	2.47%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.210	0.201	4.42%	20%	----
		sulfur, dissolved	7704-34-9	E421	0.50	mg/L	70.2	71.2	1.44%	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	0.000035	0.000035	0.0000004	Diff <2x LOR	----
		thorium, dissolved	7440-29-1	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: 344997) - continued											
CG2105558-001	Anonymous	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	0.00230	0.00228	1.07%	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	<0.0010	<0.0010	0	Diff <2x LOR	----
		zirconium, dissolved	7440-67-7	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 348710)											
VA21C5115-001	SW-01	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 348977)											
CG2105720-001	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Aggregate Organics (QC Lot: 342376)											
VA21C5115-001	SW-01	biochemical oxygen demand [BOD]	----	E550	2.0	mg/L	<2.0	<2.0	0.0%	30%	----
Aggregate Organics (QC Lot: 349145)											
VA21C5115-001	SW-01	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: 342410)						
conductivity	----	E100	1	µS/cm	1.0	----
Anions and Nutrients (QCLot: 342413)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 342414)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 342415)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 342416)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 342417)						
chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 342418)						
bromide	24959-67-9	E235.Br-L	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 348761)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 348989)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 348990)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Total Metals (QCLot: 345373)						
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	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 345373) - continued						
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: 346142)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Total Metals (QCLot: 347926)						
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	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 347926) - continued						
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: 344997)						
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: 344997) - 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: 348710)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 348977)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Aggregate Organics (QCLot: 342376)						
biochemical oxygen demand [BOD]	----	E550	2	mg/L	<2.0	----
Aggregate Organics (QCLot: 349145)						
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: 342410)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	100	90.0	110	----
Physical Tests (QCLot: 342411)									
pH	----	E108	----	pH units	7 pH units	99.6	98.0	102	----
Anions and Nutrients (QCLot: 342413)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 342414)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	97.7	90.0	110	----
Anions and Nutrients (QCLot: 342415)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	96.0	90.0	110	----
Anions and Nutrients (QCLot: 342416)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	98.1	90.0	110	----
Anions and Nutrients (QCLot: 342417)									
chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	97.9	90.0	110	----
Anions and Nutrients (QCLot: 342418)									
bromide	24959-67-9	E235.Br-L	0.05	mg/L	0.5 mg/L	95.0	85.0	115	----
Anions and Nutrients (QCLot: 348761)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	112	75.0	125	----
Anions and Nutrients (QCLot: 348989)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	98.0	85.0	115	----
Anions and Nutrients (QCLot: 348990)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	100	75.0	125	----
Total Metals (QCLot: 345373)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	105	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	99.7	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	103	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	104	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	101	80.0	120	----
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	100	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	103	80.0	120	----
cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	100	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: 345373) - continued									
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	104	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	102	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	104	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	101	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	102	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	101	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	101	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	100	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	104	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	100	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	108	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	93.0	80.0	120	----
sodium, total	17341-25-2	E420	0.05	mg/L	50 mg/L	104	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	99.8	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	102	80.0	120	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	99.2	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	101	80.0	120	----
thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	101	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	96.4	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	102	80.0	120	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	99.8	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	104	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	105	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: 346142)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	100.0	80.0	120	----
Total Metals (QCLot: 347926)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	98.1	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	98.4	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	104	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	102	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: 347926) - continued									
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	87.0	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	96.8	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	100	80.0	120	----
cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	101	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	98.4	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	99.2	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	99.0	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	103	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	101	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	99.3	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	103	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	99.9	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	95.1	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	100	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	102	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	106	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	93.2	80.0	120	----
sodium, total	17341-25-2	E420	0.05	mg/L	50 mg/L	102	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	102	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	99.6	80.0	120	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	100	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	102	80.0	120	----
thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	95.2	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	97.9	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	96.9	80.0	120	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	96.4	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	102	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	101	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	99.2	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	98.5	80.0	120	----
Dissolved Metals (QCLot: 344997)									
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	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
Dissolved Metals (QCLot: 344997) - continued									
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	94.9	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	97.1	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	95.6	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	93.9	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	95.3	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	98.9	80.0	120	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	92.8	80.0	120	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	96.0	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	95.8	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	94.5	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	94.7	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	97.9	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	103	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	100	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	98.3	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	99.6	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	95.6	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	98.8	80.0	120	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	103	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	100	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	94.5	80.0	120	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	87.4	80.0	120	----
sodium, dissolved	17341-25-2	E421	0.05	mg/L	50 mg/L	99.4	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	95.1	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	92.1	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	101	80.0	120	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	91.3	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	92.6	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	98.7	80.0	120	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	95.9	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	97.3	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	97.5	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	97.9	80.0	120	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	92.3	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 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
Dissolved Metals (QCLot: 348977) - continued									
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	100	80.0	120	----
Aggregate Organics (QCLot: 342376)									
biochemical oxygen demand [BOD]	----	E550	2	mg/L	198 mg/L	106	85.0	115	----
Aggregate Organics (QCLot: 349145)									
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: 342413)										
VA21C5102-002	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	995 mg/L	1000 mg/L	99.5	75.0	125	----
Anions and Nutrients (QCLot: 342414)										
VA21C5102-002	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	ND mg/L	25 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 342415)										
VA21C5102-002	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	4.78 mg/L	5 mg/L	95.5	75.0	125	----
Anions and Nutrients (QCLot: 342416)										
VA21C5102-002	Anonymous	fluoride	16984-48-8	E235.F	10.2 mg/L	10 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 342417)										
VA21C5102-002	Anonymous	chloride	16887-00-6	E235.Cl	989 mg/L	1000 mg/L	98.9	75.0	125	----
Anions and Nutrients (QCLot: 342418)										
VA21C5102-002	Anonymous	bromide	24959-67-9	E235.Br-L	5.05 mg/L	5 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 348761)										
VA21C5115-002	SW-02	Kjeldahl nitrogen, total [TKN]	----	E318	2.53 mg/L	2.5 mg/L	101	70.0	130	----
Anions and Nutrients (QCLot: 348989)										
VA21C5115-002	SW-02	ammonia, total (as N)	7664-41-7	E298	0.0990 mg/L	0.1 mg/L	99.0	75.0	125	----
Anions and Nutrients (QCLot: 348990)										
VA21C5115-004	SW-04	Kjeldahl nitrogen, total [TKN]	----	E318	2.61 mg/L	2.5 mg/L	104	70.0	130	----
Total Metals (QCLot: 345373)										
VA21C5085-002	Anonymous	aluminum, total	7429-90-5	E420	0.202 mg/L	0.2 mg/L	101	70.0	130	----
		antimony, total	7440-36-0	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0196 mg/L	0.02 mg/L	98.1	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	0.0379 mg/L	0.04 mg/L	94.8	70.0	130	----
		bismuth, total	7440-69-9	E420	0.00888 mg/L	0.01 mg/L	88.8	70.0	130	----
		boron, total	7440-42-8	E420	ND mg/L	0.1 mg/L	ND	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00369 mg/L	0.004 mg/L	92.2	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		cesium, total	7440-46-2	E420	0.0101 mg/L	0.01 mg/L	101	70.0	130	----
		chromium, total	7440-47-3	E420	0.0402 mg/L	0.04 mg/L	100	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: 345373) - continued										
VA21C5085-002	Anonymous	cobalt, total	7440-48-4	E420	0.0190 mg/L	0.02 mg/L	95.0	70.0	130	----
		copper, total	7440-50-8	E420	0.0188 mg/L	0.02 mg/L	93.9	70.0	130	----
		iron, total	7439-89-6	E420	1.82 mg/L	2 mg/L	90.9	70.0	130	----
		lead, total	7439-92-1	E420	0.0178 mg/L	0.02 mg/L	89.1	70.0	130	----
		lithium, total	7439-93-2	E420	ND mg/L	0.1 mg/L	ND	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	ND mg/L	0.02 mg/L	ND	70.0	130	----
		nickel, total	7440-02-0	E420	0.0371 mg/L	0.04 mg/L	92.7	70.0	130	----
		phosphorus, total	7723-14-0	E420	10.5 mg/L	10 mg/L	105	70.0	130	----
		potassium, total	7440-09-7	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		rubidium, total	7440-17-7	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		selenium, total	7782-49-2	E420	0.0382 mg/L	0.04 mg/L	95.4	70.0	130	----
		silicon, total	7440-21-3	E420	9.79 mg/L	10 mg/L	97.9	70.0	130	----
		silver, total	7440-22-4	E420	0.00366 mg/L	0.004 mg/L	91.6	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	0.0351 mg/L	0.04 mg/L	87.8	70.0	130	----
		thallium, total	7440-28-0	E420	0.00350 mg/L	0.004 mg/L	87.5	70.0	130	----
		thorium, total	7440-29-1	E420	0.0194 mg/L	0.02 mg/L	96.9	70.0	130	----
		tin, total	7440-31-5	E420	0.0184 mg/L	0.02 mg/L	92.2	70.0	130	----
		titanium, total	7440-32-6	E420	0.0402 mg/L	0.04 mg/L	100	70.0	130	----
		tungsten, total	7440-33-7	E420	0.0182 mg/L	0.02 mg/L	90.8	70.0	130	----
		uranium, total	7440-61-1	E420	0.00377 mg/L	0.004 mg/L	94.2	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	0.374 mg/L	0.4 mg/L	93.6	70.0	130	----
		zirconium, total	7440-67-7	E420	0.0383 mg/L	0.04 mg/L	95.8	70.0	130	----
Total Metals (QCLot: 346142)										
VA21C5115-002	SW-02	mercury, total	7439-97-6	E508	0.0000994 mg/L	0.0001 mg/L	99.4	70.0	130	----
Total Metals (QCLot: 347926)										
KS2103697-002	Anonymous	aluminum, total	7429-90-5	E420	0.194 mg/L	0.2 mg/L	97.1	70.0	130	----
		antimony, total	7440-36-0	E420	0.0200 mg/L	0.02 mg/L	100	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0190 mg/L	0.02 mg/L	94.9	70.0	130	----
		barium, total	7440-39-3	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0416 mg/L	0.04 mg/L	104	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: 347926) - continued										
KS2103697-002	Anonymous	bismuth, total	7440-69-9	E420	0.00911 mg/L	0.01 mg/L	91.1	70.0	130	----
		boron, total	7440-42-8	E420	0.105 mg/L	0.1 mg/L	105	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00378 mg/L	0.004 mg/L	94.4	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	0.00992 mg/L	0.01 mg/L	99.2	70.0	130	----
		chromium, total	7440-47-3	E420	0.0394 mg/L	0.04 mg/L	98.4	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0191 mg/L	0.02 mg/L	95.4	70.0	130	----
		copper, total	7440-50-8	E420	0.0182 mg/L	0.02 mg/L	91.0	70.0	130	----
		iron, total	7439-89-6	E420	1.87 mg/L	2 mg/L	93.6	70.0	130	----
		lead, total	7439-92-1	E420	0.0180 mg/L	0.02 mg/L	90.2	70.0	130	----
		lithium, total	7439-93-2	E420	0.103 mg/L	0.1 mg/L	103	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0202 mg/L	0.02 mg/L	101	70.0	130	----
		nickel, total	7440-02-0	E420	0.0373 mg/L	0.04 mg/L	93.3	70.0	130	----
		phosphorus, total	7723-14-0	E420	9.71 mg/L	10 mg/L	97.1	70.0	130	----
		potassium, total	7440-09-7	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		rubidium, total	7440-17-7	E420	0.0190 mg/L	0.02 mg/L	95.0	70.0	130	----
		selenium, total	7782-49-2	E420	0.0406 mg/L	0.04 mg/L	102	70.0	130	----
		silicon, total	7440-21-3	E420	ND mg/L	10 mg/L	ND	70.0	130	----
		silver, total	7440-22-4	E420	0.00375 mg/L	0.004 mg/L	93.7	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	21.2 mg/L	20 mg/L	106	70.0	130	----
		tellurium, total	13494-80-9	E420	0.0373 mg/L	0.04 mg/L	93.2	70.0	130	----
		thallium, total	7440-28-0	E420	0.00366 mg/L	0.004 mg/L	91.5	70.0	130	----
		thorium, total	7440-29-1	E420	0.0203 mg/L	0.02 mg/L	102	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	0.0420 mg/L	0.04 mg/L	105	70.0	130	----
		tungsten, total	7440-33-7	E420	0.0192 mg/L	0.02 mg/L	95.8	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	0.101 mg/L	0.1 mg/L	101	70.0	130	----
		zinc, total	7440-66-6	E420	0.365 mg/L	0.4 mg/L	91.2	70.0	130	----
		zirconium, total	7440-67-7	E420	0.0409 mg/L	0.04 mg/L	102	70.0	130	----
Dissolved Metals (QCLot: 344997)										
CG2105558-002	Anonymous	aluminum, dissolved	7429-90-5	E421	0.197 mg/L	0.2 mg/L	98.4	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: 344997) - continued										
CG2105558-002	Anonymous	antimony, dissolved	7440-36-0	E421	0.0199 mg/L	0.02 mg/L	99.4	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.0197 mg/L	0.02 mg/L	98.7	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	0.0407 mg/L	0.04 mg/L	102	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.00734 mg/L	0.01 mg/L	73.4	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.096 mg/L	0.1 mg/L	95.9	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.00396 mg/L	0.004 mg/L	99.1	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	0.0388 mg/L	0.04 mg/L	96.9	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.0182 mg/L	0.02 mg/L	90.8	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.0179 mg/L	0.02 mg/L	89.6	70.0	130	----
		iron, dissolved	7439-89-6	E421	1.83 mg/L	2 mg/L	91.4	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.0187 mg/L	0.02 mg/L	93.7	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.0986 mg/L	0.1 mg/L	98.6	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	0.0190 mg/L	0.02 mg/L	95.0	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.0206 mg/L	0.02 mg/L	103	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.0361 mg/L	0.04 mg/L	90.4	70.0	130	----
		phosphorus, dissolved	7723-14-0	E421	10.4 mg/L	10 mg/L	104	70.0	130	----
		potassium, dissolved	7440-09-7	E421	3.81 mg/L	4 mg/L	95.2	70.0	130	----
		rubidium, dissolved	7440-17-7	E421	0.0191 mg/L	0.02 mg/L	95.4	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.0409 mg/L	0.04 mg/L	102	70.0	130	----
		silicon, dissolved	7440-21-3	E421	8.90 mg/L	10 mg/L	89.0	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.00385 mg/L	0.004 mg/L	96.3	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	ND mg/L	20 mg/L	ND	70.0	130	----
		tellurium, dissolved	13494-80-9	E421	0.0397 mg/L	0.04 mg/L	99.4	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.00366 mg/L	0.004 mg/L	91.4	70.0	130	----
		thorium, dissolved	7440-29-1	E421	0.0199 mg/L	0.02 mg/L	99.6	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.0194 mg/L	0.02 mg/L	96.9	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.0377 mg/L	0.04 mg/L	94.2	70.0	130	----
		tungsten, dissolved	7440-33-7	E421	0.0192 mg/L	0.02 mg/L	95.8	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.00424 mg/L	0.004 mg/L	106	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.0976 mg/L	0.1 mg/L	97.6	70.0	130	----
		zinc, dissolved	7440-66-6	E421	0.380 mg/L	0.4 mg/L	95.0	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: 344997) - continued										
CG2105558-002	Anonymous	zirconium, dissolved	7440-67-7	E421	0.0416 mg/L	0.04 mg/L	104	70.0	130	----
Dissolved Metals (QCLot: 348710)										
VA21C5349-001	Anonymous	mercury, dissolved	7439-97-6	E509	0.000976 mg/L	0.001 mg/L	97.6	70.0	130	----
Dissolved Metals (QCLot: 348977)										
CG2105720-002	Anonymous	mercury, dissolved	7439-97-6	E509	0.000104 mg/L	0.0001 mg/L	104	70.0	130	----
Aggregate Organics (QCLot: 349145)										
VA21C5115-002	SW-02	chemical oxygen demand [COD]	----	E559	106 mg/L	100 mg/L	106	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
VA21C5115

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:	250-641-4141
	Company address below will appear on the final report
Street:	4545 Lazelle Avenue
City/Province:	Terrace/BC
Postal Code:	V8G4E1
Invoice To	Same as Report To ☐ YES ☑ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	Regional District of Kitimat-Stikine
Contact:	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	eblaney@rdks.bc.ca
Email 3	nveikle@rdks.bc.ca
Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	anne-maries@rdks.bc.ca
Email 2	nveikle@rdks.bc.ca

Select Service Level Below - Contact your AM to cor

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

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

EMERGENCY: 1 Business day | Same Day, Wee | (Laboratory ope

Date and Time Required for all E&P TATs:

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

Analysis Requ

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

ALS Lab Work Order # (lab use only): 5715

ALS Contact: | Sampler: H. Shinton

Indicate Filtered (F), Preserved (P) or Filtered and Prese

ALS Sample # (lab use only)	Sample Identification and/or (This description will appear o	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Total Metals	Dissolved Metals	Chloride	Fluoride	Sulphate	Hardness	Ammonia	Nitrate	Nitrite	COD / BOD	Total Kjedhal Nitrogen	Conductivity	pH			SAMPLES ON HOLD	Sample is hazardous (please provide further d	NUMBER OF CONTAINERS
					P	F/P					P			P								
1	SW-01	8-Nov-21	12:03	Water	R	R	R	R	R	R	R	R	R	R	R	R	R					
2	SW-02	8-Nov-21	10:52	Water	R	R	R	R	R	R	R	R	R	R	R	R	R					
3	SW-03	8-Nov-21	9:57	Water	R	R	R	R	R	R	R	R	R	R	R	R	R					
4	SW-04	8-Nov-21	1:27	Water	R	R	R	R	R	R	R	R	R	R	R	R	R					
5	SW-05	8-Nov-21	12:43	Water	R	R	R	R	R	R	R	R	R	R	R	R	R					
6	DUP	8-Nov-21	12:00	Water	R	R	R	R	R	R	R	R	R	R	R	R	R					
7	Field Blank	8-Nov-21	1:46	Water	R		R			R	R					R	R					
8	Travel Blank	8-Nov-21	-	Water	R		R				R											

Terrace Shipping ☐ Ground ☒ Air ☐ SFX
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			
8.8	5.6	6.0				5	

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Hannah Shinton	Date: November 9th, 2021	Time:	Received by: Chris	Date: 9 Nov 21	Time: 1130	Received by: PD	Date: NOV 09 2021	Time: 21:30

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

SEPT 2017 FRONT

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

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

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **VA21C6526**	Page	: 1 of 5
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	: Forceman Facility Sand Filter	Date Samples Received	: 26-Nov-2021 21:30
PO	: ----	Date Analysis Commenced	: 28-Nov-2021
C-O-C number	: ----	Issue Date	: 10-Dec-2021 16:12
Sampler	: Hannah Shinton		
Site	:		
Quote number	: Q62338		
No. of samples received	: 3		
No. of samples analysed	: 3		

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*
Caleb Deroche	Lab Analyst	Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	Inorganics, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	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*
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: Sand Filter	DUP	Travel Blank	----	----
					Client sampling date / time: 25-Nov-2021 09:57	25-Nov-2021 12:00	[27-Nov-2021]	----	----
					VA21C6526-001	VA21C6526-002	VA21C6526-003	--------	--------
					Result	Result	Result	----	----
Physical Tests									
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	42.2	43.0	<1.0	----	----
conductivity	----	E100	2.0	µS/cm	107	110	<2.0	----	----
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L	30.1	30.1	<0.60	----	----
pH	----	E108	0.10	pH units	7.72	7.74	5.05	----	----
Anions and Nutrients									
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.148	0.146 RRV	<0.0050	----	----
chloride	16887-00-6	E235.Cl	0.50	mg/L	1.74	1.82	----	----	----
fluoride	16984-48-8	E235.F	0.020	mg/L	0.033	0.032	----	----	----
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	0.470	0.451	----	----	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	1.28	1.34	----	----	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	0.0302	0.0323	----	----	----
nitrogen, total	7727-37-9	E366	0.030	mg/L	1.49	1.49	----	----	----
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	0.0155	0.0162	<0.0010	----	----
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	2.26	2.28	----	----	----
Organic / Inorganic Carbon									
carbon, total organic [TOC]	----	E355-L	0.50	mg/L	1.38	1.12	----	----	----
Total Metals									
aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0121	0.0126	<0.0030	----	----
antimony, total	7440-36-0	E420	0.00010	mg/L	0.00014	0.00014	<0.00010	----	----
arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00025	0.00024	<0.00010	----	----
barium, total	7440-39-3	E420	0.00010	mg/L	0.0166	0.0166	<0.00010	----	----
beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	<0.000100	----	----
bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	----	----
boron, total	7440-42-8	E420	0.010	mg/L	0.078	0.083	<0.010	----	----
cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.0000072	0.0000090	<0.0000050	----	----
calcium, total	7440-70-2	E420	0.050	mg/L	9.93	9.92	<0.050	----	----
cesium, total	7440-46-2	E420	0.000010	mg/L	0.000013	0.000014	<0.000010	----	----
chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	<0.00050	----	----
cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	----	----
copper, total	7440-50-8	E420	0.00050	mg/L	0.00106	0.00110	<0.00050	----	----

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	Sand Filter	DUP	Travel Blank	----	----
					Client sampling date / time	25-Nov-2021 09:57	25-Nov-2021 12:00	[27-Nov-2021]	----	----
Analyte	CAS Number	Method	LOR	Unit		VA21C6526-001	VA21C6526-002	VA21C6526-003	--------	--------
						Result	Result	Result	----	----
Total Metals										
iron, total	7439-89-6	E420	0.010	mg/L		0.019	0.018	<0.010	----	----
lead, total	7439-92-1	E420	0.000050	mg/L		<0.000050	<0.000050	<0.000050	----	----
lithium, total	7439-93-2	E420	0.0010	mg/L		<0.0010	<0.0010	<0.0010	----	----
magnesium, total	7439-95-4	E420	0.0050	mg/L		1.28	1.30	<0.0050	----	----
manganese, total	7439-96-5	E420	0.00010	mg/L		0.0541	0.0543	<0.00010	----	----
mercury, total	7439-97-6	E508	0.0000050	mg/L		<0.0000050	<0.0000050	<0.0000050	----	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.000149	0.000152	<0.000050	----	----
nickel, total	7440-02-0	E420	0.00050	mg/L		<0.00050	0.00052	<0.00050	----	----
phosphorus, total	7723-14-0	E420	0.050	mg/L		<0.050	<0.050	<0.050	----	----
potassium, total	7440-09-7	E420	0.050	mg/L		4.73	4.78	<0.050	----	----
rubidium, total	7440-17-7	E420	0.00020	mg/L		0.00288	0.00288	<0.00020	----	----
selenium, total	7782-49-2	E420	0.000050	mg/L		<0.000050	<0.000050	<0.000050	----	----
silicon, total	7440-21-3	E420	0.10	mg/L		2.36	2.34	<0.10	----	----
silver, total	7440-22-4	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	----	----
sodium, total	17341-25-2	E420	0.050	mg/L		6.04	6.10	<0.050	----	----
strontium, total	7440-24-6	E420	0.00020	mg/L		0.0461	0.0471	<0.00020	----	----
sulfur, total	7704-34-9	E420	0.50	mg/L		0.61	0.82	<0.50	----	----
tellurium, total	13494-80-9	E420	0.00020	mg/L		<0.00020	<0.00020	<0.00020	----	----
thallium, total	7440-28-0	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	----	----
thorium, total	7440-29-1	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	----	----
tin, total	7440-31-5	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	----	----
titanium, total	7440-32-6	E420	0.00030	mg/L		<0.00030	<0.00030	<0.00030	----	----
tungsten, total	7440-33-7	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	----	----
uranium, total	7440-61-1	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	----	----
vanadium, total	7440-62-2	E420	0.00050	mg/L		0.00061	0.00065	<0.00050	----	----
zinc, total	7440-66-6	E420	0.0030	mg/L		0.0169	0.0167	<0.0030	----	----
zirconium, total	7440-67-7	E420	0.00020	mg/L		<0.00020	<0.00020	<0.00020	----	----
Aggregate Organics										
biochemical oxygen demand [BOD]	----	E550	2.0	mg/L		<2.0	<2.0	----	----	----
chemical oxygen demand [COD]	----	E559	20	mg/L		<20	<20	----	----	----

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA21C6526**	Page	: 1 of 11
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	: Forceman Facility Sand Filter	Date Samples Received	: 26-Nov-2021 21:30
PO	: ----	Issue Date	: 10-Dec-2021 16:12
C-O-C number	: ----		
Sampler	: Hannah Shinton		
Site	:		
Quote number	: Q62338		
No. of samples received	: 3		
No. of samples analysed	: 3		

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 3d]										
DUP	E550	25-Nov-2021	----	----	----		28-Nov-2021	3 days	3 days	✓
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT 3d]										
Sand Filter	E550	25-Nov-2021	----	----	----		28-Nov-2021	3 days	3 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
DUP	E559	25-Nov-2021	----	----	----		07-Dec-2021	28 days	12 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
Sand Filter	E559	25-Nov-2021	----	----	----		07-Dec-2021	28 days	12 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
Travel Blank	E298	27-Nov-2021	02-Dec-2021	----	----		02-Dec-2021	28 days	6 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
DUP	E298	25-Nov-2021	01-Dec-2021	----	----		02-Dec-2021	28 days	7 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
Sand Filter	E298	25-Nov-2021	01-Dec-2021	----	----		02-Dec-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
Anions and Nutrients : Chloride in Water by IC										
HDPE DUP	E235.Cl	25-Nov-2021	----	----	----		28-Nov-2021	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE Sand Filter	E235.Cl	25-Nov-2021	----	----	----		28-Nov-2021	28 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE Travel Blank	E378-U	27-Nov-2021	----	----	----		28-Nov-2021	3 days	1 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE DUP	E378-U	25-Nov-2021	----	----	----		28-Nov-2021	3 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE Sand Filter	E378-U	25-Nov-2021	----	----	----		28-Nov-2021	3 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE DUP	E235.F	25-Nov-2021	----	----	----		28-Nov-2021	28 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE Sand Filter	E235.F	25-Nov-2021	----	----	----		28-Nov-2021	28 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE DUP	E235.NO3-L	25-Nov-2021	----	----	----		28-Nov-2021	3 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE Sand Filter	E235.NO3-L	25-Nov-2021	----	----	----		28-Nov-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 DUP	E235.NO2-L	25-Nov-2021	----	----	----		28-Nov-2021	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE Sand Filter	E235.NO2-L	25-Nov-2021	----	----	----		28-Nov-2021	3 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE DUP	E235.SO4	25-Nov-2021	----	----	----		28-Nov-2021	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE Sand Filter	E235.SO4	25-Nov-2021	----	----	----		28-Nov-2021	28 days	3 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) DUP	E318	25-Nov-2021	01-Dec-2021	----	----		08-Dec-2021	28 days	13 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) Sand Filter	E318	25-Nov-2021	01-Dec-2021	----	----		08-Dec-2021	28 days	13 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) DUP	E366	25-Nov-2021	01-Dec-2021	----	----		02-Dec-2021	28 days	7 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) Sand Filter	E366	25-Nov-2021	01-Dec-2021	----	----		02-Dec-2021	28 days	7 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) DUP	E355-L	25-Nov-2021	01-Dec-2021	----	----		01-Dec-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
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
Sand Filter	E355-L	25-Nov-2021	01-Dec-2021	----	----		01-Dec-2021	28 days	6 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
Travel Blank	E290	27-Nov-2021	----	----	----		29-Nov-2021	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
DUP	E290	25-Nov-2021	----	----	----		01-Dec-2021	14 days	6 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
Sand Filter	E290	25-Nov-2021	----	----	----		01-Dec-2021	14 days	6 days	✓
Physical Tests : Conductivity in Water										
HDPE										
Travel Blank	E100	27-Nov-2021	----	----	----		29-Nov-2021	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE										
DUP	E100	25-Nov-2021	----	----	----		29-Nov-2021	28 days	4 days	✓
Physical Tests : Conductivity in Water										
HDPE										
Sand Filter	E100	25-Nov-2021	----	----	----		29-Nov-2021	28 days	4 days	✓
Physical Tests : pH by Meter										
HDPE										
Travel Blank	E108	27-Nov-2021	----	----	----		29-Nov-2021	0.25 hrs	39 hrs	× EHTL
Physical Tests : pH by Meter										
HDPE										
DUP	E108	25-Nov-2021	----	----	----		29-Nov-2021	0.25 hrs	90 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 Sand Filter	E108	25-Nov-2021	----	----	----		29-Nov-2021	0.25 hrs	92 hrs	× EHTR-FM
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) Travel Blank	E508	27-Nov-2021	----	----	----		02-Dec-2021	28 days	5 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) DUP	E508	25-Nov-2021	----	----	----		02-Dec-2021	28 days	7 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) Sand Filter	E508	25-Nov-2021	----	----	----		02-Dec-2021	28 days	7 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) Travel Blank	E420	27-Nov-2021	----	----	----		30-Nov-2021	180 days	3 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) DUP	E420	25-Nov-2021	----	----	----		30-Nov-2021	180 days	5 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) Sand Filter	E420	25-Nov-2021	----	----	----		30-Nov-2021	180 days	5 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	354641	2	19	10.5	5.0	✓
Ammonia by Fluorescence	E298	357156	2	28	7.1	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	354499	1	10	10.0	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	360934	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	354645	1	17	5.8	5.0	✓
Conductivity in Water	E100	354639	1	19	5.2	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	354655	1	8	12.5	5.0	✓
Fluoride in Water by IC	E235.F	354643	1	17	5.8	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	354648	1	17	5.8	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	354647	1	18	5.5	5.0	✓
pH by Meter	E108	354638	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	354644	1	17	5.8	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	357158	1	11	9.0	5.0	✓
Total Mercury in Water by CVAAS	E508	357867	1	17	5.8	5.0	✓
Total Metals in Water by CRC ICPMS	E420	355623	1	20	5.0	5.0	✓
Total Nitrogen by Colourimetry	E366	357157	1	9	11.1	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	357155	1	15	6.6	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	354641	2	19	10.5	5.0	✓
Ammonia by Fluorescence	E298	357156	2	28	7.1	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	354499	1	10	10.0	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	360934	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	354645	1	17	5.8	5.0	✓
Conductivity in Water	E100	354639	1	19	5.2	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	354655	1	8	12.5	5.0	✓
Fluoride in Water by IC	E235.F	354643	1	17	5.8	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	354648	1	17	5.8	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	354647	1	18	5.5	5.0	✓
pH by Meter	E108	354638	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	354644	1	17	5.8	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	357158	1	11	9.0	5.0	✓
Total Mercury in Water by CVAAS	E508	357867	1	17	5.8	5.0	✓
Total Metals in Water by CRC ICPMS	E420	355623	1	20	5.0	5.0	✓
Total Nitrogen by Colourimetry	E366	357157	1	9	11.1	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	357155	1	15	6.6	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	354641	2	19	10.5	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*
Method Blanks (MB) - Continued							
Ammonia by Fluorescence	E298	357156	2	28	7.1	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	354499	1	10	10.0	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	360934	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	354645	1	17	5.8	5.0	✓
Conductivity in Water	E100	354639	1	19	5.2	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	354655	1	8	12.5	5.0	✓
Fluoride in Water by IC	E235.F	354643	1	17	5.8	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	354648	1	17	5.8	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	354647	1	18	5.5	5.0	✓
Sulfate in Water by IC	E235.SO4	354644	1	17	5.8	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	357158	1	11	9.0	5.0	✓
Total Mercury in Water by CVAAS	E508	357867	1	17	5.8	5.0	✓
Total Metals in Water by CRC ICPMS	E420	355623	1	20	5.0	5.0	✓
Total Nitrogen by Colourimetry	E366	357157	1	9	11.1	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	357155	1	15	6.6	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	357156	2	28	7.1	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	360934	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	354645	1	17	5.8	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	354655	1	8	12.5	5.0	✓
Fluoride in Water by IC	E235.F	354643	1	17	5.8	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	354648	1	17	5.8	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	354647	1	18	5.5	5.0	✓
Sulfate in Water by IC	E235.SO4	354644	1	17	5.8	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	357158	1	11	9.0	5.0	✓
Total Mercury in Water by CVAAS	E508	357867	1	17	5.8	5.0	✓
Total Metals in Water by CRC ICPMS	E420	355623	1	20	5.0	5.0	✓
Total Nitrogen by Colourimetry	E366	357157	1	9	11.1	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	357155	1	15	6.6	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.
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).
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.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Vancouver - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Total Nitrogen by Colourimetry	E366 Vancouver - Environmental	Water	APHA 4500-P J (mod)	Total Nitrogen 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 F (mod)	Dissolved Orthophosphate is determined colourimetrically on a flow analyzer on a 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 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.
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.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
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.
Preparation for Total Organic Carbon by Combustion	EP355 Vancouver - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Digestion for Total Nitrogen in water	EP366 Vancouver - Environmental	Water	APHA 4500-P J (mod)	Samples are heated with a persulfate digestion reagent.

QUALITY CONTROL REPORT

Work Order	: **VA21C6526**	Page	: 1 of 14
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	: Forceman Facility Sand Filter	Date Samples Received	: 26-Nov-2021 21:30
PO	: ----	Date Analysis Commenced	: 28-Nov-2021
C-O-C number	: ----	Issue Date	: 10-Dec-2021 16:12
Sampler	: Hannah Shinton		
Site	:		
Quote number	: Q62338		
No. of samples received	: 3		
No. of samples analysed	: 3		

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*
Caleb Deroche	Lab Analyst	Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	Inorganics, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	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: 354638)											
VA21C6525-001	Anonymous	pH	----	E108	0.10	pH units	8.28	8.28	0.0966%	4%	----
Physical Tests (QC Lot: 354639)											
VA21C6525-001	Anonymous	conductivity	----	E100	2.0	µS/cm	438	437	0.228%	10%	----
Physical Tests (QC Lot: 354641)											
VA21C6525-001	Anonymous	alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	202	210	3.74%	20%	----
Physical Tests (QC Lot: 356897)											
VA21C6415-003	Anonymous	alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	39.7	39.6	0.252%	20%	----
Anions and Nutrients (QC Lot: 354643)											
VA21C6509-001	Anonymous	fluoride	16984-48-8	E235.F	0.060	mg/L	<0.060	<0.060	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 354644)											
VA21C6509-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	0.59	0.59	0.008	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 354645)											
VA21C6509-001	Anonymous	chloride	16887-00-6	E235.Cl	0.50	mg/L	2.34	2.36	0.01	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 354647)											
VA21C6509-001	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	0.0020	0.0013	0.0007	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 354648)											
VA21C6509-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.0101	0.0064	0.0037	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 354655)											
VA21C6516-001	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: 357156)											
FJ2101348-001	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: 357157)											
VA21C6525-001	Anonymous	nitrogen, total	7727-37-9	E366	0.030	mg/L	0.827	0.818	1.06%	20%	----
Anions and Nutrients (QC Lot: 357158)											
FJ2101348-001	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	0.059	0.063	0.004	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 357791)											
FJ2101341-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 357155)											
FJ2101348-001	Anonymous	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	1.46	1.79	0.33	Diff <2x LOR	----
Total Metals (QC Lot: 355623)											
CG2106040-001	Anonymous	aluminum, total	7429-90-5	E420	0.0060	mg/L	<0.0060	<0.0060	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: 355623) - continued											
CG2106040-001	Anonymous	antimony, total	7440-36-0	E420	0.00020	mg/L	0.00273	0.00272	0.607%	20%	----
		arsenic, total	7440-38-2	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00020	mg/L	0.0230	0.0233	1.30%	20%	----
		beryllium, total	7440-41-7	E420	0.040	mg/L	<0.040 µg/L	<0.000040	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.020	mg/L	0.118	0.115	0.003	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0100	mg/L	1.08 µg/L	0.00110	2.25%	20%	----
		calcium, total	7440-70-2	E420	0.100	mg/L	547	538	1.59%	20%	----
		cesium, total	7440-46-2	E420	0.000020	mg/L	0.000715	0.000724	1.28%	20%	----
		chromium, total	7440-47-3	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.20	mg/L	85.6 µg/L	0.0852	0.394%	20%	----
		copper, total	7440-50-8	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.020	mg/L	<0.020	<0.020	0	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0020	mg/L	1.04	1.03	0.359%	20%	----
		magnesium, total	7439-95-4	E420	0.0100	mg/L	233	233	0.149%	20%	----
		manganese, total	7439-96-5	E420	0.00020	mg/L	0.456	0.453	0.612%	20%	----
		molybdenum, total	7439-98-7	E420	0.000100	mg/L	0.00563	0.00552	1.87%	20%	----
		nickel, total	7440-02-0	E420	0.00100	mg/L	0.505	0.499	1.19%	20%	----
		phosphorus, total	7723-14-0	E420	0.100	mg/L	<0.100	<0.100	0	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.100	mg/L	19.4	18.9	2.67%	20%	----
		rubidium, total	7440-17-7	E420	0.00040	mg/L	0.0306	0.0305	0.346%	20%	----
		selenium, total	7782-49-2	E420	0.100	mg/L	32.8 µg/L	0.0308	6.22%	20%	----
		silicon, total	7440-21-3	E420	0.20	mg/L	2.94	2.93	0.406%	20%	----
		silver, total	7440-22-4	E420	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		sodium, total	17341-25-2	E420	0.100	mg/L	29.2	28.5	2.50%	20%	----
		strontium, total	7440-24-6	E420	0.00040	mg/L	1.14	1.11	2.21%	20%	----
		sulfur, total	7704-34-9	E420	1.00	mg/L	446	422	5.56%	20%	----
		tellurium, total	13494-80-9	E420	0.00040	mg/L	<0.00040	<0.00040	0	Diff <2x LOR	----
		thallium, total	7440-28-0	E420	0.000020	mg/L	0.000193	0.000200	0.000007	Diff <2x LOR	----
		thorium, total	7440-29-1	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00060	mg/L	<0.00060	<0.00060	0	Diff <2x LOR	----
		tungsten, total	7440-33-7	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000020	mg/L	0.0386	0.0383	0.627%	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: 355623) - continued											
CG2106040-001	Anonymous	vanadium, total	7440-62-2	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0060	mg/L	0.0964	0.0948	1.67%	20%	----
		zirconium, total	7440-67-7	E420	0.00040	mg/L	<0.00040	<0.00040	0	Diff <2x LOR	----
Total Metals (QC Lot: 357867)											
FJ2101334-005	Anonymous	mercury, total	7439-97-6	E508	0.0000500	mg/L	<0.0000500	<0.0000500	0	Diff <2x LOR	----
Aggregate Organics (QC Lot: 354499)											
VA21C6526-001	Sand Filter	biochemical oxygen demand [BOD]	----	E550	2.0	mg/L	<2.0	<2.0	0.0%	30%	----
Aggregate Organics (QC Lot: 360934)											
VA21C6458-008	Anonymous	chemical oxygen demand [COD]	----	E559	20	mg/L	23	23	0.3	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: 354639)						
conductivity	----	E100	1	µS/cm	1.2	----
Physical Tests (QCLot: 354641)						
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 356897)						
alkalinity, total (as CaCO3)	----	E290	1	mg/L	1.0	----
Anions and Nutrients (QCLot: 354643)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 354644)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 354645)						
chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 354647)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 354648)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 354655)						
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 357156)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 357157)						
nitrogen, total	7727-37-9	E366	0.03	mg/L	<0.030	----
Anions and Nutrients (QCLot: 357158)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 357791)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Organic / Inorganic Carbon (QCLot: 357155)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 355623)						
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: 355623) - 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	----
Total Metals (QCLot: 357867)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Aggregate Organics (QCLot: 354499)						
biochemical oxygen demand [BOD]	----	E550	2	mg/L	<2.0	----
Aggregate Organics (QCLot: 360934)						
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: 354638)									
pH	----	E108	----	pH units	7 pH units	99.7	98.0	102	----
Physical Tests (QCLot: 354639)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	100	90.0	110	----
Physical Tests (QCLot: 354641)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	101	85.0	115	----
Physical Tests (QCLot: 356897)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	98.6	85.0	115	----
Anions and Nutrients (QCLot: 354643)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	99.7	90.0	110	----
Anions and Nutrients (QCLot: 354644)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 354645)									
chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 354647)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	97.6	90.0	110	----
Anions and Nutrients (QCLot: 354648)									
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: 354655)									
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	98.0	80.0	120	----
Anions and Nutrients (QCLot: 357156)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	101	85.0	115	----
Anions and Nutrients (QCLot: 357157)									
nitrogen, total	7727-37-9	E366	0.03	mg/L	0.5 mg/L	99.2	75.0	125	----
Anions and Nutrients (QCLot: 357158)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 357791)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	99.7	85.0	115	----
Organic / Inorganic Carbon (QCLot: 357155)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	100	80.0	120	----
Total Metals (QCLot: 355623)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 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
Total Metals (QCLot: 355623) - continued									
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	113	80.0	120	----
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	99.4	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	94.1	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	88.0	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	96.2	80.0	120	----
cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	110	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	99.9	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	100	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	101	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	96.1	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	116	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	95.4	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	101	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	105	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	100	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	108	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	103	80.0	120	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	106	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	101	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	100	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	104	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	111	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	95.6	80.0	120	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	109	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	111	80.0	120	----
thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	101	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	102	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	94.1	80.0	120	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	109	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	120	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	103	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	102	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	103	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: 357867)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	102	80.0	120	----
Aggregate Organics (QCLot: 354499)									
biochemical oxygen demand [BOD]	----	E550	2	mg/L	198 mg/L	105	85.0	115	----
Aggregate Organics (QCLot: 360934)									
chemical oxygen demand [COD]	----	E559	20	mg/L	100 mg/L	107	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: 354643)										
VA21C6509-002	Anonymous	fluoride	16984-48-8	E235.F	0.969 mg/L	1 mg/L	96.9	75.0	125	----
Anions and Nutrients (QCLot: 354644)										
VA21C6509-002	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	100 mg/L	100 mg/L	100	75.0	125	----
Anions and Nutrients (QCLot: 354645)										
VA21C6509-002	Anonymous	chloride	16887-00-6	E235.Cl	99.0 mg/L	100 mg/L	99.0	75.0	125	----
Anions and Nutrients (QCLot: 354647)										
VA21C6509-002	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.441 mg/L	0.5 mg/L	88.2	75.0	125	----
Anions and Nutrients (QCLot: 354648)										
VA21C6509-002	Anonymous	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: 354655)										
VA21C6516-002	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0282 mg/L	0.03 mg/L	93.9	70.0	130	----
Anions and Nutrients (QCLot: 357156)										
FJ2101348-002	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: 357157)										
VA21C6525-002	Anonymous	nitrogen, total	7727-37-9	E366	ND mg/L	0.4 mg/L	ND	70.0	130	----
Anions and Nutrients (QCLot: 357158)										
FJ2101348-002	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	2.54 mg/L	2.5 mg/L	102	70.0	130	----
Anions and Nutrients (QCLot: 357791)										
VA21C6397-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.110 mg/L	0.1 mg/L	110	75.0	125	----
Organic / Inorganic Carbon (QCLot: 357155)										
FJ2101348-002	Anonymous	carbon, total organic [TOC]	----	E355-L	5.42 mg/L	5 mg/L	108	70.0	130	----
Total Metals (QCLot: 355623)										
CG2106040-002	Anonymous	aluminum, total	7429-90-5	E420	0.387 mg/L	0.4 mg/L	96.9	70.0	130	----
		antimony, total	7440-36-0	E420	0.0420 mg/L	0.04 mg/L	105	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0429 mg/L	0.04 mg/L	107	70.0	130	----
		barium, total	7440-39-3	E420	0.0405 mg/L	0.04 mg/L	101	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0789 mg/L	0.08 mg/L	98.6	70.0	130	----
		bismuth, total	7440-69-9	E420	0.0197 mg/L	0.02 mg/L	98.6	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: 355623) - continued										
CG2106040-002	Anonymous	boron, total	7440-42-8	E420	0.182 mg/L	0.2 mg/L	90.8	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00790 mg/L	0.008 mg/L	98.7	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	0.0206 mg/L	0.02 mg/L	103	70.0	130	----
		chromium, total	7440-47-3	E420	0.0780 mg/L	0.08 mg/L	97.4	70.0	130	----
		cobalt, total	7440-48-4	E420	ND mg/L	0.04 mg/L	ND	70.0	130	----
		copper, total	7440-50-8	E420	0.0365 mg/L	0.04 mg/L	91.2	70.0	130	----
		iron, total	7439-89-6	E420	3.84 mg/L	4 mg/L	95.9	70.0	130	----
		lead, total	7439-92-1	E420	0.0388 mg/L	0.04 mg/L	97.0	70.0	130	----
		lithium, total	7439-93-2	E420	ND mg/L	0.2 mg/L	ND	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	0.0412 mg/L	0.04 mg/L	103	70.0	130	----
		nickel, total	7440-02-0	E420	ND mg/L	0.08 mg/L	ND	70.0	130	----
		phosphorus, total	7723-14-0	E420	23.0 mg/L	20 mg/L	115	70.0	130	----
		potassium, total	7440-09-7	E420	ND mg/L	8 mg/L	ND	70.0	130	----
		rubidium, total	7440-17-7	E420	0.0406 mg/L	0.04 mg/L	102	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	19.0 mg/L	20 mg/L	95.2	70.0	130	----
		silver, total	7440-22-4	E420	0.00802 mg/L	0.008 mg/L	100	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	0.0782 mg/L	0.08 mg/L	97.8	70.0	130	----
		thallium, total	7440-28-0	E420	0.00740 mg/L	0.008 mg/L	92.5	70.0	130	----
		thorium, total	7440-29-1	E420	0.0412 mg/L	0.04 mg/L	103	70.0	130	----
		tin, total	7440-31-5	E420	0.0396 mg/L	0.04 mg/L	98.9	70.0	130	----
		titanium, total	7440-32-6	E420	0.0794 mg/L	0.08 mg/L	99.2	70.0	130	----
		tungsten, total	7440-33-7	E420	0.0407 mg/L	0.04 mg/L	102	70.0	130	----
		uranium, total	7440-61-1	E420	ND mg/L	0.008 mg/L	ND	70.0	130	----
		vanadium, total	7440-62-2	E420	0.212 mg/L	0.2 mg/L	106	70.0	130	----
		zinc, total	7440-66-6	E420	0.719 mg/L	0.8 mg/L	89.9	70.0	130	----
		zirconium, total	7440-67-7	E420	0.0818 mg/L	0.08 mg/L	102	70.0	130	----
Total Metals (QCLot: 357867)										
FJ2101334-006	Anonymous	mercury, total	7439-97-6	E508	0.000102 mg/L	0.0001 mg/L	102	70.0	130	----
Aggregate Organics (QCLot: 360934)										

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: 360934) - continued										
VA21C6509-001	Anonymous	chemical oxygen demand [COD]	----	E559	ND mg/L	100 mg/L	ND	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:	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 #:	Forceman Facilty Sand Filter	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 and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Total Metals	Alkalinity / Conductivity	Chloride, Fluoride	Total Nitrogen	Sulphate	Hardness	Ammonia	Nitrate	Nitrite	TOC	Orthophosphorus	COD	BOD	pH	Total Kjeldahl Nitrogen	SAMPLES ON HOLD	Sample is hazardous (please provide further detail)	NUMBER OF CONTAINERS
					P						P			P		P			P			
	Sand Filter	25-Nov-21	9:57	Effluent	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			
	DUP	25-Nov-21	12:00	Effluent	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			
	Travel Blank	—	—	Water		R				R	R				R			R				

Environmental Division
Vancouver
Work Order Reference
VA21C6526

Telephone : +1 604 253 4188

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	

(lab use only)

Frozen ☐ No ☐

Ice Packs ☑ ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
8.3				6.5			

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Hannah Shinton	Date: Nov. 26 2021	Time:	Received by: Chris	Date: 26Nov21	Time: 1145	Received by: RJ	Date: NOV-26	Time: 21:30

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

6EPT 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**.

golder.com

Appendix B Hazardous Waste Regulation Authorization

February 11, 2021

Tracking Number: 399154
Authorization Number: 110582

REGIONAL DISTRICT OF KITIMAT-STIKINE
300-4545 LAZELLE AVENUE
TERRACE, BC
V8G 4E1

Dear REGIONAL DISTRICT OF KITIMAT-STIKINE,

Re: Hazardous Waste Regulation Registered Site (RS) Approvals The Regional District of Kitimat Stikine Forceman Ridge Landfill, RS - 110582

The Regional District of Kitimat Stikine submitted an application under HWR to register the Forceman Ridge Landfill on December 14, 2020.

The Regional District of Kitimat Stikine is registered under the HWR with registered site number RS-110582 for the disposal of waste asbestos in the Forceman Ridge Landfill (Authorization 17227) in accordance with HWR section 40, Management of waste asbestos.

Pursuant to HWR section 40(2)(e), the deposit of waste asbestos in the Forceman Ridge landfill Authorization RS-110582 is authorized with the following requirements:

1. The waste asbestos receipt, handling and disposal procedures must be in accordance with HWR section 40, Management of waste asbestos and must be included in the next and subsequent updated Design, Operations and Closure Plans, required by Authorization 17227.

2. The tonnage of waste asbestos received must be included in the next and subsequent Annual Operations and Monitoring Reports, required by Authorization 17227.

This letter is issued pursuant to the provisions of the Environmental Management Act to ensure compliance with section 8 and 120(3) of that Act which make it an offence to construct, establish, alter, enlarge, extend, use or operate a facility for the treatment, recycling, storage, disposal or destruction of a hazardous waste except in accordance with the HWR. Accordingly, contravention of any of the conditions of the HWR, or this letter is a violation of the Environmental Management Act and may result in prosecution and/or administrative penalties.

This letter 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 Regional District of Kitimat Stikine.

It is also the responsibility of the Regional District of Kitimat Stikine to ensure that all activities conducted in relation to this letter 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 online at. https://www2.gov.bc.ca/gov/content/environment/air-land-water/spills-environmental- emergencies/report-a-spill.

This letter includes decisions which 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 your registration including this letter will be carried out by staff from the Environmental Protection Division's Regional Operations Branch.

For information about how the ministry will assess compliance with your registration, including this letter, and the HWR, please refer to the ministry's Environmental Compliance website https://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/natural-resource-law-enforcement/environmental-compliance.

For information about how to make changes to your registration and to access registration amendment forms and guidance, please refer to the ministry's Waste Discharge Authorizations website https://www2.gov.bc.ca/gov/content/environment/waste-management/waste-discharge-authorization.

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

Appendix C OC Amendments and Authorisations

January 19, 2021 Authorization: 17227

REGIONAL DISTRICT OF KITIMAT-STIKINE
300 4545 LAZELLE AVENUE
TERRACE, BC
V8G 4E1

Via Email: mhaley@rdks.ca

Dear Megan Haley:

Re: Temporary Amendment – 17227

We are in receipt of your January 19, 2021 request to discharge from your sand filter and sedimentation pond until January 29, 2021 due to a large amount of precipitation that occurred during 2020 and 2021. We understand that this request has been made in order to prevent the overtopping and possible breach of the ponds at the Forceman Ridge Landfill.

Pursuant to Section 16 of the *Environmental Management Act*, I hereby approve a temporary amendment of Section 2.4.1. for the period of January 19, 2021 to January 29, 2021 only.

From:

The maximum authorized rate of discharge is 609 m3/day and the average rate of discharge is 400 m3/day. The discharge may occur 24 hours/day, 7 days/week during the months of April to November 9, inclusive.

To:

The maximum authorized rate of discharge is 609 m3/day and the average rate of discharge is 400 m3/day. The discharge may occur 24 hours/day, 7 days/week from January 19, 2021 to January 29, 2021, inclusive.

Ministry of Environment and Climate Change Strategy
Authorizations - North
Regional Operations Branch
Environmental Protection Division
Mailing Address:
325 - 1011 4th Avenue
Prince George BC V2L 3H9
Telephone: 250-645-9403
Facsimile: 250 565-6629
Website: www.gov.bc.ca/en

Reporting requirements include the following and a report must be submitted to the director on or before February 5, 2021:

1. Total volume discharged
2. Water quality parameters for: total nitrogen, ammonia, pH, chloride and total metals

This amendment does not affect any other requirements of the OC 17227, which remain in full force and effect. Additionally, this amendment does not constitute approval by any other agency with jurisdiction over this matter.

This decision may also be appealed to the Environmental Appeal Board in accordance with Part 8 of the Environmental Management Act. An appeal must be delivered 30 days from the date that the notice of this decision is given. For further information, please contact the Environmental Appeal Board at 250-387-3464, via email eabinfo@gov.bc.ca or visit their website at http://www.eab.gov.bc.ca/ .

If you have any questions regarding this letter, please contact Leonard Cook, Environmental Protection Officer at (250) 645-9403 or by email at leonard.cook@gov.bc.ca.

Yours truly,

Karen Moores, for *Director Environmental Management Act*
Section Head, *Authorizations – North*
Environmental Protection Division
Ministry of Environment & Climate Change Strategy

March 15, 2021 Authorization: 17227

REGIONAL DISTRICT OF KITIMAT-STIKINE
300 4545 LAZELLE AVENUE
TERRACE, BC
V8G 4E1

Via Email: mhaley@rdks.ca

Dear Megan Haley:

Re: Temporary Amendment – OC 17227

We are in receipt of your March 10, 2021 request to discharge sewage cake, the end product of the waste treatment plant from the LNGC Cedar Valley Lodge for a 4-week period. The maximum weekly requested discharge is 9 tonnes.

Pursuant to Section 16 of the *Environmental Management Act*, I hereby approve a temporary amendment of Section 2.1.2. for the period of March 15, 2021 to April 15, 2021 only.

From:

Subject to sections 6.2, 6.3 and 6.4, the characteristics of the discharge shall be typical of municipal solid waste.

To:

Subject to sections 6.2, 6.3 and 6.4, the characteristics of the discharge shall be typical of municipal solid waste and sewage cake. The sewage cake discharge may occur once/week and the maximum allowable weekly discharge is 9 tonnes.

This amendment does not affect any other requirements of the OC 17227, which remain in full force and effect. Additionally, this amendment does not constitute approval by any other agency with jurisdiction over this matter.

Ministry of Environment and Climate Change Strategy
Authorizations - North
Regional Operations Branch
Environmental Protection Division
Mailing Address:
325 - 1011 4th Avenue
Prince George BC V2L 3H9
Telephone: 250-645-9403
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This decision may also be appealed to the Environmental Appeal Board in accordance with Part 8 of the Environmental Management Act. An appeal must be delivered 30 days from the date that the notice of this decision is given. For further information, please contact the Environmental Appeal Board at 250-387-3464, via email eabinfo@gov.bc.ca or visit their website at http://www.eab.gov.bc.ca/ .

If you have any questions regarding this letter, please contact Leonard Cook, Environmental Protection Officer at (250) 645-9403 or by email at leonard.cook@gov.bc.ca.

Yours truly,

Karen Moores, for *Director Environmental Management Act*
Section Head, *Authorizations – North*
Environmental Protection Division
Ministry of Environment & Climate Change Strategy

March 16, 2021 Authorization: 17227

REGIONAL DISTRICT OF KITIMAT-STIKINE
300 4545 LAZELLE AVENUE
TERRACE, BC
V8G 4E1

Via Email: mhaley@rdks.ca

Dear Megan Haley:

Re: Temporary Amendment – 17227

We are in receipt of your March 15, 2021 request to discharge from your sand filter and sedimentation pond until April 1, 2021 due to a large amount of precipitation that occurred during 2020 and 2021. We understand that this request has been made in order to prevent the overtopping and possible breach of the ponds at the Forceman Ridge Landfill.

Pursuant to Section 16 of the *Environmental Management Act*, I hereby approve a temporary amendment of Section 2.4.1. for the period of March 16, 2021 to April 1, 2021 only.

From:

The maximum authorized rate of discharge is 609 m3/day and the average rate of discharge is 400 m3/day. The discharge may occur 24 hours/day, 7 days/week during the months of April to November 9, inclusive.

To:

The maximum authorized rate of discharge is 609 m3/day and the average rate of discharge is 400 m3/day. The discharge may occur 24 hours/day, 7 days/week from March 15, 2021 to April, 2021, inclusive.

Ministry of Environment and Climate Change Strategy
Authorizations - North
Regional Operations Branch
Environmental Protection Division
Mailing Address:
325 - 1011 4th Avenue
Prince George BC V2L 3H9
Telephone: 250-645-9403
Facsimile: 250 565-6629
Website: www.gov.bc.ca/en

Reporting requirements include the following and a report must be submitted to the director on or before April 5, 2021:

1. Total volume discharged
2. Water quality parameters for: total nitrogen, ammonia, pH, chloride and total metals

This amendment does not affect any other requirements of the OC 17227, which remain in full force and effect. Additionally, this amendment does not constitute approval by any other agency with jurisdiction over this matter.

This decision may also be appealed to the Environmental Appeal Board in accordance with Part 8 of the Environmental Management Act. An appeal must be delivered 30 days from the date that the notice of this decision is given. For further information, please contact the Environmental Appeal Board at 250-387-3464, via email eabinfo@gov.bc.ca or visit their website at http://www.eab.gov.bc.ca/ .

If you have any questions regarding this letter, please contact Leonard Cook, Environmental Protection Officer at (250) 645-9403 or by email at leonard.cook@gov.bc.ca.

Yours truly,

Karen Moores, for *Director Environmental Management Act*
Section Head, *Authorizations – North*
Environmental Protection Division
Ministry of Environment & Climate Change Strategy

From:	Moores, Karen ENV:EX
To:	Nicki Veikle
Cc:	Nicole Lavoie; Steven Prouse; Erin Blaney; Michael Baker; Cook, Leonard ENV:EX
Subject:	2021-06-29 Authorization to accept Chicken Carcasses
Date:	June 29, 2021 12:26:14 PM
Attachments:	image001.png
Importance:	High

Hello Nicki,

As we discussed I have checked in with the Jake Turek, Ministry Waste Management Specialist with the Ministry of Agriculture who informed me that poultry mortality due to heat stress, is a problem province wide. Rendering, gasification and composting facilities in the lower mainland are overwhelmed with poultry carcasses and it is unlikely that any facility will be able to make beneficial use of the carcasses from the RDKS in this emergency heat wave situation.

As you noted the OC 17227 is authorized to accept Municipal Solid Waste which is defined in the Environmental Management Act as the following:

> "municipal solid waste" means
>
> > (a)refuse that originates from residential, commercial, institutional, demolition, land clearing or construction sources, or
> >
> > (b)refuse specified by a director to be included in a waste management plan;

Given that this facility is an intensive agricultural/industrial use located in a rural residential area, I am providing the Regional District of Kitimat Stikine with a temporary authorization to accept this waste stream of chicken carcasses from the Daybreak facility located in the City of Terrace for use in composting and deposit as waste in the landfill to ensure protection of the environment and human health for 2021.

Please note section 7.7 of the OC which requires that animal carcasses be covered by 60cm of soil and/or refuse. I encourage you to utilize as much of the carcasses as possible in the compost facility in accordance with the Organic Matter Recycling Regulation. Should the RDKS not be able to meet the OMRR requirements the waste material may also be used as cover material or deposit in the landfill.

If you have any questions or concerns please feel free to contact me. This email is my authorization which may be appealed to the Environmental Appeal Board. I will not be sending a separate authorization under letterhead.

Karen Moores, P.Ag.
Section Head, Authorizations North

Municipal and Smelter Sectors
Environmental Protection Division
Ministry of Environment and Climate Change Strategy
Email: karen.moores@gov.bc.ca
Phone: 250-302-3577

From: Nicki Veikle <nveikle@rdks.bc.ca>
Sent: June 29, 2021 11:37 AM
To: Moores, Karen ENV:EX <Karen.Moores@gov.bc.ca>
Cc: Nicole Lavoie <nlavoie@rdks.bc.ca>; Steven Prouse <sprouse@rdks.bc.ca>; Erin Blaney <eblaney@rdks.bc.ca>; Michael Baker <mbaker@rdks.bc.ca>
Subject: Chicken Carcasses
Importance: High

Hi Karen,

Thank-you for assisting our team in figuring out how best to manage this large volume of chicken carcasses. To reiterate, these mortalities have been caused by the current heat wave and are not a result of illness.

In reviewing our current SWMP (attached), I don't see anything specific to carcasses or animal waste. Page 9 refers to material bans; page 13 refers to composting.

I'm not sure if we will need a temporary authorization to accept this waste. Currently, we are undecided whether to accept it as compost feedstock or landfill it. I believe we are leaning toward landfilling the carcasses.

Thank-you for your guidance on this matter.

Best regards,

Nicki Veikle **B.Sc., A.Sc.T., A.Ag.**
Environmental Coordinator

Office: 250-615-6100 Toll Free: 1-800-663-3208 Cell: 250-638-6804
Email: nveikle@rdks.bc.ca Website: http://www.rdks.bc.ca

Appendix D Airspace and Compaction Report

SPERLING HANSEN ASSOCIATES

- Landfill Engineering
- Landfill Gas Management
- Solid Waste Planning
- Environmental Monitoring
- Landfill Fire Control

July 16th, 2021 PRJ21-060

Steve Prouse
Regional District of Kitimat-Stikine
Suite 300, 4545 Lazelle Avenue
Terrace, B.C. V8G 4E1

RE: May 2021 Forceman Landfill Air Space and Compaction Analysis

Sperling Hansen Associates (SHA) surveyed the original Forceman Landfill surface prior to waste placement in 2017 and has been surveying the borrow and fill areas at the Forceman Landfill on a regular basis to determine the air space consumed and waste density achieved. SHA understands that the long-term target compaction density is 0.75 tonnes/m^3 and the target waste to cover ratio is 4:1 on a volume basis.

The most recent GPS topographic surveys were conducted by Allnorth on May 7, 2021 and SHA on November 7, 2020. The May 7, 2021 surveyed surface is shown in Figure 1, as are the cut and fill elevation bands as compared to the prior survey on November 7, 2020. Approximately 13,566 m^3 of total filled air space was consumed in the active landfill area during the survey period (Table 1). This includes 12,920 $m^3$of net air space consumed plus approximately 646 m^3 of air space generated by waste column settlement during the same period (assuming a 5% settlement rate).

A survey of the borrow area found that 3,400 m^3 of cover soil was consumed during the same operational period. Additionally, the survey showed that 1,200 m^3 of cover soil was extracted from the on-site stockpile. During this same period, 98.7 tonnes of contaminated soil was tipped at the landfill for use as cover. The contaminated soil is assumed to have a density of 1.98 tonnes/m^3 for a volume of 49.8 m^3. Therefore, the total cover soil usage was 3,800 m^3 over the survey period (Table 1).

Furthermore, scale data indicates that during the 184-day survey period, the landfill received 6,678.5 tonnes of waste destined for the active face (Table 1).

Using SHA's standard Air Space Utilization spreadsheet (presented in Table 1), we determined that the landfill operator achieved a compaction density of 0.68 tonnes/ m^3 for MSW and a waste to cover ratio of 2.57 to 1. Based on this analysis, the waste density is slightly lower than the target of 0.75 tonnes/m^3 and the waste to cover ratio falls short of the target ratio of 4 to 1.

Table 2 provides a summary of landfill volumes since filling commenced. As seen in Table 2, the waste to cover ratio and MSW density have improved compared to the previous reporting period.

Table 1: SHA Airspace Utilization Spreadsheet for Period May 7, 2021 to November 7, 2020

Nov 7, 2020 to May 7, 2021			
Date of last survey	07-Nov-20		
Date of current survey	07-May-21		
Days between surveys	181		
	Units	Quantity	Comments
Active Footprint Area	m^2	6,900	Per AutoCAD boundary fill area
Air Space Used From Survey	m^3	12,920	SHA AutoCAD Volumetric Anlaysis (Fill)
Air Space Created by Settlement	m^3/survey	646	Assume 5% of Fill volume
Total Filled Air Space (survey period)	m^3	13,566	Sum of airspace used + airspace created
Borrow Area Cover Soil Used (Survey Cut and Fill)	m^3	2,550	SHA AutoCAD (Cut)
Stockpile Cover Soil Used (Survey Cut and Fill)	m^3	1,200	SHA AutoCAD (Cut)
Imported Contaminated Soil for Cover	tonnes	98.7	RDKS Data
Imported Contaminated Soil as Volume	m^3	49.8	Calculation, Assume density of 1.98 tonnes/m3
Soil Usage for Vol. Analysis	m^3	3,800	Calculation, sum total soil
MSW Tonnage for Survey Period	tonnes	6,678.5	RDKS data
MSW Air Space	m^3	9,766	Total Fill minus Total Cut
MSW Density	tonnes/m^3	0.68	
Air Space Utilization Factor	tonnes/m^3	0.517	
Average Settlement Rate	m	0.094	
Waste to Cover Ratio	vol/vol	2.57	

Table 2: Summary of Landfill Compaction Analysis (2016 to 2021)

Start Date	1-Nov-16	1-Jan-18	1-Jul-18	29-Aug-19	1-May-20	7-Nov-20	Lifetime	Units	*Target*
End Date	1-Jan-18	1-Jul-18	1-Aug-19	1-May-20	7-Nov-20	7-May-21			
# of Days	426	181	396	246	190	181	1,620		
Air Space Consumed	30,100	13,428	28,319	18,480	19,215	13,566	123,108	m^3	-
Cover Soil Used	13,328	5,884	11,439	8,516	5,837	3,800	48,804	m^3	-
MSW Received	9,493	3,931	15,289	9,764	7,951	6,679	53,106	tonnes	-
MSW Density	0.57	0.52	0.91	0.98	0.59	0.68	0.71	tonnes/m^3	*0.75*
Waste to Cover Ratio	1.26	1.28	1.48	1.17	2.29	2.57	1.52	-	*4.00*

SHA recommends that the landfill operator be notified of the results of the survey and that the outcome be reviewed with their operations manager. Moving forward, it will be important to increase the waste density to at least 0.75 tonnes/m^3 and to improve on the waste to cover ratio to maximize the landfill lifespan.

As the results are not optimal, SHA recommends operator training from Dr. Sperling to educate the landfill operator on how to achieve the target waste to cover ratio and compaction density. Regular follow up surveys should be conducted to determine if trends are improving.

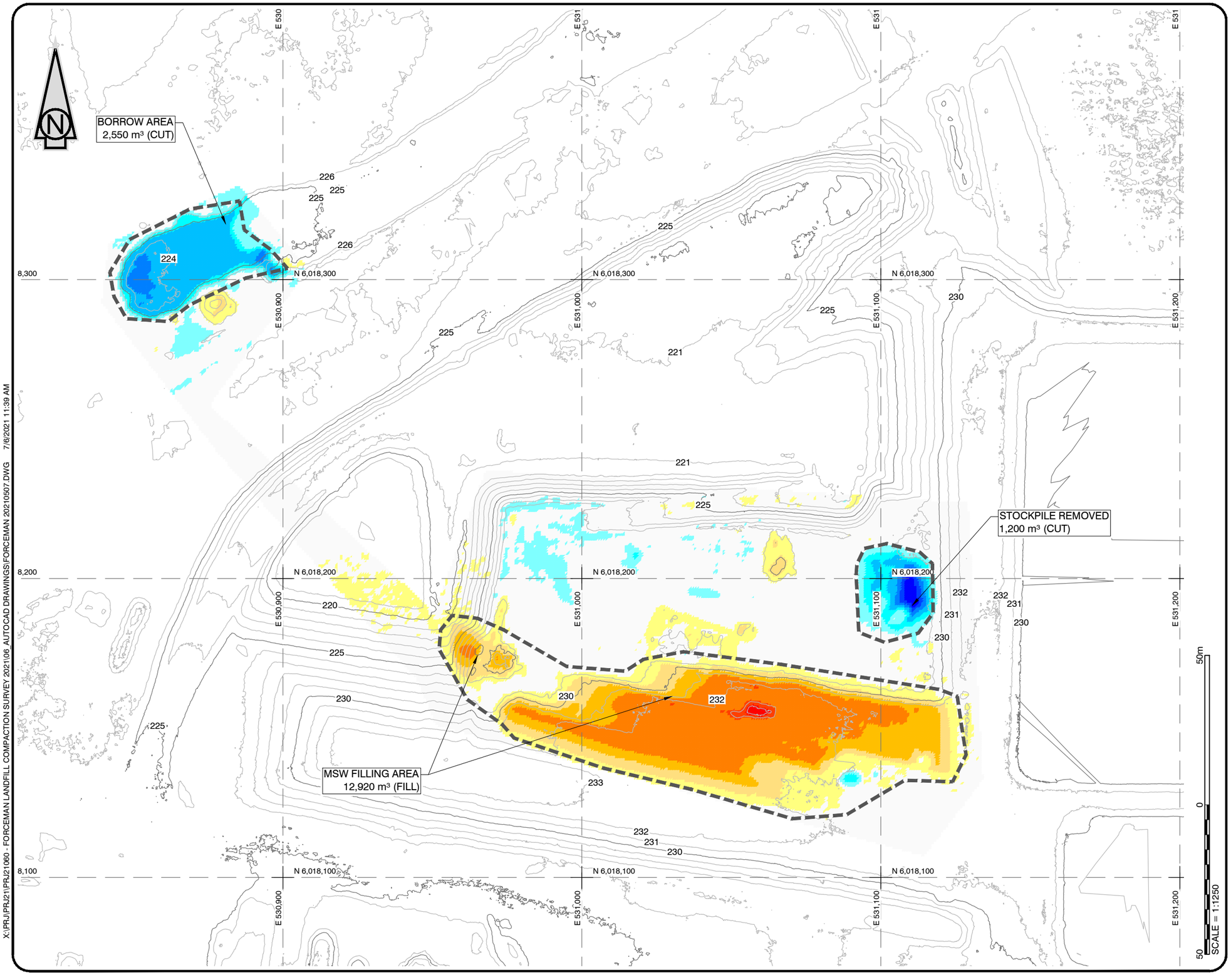
If you have any questions or concerns, please contact us at your convenience.

Yours truly,
SPERLING HANSEN ASSOCIATES

Report prepared by:

Carly Wolfe, EIT
Bioresource Engineer

Nicholas Lamm, BSc.Env.
Engineering Technologist



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SPERLING HANSEN ASSOCIATES

Landfill Services Group

- Landfill Siting
- Design & Operations Plans
- Landfill Closure
- Environmental Monitoring

#8 - 1225 Keith Road East
North Vancouver, B.C. V7J 1J3
Phone: (604) 986-7723

LEGEND:

Elevations Table		
MIN. ELEVATION	MAX. ELEVATION	COLOUR
-6.3m	-5.0m	
-5.0m	-4.0m	
-4.0m	-3.0m	
-3.0m	-2.0m	
-2.0m	-1.0m	
-1.0m	-0.2m	
-0.2m	0.2m	
0.2m	1.0m	
1.0m	2.0m	
2.0m	3.0m	
3.0m	4.0m	
4.0m	5.0m	
5.0m	5.9m	

CUT: 3,850 m³
FILL: 12,920 m³
NET: 9,070 m³ (FILL)

CLIENT:
Regional District of Kitimat-Stikine

PROJECT:
FORCEMAN LANDFILL
COMPACTION SURVEY MAY 2021

TITLE:
EXISTING TOPOGRAPHY & CUT AND FILL MAY 7, 2021 VS NOVEMBER 6, 2020 (196 DAYS)

SCALE:	DATE:	PROJECT NO:
1:1250	2021/07/06 yyyy/mm/dd	PRJ 21060
DESIGNED	-	DRAWING NO:
DRAWN	NL	**FIGURE 1**
CHECKED	CW	

SPERLING HANSEN ASSOCIATES

- Landfill Engineering
- Landfill Gas Management
- Solid Waste Planning
- Environmental Monitoring
- Landfill Fire Control

February 9th, 2022 PRJ21-060

Steve Prouse
Regional District of Kitimat-Stikine
Suite 300, 4545 Lazelle Avenue
Terrace, B.C. V8G 4E1

RE: December 2021 Forceman Landfill Airspace and Compaction Analysis

Sperling Hansen Associates (SHA) surveyed the original Forceman Landfill surface prior to waste placement in 2017 and has been surveying the borrow and fill areas at the Forceman Landfill on a regular basis to determine the airspace consumed and waste density achieved. SHA understands that the long-term target waste compaction density is 0.75 tonnes/m^3 and the target waste to cover ratio is 4:1 on a volume basis.

The most recent GPS topographic surveys were conducted by Allnorth on May 7th, 2021 and December 2nd, 2021. The December 2nd, 2021 surveyed surface is shown in Figure 1, as are the cut and fill elevation bands as compared to the prior survey on May 7th, 2021. Approximately 16,825 m^3 of total air space was consumed in the active landfill area during the 209-day survey period. This includes 15,295 m^3 of net air space consumed plus approximately 1,530 m^3 of air space generated by waste column settlement (assuming a 10% settlement rate). A survey of the borrow area found that 2,993 m^3 of cover soil was extracted during the same operational period. The RDKS provided scale data for the period from May 1st, 2021 to November 30th, 2021 (213 days), which indicates that 248.13 tonnes of contaminated soil was tipped at the landfill for use as cover and 9,465.9 tonnes of waste was landfilled. Since the scale data period is 4 days longer than the survey period, the tonnages were adjusted by 4 days to 243.46 tonnes for contaminated soil and 9,288.1 tonnes for waste. The contaminated soil is assumed to have a density of 1.98 tonnes/m^3 for a volume of 122.96 m^3. Therefore, the total cover soil usage was assumed to be 3,116 m^3 over the survey period.

Using SHA's standard Air Space Analysis spreadsheet (presented in Table 1), it was determined that the landfill operator achieved a waste compaction density of 0.68 tonnes/m^3 and a waste to cover ratio of 4.4 to 1. Based on this analysis, the waste compaction density is lower than the target of 0.75 tonnes/m^3 and the waste to cover ratio is higher than the target ratio of 4 to 1.

Table 1: SHA Airspace Analysis Spreadsheet for Period May 7, 2021 to Dec 2, 2021

	Quantity	Units	Comments
Date of last survey	07-May-21		
Date of current survey	02-Dec-21		
Days between surveys	209	days	
Air Space Used From Survey	15,295	m^3	SHA AutoCAD Volumetric Anlaysis (Net Fill)
Air Space Created by Settlement Below Waste Filling Area	1,530	m^3/survey	Assume 10% of Fill volume
Total Filled Air Space (survey period)	16,825	m^3	Sum of airspace used + airspace created
Borrow Area Cover Soil Used (Survey Cut and Fill)	2,993	m^3	SHA AutoCAD (Cut)
Stockpile Cover Soil Used (Survey Cut and Fill)	0	m^3	SHA AutoCAD (Cut)
Imported Contaminated Soil for Cover	243.46	tonnes	RDKS Data, adjusted to 209 days
Imported Contaminated Soil as Volume	122.96	m^3	Calculation, Assume density of 1.98 tonnes/m3
Soil Usage for Vol. Analysis	3,116	m^3	Calculation, sum total soil
MSW Tonnage for Survey Period	9,288.1	tonnes	RDKS data, adjusted to 209 days
MSW Air Space	13,709	m^3	Total Waste Fill Minus Soil Usage
MSW Density	0.68	tonnes/m^3	
Air Space Utilization Factor	0.607	tonnes/m^3	
Waste to Cover Ratio	4.40	vol/vol	

Forceman Ridge Landfill Compaction Density Liquidated Damages and Bonus

As per the Forceman Ridge Landfill Operations Contract, the liquidated damages and bonus will be based on a landfill volume lost or gained due to under or over compaction. For each 1 m^3 lost, a damage claim of 50% of the value of the airspace lost will apply at a tipping fee of $130/tonne. For each 1 m^3 of airspace gained, a bonus of 50% of the tipping fee value of $130/tonne will be paid.

Table 2 provides a summary of the landfill compaction analysis results since surveys started in November 2016. Table 2 also provides a summary of the airspace gained or lost during each survey period, based on a goal airspace utilization factor of 0.600 tonnes/m^3 (waste compaction density of 0.750 tonnes/m^3 together with waste to cover ratio of 4:1). The resultant liquidated damages or bonus is also shown in Table 2.

Table 2: Summary of Landfill Compaction Analysis Results

Start Date	1-Nov-16	1-Jan-18	1-Jul-18	29-Aug-19	1-May-20	7-Nov-20	7-May-21	Total to Date	Units	*Target*
End Date	1-Jan-18	1-Jul-18	1-Aug-19	1-May-20	7-Nov-20	7-May-21	2-Dec-21			
# of Days	426	181	396	246	190	181	209	1,829		
Total Air Space Consumed	30,100	13,428	28,319	18,480	19,215	13,566	16,825	139,932	m^3	-
Volume Cover Soil Used	13,328	5,884	11,439	8,516	5,837	3,800	3,116	51,920	m^3	-
Volume MSW Landfilled	16,772	7,544	16,880	9,964	13,378	9,766	13,709	88,012	m^3	-
Tonnage MSW Received	9,493	3,931	15,289	9,764	7,951	6,679	9,288	62,394	tonnes	-
MSW Density	0.57	0.52	0.91	0.98	0.59	0.68	0.68	0.71	tonnes/m^3	*0.75*
Waste to Cover Ratio	1.26	1.28	1.48	1.17	2.29	2.57	4.40	1.70	-	*4.00*
Air Space Utilization Factor	0.315	0.293	0.540	0.528	0.414	0.492	0.552	0.446	tonnes/m^3	*0.600*
Airspace Lost	-14,279	-6,876	-2,837	-2,207	-5,963	-2,435	-1,344	-35,941	m^3	-
Airspace Gained	0	0	0	0	0	0	0	0	m^3	-
Liquidated Damages						-$158,286	-$87,381	-$ 245,667		
Bonus						$ -	$ -	$ -		

As seen in Table 2, the waste to cover ratio has improved in the most recent survey period compared to the previous survey period, while the waste compaction density has remained the same. Over the 209-day period from May 7th, 2021 to December 2nd, 2021, a total of 1,344 m^3 of airspace was lost, resulting in liquidated damages totalling $87,381.

Since Green for Life (GFL) took over landfill operations starting in December 2020, SHA calculated the liquidated damages/bonus to be annualized from December 1, 2020 to December 1, 2021. The results of the annualized calculation are presented below in Table 3.

Table 3: GFL Bonus/Liquidated Damages (Dec 1, 2020 - Dec 1, 2021)

Period	Days	Airspace Lost or Gained (m^3)	Liquidated Damages	Bonus	Net
Dec 1, 2020 to May 7, 2021	157	-2,112	-$137,298	$0	-$137,298
May 7, 2021 to Dec 1, 2021	208	0	-$87,381	$0	-$87,381
Total	**365**	**-2,112**	**-$224,679**	**$0**	**-$224,679**

As seen in Table 3, the total airspace lost for the period from December 1, 2020 to December 1, 2021 was 2,112 m^3 resulting in liquidated damages totalling $224,679.

SHA recommends that the landfill operator be notified of the results of the survey and that the outcome be reviewed with their operations manager.

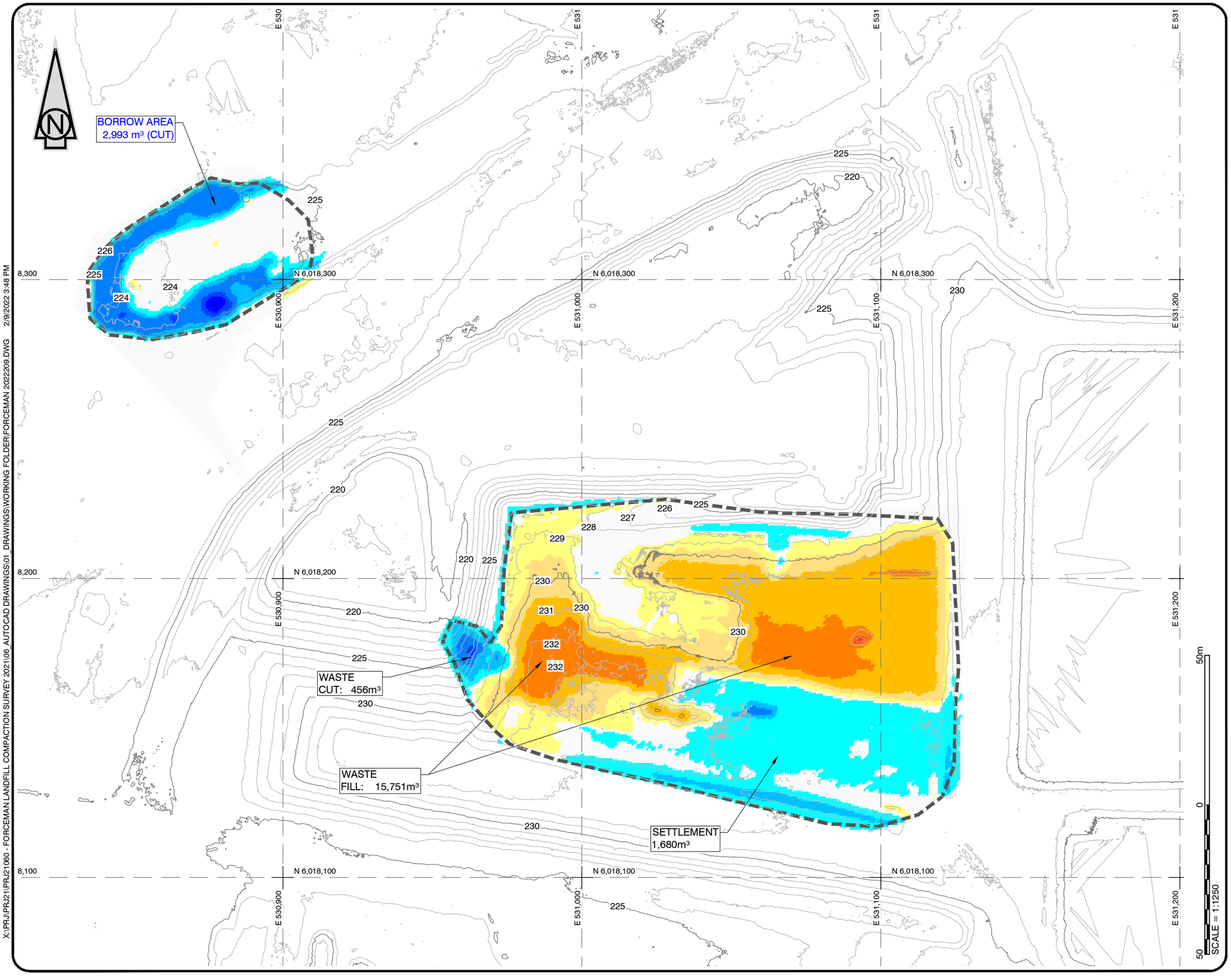
If you have any questions or concerns, please contact us at your convenience.

Yours truly,
SPERLING HANSEN ASSOCIATES

Report prepared by:

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
C. G. I. WOLFE
54733
Feb 9, 2022

Carly Wolfe, P.Eng
Bioresource Engineer



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SPERLING HANSEN ASSOCIATES

Landfill Services Group

- Landfill Siting
- Design & Operations Plans
- Landfill Closure
- Environmental Monitoring

#8 - 1225 Keith Road East
North Vancouver, B.C. V7J 1J3
Phone: (604) 986-7723

LEGEND:

Elevations Table		
MIN. ELEVATION	MAX. ELEVATION	COLOUR
-5.2m	-5.0m	
-5.0m	-4.0m	
-4.0m	-3.0m	
-3.0m	-2.0m	
-2.0m	-1.0m	
-1.0m	-0.2m	
-0.2m	0.2m	
0.2m	1.0m	
1.0m	2.0m	
2.0m	3.0m	
3.0m	4.0m	
4.0m	4.6m	

CUT:	456m³
FILL:	15,751m³
NET:	15,295m³ (FILL)

DISPLAYED EX. TOPO DEC. 2, 2021
VOLUME BASE SURFACE: EG FORCEMAN 20210507
VOLUME COMPARE SURFACE: EG FORCEMAN 20211202

CLIENT:
Regional District of Kitimat-Stikine

PROJECT:
FORCEMAN LANDFILL
COMPACTION SURVEY DEC 2021

TITLE:
EXISTING TOPOGRAPHY & CUT AND FILL MAY 7, 2021 VS DEC. 2, 2021 (209 DAYS)

SCALE:	DATE:	PROJECT NO:
1:1250	2021/12/16 yyyy/mm/dd	PRJ 21060
DESIGNED	-	DRAWING NO:
DRAWN	NL	**FIGURE 1**
CHECKED	CW	