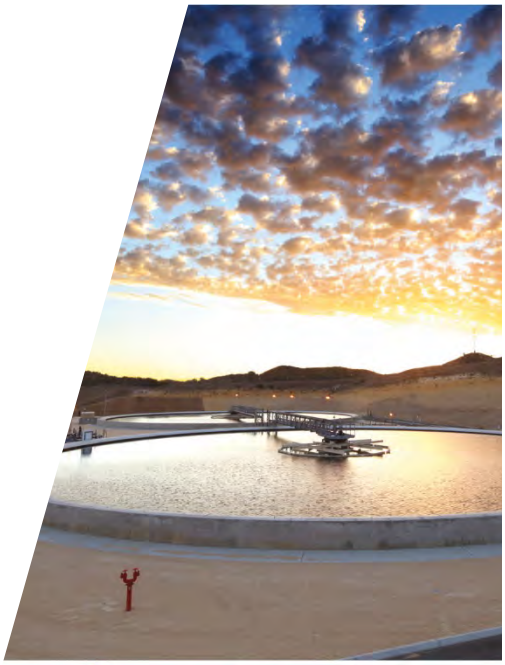

Hydrogeological Study and Data Gap Assessment

Brunswick Smelter
Belledune, New Brunswick

Glencore Canada Corporation

Executive Summary

GHD was retained by Glencore Canada Corporation (Glencore) to conduct a Hydrogeological Study (HGS) and Data Gap Assessment (DGA), of the Brunswick Smelter facility (Smelter) located at 692 Main Street (Route 134) in Belledune, New Brunswick (NB). The Brunswick Smelter includes the Smelter Area (including the New Slag Pile), the Material Handling West Area and the Fertilizer Plant. For the purpose this report, the term "Site" will refer to the wider Glencore Smelter complex and associated assets. The Site consists of 34 parcels of Glencore owned land encompassing approximately 604 hectares.

The Site is located within an industrial area of Belledune with the active facilities primarily located north of Route 134. The Site is serviced with fresh water supplied by the Jacquet River Pump House located approximately 14 km to the west of the Site. Sanitary sewage is treated by an on-Site treatment system is located north of the Lead Refinery building. A process water treatment plant is also located on-Site. Glencore has been operating the Brunswick Smelter facility in Belledune since 1966. Primary infrastructure associated with the Site is divided into three areas including:

1) The Materials Handling West Facility (which includes the coke fines storage area and the concentrate storage domes).
2) The Fertilizer Plant area (which also includes the battery plant and the bulk acid tanks).
3) The Smelter Area (which is the largest portion of the site including the Back 50, Back 40 and Process Sludge areas, Belledune Point, the acid plant, the smelter buildings (Sintering Plant, Blast Furnace, Refinery) and the New Slag Pile).

GHD completed the HGS and DGA work between August 27 and October 31, 2019. A HGS and DGA was completed at the Site as part of the "Closure Plan - Prefeasibility Study 2019 Update". The HGS and DGA consisted of the following:

- The completion of the existing monitoring well survey (a total of 69 existing monitoring wells were located on-Site, repairs made as required, and their geodetic locations were confirmed);
- The drilling and installation of 20 monitoring wells to further evaluate the geological stratigraphy and assess soil and groundwater quality conditions and drilling of 27 soil probes to further evaluate the geological stratigraphy and assess soil quality conditions; and
- The collection of representative soil, groundwater, surface water, sediment and slag samples for laboratory analyses.

The results of the HGS and DGA are summarized as follows:

- The overburden stratigraphy at the Site generally consists brown silty sand and gravel fill overlying clastic sedimentary bedrock (described as red, grey and brown sandstone, grey shale, red and grey siltstone, and conglomerate). In some test locations a layer of highly fractured bedrock was observed above the more competent bedrock. The depth to bedrock is variable across the Site, but is generally 1 to <3 mbgs.
- The depth to groundwater ranged from 0.17 to 4.39 mbgs. The direction of the shallow groundwater flow at the Site is northeast towards Chaleur Bay. The direction of the bedrock groundwater flow in the Back 40 and Back 50 area is also northeast towards Chaleur Bay. Using

the average *k* and estimated *i* values, the groundwater velocity (*V*) for the shallow groundwater table is estimated to be 10 m/year. The groundwater velocity for the bedrock groundwater table in the Back 40 and Back 50 areas is estimated to be 6 m/year. The groundwater velocity can also be locally influenced by preferential pathways such as buried utilities.

- The estimated aerial extent of metals impacted soil at the Site in excess of the lead SSTLs for protection of human health based on industrial land use (i.e. the metal with the largest footprint) is 92 ha ±20% including: 71.5 ha in the Smelter Area and 20.5 ha in the combined Material Handling West Area and the Fertilizer Plant. The volume of material required to cover the areas of metal impacted soils above industrial land use SSTLs assuming a 0.6 m thick cover to eliminate the human health exposure pathway would be 550,000 m^3. This volume of cover material includes the terrestrial areas Belledune Point.
- Metal concentrations typically decreased significantly in subsurface soil compared to surface soil. For example lead in 19GW-127 (located in the Back 40 area) was measured at 44,000 mg/kg in the 0-0.15 m depth sample and 640 mg/kg in the 1.2-1.8 m depth sample. Similar to concentrations of metals in soil, concentrations of leachable metals in soil also decreased with depth below surface grade. Using test location 19GW-127 as an example: the leachable lead was measured at a concentration of 130,000 µg/L in the 0-0.15 m depth sample and decreased to 1,400 µg/L in the 1.2-1.8 m depth sample located within the shallow groundwater table. Further, the dissolved lead concentration in the groundwater sample collected at this location was only 78 µg/L.
- As the Site is considered non-potable, human exposure pathways to metals in groundwater (i.e., ingestion) is generally considered to be incomplete. The screening of metals in groundwater was based on groundwater discharging from the Site to marine surface water body (Chaleur Bay) and protection of marine ecological receptors. Concentrations of metals in groundwater samples collected directly adjacent to the Chaleur Bay shoreline in 2019 were generally below applicable screening guidelines for the protection of marine aquatic life.
- Concentrations of metals in groundwater directly adjacent to the Salt Water Lagoon exceed applicable screening guidelines for protection of marine aquatic life. However, concentrations of metals in groundwater were observed to significantly decrease (orders of magnitude) as groundwater flows from the Smelter Area towards Belledune Point.
- Free phase petroleum product was not observed in the 53 monitoring wells sampled at the Site (18 of the monitoring wells were dry). Concentrations of petroleum hydrocarbons (BTEX/mTPH) in groundwater samples from selected test locations were within the RBCA Tier I RBSLs for an industrial site with non-potable water use and coarse grained soil. The area and volume of hydrocarbon impacted soil and groundwater will need to be assumed in the 2019 Closure Plan – Prefeasibility Study 2019 since delineation was not possible due to operating Site infrastructure. However, groundwater samples were collected as part of the HGS and DGA for monitor wells located near certain hydrocarbon source areas which will reduce some of the uncertainty in the volume estimates.
- Concentrations of PAHs and PCBs in both soil and groundwater samples collected as part of the HGS and DGA study were either not detected or well below screening criteria and therefore are not considered to be COCs that will require significant management effort in the Closure Plan - Prefeasibility Study 2019 Update.

- Black slag, as well as brown/black silt and sand, was observed at the base of the Saltwater Lagoon; the Saltwater Lagoon is located within the Belledune Point and was re-created by the removal of 526,000 m^3 of slag from the "old" slag pile to the New Slag Pile in 2011-2012. Concentrations of arsenic, cadmium, copper and lead and zinc exceeded the CCME ISQGs and the PELs in the nine sediment samples collected during the 2019 program.
- Surface water samples collected from the Saltwater Lagoon had concentrations of arsenic, cadmium and/or mercury exceeding the CCME WQGs for the Protection of Marine Aquatic Life, long term screening levels and/or the NSE PSS. Concentrations of other metals such as copper, lead, thallium and zinc also exceeded the NSE PSS. The Saltwater Lagoon likely receives shallow groundwater from a portion of the Smelter site including the Back 40 and Back 50 areas and is also influenced by tides in Chaleur Bay.
- Slag samples from the New Slag Pile contained elevated metals with the following average concentrations: arsenic 1,900 mg/kg; cadmium 21 mg/kg; copper 3,800 mg/kg; lead 26,000 mg/kg; thallium 1.8 mg/kg and zinc 110,000 mg/kg (mercury was not detected in the samples). Lead exceeded the CEPA leachate screening level (5,000 µg/L) with a concentration of 100,000 µg/L. Cadmium and arsenic did not exceed the CEPA leachate screening levels. Dissolved lead in groundwater down gradient of the New Slag Pile (05GW-52 and 05GW-53) was only 0.79 µg/L and 2.61 µg/L, respectively.

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List of Acronyms

ASTs	Aboveground Storage Tanks
BTEX	Benzene, Toluene, Ethylbenzene, and Xylene
BV	Bureau Veritas
CEPA	Canadian Environmental Protection Act
CN	Canadian National Railway
CCME	Canadian Council of Ministers of the Environment
COC	Contaminant of Concern
CSM	Conceptual Site Model
DFO	Department of Fisheries and Oceans
DGA	Data Gap Assessment
eDAT	Electronic Database Access Tool
ECD	Electron Capture Detector
EQS	Environmental Quality Standards
ESA	Environmental Site Assessment
ESL	Ecological Screening Levels
FIGQGs	Federal Interim Groundwater Quality Guidelines
GC	Gas Chromatography
GHD	GHD Limited
Glencore	Glencore Canada Corporation
Ha	Hectares
HGS	Hydrogeological Study
i	Hydraulic Gradient
ICP	Inductively Coupled Plasma
ISQGs	Interim Sediment Quality Guidelines
k	Hydraulic Conductivity
Logan	Logan Drilling
m	Metre
masl	Metres Above Sea Level
mbgs	Meters Below Ground Surface
mg/kg	Milligrams per kilogram
mg/L	Milligrams per litre
MS	Mass Spectrometry
mTPH	modified Total Petroleum Hydrocarbon
n	Porosity

List of Acronyms

NB	New Brunswick
NBDELG	New Brunswick Department of Environment & Local Government
NSE	Nova Scotia Environment
PAHs	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
PELs	Probable Effects Levels
PID	Property Identification Number
ppt	parts per thousand
PSS	Pathway Specific Standards
RBCA	Risk Based Correction Action
RBSLs	Risk-Based Screening Levels
RPD	Relative Percent Difference
SeQGs	Sediment Quality Guidelines
S_{LA}	La Vielle Formation
Smelter	Brunswick Smelter Facility
SNB	Service New Brunswick
SQGs	Soil Quality Guidelines
S_{SC}	South Charlo Formation
SSTLs	Site Specific Target Levels
TCLP	Toxicity Characteristic Leaching Procedure
TPE	Total Potency Equivalents
TPH	Total Petroleum Hydrocarbons
UCL	Upper Confidence Level
USTs	Underground Storage Tanks
V	Groundwater Velocity

1. Introduction

GHD was retained by Glencore Canada Corporation (Glencore) to conduct a Hydrogeological Study (HGS) and Data Gap Assessment (DGA), of the Brunswick Smelter facility (Smelter) located at 692 Main Street (Route 134) in Belledune, New Brunswick (NB). The Brunswick Smelter includes the Smelter Area (including the New Slag Pile), the Material Handling West Area and the Fertilizer Plant. For the purpose this report, the term "Site" will refer to the wider Glencore Smelter complex and associated assets, whereas any specific location at the Site will be named directly.

A Site location map is included as Figure 1, a property plan for the Site is presented as Figure 2 and a Site plan is presented as Figure 3. Representative photographs taken of the Site during the HGS and DGA program are included in Appendix A.

The HGS and DGA is being completed as part of the decommissioning and closure cost forecasting study ("Decommissioning Study") currently being completed by GHD for the Smelter and referred to as the "Closure Plan - Prefeasibility Study 2019 Update". The HGS and DGA program focused on evaluating:

- Current hydrogeological conditions on the Smelter Area with a detailed evaluation of the Back 40, Back 50 and Process Sludge Storage Areas, the Saltwater Lagoon and the shoreline of Chaleur Bay.
- Current environmental conditions in soil, groundwater, sediment and surface water across the Site. The 2019 environmental data collected as part of this study was also be compared to available historical data to evaluate environmental quality conditions at the Site over time.

GHD completed the HGS and DGA work between August 27 and October 31, 2019. The work was conducted in general accordance with GHD's proposal dated July 29, 2019, excluding some minor modifications to the field work program based on decisions and approval from Glencore generally related to Site conditions and Site safety requirements (see Section 2.1).

The HGS and DGA program was completed in conjunction with the Naturally Occurring Radioactive Material (NORM) and Hazardous Materials Survey specific to the Fertilizer Plant area of the Site. Applicable environmental quality data from the NORM survey work is also included herein.

This report details the findings of the work completed.

1.1 Site Description

The Site consists of 36 parcels of Glencore owned land [identified by Service New Brunswick (SNB)] as the following property identification numbers and encompassing a total area of approximately 604 hectares (Figure 2). Glencore also owns additional properties outside of the study area shown on Figure 2.

Table 1.1 Glencore Study Area Property Identification Numbers

20252680	20780508	20443172	20443214	20441283	20443099
20252318	20443149	20832481	20443115	20443164	20443073
20801619	20443255	20443057	20443222	20443263	20251963
20278339	20445789	20443198	20443230	20443180	20603197
20755302	20443156	20443206	20443123	20443107	20445714
20444840	20442992	20443081	20443248	20277968	20655122

Adjacent and nearby third party industrial properties are owned by Irving Oil, NB Power, New Brunswick Department of Transportation, the Port of Belledune, Caribou Mining and Canadian National Railway (CN). Two adjacent properties are also owned by the Roman Catholic Bishop of Bathurst (including the cemetery near the Materials Handling West area).

The Site is located within an industrial area of Belledune with the active facilities primarily located north of Route 134. Vacant wooded properties owned by Glencore as well as the New Slag Pile are located south of Route 134. The Site is serviced with fresh water supplied by the Jacquet River Pump House located approximately 14 km to the west of the Site that includes a reservoir and freshwater pipeline owned by Glencore. This fresh water pumphouse and associated infrastructure also supplies fresh water to several industrial facilities in the area (such as the Port of Belledune and Chaleur Sawmill) as well as residents on Chaleur Drive. Sanitary sewage is treated by an on-Site treatment system is located north of the Lead Refinery building. A process water treatment plant is also located on-Site.

Glencore has been operating the Brunswick Smelter facility in Belledune since 1966. Primary infrastructure associated with the Site is divided into three areas including:

1) The Materials Handling West Facility (which includes the coke fines storage area and the concentrate storage domes).
2) The Fertilizer Plant area (primarily confined to the Di-Ammonium Phosphate Plant and Phosphoric Acid Plant (DAP and PAP) buildings).
3) The Smelter Area (which is the largest portion of the site including the Back 50, Back 40 and Process Sludge areas, Belledune Point, the acid plant, the smelter buildings (Sintering Plant, Blast Furnace, Refinery) and the New Slag Pile.

The wooded properties around the slag pile are zoned industrial and are considered a buffer for Site operations (the unauthorized use of these properties is considered trespassing). A Site plan is shown as Figure 3 (with the 2018 aerial image background) and with various Site features labeled.

1.2 Previous Studies

The documents indicated that various historical environmental site assessment and site characterization work has been completed at the Site since 1988-1989 (see Section 8). The following is a summary of the number of groundwater monitoring wells that have been installed on the Site prior to the completion of the current investigation (and as shown on Figure 4):

- 36 monitoring wells installed 1988;
- 32 monitoring wells installed in 2005;

- 20 monitoring wells installed in 2008 (Bulk Handling West Facility and Fertilizer Plant areas); and
- 3 monitoring wells installed in 2015 (Smelter Area/Lead Refinery area).

A total of 69 of these monitoring wells were located as party of the 2019 HGS and DGA program. Glencore collected groundwater samples from 29 of these remaining monitoring wells in May 2019 (and this data has been provided to GHD for inclusion in this study).

The historical documents indicate that numerous soil samples have been collected across the Site for metal analyses. Concentrations of metals exceeding Canadian Council of Ministers of the Environment (CCME) Industrial Soil Quality Guidelines (SQGs) were identified at the majority of past test locations across the Site with ore concentrate also previously observed along on-Site rail spur line. Some metal exceedances were also previously reported for soil samples collected near the proposed soil granular cover borrow pit area (Figure 3). Additional samples were therefore collected as part of the 2019 study. Risk based site specific target levels (SSTLs) were previously calculated in 2007 for various metals at the Site and used in a 2010 closure plan for the Site (CRA, 2010). Soil leachate testing was also previously completed at localized areas of the Site using three lab methods. Potential leachate generating soils (zinc and cadmium) were generally limited to the old coke fines storage area. Sediment samples previously collected from the Site (Belledune Point area) also had elevated concentrations of various metals.

The historical documents also identified modified petroleum hydrocarbons (mTPH) as a contaminant of concern (COC) for the Site. Soil and groundwater have had concentrations of mTPH exceeding Atlantic Risk-Based Corrective Action (RBCA) Tier I Risk Based Screening Levels (RBSLs) at various locations on Site including Number 1 Short Rotary Furnace and Acid Day Tank as well as the former underground storage tanks (USTs) and current aboveground storage tanks (ASTs) associated with the Warehouses (as well as the former waste oil tank and former No. 2 bulk fuel oil AST north of Lead Refinery). The area and volume of hydrocarbon impacted soil and groundwater was assumed in the 2008/2009 Closure Plan PFS since delineation was not possible due to operating Site infrastructure. Some sediment samples previously collected from the Belledune Point area of the Site also had elevated concentrations of mTPH.

The historical documents indicate that polycyclic aromatic hydrocarbons (PAHs) were detected in various soil and sediment samples and therefore PAHs are considered a COC at the Site.

The historical documents indicate that polychlorinated biphenyls (PCBs) were also identified as a potential COC in various areas of the Site, including the electrical substations and the former PCB storage container area.

The historical documents indicate that NORM are also identified as a COC for the Fertilizer Plant portion of the Site. The initial NORM characterization study completed for this area of the Site in 2006 identified several building surfaces and adjacent soil areas that contained NORM concentrations above acceptable guidelines that would require specific remediation and/or disposal requirements (CRA, 2006). A supplemental assessment program completed in 2008 identified concentrations of NORM in soil adjacent to the DAP & PAP buildings that were below applicable guidelines indicating additional soil management or remediation may not be required (SNC, 2008). As noted above, the HGS and DGA program was completed in conjunction with a NORM and Hazardous Materials Survey study specific to the Fertilizer Plant area and applicable environmental quality data from the NORM characterization work is also included in this report.

To further evaluate the historical environmental conditions at the Site and to compare conditions of previous studies to the data collected as part of the current HGS and DGA program, the available data has been compiled into an electronic Data Access Tool (eDATpro). This is a customized geographic information system (GIS) software program that integrates site maps and environmental sampling databases with digital photographs, 3D visualizations, monitoring well and borehole logs, and reports to help facilitate data management, spatial interpretation, and overall data interaction. The eDAT for this study contains >30,000 data records extending from August 1988 to October 2019 (the eDAT program will be provided as a separate deliverable to Glencore with the final report).

1.3 Study Objectives and Scope of Work

Study Objectives

The objectives of the HGS and DGA program are:

- To complete a well survey to locate, repair and sample previously constructed monitor wells at the Site (to provide additional hydrogeological information for the study).
- To determine an understanding of the hydrogeology of the Back 40 (and Back 50) area of the Site and the potential influences of metal impacted surface and/or subsurface soil on shallow groundwater quality (i.e., perched above bedrock) as well as the deeper bedrock groundwater quality.
- To investigate groundwater flow and the potential for metal impacted groundwater to be discharging to surface waters of the Saltwater Lagoon and the Chaleur Bay.
- To investigate and evaluate a series of options for potential groundwater interception and treatment on-Site utilizing existing infrastructure (if required).
- To prepare a Conceptual Site Model (CSM) for the Back 40/Back 50 and Saltwater Lagoon area of the Site including identification of contaminant source areas, pathways, and receptors.
- To assess current soil and groundwater conditions in other areas of the Site to assess identified data gaps and add to the current Site environmental database. These areas include:
    - Material Handling West Area (formerly referred to as the “BHO”);
    - Coke Fines Storage Area;
    - Former Coke Fines Storage Area/Polishing Pond;
    - Cooling Pipe Excavation (Smelter Area); and
    - The former PCB Storage Container and the on-Site Electrical Substations.

Scope of Work

The HGS and DGA scope of work, required to meet the study objectives, is summarized as follows:

- Review the previous environmental reports that have been completed for the Site.
- Complete an existing well survey, repair existing monitor wells (if present), measure static water levels and collect groundwater samples from the existing wells for field parameters and dissolved metals.

- Drill a series of shallow and deep boreholes and install monitor wells in the Back 40/Back 50 and Saltwater Lagoon area of the Smelter Area.
- Collect representative surface and subsurface soil samples from the new boreholes for available metals analysis along with leachate testing on selected samples following receipt of the laboratory metal data.
- Collect representative groundwater samples from the newly installed wells for dissolved metal analyses.
- Determine the area of metal impacted soil and dissolved metal plume as well as the migration potential to down gradient ecological receptors.
- Establish the groundwater flow pattern affecting the plume, including preferential pathways such as buried utilities, high permeability layers, vertical and horizontal gradients.
- Assess current soil and groundwater conditions in other areas of the Site (Bulk Handling West Area, Fertilizer Plant and New Slag Pile) to assess potential data gaps and add to the current Site environmental database. Samples to be analyzed for petroleum hydrocarbons, PAHs, PCBs and/or metals).
- Prepare draft and final reports on the study findings.

2. Field Investigation Methodology

The HGS and DGA program was completed according to the work plan outlined in GHD's proposal dated July 29, 2019. As noted, applicable data from the NORM and Hazardous Materials Survey study specific to the Fertilizer Plant, completed in conjunction with the HGS and DGA program, is also included in this report.

The fieldwork portion of the work was completed between August and October 2019 and involved the following:

- The completion of the existing monitoring well survey (a total of 69 existing monitoring wells were located on Site, repairs made as required, and their geodetic locations were confirmed);
- The drilling and installation of 20 monitoring wells to further evaluate the geological stratigraphy and assess soil and groundwater quality conditions;
- The drilling of 31 soil probes to further evaluate the geological stratigraphy and assess soil quality conditions;
- The sampling of soil from the newly constructed monitoring wells and soil probes;
- The sampling of groundwater from the newly installed and existing on-Site monitoring wells;
- The collection of surface soil samples from 23 locations (13 from the cemetery and 10 from Belledune Point area of the Site);
- The collection of 5 surface water samples (1 from a ditch near the Back 50 and 4 from the Saltwater Lagoon);
- The collection of 9 sediment samples from the Saltwater Lagoon; and

- Surveying of the 2019 test locations.

The 2019 test locations (along with previously constructed monitoring well locations) are shown on Figure 4.

2.1 Borehole Program

Logan Drilling (Logan) from Moncton, NB, was retained by GHD for the drilling and monitoring well installation program. The boreholes were drilled using a geotechnical CME 55 rubber track mounted rig equipped with 100 mm outside diameter (82 mm ID) standard stem augers. The soil probes were drilled to depths ranging from 0.6 to 3.0 metres below ground surface (mbgs). The monitoring wells were drilled to depths ranging from 3.0 to 9.0 mbgs.

Prior to proceeding with the subsurface investigation, each proposed test location was approved by Glencore representatives. Based on the potential of buried utilities or Site specific safety requirements the following proposed drilling test locations were omitted from the program:

- 19GW-121 (in the Material Handling West area);
- 19GW135 (in the Smelter Area; west of the Sintering Building);
- 19SP-7 and 19SP-8 (in the Material Handling West area, near the electrical substation – samples were collection using a hand auger); and
- 19SP-29 (near the west electrical substation).

The following is a summary of the soil probes drilled:

- 19SP-1 to 12 and 19SP-30 to 32 (Material Handling West area);
- 19SP-13 and 18 (near the electrical substations);
- 19SP-14 to 17 (Back 50, Back 40 and Process Sludge Storage Areas);
- 19SP-19 and 20 (north of cooling recycling pond and the buried zinc refinery debris area);
- 19SP-21 to 25 (Soil Borrow area/former airstrip); and
- 19SP-26 to 28 (New Slag Pile).

The 2019 soil probe logs presented in Appendix B.

2.2 Monitoring Well Installation

A total of 20 groundwater monitoring wells were installed as part of the HGS and DGA. The monitoring wells consist of 50 mm diameter polyvinyl chloride (PVC) flush threaded 10 slot screen and solid riser pipe. The well materials arrived at the Site factory-wrapped in plastic and were only handled with disposable nitrile gloves after being unwrapped to prevent contamination.

The annular space around the PVC and borehole wall was backfilled to approximately 0.3 metres (m) above the top of the screen with #2 silica sand, and then with hydrated bentonite pellets to approximately 0.1 mbgs. All monitoring wells were capped with a j-plug and protected with either a flush-mount casing or a steel, lockable stick-up casing.

The following is a summary of the monitoring wells installed:

- 19GW-114 to 120 and 19GW-122 to 124 (Material Handling West and Fertilizer Plant areas);
- 19GW-125 and 19GW-127 to 134 (Back 50, Back 40 and Process Sludge Storage Areas and Saltwater Lagoon Area); and
- 19GW-126 (north of cooling recycling pond area).

The 2019 monitoring well logs are presented in Appendix B. Logs for previously constructed monitor wells are also included in the eDAT (Appendix E).

2.3 Test Location Survey

Roy Consultants (Roy) from Bathurst, NB, in association with GHD, conducted an elevation survey of the existing wells between August 27 and 29, 2019. Roy personnel also surveyed the 2019 HGS and DGA test locations on October 14, 2019 (Table 1). The test locations are presented on Figure 4 (and in the eDAT) are based on the geodetic survey information. A copy of the survey notes are also included in Appendix B.

2.4 Soil Sample Collection

2.4.1 Drilling Program

Soil samples were collected on a continuous basis (at 0.6 m intervals), where possible, using a split spoon sampler during the borehole drilling activities. A spatula was used to remove the soil from the split spoon. The split spoon sampler and spatula were washed with a detergent solution, followed by several rinses with distilled water and then air-dried between sample collection. The soil samples were then split, with one portion placed in sealable plastic bags for soil headspace analysis and the other portion placed into appropriate laboratory supplied glass jars with Teflon lined lids for laboratory analysis.

Selected samples from the boreholes were submitted to the laboratory for various chemical analyses. The sample containers intended for laboratory analysis were maintained in cool dark storage for shipment to the laboratory.

The soil samples submitted for benzene, toluene, ethyl benzene, xylenes (BTEX) and mTPH (specifically C_6-C_{10} fraction) analysis were measured using a 10 mL Terra Core™ Sampler to collect an approximate 10 gram soil core. The soil core was immediately field preserved by placing it into a 40 ml clear glass vial containing 10 ml of purge and trap grade methanol. Samples collected for mTPH (C_{10}-C_{32} fraction) analysis were collected with zero headspace in 60 ml glass jars with Teflon lined lids. Samples collected for PAH, PCB and metals analysis were placed in 250 ml glass jars with Teflon lined lids. All sample containers were supplied by the laboratory.

The soil samples were submitted to Bureau Veritas (BV) in Bedford, Nova Scotia for analyses. Following receipt of the laboratory metal data, selected samples were also analyzed for metal leachability using Toxicity Characteristic Leaching Procedure (TCLP) method. The TCLP method uses a pH of 5.0 to be representative of rain water. A copy of the laboratory method is included in Appendix C.

2.4.2 Surface Soil Sampling Program

In addition to surface soil samples that were collected during the drilling program, the following additional surface soil samples were collected from the Site as part of the HGS and DGA study:

- Surface soil samples (19SS-1 to 19SS-10) were collected from 10 locations on Belledune Point; and
- Surface soil samples (19SS-11 to 19SS-23) were collected from 13 locations within the cemetery located on the western end of the Smelter Area.

The surface soil samples were collected using a stainless steel hand auger and placed into 250 ml glass jars with Teflon lined lids for laboratory analysis. To prevent any cross contamination, all soil sampling equipment was cleaned between soil samples. Disposable nitrile gloves were worn by the field staff during sample collection and cleaning procedures. The surface soil samples were submitted to BV for metal analyses. The surface soil sample locations are shown on Figure 4.

2.5 Groundwater Sample Collection

The newly constructed monitoring wells and the previously existing monitoring wells were sampled for groundwater in September and October 2019. The monitoring included measurements water levels, the presence or absence of free product, field measurements of pH, temperature and conductivity. The monitoring results are presented in Table 2.

The depth to the water table and presence or absence of free product in the wells were determined with a Solinst electronic interface probe that was cleaned with a non-toxic, biodegradable cleaner/degreaser, then rinsed with clean tap water, between monitoring wells.

The monitoring wells were purged prior to the initiation of the sampling work using a 12V battery powered submersible pump. The wells were purged until a minimum of three standing well water volumes were removed or until dry. This purging procedure is intended to obtain a representative sample of formation groundwater. It is noted that the purging procedure using the pump also cleaned out silt build-up in the previously existing monitoring wells. The water level in the monitoring wells was allowed to recover to its static level prior to collecting the groundwater sample. The groundwater purging and sampling program was completed using dedicated polyethylene bailers and/or polyethylene tubing with foot valve.

Samples collected for metals were field filtered and preserved with nitric acid. All sample bottles were supplied by the laboratory. The groundwater samples were placed in coolers with ice immediately after they were collected.

Samples for BTEX/mTPH (C_6-C_{10} fraction) analysis were collected in 40 ml clear glass vials (with zero headspace), pre-charged with sodium bisulfate preservative. Samples for mTPH (>C_{10}-C_{32} fractions) analysis were collected in 250 ml clear glass bottles pre-charged with sodium bisulfate preservative supplied by BV. Samples for PAH and PCB analysis were collected in 250 ml bottles supplied by BV.

2.6 Sediment Sample Collection

A total of 9 sediment samples (19SED-1 to 19SED-9) were collected from the Saltwater Lagoon using either a hand auger or dredge sampler deployed from a shallow draft Jon boat. The sediment samples collected in 250 ml glass jars with Teflon lined lids supplied by the laboratory. The samples were submitted to BV for metals analysis.

2.7 Surface Water Sample Collection

A total of 5 surface water samples were collected from the Site including 19SW-1 (from the ditch in the Back 50 and Back 40 area), 19SW-2 (from the channel leading to the Saltwater Lagoon from the Saltwater Pumphouse), and 19SW-3 to 19SW-5 (from the Saltwater Lagoon using the Jon boat). The samples were submitted to BV for metals, including mercury (low detection limit seawater analyses) as well as pH, salinity and total suspended solids.

2.8 Analytical Program

Selected soil samples were analyzed for:

- Metal scan (including mercury) by Inductively Coupled Plasma (ICP) method
- Metal Leachate by Toxicity Characteristic Leaching Procedure (TCLP) method
- pH
- BTEX/mTPH by Atlantic PIRI method
- PCBs by Gas Chromatography (GC)/Electron Capture Detector (ECD) method
- PAHs by the GC/Mass Spectrometry (MS) Solvent Extraction method

Selected groundwater samples were analyzed for:

- Metal scan (including mercury) by ICP method
- pH, Salinity, Hardness, Total Suspended Solids
- BTEX/mTPH by Atlantic PIRI method
- PCBs by GC/ECD method
- PAHs by the GC/MS Solvent Extraction method

Sediment samples were analyzed for:

- Metal scan (including mercury) by ICP method

Surface water samples were analyzed for:

- Metal scan (including mercury) by ICP method
- pH, Salinity, Hardness, Total Suspended Solids

Slag samples were analyzed for:

- Metal scan (including mercury) by ICP method

- One representative sample also submitted for Metal Leachate TCLP method

The laboratory results are discussed in Section 4.

2.9 Quality Assurance/Quality Control Program

The purpose of the quality assurance/quality control (QA/QC) program is to ensure that the quality of the samples submitted for analyses are representative of the field conditions without interferences from other sources. The QA/QC program also ensures that analytical results are reported accurately and precisely. During the assessment program:

- Ten field duplicate soil samples were analyzed for metals;
- One field duplicate sample was analysed for PCBs;
- Nine groundwater field duplicate samples were analyzed for metals;
- One groundwater field duplicate sample was analyzed for BTEX/mTPH;
- One groundwater field duplicate sample was analyzed for PCBs;
- One sediment field duplicate sample was analysed for metals; and
- One surface water field duplicate sample was analysed for metals.

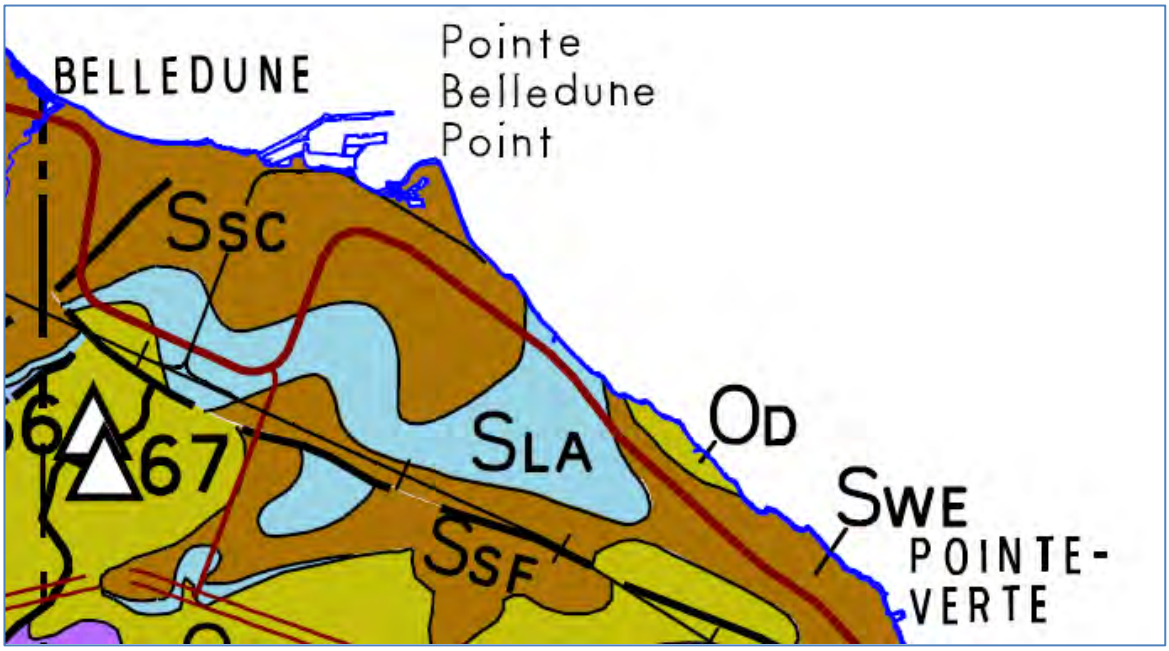
The QA/QC sample results are further discussed in Section 4.7.

3. Physical Characteristics of the Site

3.1 Regional Geology

The geology in the Belledune area (in the vicinity of the Site) consists of early to late Silurian age bedrock of the Chaleurs Group including coarse to medium grained terrestrial to nearshore marine, clastic and volcanoclastic rocks of the South Charlo Formation (S_{SC}) as well as nearshore marine carbonate rocks and associated fine-grained, calcareous, siliclastic rocks of the La Vielle Formation (S_{LA}) as shown below (Wilson, 2006).

Figure 3.1 Geology Map – Belledune Point



Bedrock is overlain by Late Wisconsinan and/or early Holocene in age marine sediments mapped a sand, silt, gravel and clay generally 0.5 to 3 m thick (Rampton, 1984).

3.2 Local Geology

The overburden stratigraphy at the Site generally consists brown silty sand and gravel fill overlying bedrock. Grain size analysis were requested on six representative soil samples collected from the Site including:

- 19SP-14 (0-0.6m) and 19SP-16 (0.6-1.2m) from the Back 40 area as well as 19GW-125 (1.2-1.8m), 19GW-129 (3.0-3.6m), 19GW-131 (1.2-1.5m) down gradient from the Back 40 area; and
- 19GW-123 (0.3-0.6m), from the Fertilizer Plant area.

Samples of upper fill (0 to 3.6 m depth) contained 22 to 46% gravel, 38 to 51% sand and 16 to 27% silt and clay; and are considered to be coarse grained by the Atlantic PIRI guidelines. *The grain size analyses are included in Appendix C.*

Bedrock was encountered in the majority of past and current drilling test locations (as shown in the logs). From the testing completed, the bedrock surface appears to be undulating and the depth to bedrock is variable across the Site for example:

- The Materials Handling West Facility (which includes the coke fines storage area and the concentrate storage domes) the depth to bedrock ranges from 0.9 to >4.5 mbgs.
- The Fertilizer Plant area (which also includes the battery plant and the bulk acid tanks) the depth to bedrock ranges from 1.2 to >3 mbgs.

- The Smelter Area (Back 50, Back 40 and Process Sludge areas) the depth to bedrock ranges from 0.6 to 3 mbgs. The depth to bedrock typically increases in the Belledune Point area (ranging from 1.5 to >4 mbgs). The depth to bedrock on the south side of Route 134 (between the road and the New Slag Pile) ranges from 1.2 to >4 mbgs.

The bedrock intersected during the various drilling programs is clastic sedimentary rocks described as red, grey and brown sandstone, grey shale, red and grey siltstone, and conglomerate. In some test locations a layer of highly fractured bedrock was observed above the more competent bedrock (for example: GW-25C, GW-30B, GW-31, MW-1, MW-2 and MW-3). Numerous fractures were also observed in the bedrock core (pebble conglomerate with calcite precipitate retrieved from 19MW-128, 132 and 134 and red sandstone with calcite veining in 19MW-130) near the Back 40 area of the Site.

3.3 Hydrology

The New Slag Pile is the highest land feature on the Glencore property. The elevation at the base of the new slag pile (near the Regulated Wetland) is approximately 25 metres above sea level (masl) and slopes northward to Route 134 (with an elevation of 10 to 12 masl). Within the Smelter Area (between Route 134 and the rail spur line) is relatively flat with a slight northward gradient and ranges in elevation from approximately 7.5 to 5 masl. North of the rail spur line, within the Belledune Point area, the surface elevation is approximately 4 to 3 masl and then sloping to the beach of Chaleur Bay at sea level. Within Belledune point, there are two large, shallow surface water pond areas including the Saltwater Lagoon (which was created by the removal of the former slag pile in 2011-2012). The depth of the Saltwater Lagoon was approximately 1.2 m and slag was encountered at the base of the lagoon.

South of Route 134 the hydrology is controlled by overland flow and infiltration in the forest covered land. Surface water run-off associated with the New Slag Pile is directed to the regulated wetland (located directly north of the New Slag Pile) which discharges into two ditches that direct the water northward to the west side of the Back 50 and into the Chaleur Bay. It is noted the regulated wetland located in the New Slag Pile area of the Site was a sedimentation pond constructed as part of the New Slag Pile design and later designated by the New Brunswick Department of Environment and Local Government (NBDELG) as a regulated wetland.

Other ditches located within the Smelter Area include: a process discharge water ditch through the Back 50 area, and a drainage ditch located on the eastern end of the Site (both draining into Chaleur Bay). Surface and storm water within the Smelter Area (generally draining from west to east) is collected via drainage network and directed to the on-Site Waste Water Treatment plant (WWTP) and polishing pond prior to discharging to Chaleur Bay. The Smelter Area retains storm water run-off for treatment with exception of the car dump area to the north of the Smelter Area (as shown on Figure 5B). Stormwater collection is collected through a ditch and retention pond system at the northwest side of the site near the Thaw Shed building.

Within the Materials Handling West area of the Site, the elevation ranges from approximately 20 masl and slopes north and northeast to the Port of Belledune property with an elevation of 4 masl. A new Storm Water Storage Pond was recently constructed east of the acid tanks which collects storm water runoff from the site and discharges through a forcemain, 2 km to the east, where the water is treated at the Smelter Area Waste Water Treatment Plant (WWTP).

Ditches on-Site include an eastern perimeter ditch collecting surface water from offsite and directing it along the eastern edge of the Material Handling site and into the Chaleur Bay. The Material Handling West Site consists of one net-zero drainage area located at the Dome storage system where storm water is collected in a local pond and can be manually, transferred through piping to the main Material West Storage Pond and then discharged to the main Smelter Area for treatment.

3.4 Hydrogeology

Groundwater levels were measured in the newly constructed monitoring wells as well as available existing monitoring wells at the Site using an electronic water/product interface probe during the groundwater sampling work. An elevation survey of the wells was conducted by GHD and relative groundwater elevations were calculated as presented in Table 1. Static water levels ranged from 0.17 to 4.39 mbgs.

Hydraulic conductivity (*k*) from bail tests were completed on the following shallow groundwater monitoring well locations (with an average *k* of 9.85×10^{-4} cm/sec):

- GW-18 (2.19×10^{-3} cm/sec),
- 05GW-64 (1.44×10^{-3} cm/sec),
- 19GW-127 (1.36×10^{-4} cm/sec), and
- 19GW-133 (1.75x10-4 cm/sec).

Hydraulic conductivity (k) from bail tests was also completed two bedrock monitoring well locations (with an average *k* of 5.75×10^{-4} cm/sec):

- 19GW-128 (4.74×10^{-4} cm/sec), and
- 19GW-134 (6.77×10^{-4} cm/sec).

As noted above, grain size analysis were requested on certain soil samples with the following samples within, or near, the shallow groundwater table: 19GW-125 (1.2-1.8m), 19GW-129 (3.0-3.6m) and 19GW-131 (1.2-1.5m) down gradient from the Back 40 area. Hydraulic conductivity can also be estimated from the grain size analyses using the Hazen method; with corresponding *k* values of 1.44×10^{-4} cm/sec, 4×10^{-3} cm/sec and 1×10^{-4} cm/sec, respectively.

The local groundwater flow direction is northeast toward Chaleur Bay (which borders the northern property boundary for the majority of the Site) at an estimated hydraulic gradient (*i*) of 1 to 1.5 percent.

The groundwater flow velocity was calculated using: $V=ki/n$ where:

V = velocity

k = average hydraulic conductivity

i = hydraulic gradient

n = porosity = 0.3 (assumed)

Using the average *k* and estimated *i* values, the groundwater velocity (*V*) for the shallow groundwater table is estimated to be 10 m/year. The groundwater velocity (*V*) for the bedrock groundwater table in the Back 40 and Back 50 area is estimated to be 6 m/year.

Groundwater flow is shown on Figures 5A and 5B. Geological Cross-Sections of the Back 40 and Back 50 area are shown on Figure 6.

Given the heavy industrial use of the Site with multiple underground utilities and process pipelines are present throughout the facility with the potential for these to act as preferential pathways for localized groundwater flow on the Site. Some of these pathways (from Glencore underground services plan 8002-10-5026) are also shown on Figure 5B for the Back 50, Back 40, Process Sludge Storage area and Belledune Point and Figure 6. As shown in Table 1, the depth to the shallow groundwater table in this area of the Site ranges from 1.13 to 2.69 mbgs (with the majority <2 mbgs). Underground pipe trenches (such as the 36 inch and 16 inch diameter pipes) running east-west from the Saltwater Pump House would intersect the shallow groundwater table. There is also a north-south run of buried pipes east of the acid plant.

It is expected that tidal influence could impact some of the static water levels in monitoring wells close to Chaleur Bay. Salinity levels were measured in the groundwater to determine potential tidal influence in the groundwater quality. The salinity data indicates that shallow groundwater within Belledune Point area (north of the rail lines) is ≥3 parts per thousand (ppt or 0.3%) whereas salinity south of this area is typically ≤2 ppt (0.2 %) (Figure 8A); for comparison the Saltwater Lagoon has a salinity of 20 ppt (2.0%).

4. Analytical Findings

4.1 Assessment Criteria

The analytical data collected during the HGS and DGA program is compared to applicable guidelines to define potentially impacted areas at the Site. The guidelines selected are those used in standard industry practice in Atlantic Canada, which are most appropriate for the current and intended future land use of the Site.

As previously noted, the current and intended future land use of the Site is industrial and the Site is surrounded by industrial properties, with the exception of the adjacent cemetery property (which will be discussed separate from this report). The overburden stratigraphy at the Site generally consists brown silty sand and gravel fill overlying bedrock. The Site is serviced with fresh water supplied by the Jacquet River Pump House located approximately 14 km to the west of the Site that includes a reservoir and freshwater pipeline owned by Glencore. For the purposes of selecting applicable assessment criteria, the Site is considered to be industrial, with non-potable groundwater use and coarse-grained soil. Since the majority of the Site is developed for industrial use, significant ecological habitat are not present. Therefore, the criteria described below focus primarily on the protection of human health.

Belledune Point and the old slag pile area have been previously referred to as a Low Exposure Land Use area (SNC, 2009). The old slag pile area located on Belledune Point was rehabilitated to become a Saltwater Lagoon as outlined in the Belledune Point Rehabilitation Plan (Brunswick

Smelter, 2013). The rehabilitation plan was developed in collaboration with several federal/provincial agencies including the NBDELG, Department of Fisheries and Oceans (DFO), Canadian Wildlife Service and Department of Energy and Mines. In addition, the Belledune Point rehabilitation work was completed in accordance with the Approval to Construct I-7784 issued by the NBDELG.

In 2012, Atlantic RBCA implemented an ecological screening protocol for contaminated sites that has been adopted by the NBDELG as part of the provincial Guideline for the Management of Contaminated Sites. Under this protocol, it is likely that the Belledune Point area and the Saltwater lagoon created by the relocation of the old slag pile would be considered ecological habitat potentially requiring additional evaluation of contaminants in soil, surface water or sediment with respect to risk to ecological receptors. However, the information provided in the Belledune Point Rehabilitation Plan Final Report along with results of the Marine Ecological Risk Assessment of Brunswick Smelter completed by Intrinsik which includes the shoreline of Belledune Point (Intrinsik, 2015) indicate that concentrations of metals in shoreline sand of Belledune Point are unlikely to pose a significant risk to ecological populations. As such, the purpose of collecting soil, sediment and surface water samples from Belledune Point was to provide information on current conditions in the area for comparison to human health based guidelines. Further evaluation of risk to ecological receptors from exposure to COCs in various media of Belledune Point was not included in the scope of work of this study. Based on discussions with Glencore personnel, it is assumed that additional rehabilitation works of Belledune Point will not be required as part of future Site closure activities and is further discussed in the Closure Plan - Prefeasibility Study 2019 Update being prepared concurrently by GHD.

The New Brunswick Guidelines for the Management of Contaminated Sites (Version 2, November 2003) indicate that the guidelines provided in the Atlantic RBCA document for Petroleum Impacted Sites should be applied for petroleum hydrocarbons and the CCME guidelines should be used for non-petroleum contaminants. In the absence of applicable screening values from CCME, the NB Guidelines for the Management of Contaminated Sites also indicate that screening values sourced from other jurisdictions may be considered. Therefore, the Nova Scotia Environment (NSE) Tier 1 Environmental Quality Standards (EQS) have also been referenced below, where no applicable RBCA or CCME screening values are available.

The various guidelines used in this study are described below.

Soil

Parameters: **Metals**

Guideline: Analytical results for select metals (arsenic, cadmium, copper, lead, silver, thallium and zinc) typically associated with the ore concentrate being processed at the Site, are compared to calculated risk based SSTLs (related to the rail transport of ore concentrate to the Smelter from the Brunswick Mine) for the Protection of Human Health for an Industrial Worker (CRA, 2013).

Rationale: The risk based SSTLs for an industrial worker, previously calculated during assessment, remediation and closure of the CN rail line properties over which ore concentrate was transported to the Site from the Brunswick Mine, were used as the primary screening values for typical ore related metals to demonstrate the likely expected areas on-Site that would require remedial action planning work as part of

the “Closure Plan - Prefeasibility Study 2019 Update”. It is also noted that a review of these SSTLs was completed with Glencore as part of the regulatory site closure work completed by GHD in 2018, on behalf of CN, for the CN rail line bordering the Site properties owned by Glencore.

As the science for risk assessment is evolving, the SSTLs presented in this report are being used specifically for environmental closure cost estimation items in the Closure Plan - Prefeasibility Study 2019 Update, and that Brunswick Smelter specific SSTLs would be required as part of a remedial action plan. For example, other metals (such as antimony) would also require site-specific consideration in a risk assessment application at the Smelter.

Guideline: For metals other than those listed above, the main criteria referenced are the CCME SQG using the associated CCME Factsheets (accessed online, October 2019). The criteria for Industrial Land Use, based on the most conservative applicable human health pathway (Soil Ingestion, Particulate Inhalation or Off-Site Migration Check) are applied.

Rationale: The CCME SQGs were used as the primary screening values for other metals, in the absence of SSTLs, as these standards are based on multiple pathway analysis considering human exposure pathways including soil ingestion / dermal contact, particulate inhalation and off-site migration. Interim CCME SQGs (1991) are not referenced as they are not human health risk-based.

Guideline: In the absence of an applicable CCME SQG, the NSE Tier 1 EQS for soil, Industrial Land Use, non-potable groundwater and coarse-grained soil are also referenced (July 6, 2013).

Rationale: The NSE Tier I EQS standards are also based on multiple pathway analysis considering human health, but do not include the particulate inhalation or off-site migration check.

Guideline: Leachable metals in soil concentrations were compared to screening levels provided in the Canadian Environmental Protection Act (CEPA), Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations, Current to July 1, 2019.

Rationale: The CEPA leachate screening levels were used as the primary screening values for metals in leachate, as these standards are used to determine if the soil would be considered a hazardous waste under the Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations, to evaluate disposal options. The leachate screening levels can also give an indication as to how likely the metal in soil is to leach from soil to groundwater.

***Parameters*: Petroleum Hydrocarbons (BTEX/mTPH)**

Guideline: RBCA Tier 1, Atlantic RBCA for Petroleum Impacted Sites in Atlantic Canada, Version 3, User Guidance, Appendix 3 – Table 4a: Tier I Risk-Based Screening Level (RBSL), July 2012, revised January 2015. Industrial Receptor,

non-potable groundwater use, coarse-grained soil type (as applicable based on soil stratigraphy) for the protection of human health.

Rationale: The Tier I RBSL are based on multiple pathway analyses considering human health in an industrial setting which includes adult receptors. This is the standard guideline for petroleum hydrocarbons used throughout Atlantic Canada. Non-potable groundwater use has been chosen as the Site and surrounding properties are supplied with water by an off-site source (Glencore Jacquet River Pump House).

Parameters: **PAHs**

Guideline: For PAHs, the main criteria referenced are the CCME SQG, CCME Factsheets (accessed online, October 2019). The criteria for non-potable Industrial Land Use, based on the most conservative applicable human health pathway (Soil Ingestion, Particulate Inhalation or Off-Site Migration Check) are applied.

Rationale: The CCME SQGs were used as the primary screening values for other PAHs, as these standards are based on multiple pathway analysis considering human exposure pathways including soil ingestion/ dermal contact, particulate inhalation and off-site migration. CCME only provides human health based guidelines for carcinogenic effects of PAHs, using the benzo(a)pyrene total potency equivalent (B(a)P TPE), and recommends consulting other jurisdictions for protection of human health from non-carcinogenic effects.

Guideline: In the absence of an applicable CCME SQG, the NSE Tier 1 EQS for soil, Industrial Land Use, non-potable groundwater and coarse grained soil (July 6, 2013) are referenced for PAHs.

Rationale: The NSE Tier I EQSs are also based on multiple pathway analysis considering human health, but do not include the particulate inhalation or off-site migration check.

Parameters: **PCBs**

Guideline: CCME SQG, CCME Factsheets accessed online, October 2019. Non-potable, Industrial Land Use, based on the most conservative applicable human health pathway (Soil Ingestion, Particulate Inhalation or Off-Site Migration Check).

Rationale: The CCME SQGs were used as the primary screening values as these standards are also based on multiple pathway analysis considering human exposure pathways including soil ingestion/ dermal contact, particulate inhalation and off-site migration. CCME does not provide a human health based guideline for PCBs.

Guideline: In the absence of an applicable CCME SQG, the NSE Tier 1 EQS for soil, Industrial Land Use, non-potable groundwater and coarse-grained soil are referenced (July 6, 2013).

Rationale: The NSE Tier I EQSs are also based on multiple pathway analysis considering human health, but do not include the particulate inhalation or off-site migration check.

Groundwater

Parameters: **Metals and PCBs**

Guideline: For non-petroleum hydrocarbon parameters in groundwater, the primary guidelines referenced are the NSE Pathway Specific Standards (PSS) (July 6, 2013) for Groundwater at a Non-Potable Site – coarse grained soil, Industrial land use (July 6, 2013) and the Federal Interim Groundwater Quality Guidelines (FIGQGs) for Commercial and Industrial Land Uses, Tier 2 – Inhalation (human health), coarse-grained soil (Version 4, June 2016). For metals and PCBs, there are no applicable NSE PSSs or FIGQGs for human health, as the only applicable exposure pathway is inhalation and metals as well as PCBs are non-volatile, resulting in no exposure.

Rationale: The NSE PSS and FIGQGs for Commercial and Industrial Land Uses, Tier 2 – Inhalation (human health) are used for screening purposes as these standards were adopted from Canadian jurisdictions, where available, and are based on pathway specific analysis for human health.

Guideline: For groundwater sampling locations located along the boundary of the Site with Chaleur Bay, the NSE PSS and FIGQGs Tier 2 for Groundwater Discharge to Surface Water, Discharge to Marine Water (July 6, 2013) would also apply. However, given the lack of applicable screening criteria for protection of human health, the NSE PSS were used for screening metals and PCBs in groundwater at the Site.

Rationale: The NSE PSS for Groundwater Discharge to Surface Water, Discharge to Marine Water are used for screening purposes where groundwater is potentially discharging to a marine aquatic environment, in order to evaluate potential effects to nearby marine aquatic life. The NSE PSS for Groundwater Discharge to Surface Water >10 m from a Marine Surface Water Body are applied to boundary groundwater sampling locations at 10 m or greater from Chaleur Bay. Similarly, the FIGQG Tier 2 – Marine Life guidelines are also used for screening purposes where groundwater at 10 m or greater from a receiving water body is potentially discharging to the water body, in order to evaluate potential effects to nearby marine aquatic life.

***Parameters*:** **Petroleum Hydrocarbons (BTEX/mTPH)**

Guideline: For petroleum hydrocarbon parameters in groundwater, the main criteria referenced are the RBCA Tier 1, Atlantic RBCA for Petroleum Impacted Sites in Atlantic Canada, Version 3, User Guidance, Appendix 3 – Table 4b: Tier I RBSL, July 2012, revised January 2015, Industrial Receptor, non-potable groundwater use, coarse-grained soil type for human health.

Rationale: The Table 4b RBCA Tier I RBSLs for groundwater are based on multiple pathway analyses considering human health in an industrial setting which includes adult receptors. These are the standard guidelines for petroleum hydrocarbons used throughout Atlantic Canada. Non-potable groundwater use has been chosen as the Site and surrounding properties are supplied with water by an off-Site source.

Guideline: For groundwater sampling locations located along the boundary of the Site with Chaleur Bay, the RBCA Tier 1 Atlantic RBCA for Petroleum Impacted Sites in Atlantic Canada, Version 3, User Guidance, Appendix 2 – Table 3a – Groundwater Ecological Screening Levels (ESLs) for the Protection of Freshwater and Marine Aquatic Life, are referenced as the primary screening levels to assess potential impacts to nearby aquatic life.

Rationale: The Table 3a Tier 1 RBSLs for groundwater are for use in evaluating groundwater quality at sampling locations at 10 m or more from a freshwater or marine aquatic water body. Where groundwater locations are situated less than 10 m from an aquatic water body, RBCA recommends use of the Table 3a Surface Water screening levels.

Guideline: Where the boundary groundwater sampling locations are located greater than 10 m from the Chaleur Bay, RBCA Tier 1 Table 3b is referenced for guidelines adjusted for distance to receiving aquatic environments.

Rationale: Where groundwater locations are situated more than 10 m from an aquatic water body, RBCA recommends the use of Table 3b screening levels, which have been adjusted for distance to the receiving water body.

Due to the highly developed nature of the industrial site, the pathway from shallow groundwater to plants and soil Invertebrates is not considered applicable.

Parameters: **PAHs**

Guideline: For non-petroleum hydrocarbon parameters in groundwater, the primary guidelines referenced are the NSE Tier 1 EQS for Groundwater at a Non-Potable Site – coarse grained soil, Industrial land use (July 6, 2013) and the FIGQGs for Commercial and Industrial Land Uses, Tier 2 – Inhalation (human health), coarse-grained soil (Version 4, June 2016).

Rationale: The NSE Tier 1 EQS and FIGQGs for Commercial and Industrial Land Uses, Tier 2 – Inhalation (human health) are used for screening purposes as these standards were adopted from Canadian jurisdictions, where available, and are based on pathway specific analysis for human health.

Guideline: For groundwater sampling locations located along the boundary of the Site with Chaleur Bay, the NSE PSS (July 6, 2013) and FIGQGs Tier 2 for Groundwater Discharge to Surface Water, Discharge to Marine Water (July 6, 2013) would also apply.

Rationale: The NSE PSS and FIGQG Tier 2 – Marine Life guidelines are used for screening purposes where groundwater at 10 m or greater from a receiving water body is potentially discharging to the water body, in order to evaluate potential effects to nearby marine aquatic life.

Sediment

Parameters: **Metals**

Guideline: For metals, the CCME Sediment Quality Guidelines (SeQGs) for the Protection of Aquatic Life, Marine, Interim Sediment Quality Guidelines (ISQGs) and Probable Effects Levels (PELs), CCME Factsheets (accessed online, October 2019) were used for comparison purposes. In addition, the NSE EQS for marine sediment were also referenced.

Rationale: The CCME ISQGs and PELs were used as the primary screening values, as these sediment quality guidelines are the standard sediment screening levels for use in Canada. The CCME SeQGs adopted by the federal government were developed using a two-tiered approach. The CCME ISQGs include a set of contaminant concentrations that were derived on the basis of the threshold effect level. This value represents the concentration below which adverse biological effects are rarely expected. The CCME guidelines also specify a PEL, which defines the level above which adverse effects in biota are expected to occur frequently. It should be noted that the SeQGs were derived using conservative assumptions; exceedances of these guidelines at a particular site indicate a need for further assessment but are not necessarily indicative of ecological effects.

Surface Water

Parameters: **Metals**

Guideline: For non-petroleum hydrocarbon parameters in surface water, such as metals, the main criteria referenced are the CCME Canadian Water Quality Guidelines (WQGs) for the Protection of Aquatic Life, Marine Life, long term screening levels, CCME Factsheets (accessed online, October 2019). The NSE EQS for marine water were also applied.

Rationale: The CCME WQGs for marine life were used as the primary screening values, as these guidelines are the standard marine surface water screening levels for use in Canada. The CCME WQGs adopted by the federal government were derived on the basis of the lowest estimates of toxicity of chemicals to fish, invertebrates and plants. This value represents the concentration below which adverse biological effects are rarely expected. For parameters that CCME does not have screening values, the NSE adopted surface water guidelines from other jurisdictions in the development of the NSE PSS. In New Brunswick, the NSE PSS values are typically used in the absence of CCME WQGs and are endorsed by the NBDELG. It should be noted that the CCME WQGs and NSE PSS were derived using conservative assumptions; exceedances of these guidelines at a particular site indicate a need for further assessment but are not necessarily indicative of ecological effects.

The applicable screening levels are identified in Tables 3 to 13 (following the text).

4.2 Soil Analytical Results

4.2.1 Metals

Overview

A total of 124 soil samples were submitted for available metal analysis from various location and depths across the Site as part of the 2019 HGS and DGA work.

Analytical results were compared to risk based SSTLs for select metals (arsenic, cadmium, copper, lead, thallium and zinc) typically associated with the ore concentrate being processed at the Site, as well as the CCME SQGs for an industrial site (see Table 3A).

The 2019 soil metal concentrations (all samples including QA/QC samples) are summarized as follows:

- Arsenic: 9 to 14,000 mg/kg (average 689 mg/kg);
- Cadmium: <0.3 to 2,100 mg/kg (average 111 mg/kg);
- Copper: 8 to 73,000 mg/kg (average 2,529 mg/kg);
- Lead: 20 to 68,000 mg/kg (average 10,207 mg/kg);
- Thallium: <0.1 to 790 mg/kg (average 28 mg/kg); and
- Zinc 51 to 130,000 mg/kg (average 11,891 mg/kg).

The 2019 soil data, along with the historical soil data available for the Site from past environmental programs, is presented on the Figures 7A to 7C for the above noted metals. These figures are intended to provide an overview of the expected aerial extent of metal impacted soil at the Site (without graphing each of the 27 metals analyzed). It is also demonstrated in these figures the value of utilizing risk based SSTLs as part future remedial action planning being considered as part of the Closure Plan - Prefeasibility Study 2019 Update being completed concurrently with this study. For example antimony ranged I concentration from <2 to 8,500 mg/kg (with an average concentration of 283 mg/kg) compared to the NSE Tier 1 EQS of 63 mg/kg.

The majority of the soil samples exceedances are located with the Smelter Area (including surface soil on Belledune Point). As well as portions of both the Fertilizer Plant and the Material Handling West Area. Localized metal impacts were also identified in some isolated soil samples collected south of Route 134.

Stock-piled Residue Material

In addition to the data described above, it is understood that there is storage and stockpiles of residue materials in the Back 40, Back 50 and the Process Sludge Storage Areas that could potentially be re-processed. The estimated volume of stockpiled residue material at the Site is 28,000 metric tonnes (Glencore provided information October 2019). The reported metal concentrations of this material is noted below.

Table 4.1 Stockpiled Residue Material Chemical Composition

Area	Material	Category	%Pb	%Ag	%Cu	%As	% Cd	%Sb	%Zn
Back 40, Back 50 Areas & North of Acid Plant (NAP)	New Pond Dredging (Hg Bleed)	Free Material	36.85	0.118	0.76	0.97	2.46	0.35	1.86

Source: Oct. 2018 Sampling Campaign

Mercury in this material was also reported to be present at 1,600 mg/kg (Glencore provided information October 2019). It is noted that mercury in the 2019 soil samples from the Back 40, Back 50 and the Process Sludge Storage Areas of the Site (19SP-14, 19SP-16, 19SP-17, 19GW-127 and 19SP-133) ranged in concentration from <0.1 to 11 mg/kg (and typically decreased in the subsurface soil samples).

Lead in the 2019 surface soil samples from Back 40, Back 50 and the Process Sludge Storage Areas (19SP-14, 19SP-16, 19SP-17, 19GW-127 and 19SP-133) ranged in concentration from 1,700 to 44,000 mg/kg; and also typically decreased in the subsurface soil samples (for example 19GW-127 contained 44,000 mg/kg lead in the 0-0.15 m depth sample and 640 mg/kg in the 1.2-1.8 m depth sample).

Soil Leachate

A total of 14 soil samples were submitted for leachable metals analysis from various locations and depths across the Site as part of the 2019 HGS and DGA work.

The 2019 soil leachate concentrations for selected metals considered associated with historical Site operations are summarized as follows:

- Arsenic: Concentrations ranged from <20 to 1,300 µg/L and were below the CEPA leachate screening level (2,500 µg/L);
- Cadmium: Concentrations ranged from 22 to 30,000 µg/L with 57% of the samples exceeding the CEPA leachate screening level (500 µg/L);
- Lead: Concentrations ranged from 1,000 to 460,000 µg/L with 64% of the samples exceeding the CEPA leachate screening level (5,000 µg/L);
- Thallium: Concentrations ranged from 1.2 to 11,000 µg/L but a CEPA leachate screening value is not available; and
- Zinc: Concentrations ranged from 250 to 77,000 µg/L but a CEPA leachate screening value is not available.

In addition to screening for hazardous waste considerations, the leachate screening levels can also give an indication as to how likely the metal in soil is to leach from soil to groundwater. Similar to concentrations of metals in soil discussed above, concentrations of leachable metals in soil also decreased with depth below surface grade. Using test location 19GW-127 as an example: the leachable lead was measured at a concentration of 130,000 µg/L in the 0-0.15 m depth sample and decreased to 1,400 µg/L in the 1.2-1.8 m depth sample located within the shallow groundwater table. Further, the dissolved lead concentration in the groundwater sample collected at this location was only 78 µg/L. This is also repeated in the samples collected from 19GW-133 as an example:

the leachable lead was measured at a concentration of 670,000 µg/L in the 0-0.15 m depth sample and decreased to 1,100 µg/L in the 1.2-1.8 m depth sample. Dissolved lead concentration in the groundwater sample collected from this location was 486 µg/L. Table 3B presents the concentration of selected metals in soil and the corresponding soil leachate concentration as well as the groundwater concentration at that same sample location. Additional discussion regarding metals in groundwater is presented in Section 4.3.

Belledune Point

Surface soil samples (19SS-1 to 19SS-10), from 0-0.05 m depth and 0.05-0.3 m depth, were collected from 10 locations (31 samples including QA/QC) on the Belledune Point. The surface soil metal concentrations are presented in Table 3A and are summarized as follows:

- Arsenic: 46 to 1,300 mg/kg (average 300 mg/kg);
- Cadmium: 1.9 to 58 mg/kg (average 21 mg/kg);
- Copper: 81 to 2,900 mg/kg (average 725 mg/kg);
- Lead: 740 to 24,000 mg/kg (average 8,046 mg/kg);
- Thallium: 1.2 to 14 mg/kg (average 5.5 mg/kg); and
- Zinc: 490 to 86,000 mg/kg (average 15,082 mg/kg).

Metal concentrations in soil samples collected from Belledune Point were generally below SSTLs or CCME SQGs for an industrial land use excluding arsenic and lead. Concentrations of these two metals exceeded SSTLs for industrial land use at several locations on Belledune Point. The area of the surface soil sample exceedances are also included on Figures 7A to 7C.

Total Area of Exceedances

The majority of the Smelter Area had concentrations of one or metals in surface soil exceeding SSTLs for industrial land use. Relatively smaller areas of metal exceedances are also located in the Fertilizer Plant and the Materials Handling West area; as shown on Figures 7A to 7C.

The estimated aerial extent of metal impacted soil at the Site in excess of the lead SSTLs (i.e., the metal with the largest footprint) is 92 hectares (ha) ±20% including:

- 71.5 ha in the Smelter Area (includes Belledune Point); and
- 20.5 ha in the combined Materials Handling West Area and Fertilizer Plant.

The estimated volume of material required for cover the areas of metal impacted soils above industrial land use SSTLs, assuming a 0.6 m thick cover to eliminate the human health exposure pathway would be 550,000 m^3 (including 415,000 m^3 of granular borrow material and 135,000 m^3 of organic topsoil [0.15m thick]). This volume of cover material would include the terrestrial areas Belledune Point (as shown on Figure 9). It is noted that the area of soil impacts exceeding the CCME SQGs is estimated to be 94 ha.

The areas presented above do not include slag contained in the New Slag Pile area (a description of slag samples collected during the HGS and DGA is included in Section 4.6).

Cemetery

It is also noted that surface soil samples (19SS-11 to 19SS-13), from 0-0.15 m depth and 0.15-0.3 m depth, were initially collected from 3 locations within the off-Site cemetery (owned by the Catholic Church). Elevated concentrations of lead (and other metals) were detected in sample 19SS-12 (0-0.15m) (3,200 mg/kg) and 19SS-13 (0-0.15m) (2,500 mg/kg) collected from the cemetery property.

In consideration that the cemetery would not be classified as an industrial property, additional sampling work was conducted in order to statistically evaluate exposure point concentrations (EPC) of metals in surface soil at the cemetery. Additional surface soil samples 19SS-14 to 19SS-23 were collected on October 31, 2019.

The EPCs are an estimate of a reasonable upper limit value for the mean metal concentration and are based on the 95% upper confidence level (UCL) of the mean. The purpose of comparing EPCs to applicable guidelines to identify the potential for risk to receptors visiting or working at the cemetery. An EPC is more representative for comparison to an applicable screening value developed for the cemetery property land use.

Table 4.2 provides the calculated EPC and summary statistics for the cemetery soil sample data set. The 95% UCL values were calculated using the USEPA's software program ProUCL Version 5.1 (USEPA, 2016). As summarized in Table 4.2, the EPCs (i.e., 95% UCLs) are greater than the CCME and/or NSE SQGs and therefore would require additional risk assessment and/or remedial action planning work.

Table 4.2 EPC and Summary Statistics

Metal	EPC (mg/kg)		Minimum		Maximum		Average	
	0-0.15m	0.15-0.3m	0-0.15m	0.15-0.3m	0-0.15m	0.15-0.3m	0-0.15m	0.15-0.3m
Arsenic	123.9	37.49	17	8.5	260	83	82.3	27.1
Lead	3521	970.3	170	22	6900	2000	2493	362.2
Thallium	13.36	2.98	0.63	0.13	21	8.5	7.6	1.5

The soil metal analytical results are presented in Table 3A and the metal leachate data is presented in Table 3B; the laboratory certificates of analysis are included in Appendix C. A summary of the 95% UCLs are presented in Appendix D.

4.2.2 Hydrocarbons

Petroleum hydrocarbons are in use, and/or generated, at the Site including No. 2 fuel oil, gasoline, and waste oil. The following table shows a list of current petroleum storage tanks associated with the Site. In addition, the Glencore underground services plan (8002-10-5026) shows a 1.5 inch diameter (4 cm) No. 2 fuel oil line extending from the west side of the Acid Plant to the Lead Refinery. It is noted, that the fuel storage and handling at the Site has been reduced by Glencore since the 2008/2009 Closure Plan PFS with the introduction of propane.

Table 4.3 Petroleum Storage Tank Inventory

Tank ID	General Area	Specific Area/Location	Content	Type	Capacity (L)
BT192 (PL #17)	MHW	BH Bulk Handling / Maintenance Shop BHO	Waste oil	Steel AST	1,443
(PL#20)	MHW	Material Handling West / Maintenance Shop	Diesel Fuel	Steel AST	900
BT891 (PL#15)	MHW	Material Handling West	Diesel Fuel	Composite AST	3,785
BT894 (PL #18)	MHW	Material Handling West / Battery Recycling Plant	Regular Oil, Gasoline	Steel AST	3,800
BT004 (PL#19)	Smelter	01 Acid Plant / Acid Out West End	Furnace Oil	Composite AST	37,800
BT351 (PL#21)	Smelter	35 Warehouse	Regular Oil, Gasoline	Steel AST	9,100
BT353 (PL#22)	Smelter	35 Warehouse	Diesel Fuel	Steel AST	9,100
BT740 (PL#28)	Smelter	74 Garage / Behind Garage	Waste oil	Steel AST	4,500
BT333 (PL#29)	Smelter	90 Lead Refinery / Adjacent to the Old Boiler Room	Furnace Oil	Steel AST	80,000
BT205 (PL#15)	Smelter	North of Furnace Generator Tank	Diesel Fuel	Composite AST	1,890
(PL#18)	Smelter	Thaw Shed	Furnace Oil	Steel AST	23,261
(PL#30)	Smelter	FCE Bag House Winter Heater	Furnace Oil	Steel AST	2,250
(PL#23)	Smelter	SRF Winter Heater	Furnace Oil	Steel AST	2,380
BT206 (PL#24)	Smelter	Proportioning Winter Heater	Furnace Oil	Steel AST	4,500
(PL#25)	Smelter	Acid Plant Winter Heater	Furnace Oil	Steel AST	4,500
(PL#26)	Smelter	North of Sinter Plant Winter Heater	Furnace Oil	Steel AST	4,745
(PL#27)	Smelter	South of Sinter Plant Winter Heater	Furnace Oil	Steel AST	4,745
(PL#17)	Smelter	Sinter Baghouse	Furnace Oil	Composite AST	22,710

In the summer of 2019, Glencore was completing maintenance work west of the Sinter Building at the Site and diesel impacted groundwater was observed in the trench excavation. GHD proposed a test location in this area of the Site as part of the 2019 HGS and DGA work program to investigate the source of the impacts. However, due to the potential for buried utilities, the drilling of proposed monitoring well 19GW-135 could not be completed and, therefore, collection of soil samples for hydrocarbon analysis was not completed as part of the 2019 HGS and DGA program.

As described in Section 1.2, historical documents also identified mTPH as a COC for the Site. Soil and groundwater have had concentrations of mTPH exceeding Atlantic RBCA Tier I Risk Based Screening Levels (RBSLs) at various locations on Site including Number 1 Short Rotary Furnace and Acid Day Tank as well as the former underground storage tanks (USTs) and current aboveground storage tanks (ASTs) associated with the Warehouses (as well as the former waste oil

tank and No. 2 fuel oil AST north of Lead Refinery). The area and volume of hydrocarbon impacted soil and groundwater was assumed in the 2008/2009 Closure Plan PFS since delineation was not possible due to operating Site infrastructure. Similar to the 2008/2009 Closure Plan PFS finding, the area and volume of hydrocarbon impacted soil and groundwater will need to be assumed in the 2019 Closure Plan – Prefeasibility Study 2019 since delineation was not possible due to operating Site infrastructure. However, groundwater samples were collected as part of the HGS and DGA for monitor wells located near certain hydrocarbon source areas which will reduce some of the uncertainty in the volume estimates (see Section 4.3).

4.2.3 PAHs

A total of three soil samples were submitted for PAH analysis in 19SP-19 (located north of the Cooling Recycling Pond) and 19GW-114 and 115 located in the Coke Fines storage area. The PAH concentrations were compared to CCME SQG and the NSE Tier I EQS for an industrial land use.

Detectable concentrations of PAHs were not identified in the soil sample collected from 19SP-19 and the laboratory detection limits were below the applicable CCME SQGs and the NSE Tier I EQS. The concentrations of PAH detected in the two samples analyzed from the Coke Fines area were below the CCME SQGs and the NSE Tier I EQS for carcinogenic PAHs based on B(a)P TPE as well as non-carcinogenic PAHs.

The PAH analytical results are presented in Table 4 and the laboratory certificates of analysis are included in Appendix C.

4.2.4 PCBs

A total of six surface soil samples were collected from locations adjacent to the electrical substations as well as the former PCB storage container in the Material Handling West Area and submitted for PCB analysis.

All soil samples submitted contained PCB levels within the CCME SQGs for an industrial site. Detectable concentrations of PCBs were not identified in the samples collected with the exception of 19SP-13 (0.0-0.6 m) which was collected in the vicinity of the substation adjacent to the saltwater intake pumphouse. Sample 19-SP-13 had a concentration of 0.062 µg/g (mg/kg) for Aroclor 1254; slightly above the detection level of 0.05 µg/g. There are no CCME, NBDELG or NSE soil quality guidelines for this parameter. The PCB soil analytical results are presented in Table 5A.

It is also noted that PCBs were not detected in two concrete samples collected from transformer bases located in the Fertilizer Plant area. The PCB concrete analytical results are presented in Table 5B (see GHD's NORM and Hazardous Materials Survey Report dated November, 2019).

The laboratory certificates of analysis are included in Appendix C.

4.3 Groundwater Analytical Results

4.3.1 Metals

A total of 74 groundwater samples from the previously existing and newly drilled monitoring wells (i.e. all monitoring wells that contained water) were submitted for metal analysis. The location of the

existing Site monitoring wells are shown in green on Figure 4. Figure 4 also shows the locations of past monitoring wells that were destroyed prior to the completion of the 2019 program (in red).

In order to graphically present the groundwater dataset in the eDAT, historical groundwater data collected from the Site were compared to the NSE PSS for "Groundwater Discharge to Surface Water >10 m from a Marine Surface Water Body" and concentrations of selected metals exceeding this screening guideline are presented on Figures 8B to 8D. Also plotted on the figures is the results of the 2019 HGS and DGA groundwater sampling work. The 2019 samples are considered to be representative of the formation groundwater quality due to the extensive purging, field filtration and preservation techniques utilized during the 2019 sampling program. It is noted that screening the groundwater data against the NSE PSS was only completed for comparison purposes as the NSE PSS guidelines would only actually apply to groundwater sampling locations or sentinel wells nearest to the Chaleur Bay.

The NSE PSS are shown below for the dissolved metals plotted on the figures:

- Arsenic >125 µg/L;
- Cadmium >1.2 µg/L;
- Copper >20 µg/L;
- Lead >20 µg/L;
- Thallium >213 µg/L; and
- Zinc >100 µg/L

These figures all demonstrate that the concentrations of metals in groundwater exceeding the NSE PSS in 2019 are much smaller in areal extent compared to historical data. This could be related in part to sampling and laboratory method improvements over time as well as the potential for fluctuations in data between sampling events. In particular, the 2019 sampling program data indicates concentrations of Site-specific indicator metals in groundwater in close proximity to Chaleur Bay (specific sentinel wells) are below the NSE PSS for groundwater discharging to a marine surface water body with the exception samples collected from 05GW-59 (cadmium and zinc) and GW-44 (zinc); Figure 8B and 8D.

As noted in Section 3.4, it is expected that tidal influence could impact some of the static water levels in monitoring wells close to Chaleur Bay. Salinity levels were measured in the groundwater to determine potential tidal influence in the groundwater quality. The salinity data indicates that shallow groundwater within Belledune Point area (north of the rail lines) is ≥3 ppt whereas salinity south of this area is typically ≤2 ppt (Figure 8A); for comparison the Saltwater Lagoon has a salinity of 20 ppt.

Although the concentrations of metals in groundwater potentially discharging to Chaleur Bay are generally below applicable NSE PSS, dissolved concentrations of arsenic, cadmium, lead, thallium and/or zinc exceeding the NSE PSS extend to the southern boundary of the Saltwater Lagoon. Concentrations of these metals in monitoring wells GW-30A, GW-30C, GW-34 and 19GW-125 located on the south side of the Saltwater Lagoon are summarized below. The metal concentrations in the Saltwater Lagoon (19SW-3 to 19SW-5) were typically lower in concentration (with the exception of lead) compared to that of the shallow groundwater table (see Table 4.3 below). As

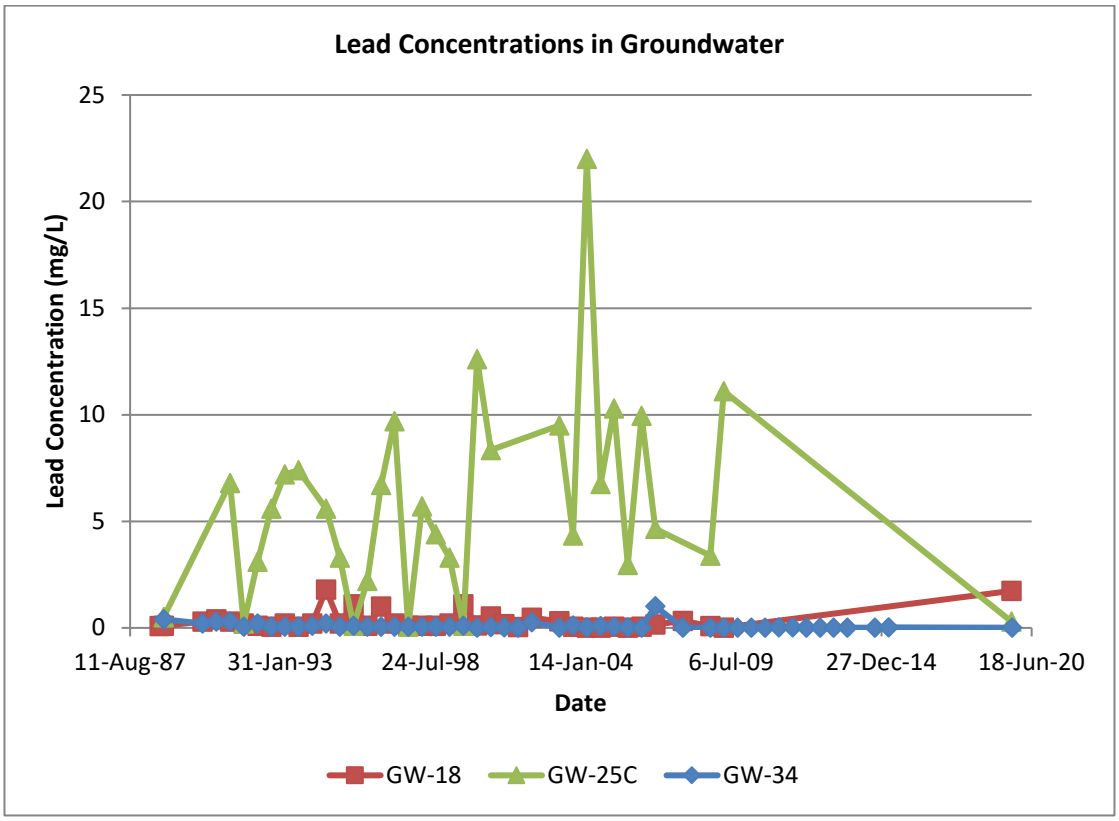
shown on Figure 6, slag was encountered in GW-34 when it was drilled in 1988 and slag was observed at the base of the Saltwater Lagoon during the 2019 HGS and DGA program.

Table 4.4 Shallow Groundwater and Saltwater Lagoon Results

		Groundwater Well Locations Nearest to Salt Water Lagoon				Salt Water Lagoon Surface Water Samples (2019)		
Analyte	Unit	GW 30A	GW-30C	GW-34	19GW-125	19SW-3	19SW-4	19SW-5
pH	pH	7.00	7.51	7.25	7.66	7.97	7.89	7.99
Salinity	N/A	<2	<2	2.9	<2	20	20	20
Dissolved Arsenic	µg/L	354	1.31	581	26.8	16.0	16.5	14.8
Total Arsenic	µg/L	Na	na	na	na	19.8	26.3	22.8
Dissolved Cadmium	µg/L	3790	0.167	2300	1550	127	200	170
Total Cadmium	µg/L	na	na	na	na	115	208	169
Dissolved Copper	µg/L	3.95	0.57	3.3	7.94	8.17	6.25	4.42
Total Copper	µg/L	na	na	na	na	10.7	12.1	10.8
Dissolved Lead	µg/L	6.35	3.04	12.9	237	53.7	34.4	34.5
Total Lead	µg/L	na	na	na	na	94.3	99.8	92.7
Dissolved Thallium	µg/L	3140	0.54	796	1130	78.8	129	100
Total Thallium	µg/L	na	na	na	na	69.8	135	98.5
Dissolved Zinc	µg/L	18,200	8.2	12,900	6,420	520	700	614
Total Zinc	µg/L	na	na	na	na	498	771	629

Based on the 2019 groundwater data collected, concentrations of dissolved metals in groundwater along the Chaleur Bay shoreline were generally below applicable NSE PSS. However, there is the potential that elevated concentrations of metals in groundwater could be discharging into the Salt Water Lagoon area of the Site. Although the concentrations of metals in the shallow groundwater table directly south of the Salt Water Lagoon exceed NSE PSS, significant attenuation of dissolved metal concentrations in groundwater is observed as the groundwater flows southwest to northeast across the Site (from the Smelter Area towards the Saltwater Lagoon).

The graph below shows the concentrations of lead recorded in groundwater samples collected from monitoring well GW-25C located in the Process Sludge Storage area compared to lead concentrations in monitoring wells GW-18 and GW-34 located approximately 150 and 350 metres to the northeast, respectively. The graph shows that a significant decrease in lead concentrations (one to two orders of magnitude) in groundwater have consistently been observed over the last 40 years as the groundwater flows from the Site to the Salt Water Lagoon (and Chaleur Bay). It is also possible that the ditch located south of the rail lines in the Back 40 area is diverting some shallow groundwater to the WWTP (as shown on Figure 5B).



The groundwater metal analytical results are presented in Table 6 and the laboratory certificates of analysis are included in Appendix C.

4.3.2 Hydrocarbons

Free phase product was not observed in any of the monitoring wells during the well water survey completed in August 2019 or the groundwater sampling work completed in September and October 2019 as part of the HGS and DGA.

A total of seven groundwater samples were submitted for petroleum hydrocarbons (BTEX/mTPH) analysis. These samples were collected from the Smelter Area in the vicinity of and surrounding the former bulk No. 2 fuel oil tank including: MW-1, MW-3, 05GW-71, 05GW-72, 09GW-107, GW-24, and GW-27.

BTEX compounds were not detected in the groundwater samples. The mTPH levels in samples collected ranged from non-detect to 2.2 mg/L. The BTEX and mTPH levels were within the applicable Atlantic RBCA Tier I RBSLs and the Tier I ESLs for the Protection of Marine Aquatic Life. The BTEX/mTPH analytical results are presented in Table 7 and the laboratory certificates of analysis for the groundwater analytical data are included in Appendix C.

As noted in Section 4.2, the volume of hydrocarbon impacted soil (and groundwater) will need to be assumed in the 2019 Closure Plan – Prefeasibility Study 2019 since delineation was not possible due to operating Site infrastructure.

4.3.3 PAHs

Two groundwater samples from monitoring wells 19GW-114 and 19GW-88 (located within and down gradient of the Coke Fines storage area, respectively) were submitted for PAH analysis. PAHs were not detected in 19GW-88 and were either not detected or within the applicable NSE EQS and/or FIGQGs for Industrial Land Uses and the NSE PSS Marine Life Guidelines- Discharge to Surface Water >10 m from Marine Surface Water Body.

The groundwater PAH analytical results are presented in Table 8 and the laboratory certificates of analysis are included in Appendix C.

4.3.4 PCBs

Groundwater samples from existing monitoring wells (09GW-103, 05GW-75, GW-32 and GW-30A) located near the four electrical substations were submitted for PCB analyses. PCB concentrations were non-detect in all samples.

The PCB analytical results are presented in Table 9. The laboratory certificates of analysis are included in Appendix C.

4.4 Sediment Analytical Results

A total of 9 sediment samples (19SED-1 to 19SED-9) collected from the Saltwater Lagoon and submitted for metals analysis. Black slag, as well as brown/black silt and sand, was observed at the base of the lagoon during the sampling work. As noted in Section 3.3, the Saltwater Lagoon is located within the Belledune Point and was re-created by the removal of 526,000 m^3 of slag from the “old” slag pile to the New Slag Pile in 2011-2012. This work was completed under the Approval to Construct I-7784 (Glencore, September 2013).

Concentrations of arsenic, cadmium, copper and lead and zinc exceeded the CCME ISQGs and the PELs in all sediment samples collected during the 2019 program. The following present the ranges concentrations observed for selected metals:

- Arsenic: 210 to 2,400 mg/kg (average 942 mg/kg);
- Cadmium: 130 to 750 mg/kg (average 291 mg/kg);
- Copper: 590 to 4,100 mg/kg (average 2,200 mg/kg);
- Lead: 6,600 to 41,000 mg/kg (average 18,830 mg/kg);
- Thallium: 19 to 620 mg/kg (average 190 mg/kg); and
- Zinc 10,000 to 99,000 mg/kg (average 55,200 mg/kg).

Concentrations of mercury also exceeded the CCME ISQG in all samples as well as the PEL in 7 of the 9 samples (with concentrations ranging from 0.57 to 3.6 mg/kg).

As described in Section 1.2, historical documents also identified that some sediment samples previously collected from the Belledune Point area of the Site also had elevated concentrations of mTPH.

The 2019 sediment analytical results are presented in Table 10 and the laboratory certificates of analysis are included in Appendix C.

4.5 Surface Water Analytical Results

A total of 5 surface water samples (19SW-1 to 19SW-5) were collected on September 26, 2019, and submitted for metals analysis (dissolved and total). As noted in Section 4.3, samples 19SW-3 to 19SW-5 were collected from the Saltwater Lagoon. Sample 19WS-1 was collected from the ditch in the Back 50 area that receives process discharge water from the Smelter operations and 19SW-2 was collected from a drainage channel leading into the second pond area within Belledune Point (Figure 4).

Surface water monitoring data including pH, conductivity, temperature, dissolved oxygen and turbidity were measured in the water at each sample location (Table 11). Temperature was observed to be elevated in 19SW-1 and 19SW-2 and conductivity was similar in all five samples.

Concentrations of arsenic, cadmium and/or mercury exceeded the CCME WQGs for the Protection of Marine Aquatic Life, long term screening levels and/or the NSE PSS.

- Dissolved arsenic concentrations ranged from 14.2 µg/L to 16.5 µg/L;
- Dissolved cadmium concentrations ranged from 34.2 µg/L to 208 µg/L; and
- Dissolved mercury was not detected (<0.013 µg/L) in samples 19SW-2, 4 and 5. Mercury was detected in 19SW-1 at a concentration of 0.015 µg/L in 19SW-1 (within the CCME WQG) and 0.018 µg/L in 19SW-3 (slightly exceeding the CCME WQG).

Concentrations of other metals such as copper, lead, thallium and zinc also exceeded the NSE PSS.

As noted in Section 4.3, the Saltwater Lagoon likely receives shallow groundwater from a portion of the Smelter site including the Back 40 and Back 50 areas. The water in the lagoon is also influenced by tides in Chaleur Bay.

The analytical results for surface water are presented in Table 12 and the laboratory certificates of analysis are included in Appendix C.

4.6 Slag Analytical Results

A total of three slag samples from the New Slag Pile (19SP-26 to 19SP-28) were submitted for metals analysis. The slag metal concentrations are summarized as follows:

- Arsenic: 1,400 to 2,700 mg/kg (average 1,900 mg/kg);
- Cadmium: 1.9 to 58 mg/kg (average 21 mg/kg);
- Copper: 3,600 to 4,200 mg/kg (average 3,800 mg/kg);
- Lead: 15,000 to 33,000 mg/kg (average 26,000 mg/kg);
- Thallium: 1.5 to 2 mg/kg (average 1.8 mg/kg); and
- Zinc: 110,000 mg/kg (average 110,000 mg/kg).

Mercury was not detected (<1 mg/kg) in the three slag samples.

Leachate testing was completed on the slag sample 19SP-27 (1.8-2.4m). Lead exceeded the CEPA leachate screening level (of 5,000 µg/L) with a concentration of 100,000 µg/L. Cadmium and arsenic did not exceed the CEPA leachate screening levels (of 500 µg/L and 2,500 µg/L) with concentrations of 260 µg/L and 490 µg/L, respectively. It is noted that dissolved lead in groundwater samples collected from monitoring wells 05GW-52 and 05GW-53 located down gradient of the New Slag Pile was only 0.79 µg/L and 2.61 µg/L, respectively (Table 4).

The slag analytical results are presented in Table 13A and the metal leachate data is presented in Table 13B; the laboratory certificates of analysis are included in Appendix C.

4.7 QA/QC Variability

A QA/QC program was implemented to reduce and quantify potential issues introduced during sample collection, handling, shipping and analysis. The program included, but was not limited to using dedicated sampling equipment, using sample specific identification and labeling procedures, and using chain of custody records. A summary of the QA/QC sample key is presented as Table 14.

As previously described, 10 field duplicates soils samples (Soil-QA/QC-1 to Soil-QA/QC-10) were analyzed for metals, and one field duplicated soil samples was analyzed for PCBs.

The RPD in soil Metals data between the field samples and the blind field duplicate sample are presented below:

- Arsenic: 2.56% to 197.35%;
- Cadmium: 8.7% to 199.54%;
- Copper: 12.05% to 198.67%;
- Lead: 0% to 199.5%;
- Mercury: 0% to 153.49%;
- Nickel: 0% to 135.14%;
- Selenium: 0% to 198.58%; and
- Zinc: 9.23% to 199.82%.

The RPD in soil PCB was 0%.

Nine field duplicate groundwater samples (QA/QC-1 to QA/QC-9) were analyzed for metals, one field duplicate groundwater sample was analyzed for PCB, and one field duplicate was analyzed for BTEX/mTPH.

The RPD in groundwater metals data between the field samples and the blind field duplicate sample are presented below:

- Arsenic: 0% to 43.51%;
- Cadmium: 0.5% to 25.72%;
- Copper: 0.87% to 105.62%;
- Lead: 0% to 96.84%;

- Mercury: 0% to 7.69%;
- Nickel: 0% to 51.43%;
- Selenium: 0% to 96.83%; and
- Zinc: 0% to 24.37%.

The RPD in groundwater PCB and BTEX/mTPH was 0%.

One field duplicate surface water sample (19SW-QA/QC) was analyzed for metals. The RPD in the surface water dissolved Metal data between the field sample and the blind field duplicate ranged from 0 to 71.71% (dissolved lead)

One field duplicate sediment sample (19SED-QA/QC-1) was analyzed for metals. The RPD in the sediment sample Metal data between the field sample and the blind field duplicate ranged from 0 to 55.56% (cadmium)

The RPD and QA/QC samples analyzed for soil, groundwater sediment and surface water are summarized in Tables 15A to 15G.

The results of the laboratory QA/QC analysis are presented in the laboratory certificates of analysis in Appendix C.

The analyses included instrument and extraction surrogate recovery, method blanks, matrix duplicates, matrix spikes and laboratory quality control samples. No laboratory QA/QC issues were identified that call into question the reliability of the laboratory data reported.

5. Conceptual Remedial Options

Potential groundwater remedial options include:

- Natural Attenuation - Further redevelop existing Salt Water Lagoon and use it as a “buffer” or groundwater “treatment wetland” prior to discharging to Chaleur Bay.
- Mechanical Treatment - Install groundwater extraction wells south of Salt Water Lagoon to limit future discharge of groundwater into the Salt Water Lagoon and pump groundwater to on-Site WWTP.
- Passive Treatment - Install interceptor trench on north side of rail lines during removal of Salt Water Pump House piping as part of future Site closure plan. Alternatively, the existing ditch located south of the rail line could be lengthened and deepened in the Back 40/Back 50 areas. The interceptor trench would discharge to treatment wetland being proposed as part of CRP redevelopment post-closure.

6. Conclusions

A HGS and DGA was completed at the Site as part of the “Closure Plan - Prefeasibility Study 2019 Update”. The HGS and DGA consisted of the following:

- The completion of the existing monitoring well survey (a total of 69 existing monitoring wells were located on-Site, repairs made as required, and their geodetic locations were confirmed);
- The drilling and installation of 20 monitoring wells to further evaluate the geological stratigraphy and assess soil and groundwater quality conditions;
- The drilling of 27 soil probes to further evaluate the geological stratigraphy and assess soil quality conditions;
- The sampling of soil from the newly constructed monitoring wells and soil probes;
- The sampling of groundwater from the newly installed and existing on-Site monitoring wells;
- The collection of surface soil samples from 13 locations (3 from the cemetery and the remainder from Belledune Point area of the Site);
- The collection of 5 surface water samples (1 from a ditch near the Back 50 and 4 from the Saltwater Lagoon);
- The collection of 9 sediment sample from the Saltwater Lagoon; and
- Surveying of the 2019 test locations.

The results of the HGS and DGA are summarized as follows:

- The overburden stratigraphy at the Site generally consists brown silty sand and gravel fill overlying clastic sedimentary bedrock (described as red, grey and brown sandstone, grey shale, red and grey siltstone, and conglomerate). In some test locations a layer of highly fractured bedrock was observed above the more competent bedrock. The depth to bedrock is variable across the Site, but is generally 1 to <3 mbgs.
- The depth to groundwater ranged from 0.17 to 4.39 mbgs. The direction of the shallow groundwater flow at the Site is northeast towards Chaleur Bay. The direction of the bedrock groundwater flow in the Back 40 and Back 50 areas is also northeast towards Chaleur Bay. Using the average *k* and estimated *i* values, the groundwater velocity (*V*) for the shallow groundwater table is estimated to be 10 m/year. The groundwater velocity (*V*) for the bedrock groundwater table in the Back 40 and Back 50 area is estimated to be 6 m/year. The groundwater velocity can also be locally influenced by preferential pathways such as buried utilities.
- The estimated aerial extent of metals impacted soil at the Site in excess of the lead SSTLs for protection of human health based on industrial land use (i.e. the metal with the largest footprint) is 92 ha ±20% including: 71.5 ha in the Smelter Area and 20.5 ha in the combined Material Handling West Area and the Fertilizer Plant. The volume of material required to cover the areas of metal impacted soils above industrial land use SSTLs assuming a 0.6 m thick cover to eliminate the human health exposure pathway would be 550,000 m^3. This volume of cover material would include the terrestrial areas Belledune Point.
- Metal concentrations typically decreased significantly in subsurface soil compared to surface soil. For example lead in 19GW-127 (located in the Back 40 area) was measured at 44,000 mg/kg in the 0-0.15 m depth sample and 640 mg/kg in the 1.2-1.8 m depth sample. Similar to concentrations of metals in soil, concentrations of leachable metals in soil also decreased with depth below surface grade. Using test location 19GW-127 as an example: the

leachable lead was measured at a concentration of 130,000 µg/L in the 0-0.15 m depth sample and decreased to 1,400 µg/L in the 1.2-1.8 m depth sample located within the shallow groundwater table. Further, the dissolved lead concentration in the groundwater sample collected at this location was only 78 µg/L.

- As the Site is considered non-potable, human exposure pathways to metals in groundwater (i.e., ingestion) is generally considered to be incomplete. The screening of metals in groundwater was based on groundwater discharging from the Site to marine surface water body (Chaleur Bay) and protection of marine ecological receptors. Concentrations of metals in groundwater samples collected directly adjacent to the Chaleur Bay shoreline in 2019 were generally below applicable screening guidelines for the protection of marine aquatic life.
- Concentrations of metals in groundwater directly adjacent to the Salt Water Lagoon exceed applicable screening guidelines for protection of marine aquatic life. However, concentrations of metals in groundwater were observed to significantly decrease (orders of magnitude) as groundwater flows from the Smelter Area towards Belledune Point.
- Free phase petroleum product was not observed in the 53 monitoring wells sampled at the Site (18 of the monitoring wells were dry). Concentrations of petroleum hydrocarbons (BTEX/mTPH) in groundwater samples from selected test locations were within the RBCA Tier I RBSLs for an industrial site with non-potable water use and coarse grained soil. The area and volume of hydrocarbon impacted soil and groundwater will need to be assumed in the 2019 Closure Plan – Prefeasibility Study 2019 since delineation was not possible due to operating Site infrastructure. However, groundwater samples were collected as part of the HGS and DGA for monitor wells located near certain hydrocarbon source areas which will reduce some of the uncertainty in the volume estimates.
- Concentrations of PAHs and PCBs in both soil and groundwater samples collected as part of the HGS and DGA study were either not detected or well below screening criteria and therefore are not considered to be COCs that will require significant management effort in the Closure Plan - Prefeasibility Study 2019 Update.
- Black slag, as well as brown/black silt and sand, was observed at the base of the Saltwater Lagoon; the Saltwater Lagoon is located within the Belledune Point and was re-created by the removal of 526,000 m^3 of slag from the “old” slag pile to the New Slag Pile in 2011-2012. Concentrations of arsenic, cadmium, copper and lead and zinc exceeded the CCME ISQGs and the PELs in the nine sediment samples collected during the 2019 program.
- Surface water samples collected from the Saltwater Lagoon had concentrations of arsenic, cadmium and/or mercury exceeding the CCME WQGs for the Protection of Marine Aquatic Life, long term screening levels and/or the NSE PSS. Concentrations of other metals such as copper, lead, thallium and zinc also exceeded the NSE PSS. The Saltwater Lagoon likely receives shallow groundwater from a portion of the Smelter site including the Back 40 and Back 50 areas and is also influenced by tides in Chaleur Bay.
- Slag samples from the New Slag Pile contained elevated metals with the following average concentrations: arsenic 1,900 mg/kg; cadmium 21 mg/kg; copper 3,800 mg/kg; lead 26,000 mg/kg; thallium 1.8 mg/kg and zinc 110,000 mg/kg (mercury was not detected in the samples). Lead exceeded the CEPA leachate screening level (5,000 µg/L) with a concentration of 100,000 µg/L. Cadmium and arsenic did not exceed the CEPA leachate screening levels.

Dissolved lead in groundwater down gradient of the New Slag Pile (05GW-52 and 05GW-53) was only 0.79 µg/L and 2.61 µg/L, respectively.

7. Statement of Limitations

This reports has been prepared, and the work referred to in this report has been undertaken, by GHD for Glencore Canada Corporation (Glencore). It is intended for the sole and exclusive use of Glencore, its affiliated companies and partners and their respective insurers, agents, employees and advisors (collectively, “Glencore”). Any use, reliance on, or decision made by any person other than Glencore based on this report is the sole responsibility of such other person. Glencore and GHD make no representation or warranty to any other person with regard to this report and the work referred to in this report and they accept no duty of care to any other person or any liability or responsibility whatsoever for any losses, expenses, damages, fines, penalties or other harm that may be suffered or incurred by any other person as a result of the use of, reliance on, any decision made or any action taken based on this report or the work referred to in this report.

The investigation undertaken by GHD with respect to this report and any conclusions or recommendations made in this report reflect GHD’s judgement based on the Site conditions observed at the time of the Site inspection on the date(s) set out in this report and on information available at the time of preparation of this report. This report has been prepared for specific application to this Site and it is based, in part, upon visual observation of the Site, surface and sub-surface investigation at discrete locations and depths, and specific analysis of specific chemical parameters and materials during a specific time interval, all as described in this report. Unless otherwise stated, the findings cannot be extended to previous or future Site conditions, portions of the Site which were unavailable for direct investigation, sub-surface locations which were not investigated directly, or chemical parameters, materials or analysis which were not addressed. Substances other than those addressed by the investigation described in this report may exist within the Site, substances addressed by the investigation may exist in areas of the Site not investigated and concentrations of substances addressed which are different than those reported may exist in areas other than the locations from which samples were taken. If Site conditions or applicable standards change or if any additional information becomes available at a future date, modifications to the findings, conclusions and recommendations in this report may be necessary.

Other than by Glencore, copying or distribution of this report or use of or reliance on the information contained herein in whole or in part, is not permitted without the express written permission of Glencore. Nothing in this report is intended to constitute or provide a legal opinion

8. Closure

This report was prepared by GHD and reviewed by Gina Burtt, M.Sc., P.Eng., P.Geo. with Roy Consultants.

All of Which is Respectfully Submitted,

GHD

Robert Turner, M.A.Sc., P.Geo.

Troy Small, M.Sc., CE

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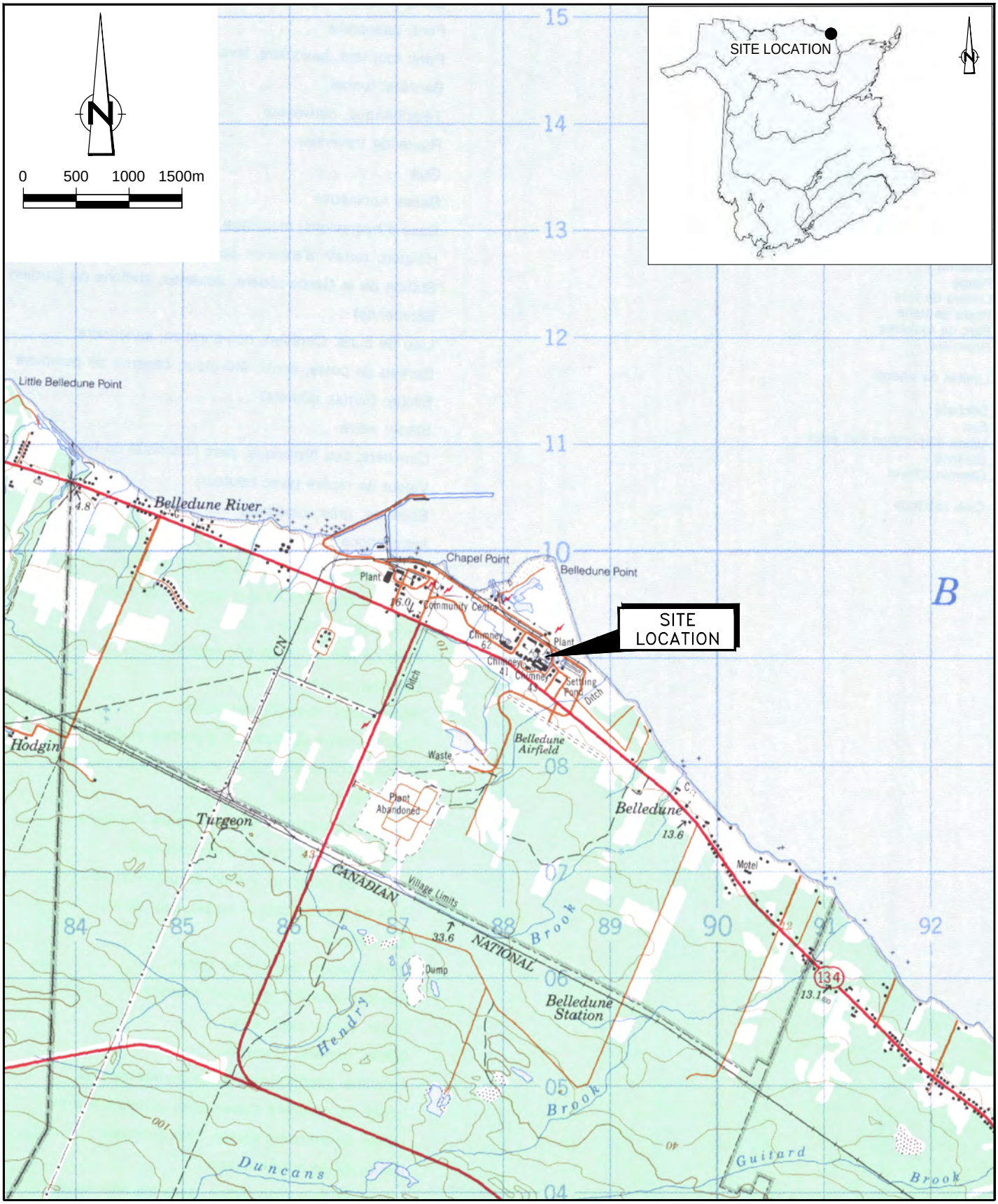

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BRUNSWICK SMELTER, BELLEDUNE, NEW BRUNSWICK
HYDROGEOLOGICAL STUDY AND DATA GAP ASSESSMENT

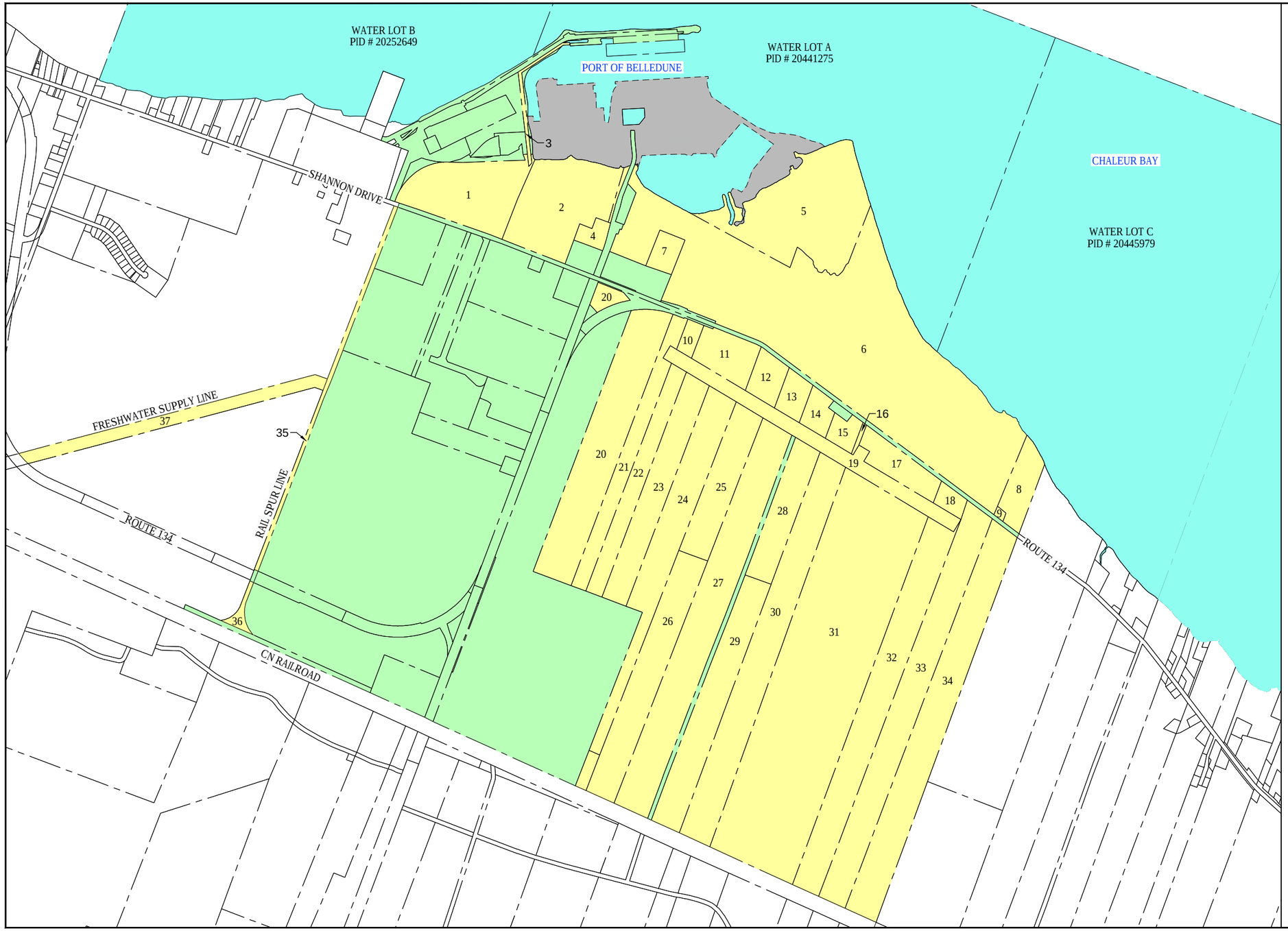
11198639-04(002)

Jan 6, 2020

SITE LOCATION

FIGURE 1

CAD File: N:\CA\Fredericton\Projects\661\11198639\Digital_Design\Figures\11198639-04(002)GN\11198639-04(002)GN-FR001.dwg



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4	20755302
5	20252318
6	20252680
7	20801619
8	20251963
9	20603197
10	20445789
11	20442992
12	20443057
13	20443081
14	20443115
15	20443123
16	20441283
17	20443164
18	20443180
19	20277968
20	20443149
21	20443255
22	20443156
23	20443172
24	20832481
25	20443198
26	20443206
27	20443214
28	20443222
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30	20443248
31	20443263
32	20443107
33	20443099
34	20443073
35	20445714
36	20655122
37	20616314

Source: High Resolution Aerial Imagery from New Brunswick Dept of Natural Resources, Acquisition Date: 2018.

0 200 400 600m

LEGEND

- PROPERTY LINES
- GLENCORE PROPERTIES - STUDY AREA (TOTAL AREA = 602 ha)
- THIRD PARTY PROPERTIES
- CROWN OWNED RECLAIMED LAND
- CROWN OWNED WATER LOT PROPERTIES

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HYDROGEOLOGICAL STUDY AND GAP ASSESSMENT

PROPERTY PLAN

11198639-04(002)

Jan 6, 2020

FIGURE 2

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Source: High Resolution Aerial Imagery from New Brunswick Dept of Natural Resources, Acquisition Date: 2018.

0 125 250 375m

N

LEGEND:

- SMELTER AREA
- FERTILIZER PLANT
- MATERIALS HANDLING WEST AREA

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OVERALL SITE PLAN

FIGURE 3

CAD File: N:\CA\Fredericton\Projects\661\11198639\Digital_Design\Figures\11198639-04(002)\11198639-04(002)GN-FR003.dwg

LEGEND

- SOIL SAMPLE
- SOIL PROBE
- SEDIMENT SAMPLE
- SURFACE WATER
- MONITOR WELL
- MONITOR WELL - DESTROYED

Paper Size ANSI D

0 50 100 150 200 250

Meters

N

Map Projection: Double Stereographic
Horizontal Datum: North American 1983 CSRS
Grid: NAD 1983 CSRS New Brunswick Stereographic

GHD

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HYDROGEOLOGICAL STUDY AND DATA GAP ASSESSMENT

TEST LOCATIONS

Project No. 11198639-04
Revision No. -
Date **JAN 6, 2020**

FIGURE 4

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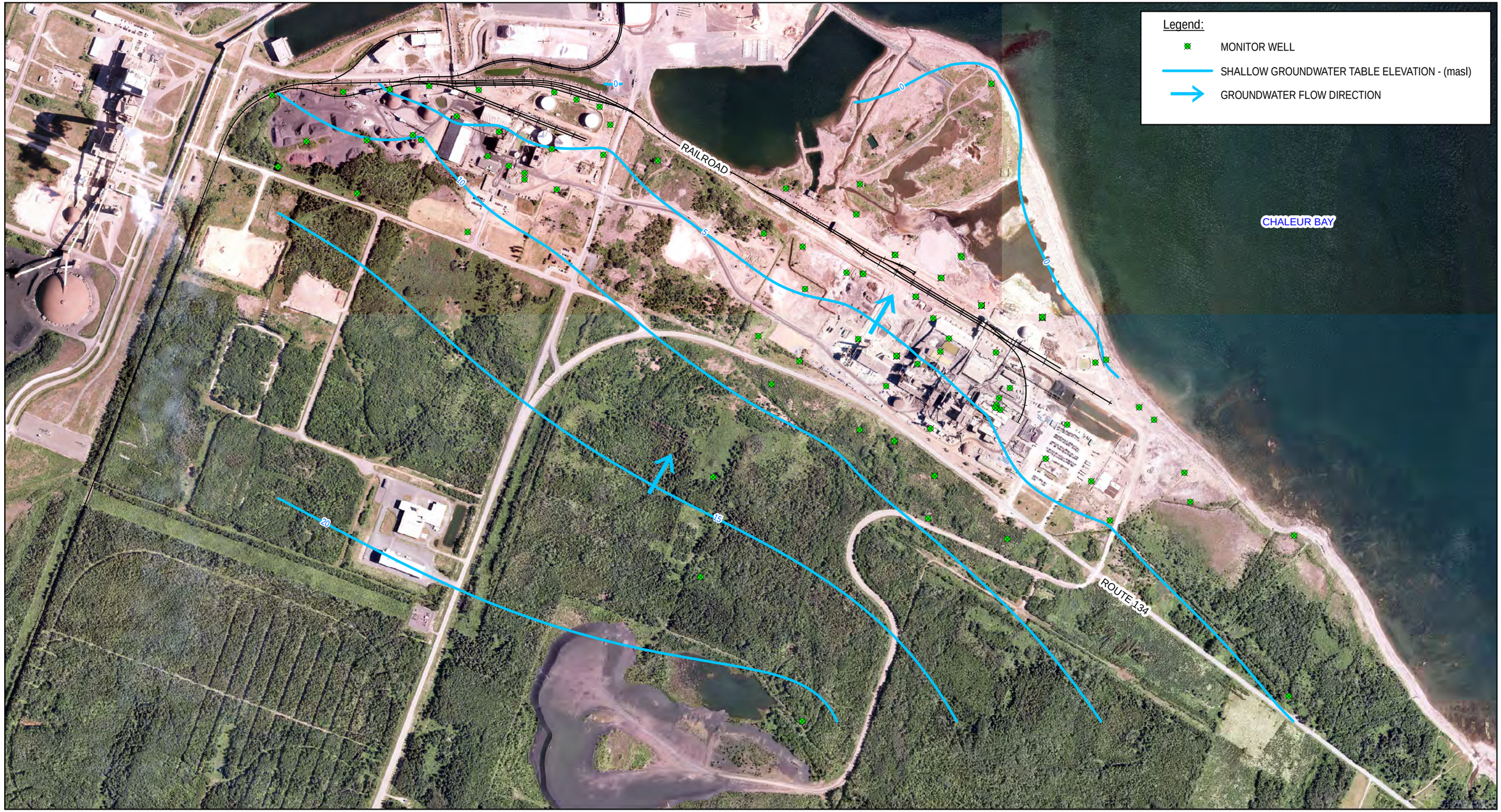

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Meters

Map Projection: Double Stereographic
Horizontal Datum: North American 1983 CSRS
Grid: NAD 1983 CSRS New Brunswick Stereographic

N

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BRUNSWICK SMELTER, BELLEDUNE, NB
HYDROGEOLOGICAL STUDY AND DATA GAP ASSESSMENT

Job Number 11198639-04(002)
Revision
Date Jan 6, 2020

GROUNDWATER FLOW - SHALLOW GROUNDWATER TABLE

Figure 5A

N:\CA\Fredericton\Projects\661\11198639\Digital_Design\Figures\11198639-04(002)\11198639-04(002)GIS-FR005.mxd

Data source: High Resolution Aerial Photography from NB Dept. of Natural Resources, Aquisition Date: 2018.. Created by:parseneault

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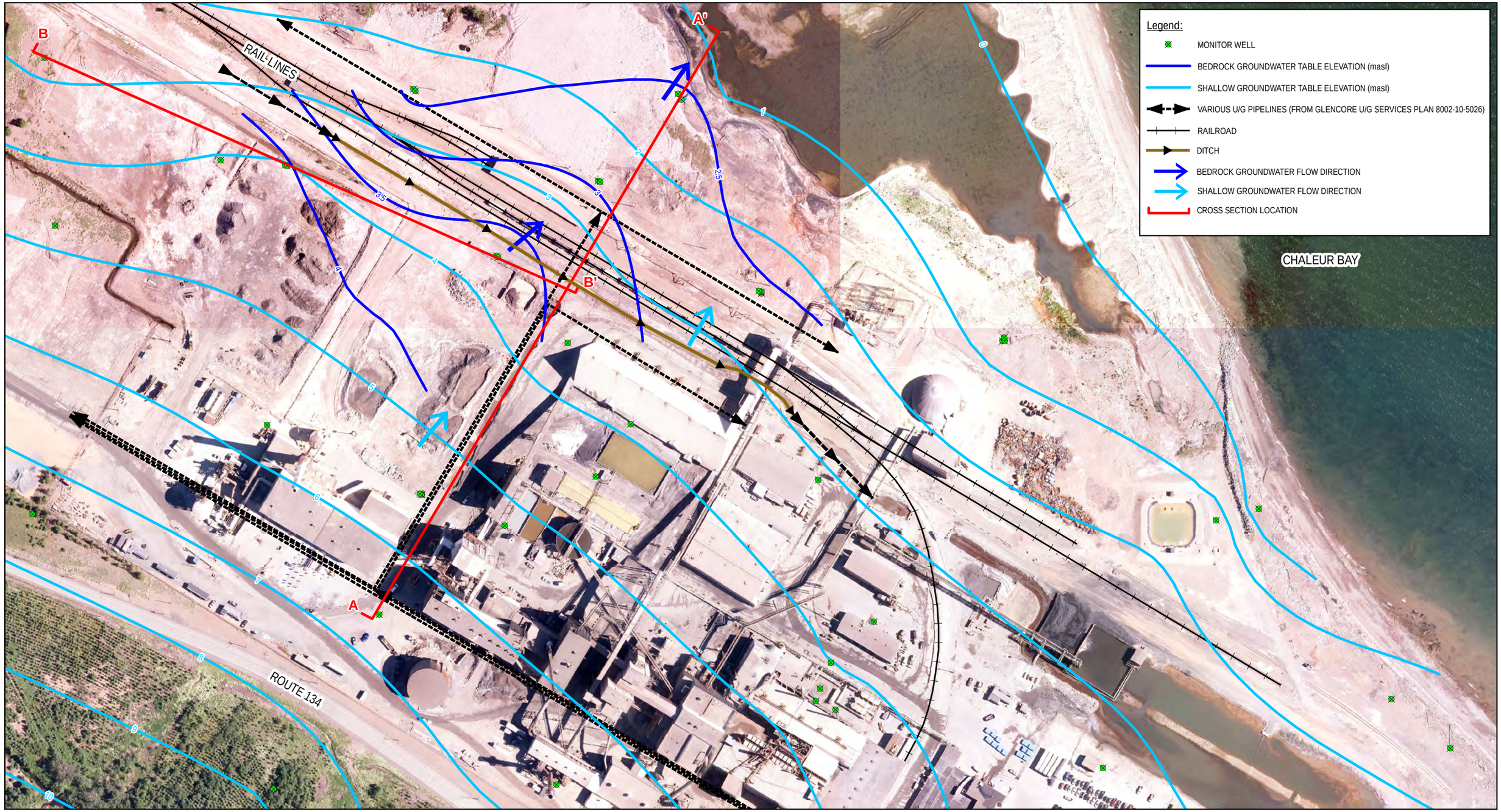

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Meters

Map Projection: Double Stereographic
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N

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HYDROGEOLOGICAL STUDY AND DATA GAP ASSESSMENT

GROUNDWATER FLOW - BACK 40 AND BACK 50 AREA

Job Number 11198639-04(002)
Revision
Date Jan 6, 2020

Figure 5B

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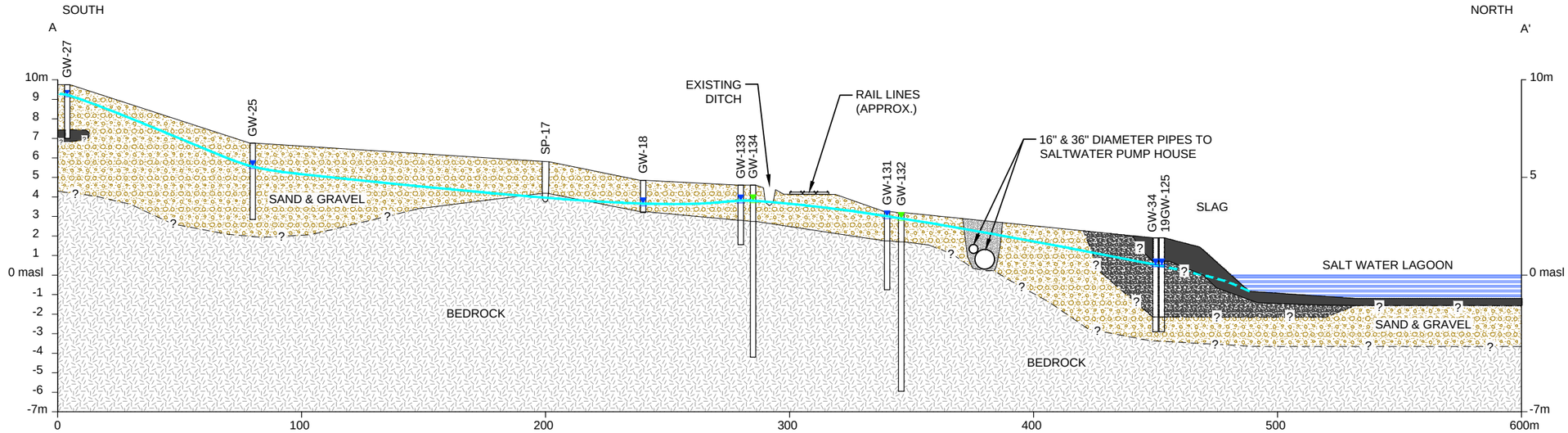
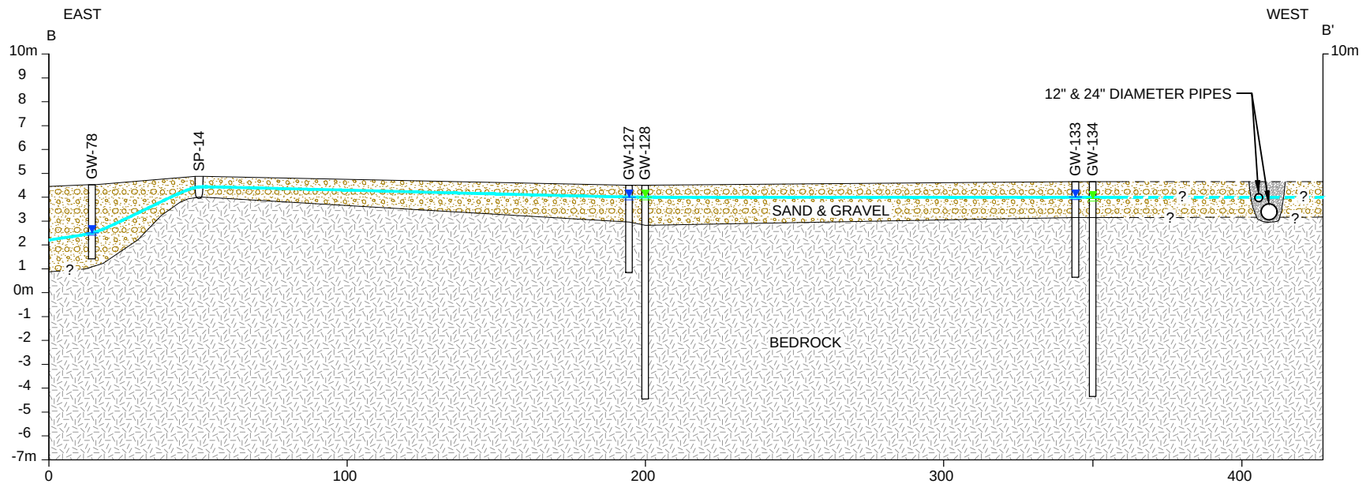
Data source: Data Custodian, Data Set Name/Title, Version/Date. Created by:parseneault

180 Lonsdale Street Melbourne VIC 3000 Australia **T** 61 3 8687 8000 **F** 61 3 8687 8111 **E** melmail@ghd.com **W** www.ghd.com



CROSS SECTION A-A' (LOOKING WEST)



CROSS SECTION B-B' (LOOKING NORTH)

Source: High Resolution Aerial Imagery from New Brunswick Dept of Natural Resources, Acquisition Date: 2018.

0 20 40 60m

LEGEND

- SLAG
- BLACK SILTY SAND AND GRAVEL
- BROWN SAND AND GRAVEL, SOME SILT
- BEDROCK
- PIPE TRENCH FILL
- GROUNDWATER TABLE
- SHALLOW GROUNDWATER
- BEDROCK GROUNDWATER

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CROSS SECTIONS - BACK 40 / BACK 50 AREA

11198639-04(002)

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FIGURE 6

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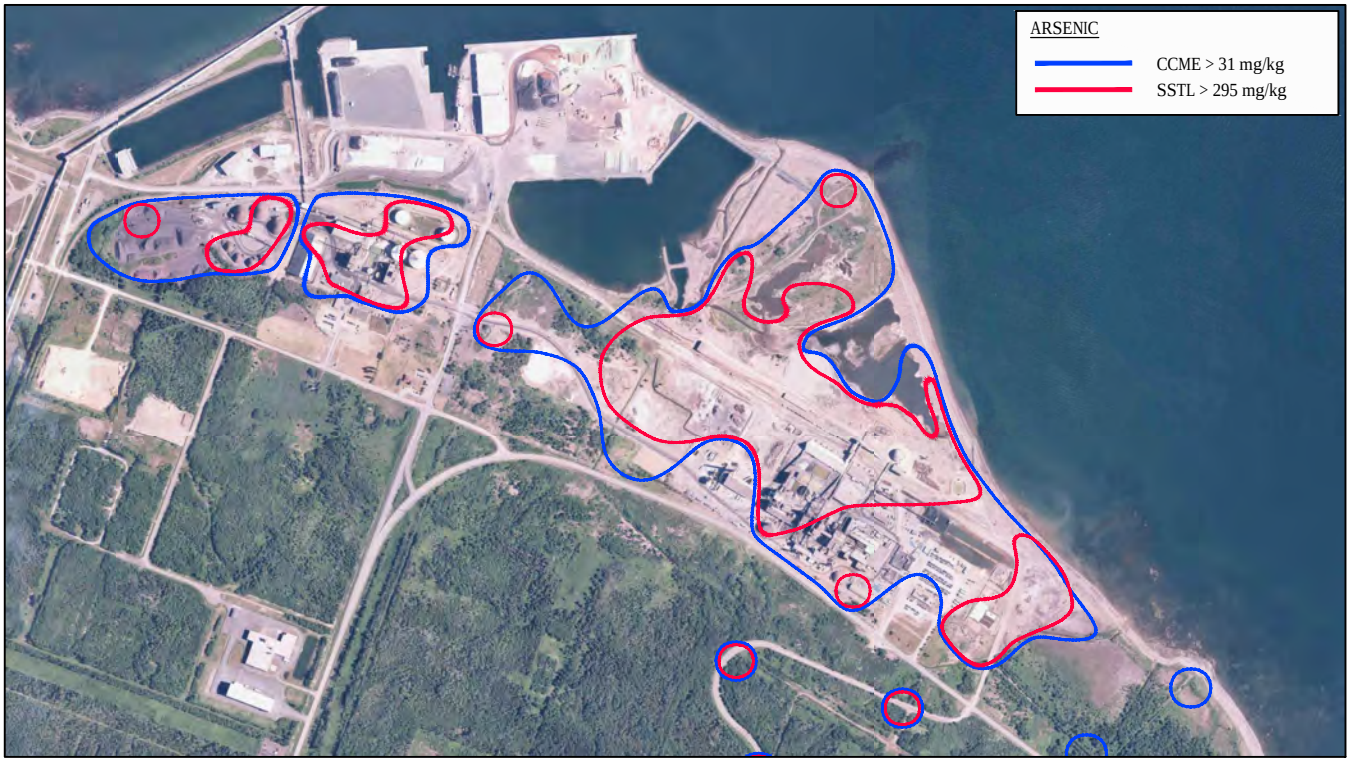

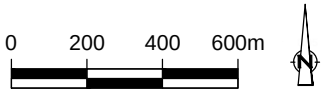

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SUMMARY OF SOIL EXCEEDANCES - METALS: ARSENIC & CADMIUM

FIGURE 7A

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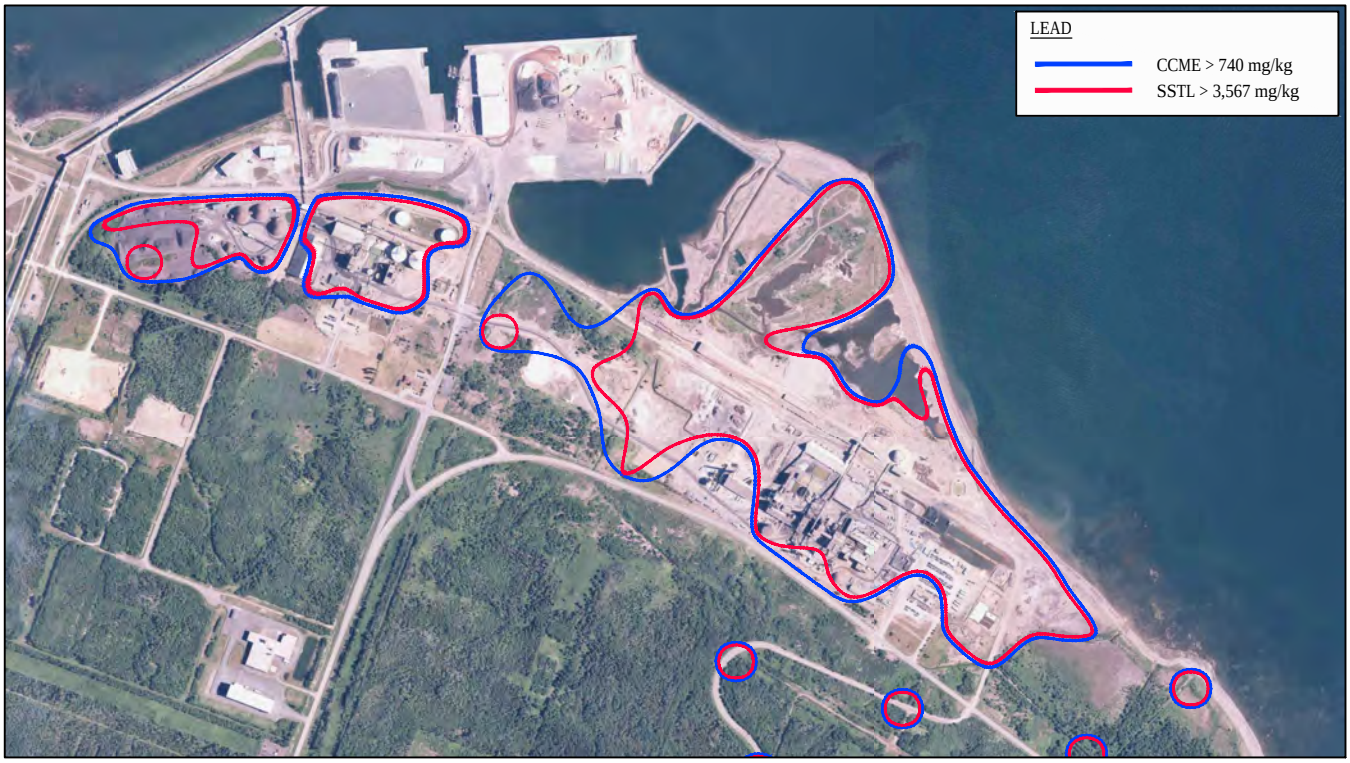

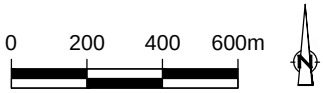

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HYDROGEOLOGICAL STUDY AND DATA GAP ASSESSMENT

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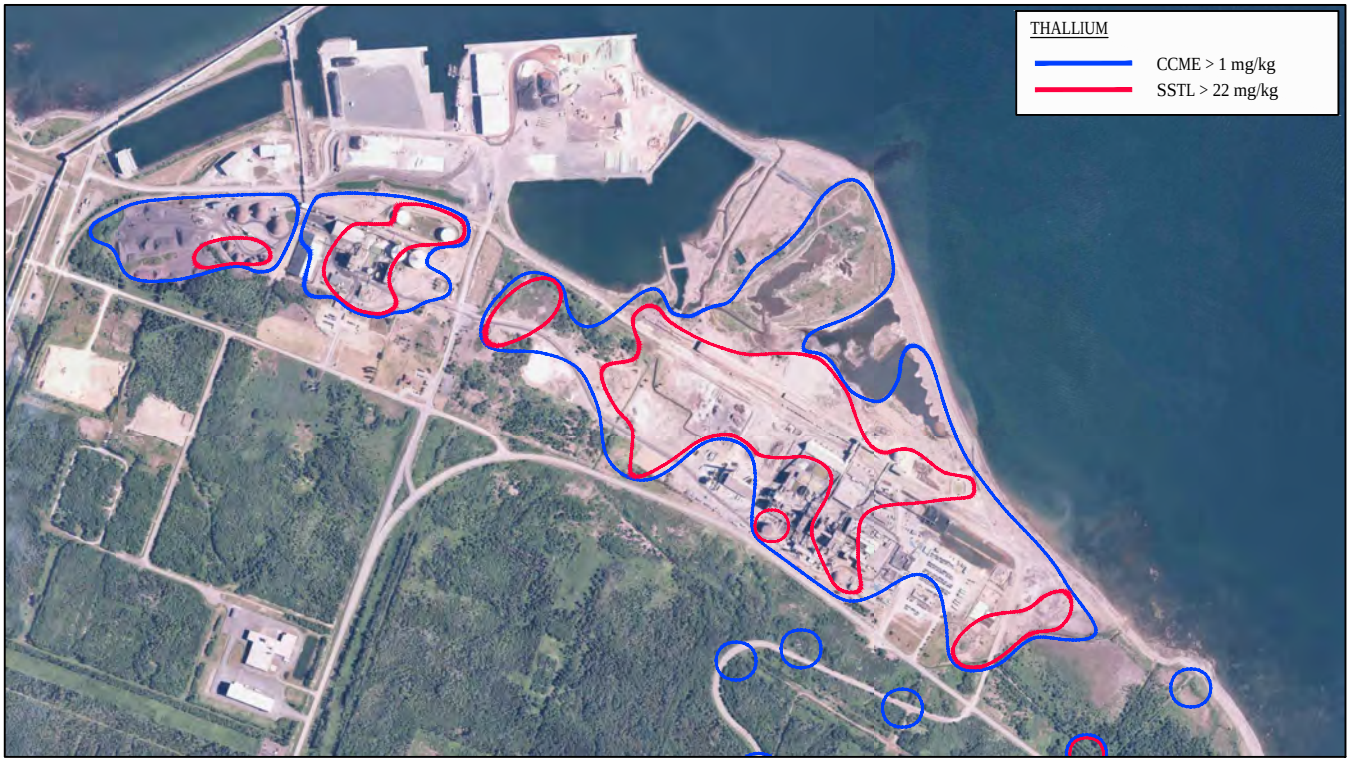
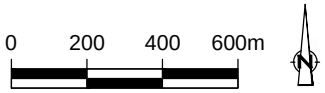
SUMMARY OF SOIL EXCEEDANCES - METALS: COPPER & LEAD

FIGURE 7B

CAD File: N:\CA\Fredericton\Projects\661\11198639\Digital_Design\Figures\11198639-04(002)\11198639-04(002)GN-FR009.dwg





Source: High Resolution Aerial Imagery from New Brunswick Dept of Natural Resources, Acquisition Date: 2018.

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HYDROGEOLOGICAL STUDY AND DATA GAP ASSESSMENT

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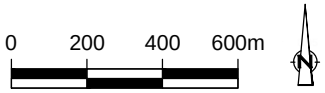
SUMMARY OF SOIL EXCEEDANCES - METALS: THALLIUM & ZINC

FIGURE 7C

CAD File: N:\CA\Fredericton\Projects\661\11198639\Digital_Design\Figures\11198639-04(002)\11198639-04(002)GN-FR009.dwg



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11198639-04(002)

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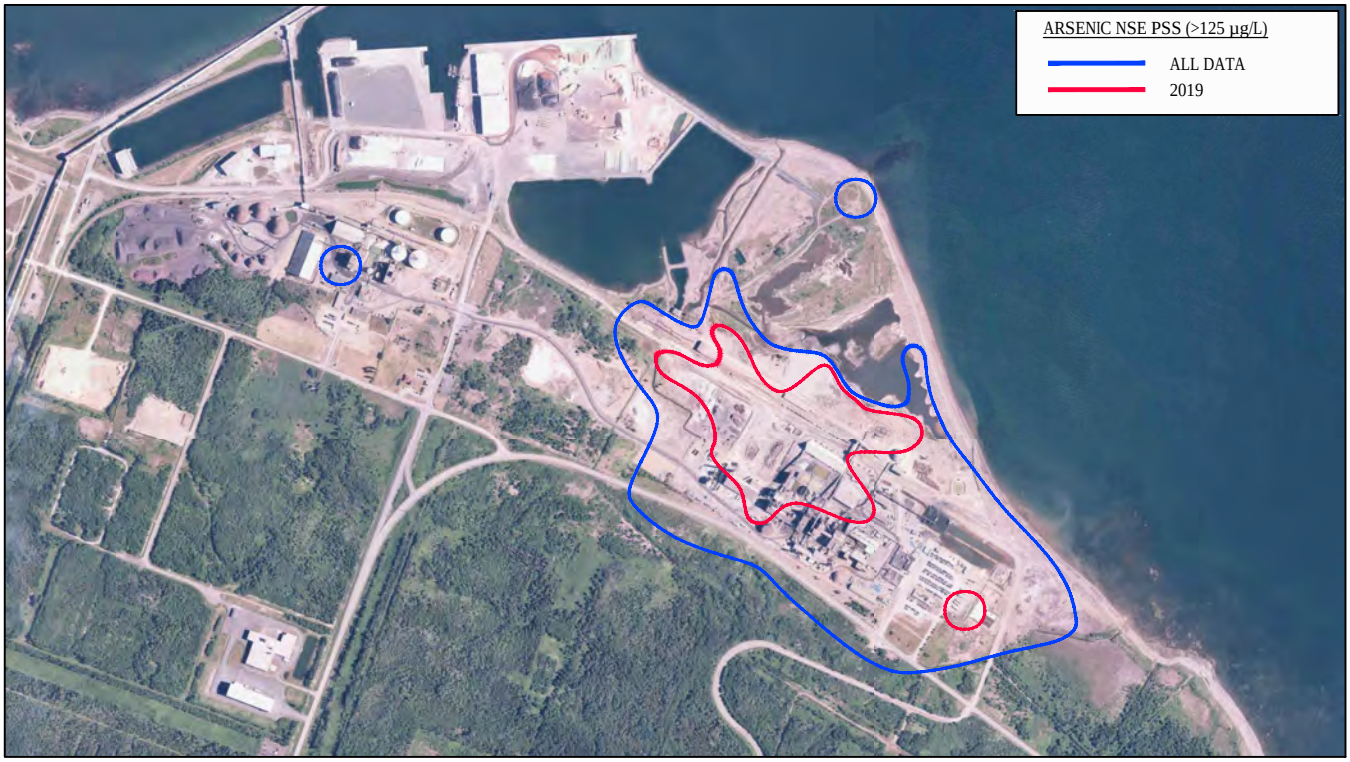
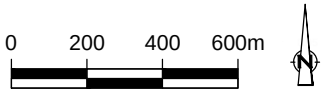
SUMMARY OF GROUNDWATER QUALITY - SALINITY AND pH

FIGURE 8A

CAD File: N:\CA\Fredericton\Projects\661\11198639\Digital_Design\Figures\11198639-04(002)\11198639-04(002)GN-FR008.dwg





Source: High Resolution Aerial Imagery from New Brunswick Dept of Natural Resources, Acquisition Date: 2018.

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HYDROGEOLOGICAL STUDY AND DATA GAP ASSESSMENT

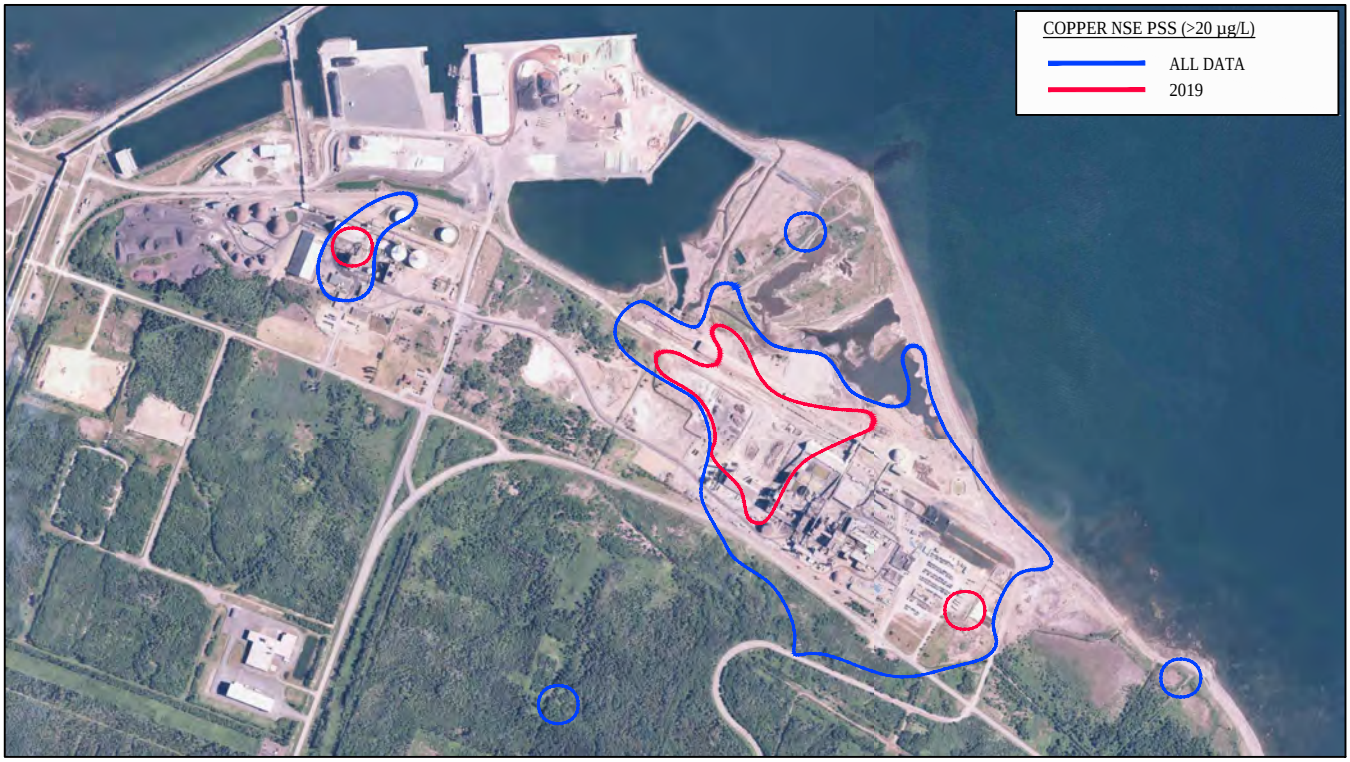
11198639-04(002)

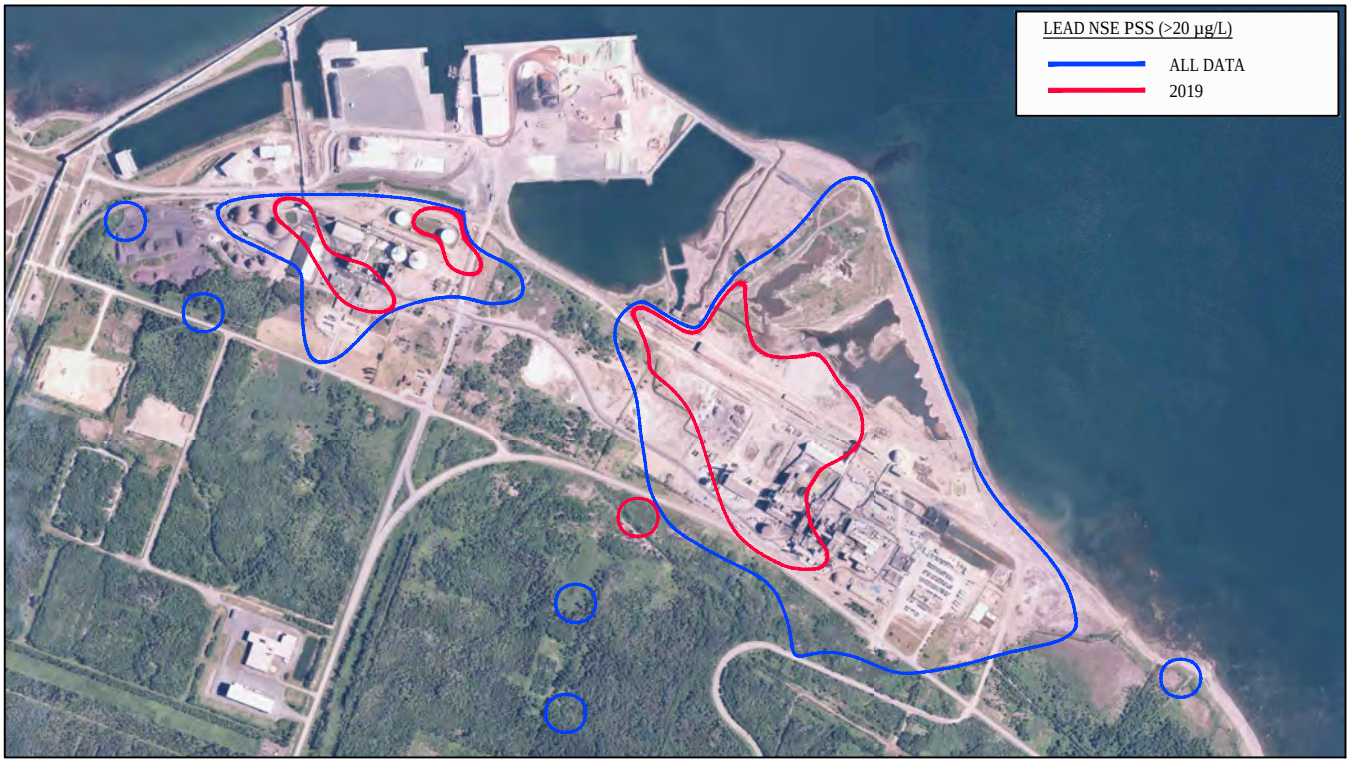
Jan 6, 2020

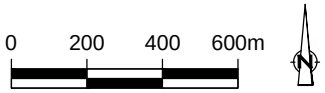
SUMMARY OF GROUNDWATER EXCEEDANCES - METALS: ARSENIC & CADMIUM

FIGURE 8B

CAD File: N:\CA\Fredericton\Projects\661\11198639\Digital_Design\Figures\11198639-04(002)\11198639-04(002)GN-FR008.dwg







Source: High Resolution Aerial Imagery from New Brunswick Dept of Natural Resources, Acquisition Date: 2018.

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BRUNSWICK SMELTER, BELLEDUNE, NEW BRUNSWICK
HYDROGEOLOGICAL STUDY AND DATA GAP ASSESSMENT

11198639-04(002)

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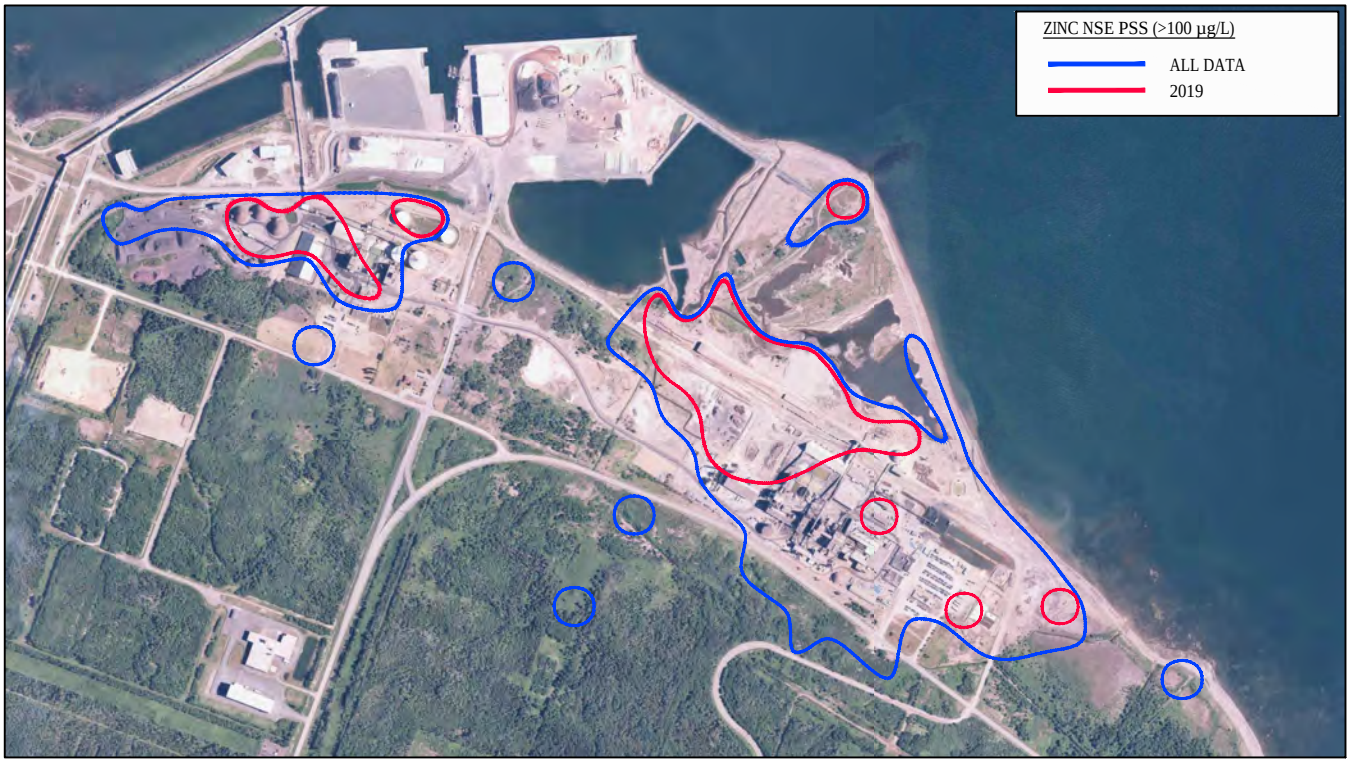
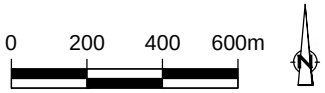
SUMMARY OF GROUNDWATER EXCEEDANCES - METALS: COPPER & LEAD

FIGURE 8C

CAD File: N:\CA\Fredericton\Projects\661\11198639\Digital_Design\Figures\11198639-04(002)\11198639-04(002)GN-FR008.dwg





Source: High Resolution Aerial Imagery from New Brunswick Dept of Natural Resources, Acquisition Date: 2018.

GLENCORE CANADA CORPORATION
BRUNSWICK SMELTER, BELLEDUNE, NEW BRUNSWICK
HYDROGEOLOGICAL STUDY AND DATA GAP ASSESSMENT

SUMMARY OF GROUNDWATER EXCEEDANCES - METALS: THALLIUM & ZINC

11198639-04(002)

Jan 6, 2020

FIGURE 8D

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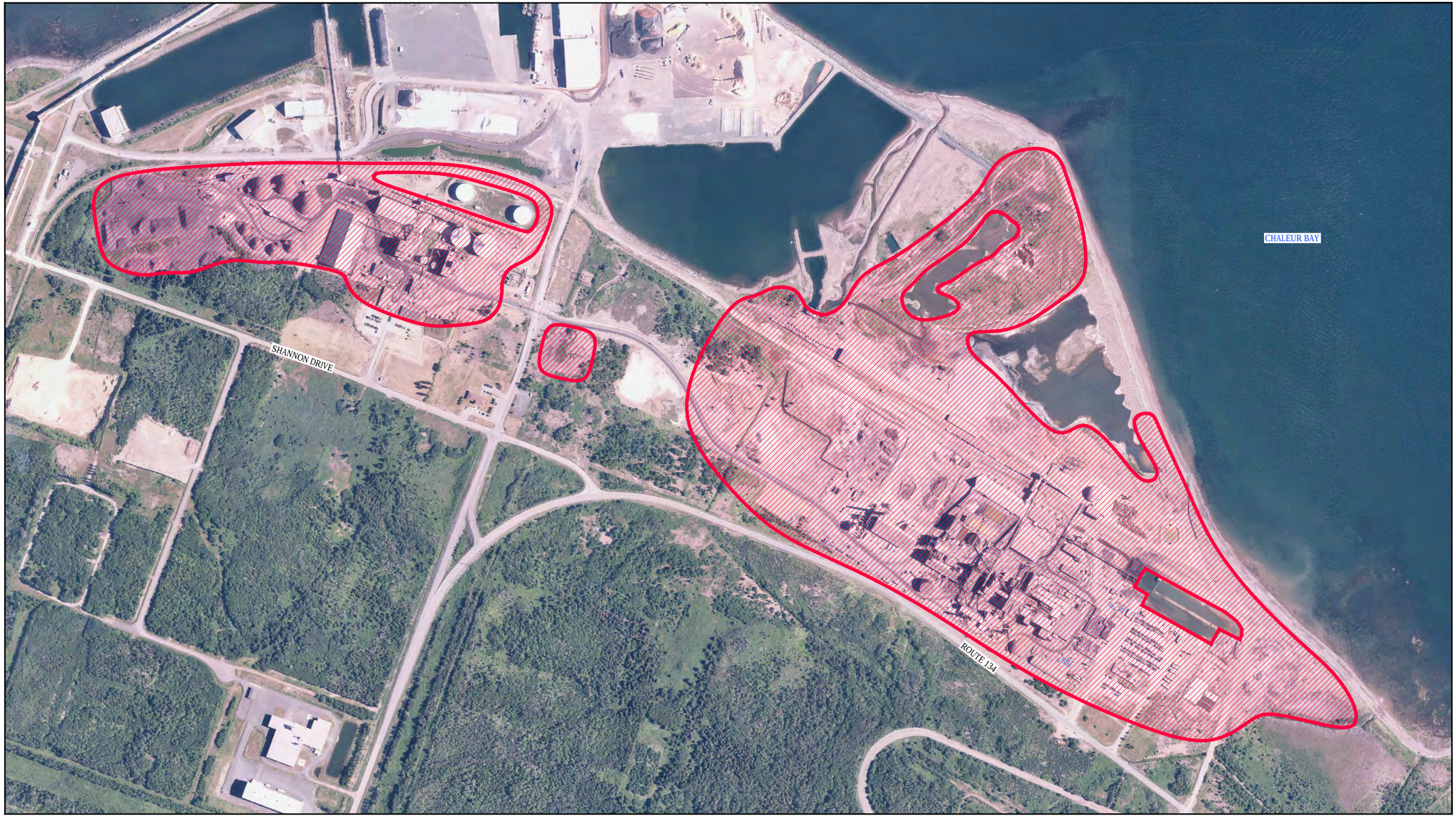

Source: High Resolution Aerial Imagery from New Brunswick Dept of Natural Resources, Acquisition Date: 2018.

0 75 150 225m

LEGEND:

PROPOSED SITE COVER AREAS

GLENCORE CANADA CORPORATION
BRUNSWICK SMELTER, BELLEDUNE, NEW BRUNSWICK
HYDROGEOLOGICAL STUDY AND DATA GAP ASSESSMENT

11198639-04(002)

Jan 6, 2020

PROPOSED SITE COVER

FIGURE 9

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Table 1
Groundwater Elevations
Hydrogeological Study and Data Gap Assessment
Brunswick Smelter, Belledune, NB

Location	Water level TOC (M)	TOC Elevation (m)	Groundwater Elevation-TOC (M)	stick up height (m)	Water level TOG(M)	Elevation (TOG) (m)	Groundwater Elevation-(TOG) (M)	Northing	Easting	Well Depth
05GW-49	2.03	3.456	1.43	1.055	0.98	2.401	1.43	7655746.807	2550381.282	3.96
05GW-51	Dry	15.276	Dry	0.659	Dry	14.617	Dry	7655554.947	2549209.495	4.57
05GW-52	Dry	17.762	Dry	0.699	Dry	17.063	Dry	7655279.971	2549174.679	3.96
05GW-53	3.98	25.552	21.572	0.739	3.24	24.813	21.572	7654882.194	2549454.274	4.57
05GW-54	2.10	3.76	1.66	1.164	0.94	2.596	1.66	7656348.397	2549409.353	3.05
05GW-59	2.91	3.484	0.574	0.658	2.25	2.826	0.574	7656636.602	2549974.947	4.57
05GW-63	Dry	6.909	Dry	0.00	Dry	6.909	Dry	7655917.815	2549587.403	3.35
05GW-64	1.53	7.176	5.646	-0.018	1.55	7.194	5.646	7655935.063	2549608.108	3.05
05GW-67	Dry	3.729	Dry	-0.011	Dry	3.74	Dry	7655897.567	2549987.105	0.25
05GW-68	3.05	6.603	3.553	-0.106	3.16	6.709	3.553	7655605.088	2550123.824	4.57
05GW-70	1.82	5.541	3.721	-0.034	1.85	5.575	3.721	7655799.951	2550025.409	3.66
05GW-71	1.82	5.762	3.942	-0.043	1.86	5.805	3.942	7655771.675	2549995.813	3.05
05GW-72	1.92	6.36	4.44	-0.146	2.07	6.506	4.44	7655739.379	2549998.997	3.96
05GW-74	DRY	4.771	Dry	-0.06	Dry	4.831	Dry	7655935.877	2549858.064	1.42
05GW-75	3.01	6.122	3.112	0.74	2.27	5.382	3.112	7656425.61	2549057.553	4.57
05GW-76	1.61	3.275	1.665	0.666	0.94	2.609	1.665	7655394.157	2550807.353	2.44
05GW-77	2.76	7.337	4.577	0.706	2.05	6.631	4.577	7654952.09	2550792.231	3.66
05GW-78	2.62	5.301	2.681	0.857	1.76	4.444	2.681	7656188.044	2549455.181	3.05
08GW-79	4.73	16.403	11.673	0.797	3.93	15.606	11.673	7656228.758	2548534.286	6.10
08GW-80	Dry	21.425	Dry	0.368	Dry	21.057	Dry	7656335.91	2548230.066	1.95
08GW-82	2.81	9.956	7.146	0.474	2.34	9.482	7.146	7656373.25	2548690.484	3.85
08GW-83	3.02	9.65	6.63	0.46	2.56	9.19	6.63	7656391.284	2548690.543	3.85
08GW-84	3.00	9.473	6.473	0.00	3.00	9.473	6.473	7656410.716	2548647.087	4.60
08GW-88	3.63	8.275	4.645	0.009	3.62	8.266	4.645	7656621.073	2548320.544	4.60
08GW-89	Dry	11.633	Dry	-0.116	Dry	11.749	Dry	7656495.467	2548383.4	1.95
08GW-90	Dry	9.604	Dry	0.728	Dry	8.876	Dry	7656614.591	2548192.099	3.30
08GW-91	Dry	11.815	Dry	0.717	Dry	11.098	Dry	7656604.951	2547996.111	4.00
08GW-95	2.70	3.899	1.199	-0.068	2.77	3.967	1.199	7656593.208	2548833.637	4.60
08GW-97	Dry	6.123	Dry	-0.019	Dry	6.142	Dry	7656523.925	2548926.28	1.65
09GW-102	3.40	11.049	7.649	0.836	2.56	10.213	7.649	7656346.483	2548779.168	4.90
09GW-103	2.92	8.654	5.734	0.772	2.15	7.882	5.734	7656441.279	2548907.009	5.20
09GW-104	Dry	10.232	Dry	0.923	Dry	9.309	Dry	7655942.179	2549333.976	2.77
09GW-105	Dry	10.437	Dry	0.922	Dry	9.515	Dry	7655874.083	2549446.856	3.19
09GW-106	1.76	5.845	4.085	0.922	0.84	4.923	4.085	7656117.549	2549576.176	3.65
09GW-107	1.13	7.783	6.653	-0.021	1.15	7.804	6.653	7655687.863	2549807.019	3.00
09GW-109	1.33	4.728	3.398	-0.017	1.35	4.745	3.398	7655699.249	2550182.922	3.65
09GW-110	2.59	6.293	3.703	0.898	1.69	5.395	3.703	7655542.896	2550249.624	3.65
09GW-111	2.43	7.29	4.86	1.06	1.37	6.23	4.86	7655435.264	2550300.654	3.65
09GW-112	1.92	4.174	2.254	0.884	1.04	3.29	2.254	7655485.983	2550521.638	3.65
09GW-113	Dry	13.105	Dry	0.928	Dry	12.177	Dry	7655440.392	2549800.976	2.74
09GW-99	2.38	16.204	13.824	0.46	1.92	15.744	13.824	7656407.698	2548012.828	3.00
19GW-114	4.32	15.881	11.561	0.759	3.56	15.122	11.561	7656478.01	2548090.363	4.20
19GW-115	Dry	14.966	Dry	0.79	Dry	14.18	Dry	7656481.036	2548257.035	4.20
19GW-116	1.28	11.799	10.519	-0.134	1.41	11.933	10.519	7656481.913	2548405.73	3.00
19GW-117	2.76	5.228	2.468	-0.131	2.89	5.359	2.468	7656630.306	2548428.242	3.60
19GW-118	2.3	4.323	2.023	0.764	1.54	3.559	2.023	7656620.267	2548564.897	3.60
19GW-119	4.2	8.128	3.928	-0.191	4.39	8.319	3.928	7656547.338	2548504.001	4.50
19GW-120	2.37	7.959	5.589	0.621	1.75	7.338	5.589	7656505.223	2548620.111	3.60
19GW-122	2.64	3.711	1.071	-0.121	2.76	3.832	1.071	7656613.68	2548772.481	3.60

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Groundwater Elevations
Hydrogeological Study and Data Gap Assessment
Brunswick Smelter, Belledune, NB

Location	Water level TOC (M)	TOC Elevation (m)	Groundwater Elevation-TOC (M)	stick up height (m)	Water level TOG(M)	Elevation (TOG) (m)	Groundwater Elevation-(TOG) (M)	Northing	Easting	Well Depth
19GW-123	3.15	3.822	0.672	-0.083	3.23	3.905	0.672	7656573.297	2548897.056	3.60
19GW-124	1.66	8.366	6.706	estimated	-	-	-	7656457.49	2548765.862	3.30
19GW-125	1.73	3.122	1.392	0.817	0.91	2.305	1.392	7656163.112	2549890.675	3.60
19GW-126	2.33	3.893	1.563	0.737	1.59	3.156	1.563	7655869.841	2550260.693	3.60
19GW-127	1.27	5.338	4.068	0.817	0.45	4.521	4.068	7656114.17	2549620.482	3.60
19GW-128	1.37	5.387	4.017	0.809	0.56	4.578	4.017	7656113.415	2549622.012	9.00
19GW-129	1.65	3.98	2.33	0.741	0.91	3.239	2.33	7656166.455	2549708.787	3.60
19GW-130	1.63	3.974	2.344	0.824	0.81	3.15	2.344	7656165.158	2549710.107	9.00
19GW-131	1.13	3.801	2.671	0.601	0.53	3.2	2.671	7656103.225	2549835.733	3.60
19GW-132	0.84	3.801	2.961	0.668	0.17	3.133	2.961	7656102.453	2549837.141	9.00
19GW-133	1.73	5.516	3.786	0.819	0.91	4.697	3.786	7656051.489	2549765.928	3.00
19GW-134	1.63	5.391	3.761	0.683	0.95	4.708	3.761	7656050.598	2549766.974	9.00
GW-1	2.90	11.675	8.775	0.594	2.31	11.081	8.775	7655810.201	2549370.053	3.30
GW-10	2.39	3.393	1.003	0.718	1.67	2.675	1.003	7656276.584	2549602.493	4.10
GW-12	2.27	5.849	3.579	1.075	1.20	4.774	3.579	7656224.033	2549348.62	1.80
GW-13	Dry	7.096	Dry	0.878	Dry	6.218	Dry	7656072.356	2549462.317	1.80
GW-18	2.54	5.977	3.437	1.282	1.26	4.695	3.437	7655991.741	2549814.922	1.50
GW-2	Dry	no data	Dry	no data	Dry	no data	Dry	7655684.74	2549612.547	2.67
GW-23	2.62	7.125	4.505	0.34	2.28	6.785	4.505	7655899.853	2549834.118	3.00
GW-24	1.64	6.818	5.178	0.46	1.18	6.358	5.178	7655866.199	2549771.611	3.00
GW-25	2.16	7.691	5.531	0.932	1.23	6.759	5.531	7655887.562	2549714.548	3.90
GW-25B	Dry	7.569	Dry	0.793	Dry	6.776	Dry	7655887.336	2549714.429	1.60
GW-25C	2.23	7.701	5.471	0.756	1.47	6.945	5.471	7655887.829	2549713.326	4.67
GW-27	1.90	10.783	8.883	0.778	1.12	10.005	8.883	7655804.983	2549685.229	3.00
GW-30A	2.40	3.081	0.681	0.755	1.65	2.326	0.681	7655993.004	2550113.773	3.60
GW-30B	1.83	3.45	1.62	0.584	1.25	2.866	1.62	7655992.922	2550115.5	>30
GW-30C	1.37	4.077	2.707	1.703	-0.33	2.374	2.707	7655995.432	2550114.881	6.00
GW-31A	2.25	9.674	7.424	0.255	2.00	9.419	7.424	7655651.649	2549708.422	3.60
GW-31B	2.28	9.831	7.551	0.296	1.98	9.535	7.551	7655653.911	2549707.724	>30
GW-32	2.28	3.183	0.903	0.941	1.34	2.242	0.903	7656360.98	2549612.921	7.00
GW-34	2.69	3.656	0.966	1.757	0.93	1.899	0.966	7656159.103	2549893.127	4.80
GW-3A	Dry	12.111	Dry	0.911	Dry	11.2	Dry	7655558.534	2549817.341	2.84
GW-3B	4.36	12.06	7.7	0.851	3.51	11.209	7.7	7655557.916	2549818.596	>30
GW-42	1.78	no data	no data	0.304	1.48	no data	no data	7655746.807	2550381.282	no data
GW-43	3.76	3.236	-0.524	0.401	3.36	2.835	-0.524	7655877.589	2550290.123	6.00
GW-44	0.85	3.363	2.513	0.186	0.66	3.177	2.513	7655566.136	2550505.152	3.00
GW-45	1.77	9.387	7.617	-0.138	1.91	9.525	7.617	7656436.959	2548589.775	4.00
GW-8A	1.34	3.93	2.59	0.675	0.67	3.255	2.59	7656025.772	2549948.069	3.00
GW-8B	1.90	4.518	2.618	1.342	0.56	3.176	2.618	7656026.676	2549948.039	>30
GW-8C	1.53	3.918	2.388	0.748	0.78	3.17	2.388	7656027.538	2549946.385	7.00
MW-1	2.67	7.092	4.422	0.634	2.04	6.458	4.422	7655753.98	2549988.463	3.66
MW-3	1.65	6.357	4.707	-0.034	1.68	6.391	4.707	7655745.36	2549985.359	2.90

Table 2
Groundwater - Monitoring Data
Hydrogeological Study and Data Gap Assessment
Brunswick Smelter, Belledune, NB

Location	Date	Water level (M)	Free Product	pH	Conductivity (mS/cm)	Temperature °C
08GW-91	17-Sep-19	DRY	No	---	---	---
08GW-90	17-Sep-19	DRY	No	---	---	---
08GW-88	17-Sep-19	3.63	No	7.08	2.040	12.23
08GW-89	17-Sep-19	DRY	No	---	---	---
GW-45	17-Sep-19	1.77	No	7.03	0.647	13.5
08GW-84	17-Sep-19	3.00	No	7.41	0.950	13.48
08GW-82	17-Sep-19	2.81	No	6.96	2.390	15.76
09GW-102	17-Sep-19	3.40	No	6.94	0.598	13.58
09GW-103	17-Sep-19	2.92	No	7.01	0.181	13.52
08GW-97	17-Sep-19	DRY	No	---	---	---
08GW-95	17-Sep-19	2.70	No	6.83	1.760	13.43
08GW-79	17-Sep-19	4.73	No	7.36	0.527	10.4
08GW-80	17-Sep-19	DRY	No	---	---	---
09GW-99	17-Sep-19	2.38	No	7.25	1.290	12.28
05GW-75	17-Sep-19	3.01	No	7.42	0.621	10.9
08GW-83	17-Sep-19	3.02	No	7.25	0.640	14.5
GW-12	18-Sep-19	2.27	No	7.49	0.582	9.74
09GW-104	18-Sep-19	DRY	No	---	---	---
09GW-105	18-Sep-19	DRY	No	---	---	---
05GW-78	18-Sep-19	2.62	No	7.45	13.5	9.97
09GW-106	18-Sep-19	1.76	No	9.65	33.3	10.69
GW-13	18-Sep-19	DRY	No	---	---	---
05GW-63	18-Sep-19	DRY	No	---	---	---
05GW-64	18-Sep-19	1.53	No	4.77	5.51	14.53
GW-27	18-Sep-19	1.90	No	10.23	3.02	14.19
GW-25C	18-Sep-19	2.23	No	6.02	28	14
GW-25	18-Sep-19	2.16	No	6.96	26.5	15.23
GW-25B	18-Sep-19	DRY	No	---	---	---
GW-24	18-Sep-19	1.64	No	7.07	1.23	13.04
GW-18	18-Sep-19	2.54	No	6.44	1.18	14.28
05GW-74	18-Sep-19	DRY	No	---	---	---
GW-23	18-Sep-19	2.62	No	6.2	6.59	15.05
05GW-67	18-Sep-19	Dry	No	---	---	---
05GW-70	18-Sep-19	1.82	No	7.6	1.67	15.27
05GW-71	18-Sep-19	1.82	No	7.14	1.65	15.5
MW-1	18-Sep-19	2.67	No	7.45	1.23	18.06
MW-3	18-Sep-19	1.65	Heavy Sheen	did not measure		
05GW-72	18-Sep-19	1.92	No	7.62	1.33	19.52
05GW-54	19-Sep-19	2.10	No	6.95	0.626	13.12
GW-32	19-Sep-19	2.28	No	7.57	36.9	20.41
05GW-59	19-Sep-19	2.91	No	7.72	37.6	18.14
GW-10	19-Sep-19	2.39	No	7.17	6.29	11.76
GW-34	19-Sep-19	2.69	No	7.49	2.72	9.49
GW-8A	19-Sep-19	1.34	No	6.45	5.72	13.75
GW-8B	19-Sep-19	1.90	No	7.49	5.64	13.87
GW-8C	19-Sep-19	1.53	No	7.19	4.29	14.12
GW-30A	19-Sep-19	2.40	No	6.78	3.65	12.3
GW-30B	19-Sep-19	1.83	No	8.48	2.76	9.84
GW-30C	19-Sep-19	1.37	No	9.01	1.08	12.48
GW-43	19-Sep-19	3.76	No	7.51	0.721	10.09

Table 2
Groundwater - Monitoring Data
Hydrogeological Study and Data Gap Assessment
Brunswick Smelter, Belledune, NB

Location	Date	Water level (M)	Free Product	pH	Conductivity (mS/cm)	Temperature °C
GW-42	19-Sep-19	1.78	No	7.07	1.61	12.4
05GW-49	19-Sep-19	2.03	No	7.25	2.67	12.07
09GW-107	19-Sep-19	1.13	No	7.08	0.584	16.46
GW-44	19-Sep-19	0.85	No	6.6	2.98	14.2
09GW-112	19-Sep-19	1.92	No	6.78	0.764	12.46
09GW-111	19-Sep-19	2.43	No	7.37	0.3	13.14
05GW-76	19-Sep-19	1.61	No	6.97	8.632	14.16
05GW-77	19-Sep-19	2.76	No	7.36	0.427	12.04
09GW-110	19-Sep-19	2.59	No	7.07	0.712	15.05
09GW-109	19-Sep-19	1.33	No	7.59	1.33	17.3
05GW-68	19-Sep-19	3.05	No	7.45	0.62	14.73
19GW-118	20-Sep-19	2.3	No	6.74	1.29	18.2
19GW-120	20-Sep-19	2.37	No	6.1	4.93	17.78
19GW-122	20-Sep-19	2.64	No	7.01	1.36	16.36
19GW-124	20-Sep-19	1.66	No	7.29	1.66	16.46
19GW-115	20-Sep-19	DRY	No	---	---	---
19GW-114	20-Sep-19	4.32	No	6.49	0.96	17.05
19GW-116	20-Sep-19	1.28	No	6.94	0.856	15.2
19GW-123	20-Sep-19	3.15	No	7.01	2.16	16.5
19GW-119	23-Sep-19	4.2	No	7.3	0.69	17.25
19GW-117	23-Sep-19	2.76	No	8	0.348	17.61
GW-1	27-Sep-19	2.90	No	7.74	643	13.23
GW-2	27-Sep-19	DRY	No	---	---	---
GW-3A	27-Sep-19	DRY	No	---	---	---
GW-3B	27-Sep-19	4.36	No	7.64	301	11.45
GW-31A	27-Sep-19	2.25	No	7.49	656	12.19
GW-31B	27-Sep-19	2.28	No	7.97	509	8.92
05GW-51	25-Sep-19	DRY	No	---	---	---
05GW-52	25-Sep-19	DRY	No	---	---	---
05GW-53	25-Sep-19	3.98	No	7.43	812	11.23
09GW-113	25-Sep-19	DRY	No	---	---	---
19GW-125	26-Sep-19	1.73	No	6.84	1300	10.33
19GW-126	26-Sep-19	2.33	No	6.26	2390	12.6
19GW-127	26-Sep-19	1.27	No	7.91	7460	12.78
19GW-128	26-Sep-19	1.37	No	7.9	2690	11.09
19GW-129	26-Sep-19	1.65	No	6.71	1370	13.8
19GW-130	26-Sep-19	1.63	No	6.72	2100	12.7
19GW-131	26-Sep-19	1.13	No	6.88	534	12.86
19GW-132	26-Sep-19	0.84	No	6.93	573	11.85
19GW-133	26-Sep-19	1.73	No	6.75	1060	11.27
19GW-134	26-Sep-19	1.63	No	6.83	970	10.65
19GW-135	26-Sep-19	DRY	No	---	---	---

Table 3A
Soil Analytical Results - Metals
Hydrogeological Study and Data Gap Assessment
Brunswick Smelter, Belledune, NB

Sampling Date		CCME SQG [1]	NSE Tier 1 EQS [2]	Risk Based SSTL [3]	9/18/2019	9/18/2019	9/19/2019	9/18/2019	9/18/2019	9/18/2019	9/19/2019
Metals	**Units**				**19SP-1 (0-0.15M)**	**19SP-1 (0-0.15-0.30M)**	**19SP-1 (1.2-1.8M)**	**19SP-3 (0-0.15M)**	**19SP-3 (0.15-0.3M)**	**19SP-3 (0.15-0.3M) Lab-Dup**	**19SP-3 (1.2-1.8M)**
Aluminum	mg/kg		198000		50000	25000	22000	25000	24000	23000	19000
Antimony	mg/kg		63		28	53	17	42	320	310	7.1
Arsenic	mg/kg	31	31	295	67	130	16	90	640	590	23
Barium	mg/kg	96,000	140,000		120	91	49	94	190	200	77
Beryllium	mg/kg	1100	320		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Bismuth	mg/kg				9.1	21	<2.0	18	100	120	2.2
Boron	mg/kg		24000		<50	<50	<50	<50	<50	<50	<50
Cadmium	mg/kg	192	192	1505	18	35	6.4	23	54	58	1.8
Chromium	mg/kg	2300	2300		300	92	66	57	88	92	53
Cobalt	mg/kg		250		41	20	18	18	15	15	16
Copper	mg/kg	16,000	16,000	104,983	210	250	28	220	900	880	37
Iron	mg/kg		144000		69000	42000	36000	42000	53000	51000	40000
Lead	mg/kg	740	740	3567	3000	5000	710	4100	27000	27000	510
Lithium	mg/kg				42	25	20	26	21	21	23
Manganese	mg/kg				1500	1100	1300	970	870	830	1000
Mercury	mg/kg	99	99		1.3	1.2	<0.10	0.33	1.9	2.1	<0.10
Molybdenum	mg/kg		1200		<2.0	<2.0	2.4	<2.0	8.3	8.8	<2.0
Nickel	mg/kg	2500	2200		120	54	46	47	41	42	44
Rubidium	mg/kg				<2.0	8.2	7.0	12	13	13	7.8
Selenium	mg/kg	1135	1135		5.4	3.8	<1.0	1.9	17	18	<1.0
Silver	mg/kg		490	7526	13	23	1.0	17	91	89	2.4
Strontium	mg/kg		122,000		76	63	66	43	100	100	18
Thallium	mg/kg	1	1	22	1.8	7.5	0.30	5.0	26	26	0.64
Tin	mg/kg		122,000		4.3	12	12	10	170	170	2.4
Uranium	mg/kg	300	300		0.20	2.8	42	4.5	38	38	1.6
Vanadium	mg/kg		160		220	98	99	89	98	100	89
Zinc	mg/kg	140,000	47,000	466,418	870	1400	530	1500	4900	5100	200

Notes:

[1] Canadian Council of Ministers of the Environment Soil Quality Guideline for Industrial Land Use based on most conservative human health pathway (Soil Ingestion, particulate inhalation or Off-Site Migration Check) (CCME Factsheets accessed October 2019)

[2] Nova Scotia Environment (NSE) Tier 1 Environmental Quality Standards (EQS) for Soil at a Non-Potable Site - Coarse Soil Type, Industrial Land Use (July 6, 2013)

[3] Risk Based Target Level for Protection of Human Health assuming Industrial Worker and/or Construction/Utility Worker

Underlined - Exceeds Risk Based SSTL

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Table 3A
Soil Analytical Results - Metals
Hydrogeological Study and Data Gap Assessment
Brunswick Smelter, Belledune, NB

Sampling Date		CCME SQG [1]	NSE Tier 1 EQS [2]	Risk Based SSTL [3]	9/18/2019	9/18/2019	9/18/2019	9/19/2019	9/18/2019	9/18/2019	9/19/2019
Metals	**Units**				**19SP-5 (0-0.15M)**	**19SP-5 (0.15-0.3M)**	**19SP-9 (0-0.15M)**	**19SP-9 (0.6-1.2M)**	**19SP-11 (0-0.15M)**	**19SP-11 (1.2-1.8M)**	**19SP-14 (0-0.6M)**
Aluminum	mg/kg		198000		24000	30000	18000	16000	29000	20000	17000
Antimony	mg/kg		63		1100	430	24	22	100	17	760
Arsenic	mg/kg	31	31	295	1400	620	53	46	170	50	4300
Barium	mg/kg	96,000	140,000		220	290	90	79	100	69	220
Beryllium	mg/kg	1100	320		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<20
Bismuth	mg/kg				200	120	6.7	5.4	21	4.1	220
Boron	mg/kg		24000		<50	<50	<50	<50	<50	<50	<500
Cadmium	mg/kg	192	192	1505	180	74	24	18	19	3.4	1700
Chromium	mg/kg	2300	2300		100	79	42	38	59	40	190
Cobalt	mg/kg		250		32	32	15	14	18	13	59
Copper	mg/kg	16,000	16,000	104,983	9300	2500	86	81	310	120	17000
Iron	mg/kg		144000		63000	71000	35000	33000	44000	33000	54000
Lead	mg/kg	740	740	3567	48000	28000	1600	1500	6600	1300	34000
Lithium	mg/kg				24	31	22	23	26	21	<20
Manganese	mg/kg				2000	2000	990	980	920	650	1100
Mercury	mg/kg	99	99		5.2	2.7	0.14	<0.10	0.51	0.13	1.8
Molybdenum	mg/kg		1200		16	8.0	<2.0	<2.0	2.2	<2.0	<20
Nickel	mg/kg	2500	2200		85	56	43	41	52	40	71
Rubidium	mg/kg				9.5	4.9	7.6	6.5	11	9.6	<20
Selenium	mg/kg	1135	1135		100	34	1.5	<1.0	4.4	<1.0	340
Silver	mg/kg		490	7526	82	85	9.9	6.0	39	6.8	79
Strontium	mg/kg		122,000		160	98	17	14	32	14	69
Thallium	mg/kg	1	1	22	36	22	1.2	1.1	4.2	0.80	45
Tin	mg/kg		122,000		310	140	4.2	5.6	26	5.8	1300
Uranium	mg/kg	300	300		5.0	2.5	0.74	0.59	4.9	1.3	1.5
Vanadium	mg/kg		160		99	160	63	61	80	56	73
Zinc	mg/kg	140,000	47,000	466,418	9600	4500	350	310	1600	310	12000

Notes:

[1] Canadian Council of Ministers of the Environment Soil Quality Guideline for Industrial Land Use based on most conservative human health pathway (Soil Ingestion, particulate inhalation or Off-Site Migration Check) (CCME Factsheets accessed October 2019)

[2] Nova Scotia Environment (NSE) Tier 1 Environmental Quality Standards (EQS) for Soil at a Non-Potable Site - Coarse Soil Type, Industrial Land Use (July 6, 2013)

[3] Risk Based Target Level for Protection of Human Health assuming Industrial Worker and/or Construction/Utility Worker

Underlined - Exceeds Risk Based SSTL

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Table 3A
Soil Analytical Results - Metals
Hydrogeological Study and Data Gap Assessment
Brunswick Smelter, Belledune, NB

Sampling Date		CCME SQG [1]	NSE Tier 1 EQS [2]	Risk Based SSTL [3]	9/20/2019	9/20/2019	9/19/2019	9/24/2019	9/24/2019	9/24/2019	9/24/2019
Metals	**Units**				**19SP-16 (0.6-1.2M)**	**19SP-16 (0.6-1.2M) Lab-Dup**	**19SP-17 (0.6-1.2M)**	**19SP-19 (0-0.15M)**	**19SP-19 (0.6-1.2M)**	**19SP-20 (0-0.15M)**	**19SP-20 (0.6-1.2M)**
Aluminum	mg/kg		198000		20000	19000	21000	19000	17000	15000	1600
Antimony	mg/kg		63		690	490	51	210	37	1700	470
Arsenic	mg/kg	31	31	295	1300	1500	380	2100	210	3400	1600
Barium	mg/kg	96,000	140,000		230	220	120	180	450	240	130
Beryllium	mg/kg	1100	320		<2.0	<2.0	<2.0	<20	<2.0	<20	<20
Bismuth	mg/kg				96	81	6.3	<20	4.5	430	260
Boron	mg/kg		24000		<50	<50	<50	1100	73	<500	<500
Cadmium	mg/kg	192	192	1505	790	630	85	47	43	1400	70
Chromium	mg/kg	2300	2300		70	67	57	240	86	110	28
Cobalt	mg/kg		250		23	25	27	130	32	81	18
Copper	mg/kg	16,000	16,000	104,983	2200	2000	1100	1500	250	6600	2600
Iron	mg/kg		144000		41000	39000	38000	220000	65000	100000	70000
Lead	mg/kg	740	740	3567	22000	18000	1700	9700	1800	48000	68000
Lithium	mg/kg				26	25	31	<20	24	<20	<20
Manganese	mg/kg				1500	1400	960	1700	1300	3400	180
Mercury	mg/kg	99	99		11	9.7	1.1	<1.0	0.26	8.1	3.8
Molybdenum	mg/kg		1200		5.6	5.9	13	52	14	31	<20
Nickel	mg/kg	2500	2200		66	62	62	39	48	59	<20
Rubidium	mg/kg				18	17	6.2	<20	7.9	<20	<20
Selenium	mg/kg	1135	1135		90	78	35	61	5.8	140	25
Silver	mg/kg		490	7526	84	92	8.5	25	3.3	76	73
Strontium	mg/kg		122,000		68	72	23	3200	290	400	<50
Thallium	mg/kg	1	1	22	93	87	32	8.4	8.6	170	110
Tin	mg/kg		122,000		150	110	91	1200	120	740	230
Uranium	mg/kg	300	300		0.65	0.66	0.59	2.1	0.93	1.6	<1.0
Vanadium	mg/kg		160		75	69	88	52	46	55	<20
Zinc	mg/kg	140,000	47,000	466,418	4800	3800	730	60000	6600	33000	13000

Notes:

[1] Canadian Council of Ministers of the Environment Soil Quality Guideline for Industrial Land Use based on most conservative human health pathway (Soil Ingestion, particulate inhalation or Off-Site Migration Check) (CCME Factsheets accessed October 2019)

[2] Nova Scotia Environment (NSE) Tier 1 Environmental Quality Standards (EQS) for Soil at a Non-Potable Site - Coarse Soil Type, Industrial Land Use (July 6, 2013)

[3] Risk Based Target Level for Protection of Human Health assuming Industrial Worker and/or Construction/Utility Worker

Underlined - Exceeds Risk Based SSTL

Empty Cell - No Value

Table 3A
Soil Analytical Results - Metals
Hydrogeological Study and Data Gap Assessment
Brunswick Smelter, Belledune, NB

Sampling Date		CCME SQG [1]	NSE Tier 1 EQS [2]	Risk Based SSTL [3]	9/25/2019	9/25/2019	9/25/2019	9/25/2019	9/25/2019	9/25/2019	9/25/2019
Metals	**Units**				**19SP-21 (0-0.15M)**	**19SP-21 (0.3-0.6M)**	**19SP-22 (0-0.15M)**	**19SP-22 (1.2-1.8M)**	**SOIL-QA/QC-5**	**SOIL-QA/QC-5**	**19SP-23 (0-0.15M)**
Aluminum	mg/kg		198000		12000	12000	15000	12000	20000	20000	20000
Antimony	mg/kg		63		21	2.4	14	<2.0	330	310	6.1
Arsenic	mg/kg	31	31	295	75	12	59	10	1500	1500	37
Barium	mg/kg	96,000	140,000		120	62	89	39	350	310	85
Beryllium	mg/kg	1100	320		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Bismuth	mg/kg				2.4	<2.0	2.8	<2.0	18	14	2.5
Boron	mg/kg		24000		<50	<50	<50	<50	1100	1100	<50
Cadmium	mg/kg	192	192	1505	10	1.2	5.7	<0.30	23	21	4.8
Chromium	mg/kg	2300	2300		32	28	45	33	170	150	47
Cobalt	mg/kg		250		18	9.0	17	12	42	41	17
Copper	mg/kg	16,000	16,000	104,983	170	24	92	13	3900	3700	98
Iron	mg/kg		144000		33000	21000	38000	29000	240000	240000	41000
Lead	mg/kg	740	740	3567	1400	140	810	20	16000	14000	690
Lithium	mg/kg				18	18	21	16	27	26	26
Manganese	mg/kg				870	480	790	570	13000	12000	880
Mercury	mg/kg	99	99		0.11	<0.10	<0.10	<0.10	<0.10	<0.10	0.11
Molybdenum	mg/kg		1200		3.3	<2.0	<2.0	<2.0	200	200	<2.0
Nickel	mg/kg	2500	2200		28	21	41	31	6.0	5.4	42
Rubidium	mg/kg				6.1	4.8	6.6	4.8	28	29	11
Selenium	mg/kg	1135	1135		2.2	<1.0	1.0	<1.0	140	140	<1.0
Silver	mg/kg		490	7526	3.2	<0.50	2.1	<0.50	74	58	1.4
Strontium	mg/kg		122,000		46	19	32	43	2400	2300	12
Thallium	mg/kg	1	1	22	1.4	0.30	0.91	<0.10	1.3	1.0	1.6
Tin	mg/kg		122,000		35	2.4	23	<1.0	450	460	5.9
Uranium	mg/kg	300	300		0.65	1.3	0.51	0.37	6.2	6.1	0.77
Vanadium	mg/kg		160		46	41	68	57	92	89	78
Zinc	mg/kg	140,000	47,000	466,418	3900	180	1900	54	120000	120000	620

Notes:

[1] Canadian Council of Ministers of the Environment Soil Quality Guideline for Industrial Land Use based on most conservative human health pathway (Soil Ingestion, particulate inhalation or Off-Site Migration Check) (CCME Factsheets accessed October 2019)

[2] Nova Scotia Environment (NSE) Tier 1 Environmental Quality Standards (EQS) for Soil at a Non-Potable Site - Coarse Soil Type, Industrial Land Use (July 6, 2013)

[3] Risk Based Target Level for Protection of Human Health assuming Industrial Worker and/or Construction/Utility Worker

Underlined - Exceeds Risk Based SSTL

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Table 3A
Soil Analytical Results - Metals
Hydrogeological Study and Data Gap Assessment
Brunswick Smelter, Belledune, NB

Sampling Date		CCME SQG [1]	NSE Tier 1 EQS [2]	Risk Based SSTL [3]	9/25/2019	9/24/2019	9/24/2019	9/24/2019	9/24/2019	9/24/2019	9/25/2019
Metals	**Units**				**19SP-23 (0.6-1.2M)**	**19SP-24 (0-0.15M)**	**19SP-24 (1.2-1.8M)**	**19SP-24 (1.2-1.8M) Lab-Dup**	**19SP-25 (0-0.15M)**	**19SP-25 (0.6-1.2M)**	**19SP-26 (0.6-1.2M)**
Aluminum	mg/kg		198000		13000	23000	21000	24000	23000	15000	12000
Antimony	mg/kg		63		<2.0	3.4	3.3	3.4	5.9	12	130
Arsenic	mg/kg	31	31	295	15	26	25	25	41	75	1600
Barium	mg/kg	96,000	140,000		76	76	71	74	86	120	520
Beryllium	mg/kg	1100	320		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<20
Bismuth	mg/kg				<2.0	<2.0	<2.0	<2.0	2.7	3.9	29
Boron	mg/kg		24000		<50	<50	<50	<50	<50	<50	<500
Cadmium	mg/kg	192	192	1505	0.32	2.8	2.3	2.1	4.2	8.0	69
Chromium	mg/kg	2300	2300		31	42	31	32	39	30	90
Cobalt	mg/kg		250		13	14	13	14	16	14	230
Copper	mg/kg	16,000	16,000	104,983	14	42	41		63	310	3600
Iron	mg/kg		144000		31000	33000	25000	27000	39000	30000	270000
Lead	mg/kg	740	740	3567	30	290	400	380	950	1200	30000
Lithium	mg/kg				19	26	31	34	30	27	<20
Manganese	mg/kg				960	770	860	860	720	780	4300
Mercury	mg/kg	99	99		<0.10	<0.10	<0.10	<0.10	0.10	0.12	<1.0
Molybdenum	mg/kg		1200		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	46
Nickel	mg/kg	2500	2200		35	38	30	32	41	38	<20
Rubidium	mg/kg				5.8	10	8.0	10	12	8.1	<20
Selenium	mg/kg	1135	1135		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	26
Silver	mg/kg		490	7526	<0.50	0.77	0.64		1.8	2.7	28
Strontium	mg/kg		122,000		10	9.4	11	11	11	14	470
Thallium	mg/kg	1	1	22	0.14	0.98	0.73	0.73	1.5	2.4	2.0
Tin	mg/kg		122,000		<1.0	2.2	1.8	2.2	4.1	6.9	790
Uranium	mg/kg	300	300		0.46	0.58	0.67	0.81	0.61	0.87	2.2
Vanadium	mg/kg		160		56	66	39	43	72	51	32
Zinc	mg/kg	140,000	47,000	466,418	51	130	160	160	260	400	110000

Notes:

[1] Canadian Council of Ministers of the Environment Soil Quality Guideline for Industrial Land Use based on most conservative human health pathway (Soil Ingestion, particulate inhalation or Off-Site Migration Check) (CCME Factsheets accessed October 2019)

[2] Nova Scotia Environment (NSE) Tier 1 Environmental Quality Standards (EQS) for Soil at a Non-Potable Site - Coarse Soil Type, Industrial Land Use (July 6, 2013)

[3] Risk Based Target Level for Protection of Human Health assuming Industrial Worker and/or Construction/Utility Worker

Underlined - Exceeds Risk Based SSTL

Empty Cell - No Value

Table 3A
Soil Analytical Results - Metals
Hydrogeological Study and Data Gap Assessment
Brunswick Smelter, Belledune, NB

Sampling Date		CCME SQG [1]	NSE Tier 1 EQS [2]	Risk Based SSTL [3]	9/25/2019	9/25/2019	9/17/2019	9/17/2019	9/17/2019	9/17/2019	9/17/2019
Metals	**Units**				**19SP-27 (1.8-2.4M)**	**19SP-28 (0-0.6M)**	**19GW-114 (0-0.15M)**	**19GW-114 (0.6-1.2M)**	**19GW-115 (0-0.15M)**	**19GW-115 (1.8-2.4M)**	**19GW-116 (0-0.15M)**
Aluminum	mg/kg		198000		18000	21000	30000	28000	20000	20000	20000
Antimony	mg/kg		63		620	440	16	6.9	140	4.9	190
Arsenic	mg/kg	31	31	295	2700	1400	38	37	600	23	280
Barium	mg/kg	96,000	140,000		600	210	99	100	110	58	63
Beryllium	mg/kg	1100	320		<20	<20	<2.0	<2.0	<2.0	<2.0	<2.0
Bismuth	mg/kg				39	20	3.9	2.6	54	2.1	56
Boron	mg/kg		24000		<500	640	<50	<50	<50	<50	<50
Cadmium	mg/kg	192	192	1505	190	28	8.5	18	220	94	15
Chromium	mg/kg	2300	2300		280	170	74	75	62	42	61
Cobalt	mg/kg		250		340	51	15	16	22	14	22
Copper	mg/kg	16,000	16,000	104,983	3600	4200	92	73	1700	28	410
Iron	mg/kg		144000		250000	240000	38000	37000	42000	37000	46000
Lead	mg/kg	740	740	3567	33000	15000	2300	1800	11000	420	13000
Lithium	mg/kg				<20	24	23	24	22	22	23
Manganese	mg/kg				3600	15000	600	870	980	980	2800
Mercury	mg/kg	99	99		<1.0	<1.0	0.46	0.27	2.4	0.15	0.38
Molybdenum	mg/kg		1200		100	220	3.0	3.2	5.4	<2.0	2.5
Nickel	mg/kg	2500	2200		<20	<20	38	44	51	43	51
Rubidium	mg/kg				<20	28	20	17	8.4	7.4	5.9
Selenium	mg/kg	1135	1135		22	150	1.0	<1.0	25	<1.0	6.3
Silver	mg/kg		490	7526	78	63	3.0	2.4	61	2.8	120
Strontium	mg/kg		122,000		480	2400	210	210	77	10	32
Thallium	mg/kg	1	1	22	2.0	1.5	2.0	1.9	54	2.6	2.0
Tin	mg/kg		122,000		1100	490	7.9	6.9	170	2.0	21
Uranium	mg/kg	300	300		4.0	6.5	35	32	5.8	0.56	3.0
Vanadium	mg/kg		160		37	93	120	96	73	71	85
Zinc	mg/kg	140,000	47,000	466,418	110000	110000	940	1500	3700	400	3800

Notes:

[1] Canadian Council of Ministers of the Environment Soil Quality Guideline for Industrial Land Use based on most conservative human health pathway (Soil Ingestion, particulate inhalation or Off-Site Migration Check) (CCME Factsheets accessed October 2019)

[2] Nova Scotia Environment (NSE) Tier 1 Environmental Quality Standards (EQS) for Soil at a Non-Potable Site - Coarse Soil Type, Industrial Land Use (July 6, 2013)

[3] Risk Based Target Level for Protection of Human Health assuming Industrial Worker and/or Construction/Utility Worker

Underlined - Exceeds Risk Based SSTL

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Table 3A
Soil Analytical Results - Metals
Hydrogeological Study and Data Gap Assessment
Brunswick Smelter, Belledune, NB

Sampling Date		CCME SQG [1]	NSE Tier 1 EQS [2]	Risk Based SSTL [3]	9/17/2019	9/17/2019	9/17/2019	9/18/2019	9/18/2019	9/17/2019	9/17/2019
Metals	**Units**				**19GW-116 (1.2-1.5M)**	**19GW-117 (0-0.15M)**	**19GW-117 (0.3-0.9M)**	**19GW-118 (0-0.15M)**	**19GW-118 (1.2-1.8M)**	**19GW-119 (0-0.15M)**	**19GW-119 (2.7-3.3M)**
Aluminum	mg/kg		198000		23000	22000	21000	22000	12000	17000	24000
Antimony	mg/kg		63		23	210	35	27	36	2700	23
Arsenic	mg/kg	31	31	295	30	350	52	83	40	2100	30
Barium	mg/kg	96,000	140,000		140	160	80	92	62	59	88
Beryllium	mg/kg	1100	320		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Bismuth	mg/kg				6.0	54	7.6	16	3.7	590	4.0
Boron	mg/kg		24000		<50	<50	<50	<50	<50	<50	<50
Cadmium	mg/kg	192	192	1505	1.9	50	10	36	89	98	1.3
Chromium	mg/kg	2300	2300		47	51	46	81	33	45	73
Cobalt	mg/kg		250		2.4	24	16	21	17	15	19
Copper	mg/kg	16,000	16,000	104,983	58	900	110	230	79	3300	43
Iron	mg/kg		144000		24000	53000	38000	42000	32000	56000	43000
Lead	mg/kg	740	740	3567	1200	15000	2100	6000	1500	49000	1800
Lithium	mg/kg				3.8	26	25	29	17	21	29
Manganese	mg/kg				170	1400	840	1100	1900	1800	1000
Mercury	mg/kg	99	99		0.54	1.9	0.16	0.40	0.26	1.3	<0.10
Molybdenum	mg/kg		1200		6.3	5.2	<2.0	<2.0	<2.0	9.2	<2.0
Nickel	mg/kg	2500	2200		6.5	56	41	71	39	38	49
Rubidium	mg/kg				74	6.5	8.1	6.8	5.7	7.9	7.1
Selenium	mg/kg	1135	1135		1.9	8.2	<1.0	2.0	1.3	59	<1.0
Silver	mg/kg		490	7526	9.7	85	13	12	6.6	68	6.9
Strontium	mg/kg		122,000		620	42	28	56	30	26	48
Thallium	mg/kg	1	1	22	1.5	12	0.76	17	6.1	6.4	0.25
Tin	mg/kg		122,000		5.1	36	7.5	12	2.6	310	3.7
Uranium	mg/kg	300	300		21	1.1	0.57	1.6	0.41	2.3	1.5
Vanadium	mg/kg		160		63	78	79	84	78	50	90
Zinc	mg/kg	140,000	47,000	466,418	280	14000	1600	3300	1200	21000	280

Notes:

[1] Canadian Council of Ministers of the Environment Soil Quality Guideline for Industrial Land Use based on most conservative human health pathway (Soil Ingestion, particulate inhalation or Off-Site Migration Check) (CCME Factsheets accessed October 2019)

[2] Nova Scotia Environment (NSE) Tier 1 Environmental Quality Standards (EQS) for Soil at a Non-Potable Site - Coarse Soil Type, Industrial Land Use (July 6, 2013)

[3] Risk Based Target Level for Protection of Human Health assuming Industrial Worker and/or Construction/Utility Worker

Underlined - Exceeds Risk Based SSTL

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Table 3A
Soil Analytical Results - Metals
Hydrogeological Study and Data Gap Assessment
Brunswick Smelter, Belledune, NB

Sampling Date		CCME SQG [1]	NSE Tier 1 EQS [2]	Risk Based SSTL [3]	9/20/2019	9/19/2019	9/19/2019	9/18/2019	9/18/2019	9/20/2019	9/18/2019
Metals	**Units**				**SOIL-QA/QC-1**	**19GW-120 (0-0.15M)**	**19GW-120 (1.2-1.8M)**	**19GW-122 (0-0.15M)**	**19GW-122 (0.6-1.2M)**	**SOIL-QA/QC-2**	**19GW-123 (0-0.15M)**
Aluminum	mg/kg		198000		24000	23000	22000	18000	19000	18000	20000
Antimony	mg/kg		63		240	630	<2.0	240	16	28	75
Arsenic	mg/kg	31	31	295	190	930	14	810	65	110	300
Barium	mg/kg	96,000	140,000		91	250	62	110	75	81	85
Beryllium	mg/kg	1100	320		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Bismuth	mg/kg				61	170	<2.0	180	11	21	75
Boron	mg/kg		24000		<50	<50	<50	<50	<50	<50	<50
Cadmium	mg/kg	192	192	1505	12	60	1.7	98	54	59	160
Chromium	mg/kg	2300	2300		62	93	54	47	41	39	48
Cobalt	mg/kg		250		17	18	17	38	17	17	23
Copper	mg/kg	16,000	16,000	104,983	430	1900	21	2600	130	190	1200
Iron	mg/kg		144000		42000	55000	40000	75000	40000	38000	44000
Lead	mg/kg	740	740	3567	17000	42000	53	41000	3400	6300	12000
Lithium	mg/kg				28	22	23	23	24	23	24
Manganese	mg/kg				1200	860	1000	730	1200	1300	820
Mercury	mg/kg	99	99		0.20	4.2	<0.10	2.8	0.18	0.17	0.76
Molybdenum	mg/kg		1200		2.5	17	<2.0	7.7	2.8	5.3	7.7
Nickel	mg/kg	2500	2200		45	50	46	46	43	41	40
Rubidium	mg/kg				11	10	8.1	7.4	7.9	7.8	8.3
Selenium	mg/kg	1135	1135		5.9	40	<1.0	17	<1.0	<1.0	6.7
Silver	mg/kg		490	7526	74	87	<0.50	85	6.1	10	23
Strontium	mg/kg		122,000		44	120	15	33	41	52	42
Thallium	mg/kg	1	1	22	1.6	30	0.15	120	3.7	3.9	24
Tin	mg/kg		122,000		26	210	<1.0	100	5.5	9.2	50
Uranium	mg/kg	300	300		11	9.8	5.9	1.7	0.99	1.0	2.8
Vanadium	mg/kg		160		91	90	82	55	67	61	68
Zinc	mg/kg	140,000	47,000	466,418	2200	5800	260	18000	3100	3400	9300

Notes:

[1] Canadian Council of Ministers of the Environment Soil Quality Guideline for Industrial Land Use based on most conservative human health pathway (Soil Ingestion, particulate inhalation or Off-Site Migration Check) (CCME Factsheets accessed October 2019)

[2] Nova Scotia Environment (NSE) Tier 1 Environmental Quality Standards (EQS) for Soil at a Non-Potable Site - Coarse Soil Type, Industrial Land Use (July 6, 2013)

[3] Risk Based Target Level for Protection of Human Health assuming Industrial Worker and/or Construction/Utility Worker

Underlined - Exceeds Risk Based SSTL

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Table 3A
Soil Analytical Results - Metals
Hydrogeological Study and Data Gap Assessment
Brunswick Smelter, Belledune, NB

Sampling Date		CCME SQG [1]	NSE Tier 1 EQS [2]	Risk Based SSTL [3]	9/18/2019	9/18/2019	9/24/2019	9/24/2019	9/25/2019	9/24/2019	9/24/2019
Metals	**Units**				**19GW-123 (0.3-0.6M)**	**19GW-124 (0-0.15M)**	**19GW-125 (0-0.15M)**	**19GW-125 (1.8-2.4M)**	**SOIL-QA/QC-4**	**19GW-126 (0-0.6M)**	**19GW-126 (1.2-1.8M)**
Aluminum	mg/kg		198000		20000	21000	15000	13000	12000	21000	16000
Antimony	mg/kg		63		280	140	140	63	<2.0	1100	210
Arsenic	mg/kg	31	31	295	970	250	1300	220	8.9	1700	710
Barium	mg/kg	96,000	140,000		150	170	520	46	41	190	130
Beryllium	mg/kg	1100	320		<2.0	<2.0	<20	<2.0	<2.0	<2.0	<2.0
Bismuth	mg/kg				240	63	52	38	<2.0	130	56
Boron	mg/kg		24000		<50	<50	<500	<50	<50	<50	<50
Cadmium	mg/kg	192	192	1505	210	45	51	130	<0.30	260	140
Chromium	mg/kg	2300	2300		51	88	100	42	31	98	50
Cobalt	mg/kg		250		44	21	290	26	11	45	53
Copper	mg/kg	16,000	16,000	104,983	2600	520	3900	410	15	2500	1500
Iron	mg/kg		144000		81000	37000	290000	37000	25000	55000	56000
Lead	mg/kg	740	740	3567	47000	19000	37000	7900	21	19000	13000
Lithium	mg/kg				25	17	<20	21	18	30	23
Manganese	mg/kg				1100	580	900	410	540	1900	990
Mercury	mg/kg	99	99		3.3	0.73	<1.0	0.38	<0.10	1.8	0.70
Molybdenum	mg/kg		1200		6.3	7.7	56	3.2	<2.0	7.0	8.0
Nickel	mg/kg	2500	2200		47	37	<20	33	33	79	38
Rubidium	mg/kg				9.7	19	<20	8.7	4.7	9.9	9.3
Selenium	mg/kg	1135	1135		18	7.9	16	1.9	<1.0	56	12
Silver	mg/kg		490	7526	94	65	56	10	<0.50	110	33
Strontium	mg/kg		122,000		32	510	150	18	43	65	47
Thallium	mg/kg	1	1	22	210	11	12	89	<0.10	75	66
Tin	mg/kg		122,000		130	86	730	44	<1.0	270	140
Uranium	mg/kg	300	300		1.8	65	2.4	1.1	0.35	0.86	0.81
Vanadium	mg/kg		160		64	100	39	46	46	63	44
Zinc	mg/kg	140,000	47,000	466,418	28000	5900	130000	8100	57	6500	19000

Notes:

[1] Canadian Council of Ministers of the Environment Soil Quality Guideline for Industrial Land Use based on most conservative human health pathway (Soil Ingestion, particulate inhalation or Off-Site Migration Check) (CCME Factsheets accessed October 2019)

[2] Nova Scotia Environment (NSE) Tier 1 Environmental Quality Standards (EQS) for Soil at a Non-Potable Site - Coarse Soil Type, Industrial Land Use (July 6, 2013)

[3] Risk Based Target Level for Protection of Human Health assuming Industrial Worker and/or Construction/Utility Worker

Underlined - Exceeds Risk Based SSTL

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Table 3A
Soil Analytical Results - Metals
Hydrogeological Study and Data Gap Assessment
Brunswick Smelter, Belledune, NB

Sampling Date		CCME SQG [1]	NSE Tier 1 EQS [2]	Risk Based SSTL [3]	9/20/2019	9/20/2019	9/23/2019	9/23/2019	9/23/2019	9/23/2019	9/19/2019
Metals	**Units**				**19GW-127 (0-0.15M)**	**19GW-127 (1.2-1.8M)**	**19GW-129 (0-0.15M)**	**19GW-129 (0.6-1.2M)**	**19GW-131 (0-0.15M)**	**19GW-131 (0.6-1.2M)**	**19GW-133 (0-0.15M)**
Aluminum	mg/kg		198000		16000	21000	18000	15000	18000	24000	16000
Antimony	mg/kg		63		8500	46	1700	89	740	29	620
Arsenic	mg/kg	31	31	295	8300	110	2800	250	1400	230	11000
Barium	mg/kg	96,000	140,000		100	84	150	99	89	83	140
Beryllium	mg/kg	1100	320		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<20
Bismuth	mg/kg				340	3.2	180	24	110	13	290
Boron	mg/kg		24000		83	<50	<50	<50	<50	<50	<500
Cadmium	mg/kg	192	192	1505	82	12	540	53	540	93	1900
Chromium	mg/kg	2300	2300		48	76	66	41	49	53	72
Cobalt	mg/kg		250		23	20	34	17	31	18	87
Copper	mg/kg	16,000	16,000	104,983	73000	86	3500	830	9400	390	49000
Iron	mg/kg		144000		25000	39000	54000	34000	39000	38000	47000
Lead	mg/kg	740	740	3567	44000	640	32000	8700	29000	2800	39000
Lithium	mg/kg				19	33	24	21	25	27	<20
Manganese	mg/kg				660	1300	1200	630	770	500	800
Mercury	mg/kg	99	99		1.8	<0.10	9.7	44	<1.0	3.1	21
Molybdenum	mg/kg		1200		<2.0	8.4	6.8	<2.0	<2.0	<2.0	<20
Nickel	mg/kg	2500	2200		120	49	56	35	56	53	190
Rubidium	mg/kg				27	7.1	7.7	7.9	5.8	6.0	<20
Selenium	mg/kg	1135	1135		130	2.9	52	4.3	5.0	2.5	380
Silver	mg/kg		490	7526	90	2.1	110	22	100	7.9	89
Strontium	mg/kg		122,000		66	26	59	42	39	23	<50
Thallium	mg/kg	1	1	22	47	1.8	90	5.5	14	16	780
Tin	mg/kg		122,000		100	9.8	350	25	200	14	1600
Uranium	mg/kg	300	300		0.91	0.40	0.91	0.74	0.49	0.48	<1.0
Vanadium	mg/kg		160		47	92	120	52	65	66	49
Zinc	mg/kg	140,000	47,000	466,418	9300	140	8900	12000	8900	680	6200

Notes:

[1] Canadian Council of Ministers of the Environment Soil Quality Guideline for Industrial Land Use based on most conservative human health pathway (Soil Ingestion, particulate inhalation or Off-Site Migration Check) (CCME Factsheets accessed October 2019)

[2] Nova Scotia Environment (NSE) Tier 1 Environmental Quality Standards (EQS) for Soil at a Non-Potable Site - Coarse Soil Type, Industrial Land Use (July 6, 2013)

[3] Risk Based Target Level for Protection of Human Health assuming Industrial Worker and/or Construction/Utility Worker

Underlined - Exceeds Risk Based SSTL

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Table 3A
Soil Analytical Results - Metals
Hydrogeological Study and Data Gap Assessment
Brunswick Smelter, Belledune, NB

Sampling Date		CCME SQG [1]	NSE Tier 1 EQS [2]	Risk Based SSTL [3]	9/20/2019	9/19/2019	9/27/2019	9/27/2019	9/27/2019	9/27/2019	9/27/2019
Metals	**Units**				**SOIL-QA/QC-3**	**19GW-133 (1.2-1.8M)**	**19SS-1 (0-0.05m)**	**19SS-1 (0.05-0.3m)**	**SOIL-QA/QC-8**	**19SS-2 (0-0.05m)**	**19SS-2 (0.05-0.3m)**
Aluminum	mg/kg		198000		15000	30000	18000	15000	14000	21000	19000
Antimony	mg/kg		63		750	5.0	140	120	110	50	8.1
Arsenic	mg/kg	31	31	295	14000	83	640	760	840	360	93
Barium	mg/kg	96,000	140,000		120	140	280	360	290	60	54
Beryllium	mg/kg	1100	320		<20	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Bismuth	mg/kg				350	<2.0	25	25	21	37	3.2
Boron	mg/kg		24000		<500	<50	<50	<50	<50	<50	<50
Cadmium	mg/kg	192	192	1505	2100	13	29	19	17	22	11
Chromium	mg/kg	2300	2300		72	91	66	80	65	75	65
Cobalt	mg/kg		250		100	24	110	150	120	27	19
Copper	mg/kg	16,000	16,000	104,983	62000	240	2100	2900	2400	520	100
Iron	mg/kg		144000		45000	42000	150000	200000	170000	42000	38000
Lead	mg/kg	740	740	3567	39000	440	19000	21000	17000	9700	1200
Lithium	mg/kg				<20	38	21	15	15	30	29
Manganese	mg/kg				720	1200	780	960	800	880	750
Mercury	mg/kg	99	99		26	0.21	0.23	<0.10	0.13	5.8	2.0
Molybdenum	mg/kg		1200		<20	<2.0	12	19	14	<2.0	<2.0
Nickel	mg/kg	2500	2200		230	64	27	16	19	49	45
Rubidium	mg/kg				<20	7.3	9.9	9.1	8.2	12	8.4
Selenium	mg/kg	1135	1135		430	2.4	5.1	4.8	3.9	16	4.3
Silver	mg/kg		490	7526	82	1.3	23	24	19	12	2.4
Strontium	mg/kg		122,000		<50	35	110	140	130	87	52
Thallium	mg/kg	1	1	22	790	6.2	3.6	2.8	2.9	14	5.6
Tin	mg/kg		122,000		2000	9.0	250	320	250	53	6.0
Uranium	mg/kg	300	300		<1.0	0.81	1.3	1.7	1.4	9.6	2.7
Vanadium	mg/kg		160		47	120	59	48	47	110	88
Zinc	mg/kg	140,000	47,000	466,418	7900	120	45000	70000	56000	3500	1600

Notes:

[1] Canadian Council of Ministers of the Environment Soil Quality Guideline for Industrial Land Use based on most conservative human health pathway (Soil Ingestion, particulate inhalation or Off-Site Migration Check) (CCME Factsheets accessed October 2019)

[2] Nova Scotia Environment (NSE) Tier 1 Environmental Quality Standards (EQS) for Soil at a Non-Potable Site - Coarse Soil Type, Industrial Land Use (July 6, 2013)

[3] Risk Based Target Level for Protection of Human Health assuming Industrial Worker and/or Construction/Utility Worker

Underlined - Exceeds Risk Based SSTL

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Table 3A
Soil Analytical Results - Metals
Hydrogeological Study and Data Gap Assessment
Brunswick Smelter, Belledune, NB

Sampling Date		CCME SQG [1]	NSE Tier 1 EQS [2]	Risk Based SSTL [3]	9/27/2019	9/27/2019	9/27/2019	9/27/2019	9/27/2019	9/27/2019	9/27/2019
Metals	**Units**				**SOIL-QA/QC-7**	**19SS-2 (0.05-0.3m) Lab-Dup**	**19SS-3 (0-0.05m)**	**19SS-3 (0.05-0.3m)**	**19SS-4 (0-0.05m)**	**19SS-4 (0.05-0.3m)**	**19SS-5 (0-0.05m)**
Aluminum	mg/kg		198000		20000	19000	7700	9100	16000	24000	7800
Antimony	mg/kg		63		21	7.4	89	120	35	6.3	93
Arsenic	mg/kg	31	31	295	170	91	1300	1100	160	63	360
Barium	mg/kg	96,000	140,000		56	54	480	440	50	48	84
Beryllium	mg/kg	1100	320		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Bismuth	mg/kg				10	3.0	19	16	26	2.7	79
Boron	mg/kg		24000		<50	<50	<50	<50	<50	<50	<50
Cadmium	mg/kg	192	192	1505	12	11	38	35	13	2.3	51
Chromium	mg/kg	2300	2300		71	59	49	54	45	54	37
Cobalt	mg/kg		250		24	19	180	160	23	25	16
Copper	mg/kg	16,000	16,000	104,983	260	98	1700	1600	390	81	840
Iron	mg/kg		144000		41000	36000	210000	190000	46000	52000	37000
Lead	mg/kg	740	740	3567	3700	1000	24000	24000	6600	740	19000
Lithium	mg/kg				29	29	7.0	11	23	37	6.3
Manganese	mg/kg				900	780	650	820	940	1600	340
Mercury	mg/kg	99	99		3.2	2.0	<0.10	<0.10	0.79	0.11	2.3
Molybdenum	mg/kg		1200		<2.0	<2.0	26	24	2.4	<2.0	3.6
Nickel	mg/kg	2500	2200		50	46	6.6	13	41	60	24
Rubidium	mg/kg				8.3	8.0	5.4	5.6	9.3	7.4	5.0
Selenium	mg/kg	1135	1135		8.7	4.1	11	9.7	2.3	<1.0	7.1
Silver	mg/kg		490	7526	4.5	2.4	11	10	11	1.2	34
Strontium	mg/kg		122,000		70	51	85	80	50	15	110
Thallium	mg/kg	1	1	22	9.7	5.5	1.2	1.7	6.5	1.7	14
Tin	mg/kg		122,000		18	5.4	650	560	53	5.4	110
Uranium	mg/kg	300	300		5.6	2.5	1.6	1.6	4.7	1.3	14
Vanadium	mg/kg		160		110	90	25	32	73	81	80
Zinc	mg/kg	140,000	47,000	466,418	3400	1500	86000	77000	3600	580	4200

Notes:

[1] Canadian Council of Ministers of the Environment Soil Quality Guideline for Industrial Land Use based on most conservative human health pathway (Soil Ingestion, particulate inhalation or Off-Site Migration Check) (CCME Factsheets accessed October 2019)

[2] Nova Scotia Environment (NSE) Tier 1 Environmental Quality Standards (EQS) for Soil at a Non-Potable Site - Coarse Soil Type, Industrial Land Use (July 6, 2013)

[3] Risk Based Target Level for Protection of Human Health assuming Industrial Worker and/or Construction/Utility Worker

Underlined - Exceeds Risk Based SSTL

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Table 3A
Soil Analytical Results - Metals
Hydrogeological Study and Data Gap Assessment
Brunswick Smelter, Belledune, NB

Sampling Date		CCME SQG [1]	NSE Tier 1 EQS [2]	Risk Based SSTL [3]	9/27/2019	9/27/2019	9/27/2019	9/27/2019	9/27/2019	9/27/2019	9/27/2019
Metals	**Units**				**19SS-5 (0.05-0.3m)**	**19SS-6 (0-0.05m)**	**19SS-6 (0.05-0.3m)**	**19SS-7 (0-0.05m)**	**19SS-7 (0.05-0.3m)**	**19SS-8 (0-0.05m)**	**19SS-8 (0.05-0.3m)**
Aluminum	mg/kg		198000		15000	3800	14000	12000	12000	14000	12000
Antimony	mg/kg		63		7.2	140	44	23	16	39	20
Arsenic	mg/kg	31	31	295	60	190	390	150	73	140	72
Barium	mg/kg	96,000	140,000		44	86	66	35	55	53	50
Beryllium	mg/kg	1100	320		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Bismuth	mg/kg				3.8	61	44	16	7.4	31	9.3
Boron	mg/kg		24000		<50	<50	<50	<50	<50	<50	<50
Cadmium	mg/kg	192	192	1505	4.9	58	39	30	24	32	15
Chromium	mg/kg	2300	2300		46	22	41	41	37	44	36
Cobalt	mg/kg		250		20	8.0	15	18	12	16	13
Copper	mg/kg	16,000	16,000	104,983	88	1000	510	180	130	340	190
Iron	mg/kg		144000		36000	16000	34000	33000	28000	34000	28000
Lead	mg/kg	740	740	3567	800	15000	9900	3300	1700	6000	2200
Lithium	mg/kg				25	3.3	15	17	17	20	16
Manganese	mg/kg				1200	720	670	710	610	780	960
Mercury	mg/kg	99	99		0.15	2.3	1.6	1.5	0.75	0.72	0.27
Molybdenum	mg/kg		1200		<2.0	2.8	2.4	<2.0	<2.0	<2.0	<2.0
Nickel	mg/kg	2500	2200		34	17	30	34	30	42	33
Rubidium	mg/kg				8.8	2.2	9.3	6.5	7.0	8.9	8.5
Selenium	mg/kg	1135	1135		<1.0	9.7	5.2	4.6	2.3	2.3	1.2
Silver	mg/kg		490	7526	1.9	73	13	4.0	5.3	11	5.5
Strontium	mg/kg		122,000		24	58	59	26	23	52	45
Thallium	mg/kg	1	1	22	2.0	10	9.7	7.3	3.6	12	4.7
Tin	mg/kg		122,000		5.3	77	47	20	9.9	25	7.1
Uranium	mg/kg	300	300		1.5	2.2	11	2.2	1.0	6.6	2.7
Vanadium	mg/kg		160		87	22	98	70	61	81	65
Zinc	mg/kg	140,000	47,000	466,418	510	4900	1700	2400	1100	2100	950

Notes:

[1] Canadian Council of Ministers of the Environment Soil Quality Guideline for Industrial Land Use based on most conservative human health pathway (Soil Ingestion, particulate inhalation or Off-Site Migration Check) (CCME Factsheets accessed October 2019)

[2] Nova Scotia Environment (NSE) Tier 1 Environmental Quality Standards (EQS) for Soil at a Non-Potable Site - Coarse Soil Type, Industrial Land Use (July 6, 2013)

[3] Risk Based Target Level for Protection of Human Health assuming Industrial Worker and/or Construction/Utility Worker

Underlined - Exceeds Risk Based SSTL

Empty Cell - No Value

Table 3A
Soil Analytical Results - Metals
Hydrogeological Study and Data Gap Assessment
Brunswick Smelter, Belledune, NB

Sampling Date		CCME SQG [1]	NSE Tier 1 EQS [2]	Risk Based SSTL [3]	9/27/2019	9/27/2019	9/27/2019	9/27/2019	9/27/2019	9/27/2019	10/1/2019
Metals	**Units**				**19SS-9 (0-0.05m)**	**19SS-9 (0.05-0.3m)**	**19SS-10 (0-0.05m)**	**19SS-10 (0-0.05m) Lab-Dup**	**19SS-10 (0.05-0.3m)**	**SOIL-QA/QC-9**	**19SS-11 (0-0.15m)**
Aluminum	mg/kg		198000		7200	17000	10000	14000	23000	20000	25000
Antimony	mg/kg		63		20	7.4	49	52	16	15	8.9
Arsenic	mg/kg	31	31	295	46	51	110	130	77	79	41
Barium	mg/kg	96,000	140,000		92	100	59	65	54	63	97
Beryllium	mg/kg	1100	320		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Bismuth	mg/kg				8.9	3.8	18	16	2.9	4.1	2.1
Boron	mg/kg		24000		<50	<50	<50	<50	<50	<50	<50
Cadmium	mg/kg	192	192	1505	20	7.4	11	9.5	1.9	2.8	5.9
Chromium	mg/kg	2300	2300		24	43	40	48	60	50	54
Cobalt	mg/kg		250		9.3	19	21	27	27	23	17
Copper	mg/kg	16,000	16,000	104,983	170	81	950	930	300	270	59
Iron	mg/kg		144000		27000	41000	46000	64000	60000	50000	46000
Lead	mg/kg	740	740	3567	2000	770	5400	5000	840	1300	440
Lithium	mg/kg				10	24	15	20	35	30	41
Manganese	mg/kg				690	1300	1000	1100	1400	1200	1200
Mercury	mg/kg	99	99		0.35	0.25	0.45	0.41	0.10	0.18	0.13
Molybdenum	mg/kg		1200		<2.0	2.2	4.1	4.5	<2.0	2.1	<2.0
Nickel	mg/kg	2500	2200		25	48	38	49	62	53	43
Rubidium	mg/kg				4.5	8.1	4.8	5.7	6.9	7.2	13
Selenium	mg/kg	1135	1135		1.3	<1.0	2.3	2.1	<1.0	<1.0	<1.0
Silver	mg/kg		490	7526	9.0	1.9	14	13	2.3	3.0	2.0
Strontium	mg/kg		122,000		21	14	84	74	17	21	18
Thallium	mg/kg	1	1	22	4.0	2.3	4.3	4.0	2.3	2.5	1.6
Tin	mg/kg		122,000		13	4.7	57	73	35	18	2.1
Uranium	mg/kg	300	300		1.5	1.3	2.5	2.3	1.2	1.3	2.2
Vanadium	mg/kg		160		27	50	39	53	68	62	100
Zinc	mg/kg	140,000	47,000	466,418	1100	490	3100	4400	720	1200	550

Notes:

[1] Canadian Council of Ministers of the Environment Soil Quality Guideline for Industrial Land Use based on most conservative human health pathway (Soil Ingestion, particulate inhalation or Off-Site Migration Check) (CCME Factsheets accessed October 2019)

[2] Nova Scotia Environment (NSE) Tier 1 Environmental Quality Standards (EQS) for Soil at a Non-Potable Site - Coarse Soil Type, Industrial Land Use (July 6, 2013)

[3] Risk Based Target Level for Protection of Human Health assuming Industrial Worker and/or Construction/Utility Worker

Underlined - Exceeds Risk Based SSTL

Empty Cell - No Value

Table 3A
Soil Analytical Results - Metals
Hydrogeological Study and Data Gap Assessment
Brunswick Smelter, Belledune, NB

Sampling Date		CCME SQG [1]	NSE Tier 1 EQS [2]	Risk Based SSTL [3]	10/1/2019	10/1/2019	10/1/2019	10/1/2019	10/1/2019	10/31/2019	10/31/2019
Metals	**Units**				**19SS-11 (0.15-0.3m)**	**19SS-12 (0-0.15m)**	**19SS-12 (0.15-0.3m)**	**19SS-13 (0-0.15m)**	**19SS-13 (0.15-0.3m)**	**19SS-14 (0-0.15m)**	**19SS-14 (0.15-0.3m)**
Aluminum	mg/kg		198000		25000	25000	16000	22000	19000	11000	8800
Antimony	mg/kg		63		3.9	32	8.8	40	12	3.7	<2.0
Arsenic	mg/kg	31	31	295	22	96	26	81	24	17	8.5
Barium	mg/kg	96,000	140,000		83	140	130	100	100	60	53
Beryllium	mg/kg	1100	320		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Bismuth	mg/kg				<2.0	14	<2.0	11	<2.0	<2.0	<2.0
Boron	mg/kg		24000		<50	<50	<50	<50	<50	<50	<50
Cadmium	mg/kg	192	192	1505	2.9	35	5.4	49	24	4.2	0.45
Chromium	mg/kg	2300	2300		56	60	35	50	42	26	24
Cobalt	mg/kg		250		17	17	12	15	14	7.8	7.3
Copper	mg/kg	16,000	16,000	104,983	33	240	57	170	59	27	8.2
Iron	mg/kg		144000		45000	41000	35000	36000	40000	29000	28000
Lead	mg/kg	740	740	3567	220	3200	420	2500	320	170	22
Lithium	mg/kg				46	27	19	25	26	13	9.1
Manganese	mg/kg				1100	1400	1500	1100	1200	580	550
Mercury	mg/kg	99	99		<0.10	0.36	0.10	0.37	<0.10	<0.10	<0.10
Molybdenum	mg/kg		1200		<2.0	2.9	<2.0	<2.0	<2.0	<2.0	<2.0
Nickel	mg/kg	2500	2200		42	49	30	43	33	17	14
Rubidium	mg/kg				13	26	15	17	15	11	12
Selenium	mg/kg	1135	1135		<1.0	2.0	<1.0	2.1	<1.0	<1.0	<1.0
Silver	mg/kg		490	7526	0.84	11	2.2	12	1.8	0.51	<0.50
Strontium	mg/kg		122,000		12	180	39	83	18	13	10
Thallium	mg/kg	1	1	22	0.55	10	1.3	10	1.7	0.63	0.13
Tin	mg/kg		122,000		1.2	12	2.3	10	2.2	1.5	1.0
Uranium	mg/kg	300	300		0.88	26	2.9	13	1.9	1.1	0.41
Vanadium	mg/kg		160		90	130	78	130	90	68	67
Zinc	mg/kg	140,000	47,000	466,418	340	2500	610	650	380	340	130

Notes:

[1] Canadian Council of Ministers of the Environment Soil Quality Guideline for Industrial Land Use based on most conservative human health pathway (Soil Ingestion, particulate inhalation or Off-Site Migration Check) (CCME Factsheets accessed October 2019)

[2] Nova Scotia Environment (NSE) Tier 1 Environmental Quality Standards (EQS) for Soil at a Non-Potable Site - Coarse Soil Type, Industrial Land Use (July 6, 2013)

[3] Risk Based Target Level for Protection of Human Health assuming Industrial Worker and/or Construction/Utility Worker

Underlined - Exceeds Risk Based SSTL

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Table 3A
Soil Analytical Results - Metals
Hydrogeological Study and Data Gap Assessment
Brunswick Smelter, Belledune, NB

Sampling Date		**CCME SQG [1]**	**NSE Tier 1 EQS [2]**	**Risk Based SSTL [3]**	10/31/2019	10/31/2019	10/31/2019	10/31/2019	10/31/2019	10/31/2019	10/31/2019
Metals	**Units**				**19SS-15 (0-0.15m)**	**19SS-15 (0.15-0.3m)**	**19SS-16 (0-0.15m)**	**19SS-16 (0.15-0.3m)**	**19SS-17 (0-0.15m)**	**19SS-17 (0.15-0.3m)**	**19SS-18 (0-0.15m)**
Aluminum	mg/kg		198000		18000	16000	22000	19000	23000	24000	20000
Antimony	mg/kg		63		12	4.1	15	6.0	14	3.3	33
Arsenic	mg/kg	31	31	295	54	22	74	35	45	21	94
Barium	mg/kg	96,000	140,000		72	61	80	92	88	90	100
Beryllium	mg/kg	1100	320		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Bismuth	mg/kg				5.7	<2.0	5.1	<2.0	6.1	<2.0	16
Boron	mg/kg		24000		<50	<50	<50	<50	<50	<50	<50
Cadmium	mg/kg	192	192	1505	13	3.2	11	6.4	9.6	2.7	38
Chromium	mg/kg	2300	2300		39	35	47	44	51	52	57
Cobalt	mg/kg		250		14	11	15	14	17	17	15
Copper	mg/kg	16,000	16,000	104,983	100	37	230	96	110	50	290
Iron	mg/kg		144000		34000	34000	36000	39000	39000	43000	33000
Lead	mg/kg	740	740	3567	1400	230	1100	160	1500	280	4300
Lithium	mg/kg				23	19	28	25	29	31	22
Manganese	mg/kg				810	640	1000	990	1100	1200	800
Mercury	mg/kg	99	99		0.14	<0.10	0.10	<0.10	0.17	<0.10	0.37
Molybdenum	mg/kg		1200		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.8
Nickel	mg/kg	2500	2200		36	28	40	33	44	44	39
Rubidium	mg/kg				13	13	12	14	15	15	17
Selenium	mg/kg	1135	1135		<1.0	<1.0	1.4	<1.0	<1.0	<1.0	2.2
Silver	mg/kg		490	7526	3.9	0.72	3.7	0.68	5.9	0.83	11
Strontium	mg/kg		122,000		48	19	28	16	52	26	190
Thallium	mg/kg	1	1	22	4.6	0.94	4.4	1.4	2.8	0.79	12
Tin	mg/kg		122,000		5.1	1.7	7.4	1.4	5.9	1.9	16
Uranium	mg/kg	300	300		7.7	2.2	3.9	1.6	7.0	3.1	29
Vanadium	mg/kg		160		74	75	76	89	94	100	100
Zinc	mg/kg	140,000	47,000	466,418	1100	340	1000	640	810	330	2300

Notes:

[1] Canadian Council of Ministers of the Environment Soil Quality Guideline for Industrial Land Use based on most conservative human health pathway (Soil Ingestion, particulate inhalation or Off-Site Migration Check) (CCME Factsheets accessed October 2019)

[2] Nova Scotia Environment (NSE) Tier 1 Environmental Quality Standards (EQS) for Soil at a Non-Potable Site - Coarse Soil Type, Industrial Land Use (July 6, 2013)

[3] Risk Based Target Level for Protection of Human Health assuming Industrial Worker and/or Construction/Utility Worker

Underlined - Exceeds Risk Based SSTL

Empty Cell - No Value

Table 3A
Soil Analytical Results - Metals
Hydrogeological Study and Data Gap Assessment
Brunswick Smelter, Belledune, NB

Sampling Date		**CCME SQG [1]**	**NSE Tier 1 EQS [2]**	**Risk Based SSTL [3]**	10/31/2019	10/31/2019	10/31/2019	10/31/2019	10/31/2019	10/31/2019	10/31/2019
Metals	**Units**				**19SS-18 (0.15-0.3m)**	**19SS-19 (0-0.15m)**	**19SS-19 (0.15-0.3m)**	**19SS-20 (0-0.15m)**	**19SS-20 (0.15-0.3m)**	**19SS-20 (0.15-0.3m) Lab-Dup**	**19SS-21 (0-0.15m)**
Aluminum	mg/kg		198000		15000	24000	23000	21000	19000	19000	22000
Antimony	mg/kg		63		6.0	50	20	23	4.5	4.4	20
Arsenic	mg/kg	31	31	295	31	260	83	62	23	22	50
Barium	mg/kg	96,000	140,000		67	110	91	81	69	65	86
Beryllium	mg/kg	1100	320		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Bismuth	mg/kg				<2.0	27	8.9	9.3	<2.0	<2.0	6.1
Boron	mg/kg		24000		<50	<50	<50	<50	<50	<50	<50
Cadmium	mg/kg	192	192	1505	5.3	44	21	16	4.7	4.6	15
Chromium	mg/kg	2300	2300		35	55	44	47	39	38	50
Cobalt	mg/kg		250		11	15	17	14	13	14	16
Copper	mg/kg	16,000	16,000	104,983	49	1100	330	140	52	51	100
Iron	mg/kg		144000		32000	37000	39000	33000	35000	35000	36000
Lead	mg/kg	740	740	3567	220	6000	2000	2200	300	330	1400
Lithium	mg/kg				21	27	28	24	24	23	26
Manganese	mg/kg				800	730	1000	820	980	930	1000
Mercury	mg/kg	99	99		<0.10	0.58	0.20	0.21	<0.10	<0.10	0.19
Molybdenum	mg/kg		1200		<2.0	2.2	<2.0	<2.0	<2.0	<2.0	<2.0
Nickel	mg/kg	2500	2200		30	55	39	37	37	37	42
Rubidium	mg/kg				11	17	17	16	12	11	13
Selenium	mg/kg	1135	1135		<1.0	7.6	1.8	1.2	<1.0	<1.0	1.0
Silver	mg/kg		490	7526	1.0	14	3.9	8.5	1.2	1.4	5.4
Strontium	mg/kg		122,000		20	120	61	100	25	25	88
Thallium	mg/kg	1	1	22	1.2	20	8.5	4.8	0.96	0.91	4.6
Tin	mg/kg		122,000		1.7	45	10	8.4	2.1	1.9	5.7
Uranium	mg/kg	300	300		2.0	15	11	16	2.7	2.8	13
Vanadium	mg/kg		160		73	83	100	92	87	79	100
Zinc	mg/kg	140,000	47,000	466,418	680	1300	440	930	600	570	750

Notes:

[1] Canadian Council of Ministers of the Environment Soil Quality Guideline for Industrial Land Use based on most conservative human health pathway (Soil Ingestion, particulate inhalation or Off-Site Migration Check) (CCME Factsheets accessed October 2019)

[2] Nova Scotia Environment (NSE) Tier 1 Environmental Quality Standards (EQS) for Soil at a Non-Potable Site - Coarse Soil Type, Industrial Land Use (July 6, 2013)

[3] Risk Based Target Level for Protection of Human Health assuming Industrial Worker and/or Construction/Utility Worker

Underlined - Exceeds Risk Based SSTL

Empty Cell - No Value

Table 3A
Soil Analytical Results - Metals
Hydrogeological Study and Data Gap Assessment
Brunswick Smelter, Belledune, NB

Sampling Date		**CCME SQG [1]**	**NSE Tier 1 EQS [2]**	**Risk Based SSTL [3]**	10/31/2019	10/31/2019	10/31/2019	10/31/2019	10/31/2019	10/31/2019
Metals	**Units**				**19SS-21 (0.15-0.3m)**	**19SS-22 (0-0.15m)**	**19SS-22 (0.15-0.3m)**	**SOIL-QA/QC-10**	**19SS-23 (0-0.15m)**	**19SS-23 (0.15-0.3m)**
Aluminum	mg/kg		198000		19000	20000	14000	14000	20000	19000
Antimony	mg/kg		63		6.2	100	7.3	6.8	18	4.0
Arsenic	mg/kg	31	31	295	21	150	16	13	46	20
Barium	mg/kg	96,000	140,000		73	110	89	93	68	71
Beryllium	mg/kg	1100	320		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Bismuth	mg/kg				<2.0	26	<2.0	<2.0	5.5	<2.0
Boron	mg/kg		24000		<50	<50	<50	<50	<50	<50
Cadmium	mg/kg	192	192	1505	2.4	96	9.0	7.0	11	2.7
Chromium	mg/kg	2300	2300		39	51	30	28	47	40
Cobalt	mg/kg		250		14	17	11	12	15	14
Copper	mg/kg	16,000	16,000	104,983	44	420	44	39	95	51
Iron	mg/kg		144000		37000	37000	32000	33000	36000	36000
Lead	mg/kg	740	740	3567	76	6900	190	100	1300	240
Lithium	mg/kg				24	23	19	18	25	26
Manganese	mg/kg				1100	1300	920	1000	850	820
Mercury	mg/kg	99	99		<0.10	0.72	<0.10	<0.10	0.15	<0.10
Molybdenum	mg/kg		1200		<2.0	2.7	<2.0	<2.0	<2.0	<2.0
Nickel	mg/kg	2500	2200		35	44	24	22	44	37
Rubidium	mg/kg				11	15	11	12	10	11
Selenium	mg/kg	1135	1135		<1.0	5.5	<1.0	<1.0	<1.0	<1.0
Silver	mg/kg		490	7526	0.51	31	1.0	0.69	5.5	0.97
Strontium	mg/kg		122,000		12	110	13	9.1	39	16
Thallium	mg/kg	1	1	22	0.65	21	0.88	0.60	2.9	0.71
Tin	mg/kg		122,000		1.2	25	1.5	1.2	5.3	1.7
Uranium	mg/kg	300	300		1.1	16	1.2	0.68	6.2	1.8
Vanadium	mg/kg		160		77	110	65	69	100	88
Zinc	mg/kg	140,000	47,000	466,418	370	1600	290	260	550	280

Notes:

[1] Canadian Council of Ministers of the Environment Soil Quality Guideline for Industrial Land Use based on most conservative human health pathway (Soil Ingestion, particulate inhalation or Off-Site Migration Check) (CCME Factsheets accessed October 2019)

[2] Nova Scotia Environment (NSE) Tier 1 Environmental Quality Standards (EQS) for Soil at a Non-Potable Site - Coarse Soil Type, Industrial Land Use (July 6, 2013)

[3] Risk Based Target Level for Protection of Human Health assuming Industrial Worker and/or Construction/Utility Worker

Underlined - Exceeds Risk Based SSTL

Empty Cell - No Value

Table 3B
Soil Analytical Results - Metal Leachate Summary
Hydrogeological Study and Data Gap Assessment
Brunswick Smelter, Belledune, NB

Back 40 / Back 50 Area

	Leachate Guideline µg/L	Soil mg/kg	Soil mg/kg	Soil Leachable µg/L	Soil Leachable µg/L	Groundwater µg/L	Groundwater pH
		19GW-133 (0-0.15m)	19GW-133 (1.2-1.8m)	19GW-133 (0-0.15m)	19GW-133 (1.2-1.8m)	19GW-133	19GW-133
Arsenic	2500	11000	83	800	61	176	7.06
Cadmium	500	1900	13	30000	140	15000	7.06
Lead	5000	39000	440	670000	1100	486	7.06
Thallium	NG	780	6.2	11000	48	6250	7.06
Zinc	NG	6200	120	27000	250	14900	7.06

	Leachate Guideline µg/L	Soil mg/kg	Soil mg/kg	Soil Leachable µg/L	Soil Leachable µg/L	Groundwater µg/L	Groundwater pH
		19GW-127 (0-0.15m)	19GW-127 (1.2-1.8m)	19GW-127 (0-0.15m)	19GW-127 (1.2-1.8m)	19GW-127	19GW-127
Arsenic	2500	8300	110	15000	43	338	8.49
Cadmium	500	82	12	320	150	29	8.49
Lead	5000	44000	640	130000	1400	78	8.49
Thallium	NG	47	1.8	170	11	328	8.49
Zinc	NG	9300	140	46000	320	34	8.49

	Leachate Guideline µg/L	Soil mg/kg	Soil Leachable µg/L	Soil mg/kg	Soil Leachable µg/L	Soil mg/kg	Soil Leachable µg/L
		19SP-14 (0-0.6m)	19SP-14 (0-0.6m)	19SP-16 (0.6-1.2m)	19SP-16 (0.6-1.2m)	19SP-17 (0.6-1.2m)	19SP-17 (0.6-1.2m)
Arsenic	2500	4300	820	1300	580	380	570
Cadmium	500	1700	16000	790	4500	85	1700
Lead	5000	34000	180000	22000	38000	1700	11000
Thallium	NG	45	61	93	130	32	130
Zinc	NG	12000	77000	4800	6300	730	7400

Coke Fines Storage Area

	Leachate Guideline µg/L	Soil mg/kg	Soil mg/kg	Soil Leachable µg/L	Soil Leachable µg/L	Groundwater µg/L	Groundwater pH
		19GW-115 (0-0.15m)	19GW-115 (1.8-2.4m)	19GW-115 (0-0.15m)	19GW-115 (1.2-1.8m)	19GW-115	19GW-115
Arsenic	2500	600	23	120	<20	Dry	Dry
Cadmium	500	220	94	6500	2400	Dry	Dry
Lead	5000	11000	420	73000	1000	Dry	Dry
Thallium	NG	54	2.6	260	6.9	Dry	Dry
Zinc	NG	3700	400	39000	5600	Dry	Dry

Fertilizer Plant Area

	Leachate Guideline µg/L	Soil mg/kg	Soil Leachable µg/L	Soil mg/kg	Soil Leachable µg/L	Soil mg/kg	Soil Leachable µg/L
		19SP-1 (0.15-0.3m)	19SP-1 (0.15-0.3m)	19SP-3 (0.15-0.3m)	19SP-3 (0.15-0.3m)	19SP-5 (0-0.15m)	19SP-5 (0-0.15m)
Arsenic	2500	130	42	640	180	1400	280
Cadmium	500	35	200	54	280	180	1500
Lead	5000	5000	3900	27000	7000	48000	460000
Thallium	NG	7.5	4.7	26	4.9	36	45
Zinc	NG	1400	4200	4900	12000	9600	35000

	Leachate Guideline µg/L	Soil mg/kg	Soil Leachable µg/L	Soil mg/kg	Soil Leachable µg/L
		19SP-9 (0-0.15m)	19SP-9 (0-0.15m)	19SP-11 (1.2-1.8m)	19SP-11 (1.2-1.8m)
Arsenic	2500	53	48	50	26
Cadmium	500	24	270	3.4	22
Lead	5000	35000	20000	1300	4100
Thallium	NG	1.2	1.2	0.8	<1
Zinc	NG	350	2100	310	1000

Notes:

NG No Guideline

Exceeds Leachate Guideline (CEPA, 2019)

Table 4
Soil Analytical Results - Polycyclic Aromatic Hydrocarbons
Hydrogeological Study and Data Gap Assessment
Brunswick Smelter, Belledune, NB

PAHs	Units	RDL	CCME SQG - Non-Potable, Coarse, Industrial [1]	NSE Tier 1 EQS - Non-Potable, Coarse, Industrial [2]	Sample ID	19SP-19	19SP-19 Lab Dup	19GW-114	19GW-114 Lab Dup	19GW-115
					Sample Depth (m)	(1.8-1.4)	(1.8-1.4)	1.2-1.8	1.2-1.8	1.2-1.8
					Sample Date	9/24/2019	9/24/2019	9/17/2019	9/17/2019	9/17/2019
1-Methylnaphthalene	mg/kg	0.01	NG	560		<0.010	<0.010	<0.010	<0.010	<0.010
2-Methylnaphthalene	mg/kg	0.01	NG	560		<0.010	<0.010	<0.010	<0.010	<0.010
Acenaphthene	mg/kg	0.01	NG	8,000		<0.010	<0.010	<0.010	<0.010	<0.010
Acenaphthylene	mg/kg	0.01	NG	66		<0.010	<0.010	<0.010	<0.010	<0.010
Anthracene	mg/kg	0.01	NG	37,000		<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(a)anthracene	mg/kg	0.01	NG	NG		<0.010	<0.010	0.013	0.013	<0.010
Benzo(a)pyrene	mg/kg	0.01	NG	NG		<0.010	<0.010	0.022	<0.010	<0.010
Benzo(b)fluoranthene	mg/kg	0.01	NG	NG		<0.010	<0.010	0.023	0.015	<0.010
Benzo(b/j)fluoranthene	mg/kg	0.02	NG	NG		<0.010	-	0.036	-	<0.010
Benzo(g,h,i)perylene	mg/kg	0.01	NG	NG		<0.010	<0.010	0.017	0.013	<0.010
Benzo(j)fluoranthene	mg/kg	0.01	NG	NG		<0.010	<0.010	0.012	<0.010	<0.010
Benzo(k)fluoranthene	mg/kg	0.01	NG	NG		<0.010	<0.010	0.017	<0.010	<0.010
Chrysene	mg/kg	0.01	NG	NG		<0.010	<0.010	0.026	0.019	<0.010
Dibenz(a,h)anthracene	mg/kg	0.01	NG	NG		<0.010	<0.010	<0.010	<0.010	<0.010
Fluoranthene	mg/kg	0.01	NG	5,300		<0.010	<0.010	0.042	0.027	<0.010
Fluorene	mg/kg	0.01	NG	4,100		<0.010	<0.010	<0.010	<0.010	<0.010
Indeno(1,2,3-cd)pyrene	mg/kg	0.01	NG	NG		<0.010	<0.010	0.016	<0.010	<0.010
Naphthalene	mg/kg	0.01	NG	25		<0.010	<0.010	0.021	0.017	<0.010
Perylene	mg/kg	0.01	NG	NG		<0.010	<0.010	<0.010	<0.010	<0.010
Phenanthrene	mg/kg	0.01	NG	NG		<0.010	<0.010	0.015	0.014	0.012
Pyrene	mg/kg	0.01	NG	3,200		<0.010	<0.010	0.032	0.024	<0.010
BaP TPE	mg/kg	-	5.3	5.3		0.01	0.01	0.03	0.01	0.01

Notes:

[1] Canadian Council of Ministers of the Environment Soil Quality Guideline for Industrial Land Use based on most conservative human health pathway (Soil Ingestion, particulate inhalation or Off-Site Migration Check) (CCME Factsheets accessed October 2019)

[2] Nova Scotia Environment (NSE) Tier 1 Environmental Quality Standards (EQS) for Soil at a Non-Potable Site - Coarse Soil Type, Industrial Land Use (July 6, 2013)

BaP TPE - Benzo(a)pyrene Total Potency Equivalents

NG - No Guideline

UNDERLINE - Exceeds Industrial criteria

"-" - Not Applicable/Not Analyzed

Table 5A
Soil Analytical Results - Polychlorinated Biphenyls
Hydrogeological Study and Data Gap Assessment
Brunswick Smelter, Belledune, NB

PCBs	Units	CCME SQG - Non-Potable, Coarse, Industrial [1]	NSE Tier 1 EQS - Non-Potable, Coarse, Industrial [2]	Sample ID	19SP-13 (0.0-0.6)	19SP-13 (0.0-0.6) Lab Dup	19SP-18 (0.3-0.9)	19SP-18 (0.3-0.9) Lab Dup	19SP-7 (0.0-0.15)	19SP-7 (0.0-0.15) Lab Dup	19SP-7 (0.15-0.3)	19SP-8 (0.0-0.15)	Soil-QA/QC-6 Field Dup of 19SP-8 (0.0-0.15)	19SP-8 (0.15-0.3)
				Sample Date	9/23/2019	9/23/2019	9/24/2019	9/24/2019	10/2/2019	10/2/2019	10/2/2019	10/2/2019	10/2/2019	10/2/2019
Aroclor 1016	µg/g	NG	NG		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Aroclor 1221	µg/g	NG	NG		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Aroclor 1232	µg/g	NG	NG		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Aroclor 1248	µg/g	NG	NG		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Aroclor 1242	µg/g	NG	NG		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Aroclor 1254	µg/g	NG	NG		0.06	0.062	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Aroclor 1260	µg/g	NG	NG		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Calculated Total PCB	µg/g	NG	33		0.06	-	<0.050	-	<0.050	-	<0.050	<0.050	<0.050	<0.050

Notes:

[1] Canadian Council of Ministers of the Environment Soil Quality Guideline for Industrial Land Use based on most conservative human health pathway (Soil Ingestion, particulate inhalation or Off-Site Migration Check) (CCME Factsheets accessed October 2019).

[2] Nova Scotia Environment (NSE) Tier 1 Environmental Quality Standards (EQS) for Soil at a Non-Potable Site - Coarse Soil Type, Industrial Land Use (July 6, 2013)

"-" - Not Applicable/Not Analyzed

Lab Dup - Laboratory Duplicate

PCB - Polychlorinated Biphenyls

NG - No Guideline

UNDERLINE - Exceeds Industrial criteria

Table 5B
Concrete Analytical Results - Polychlorinated Biphenyls
Hydrogeological Study and Data Gap Assessment
Brunswick Smelter, Belledune, NB

PCBs	Units	CCME SQGs, Industrial Site [1]	Sample ID	19-Concrete-1	19-Concrete-2	19-Concrete-2 Lab Dup
			Sample Date	9/18/2019	9/18/2019	9/18/2019
Aroclor 1016	µg/g	NG		<50	<50	<50
Aroclor 1221	µg/g	NG		<50	<50	<50
Aroclor 1232	µg/g	NG		<50	<50	<50
Aroclor 1248	µg/g	NG		<50	<50	<50
Aroclor 1242	µg/g	NG		<50	<50	<50
Aroclor 1254	µg/g	NG		<50	<50	<50
Aroclor 1260	µg/g	NG		<50	<50	<50
Calculated Total PCB	µg/g	NG		<50	<50	-

Notes:

[1] Canadian Council of Ministers of the Environment Soil Quality Guidelines (SQGs) for the protection of Environmental and Human Health-Industrial Site

"-" - Not Applicable/Not Analyzed

Lab Dup - Laboratory Duplicate

PCB - Polychlorinated Biphenyls

NG - No Guideline

UNDERLINE - Exceeds criteria

Table 6
Groundwater Analytical Results - Metals
Hydrogeological Study and Data Gap Assessment
Brunswick Smelter, Belledune, NB

BV Labs ID		**NSE PSS for Groundwater - >10m to Marine Surface Water Body[1]**	**FIGQGs 10m to Marine Surface Water Body[2]**	KZF809	KZF809	KZF810	KZF811	KZF812	KZF813	KZF814	KWV862	KWV858	KWV858	KWV859	KZF815	KWV860	KWV861	KZF816
Sampling Date				10/3/2019	10/3/2019	10/3/2019	10/2/2019	10/2/2019	10/2/2019	10/2/2019	9/24/2019	9/24/2019	9/24/2019	9/24/2019	10/3/2019	9/24/2019	9/24/2019	10/3/2019
COC Number				112031	112031	112031	112031	112031	112031	112031	D34711	D34711	D34711	D34711	112031	D34711	D34711	112031
	Units			**GW-1**	**GW-1 Lab-Dup**	**GW3B**	**GW8A**	**GW8B**	**GW8C**	**GW10**	**GW-12**	**GW-18**	**GW-18 Lab-Dup**	**GW-23**	**GW24**	**GW-25**	**GW-25C**	**GW27**
Calculated Parameters																		
Dissolved Hardness (CaCO3)	mg/L			306		169	1560	991	1100	282	167	1070		881	91.6	1960	1840	33.9
Inorganics																		
pH	pH			7.67		7.43	5.86	5.66	6.08	7.58					7.84			9.87
Salinity	N/A			<2.0		<2.0	3.3	3.0	2.3	<2.0					<2.0			<2.0
Total Suspended Solids	mg/L			17		290	190	60	40	7.2					2200			23
Metals (Dissolved)																		
Aluminum	µg/L			57	60	56	493	59	101	59	<10	<10	<10	841	65	703	371	272
Antimony	µg/L	5000		2.03	1.81	<0.50	4.06	<0.50	1.38	0.79	4.49	77.7	78.2	27.9	4.80	31.7	10.1	68.0
Arsenic	µg/L	125	125	1.33	0.89	1.08	1820	59.3	2310	14.5	17.7	3450	3430	8740	1680	15200	12000	9330
Barium	µg/L	5000	500	264	263	125	39.8	45.7	41.2	57.8	67.1	45.0	44.4	48.6	25.2	67.5	76.4	52.7
Beryllium	µg/L	1000	100	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bismuth	µg/L			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	3.6	3.5	<1.0	<1.0	<1.0	<1.0	1.6
Boron	µg/L	12000	5000	54	52	<50	1470	414	1380	887	<50	1700	1710	2030	1300	2210	2340	2530
Cadmium	µg/L	1.2	0.12	0.703	0.693	0.569	42300	1250	31400	23.6	16.9	13600	13500	416000	978	22300	22400	73.3
Chromium	µg/L	15 (hexavalent)	56 (Total)	2.45	2.92	2.59	4.42	2.53	1.34	3.56	<0.50	<0.50	<0.50	<0.50	2.08	1.62	2.51	3.45
Cobalt	µg/L			<0.10	<0.10	<0.10	128	1.78	71.9	1.84	<0.10	62.1	61.9	84.1	3.15	14.2	8.67	0.61
Copper	µg/L	20	2	1.74	1.84	1.20	408	1.48	<0.50	20.1	1.49	0.62	0.51	5.02	4.34	25.2	8.74	100
Iron	µg/L			9.9	13.4	11.3	15000	65800	75900	41.3	<2.0	114000	116000	10600	614	14600	21200	160
Lead	µg/L	20	2	4.67	4.67	4.02	272	1.56	17.8	2.06	12.4	1730	1730	886	251	2410	288	461
Lithium	µg/L			<20	<20	<20	54	128	48	<20	<20	30	30	93	<20	47	35	<20
Manganese	µg/L			1.19	1.18	4.46	19900	7290	18200	757	1.14	9370	9160	29100	1120	2000	2100	84.4
Mercury	µg/L	0.16	0.016	<0.013		<0.013	0.280	<0.013	<0.013	0.110	<1.0	0.030	0.033	<1.0	0.140	1.400	0.130	1.400
Molybdenum	µg/L			1.8	1.7	<1.0	2.2	<1.0	2.7	11.5	<0.20	3.4	3.4	97.0	35.3	3.0	<1.0	190
Nickel	µg/L	83	83	1.25	1.38	1.20	105	1.53	52.0	2.27	255	71.5	71.9	112	5.47	28.7	27.5	6.51
Phosphorus	µg/L			<50	<50	<50	144	<50	121	<50	0.76	<50	<50	22.1	<50	<50	<50	718
Selenium	µg/L	20	54	<0.50	<0.50	<0.50	6.46	3.49	2.68	<0.50	0.018	2.83	3.03	0.320	2.89	28.1	20.3	19.8
Silicon	µg/L			3620	3790	2970	7600	3060	6020	6170	2590	11700	11800	10700	5700	12100	10800	2720
Silver	µg/L	15	1.5	<0.050	<0.050	<0.050	0.947	0.050	0.073	0.111	<0.050	<0.050	<0.050	0.778	0.283	2.30	0.189	3.36
Strontium	µg/L			570	569	111	1660	5080	1330	299	131	674	661	564	78	2100	2020	31
Thallium	µg/L	213		0.27	0.26	0.20	6400	491	4700	16.5	4.28	7530	7500	49200	4400	32800	27600	184
Tin	µg/L			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.3
Titanium	µg/L			<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Uranium	µg/L	1000		0.429	0.410	0.169	0.087	<0.050	0.064	0.317	0.120	<0.050	<0.050	<0.050	0.107	<0.050	<0.050	1.61
Vanadium	µg/L	500		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	42
Zinc	µg/L	100	10	10.4	8.9	11.8	63600	2980	36300	2970	16.9	41700	42100	166000	1460	12500	11000	66.4
Calcium	mg/L			114		63.2	427	295	312	86.0	61.9	312		308	31.8	236	185	13.6
Magnesium	mg/L			5.1		2.7	119	61.9	77.8	16.4	3.0	71.2		26.8	3.0	332	333	<1.0
Potassium	mg/L			2.2		1.2	131	23.9	113	13.7	<1.0	128		603	24.6	222	206	2.9
Sodium	mg/L			22.4	22.4	9.7	680	879	635	264	19.2	670	705	411	216	4180	4130	411
Sulphur	mg/L			51		<20	587	280	429	84	<20	434		696	94	527	553	80

Notes:

[1] Nova Scotia Environment (NSE) Pathway Specific Standards (PSS) for Groundwater at a Non-Potable Site - Groundwater Discharge to Surface Water, >10m from Surface Water Body, Coarse Soil Type, Discharge to Marine Water, (July 6, 2013)

[2] Federal Interim Groundwater Quality Guidelines (FIGQGs) Tier 2 Water Use/ Exposure Pathway, Marine Life, Coarse Soil Type, applicable at 10m from Surface Water Body (Version 4, June 2016)

Underlined - Exceeds NSE Tier I EQS

Empty Cell = No Value

Table 6
Groundwater Analytical Results - Metals
Hydrogeological Study and Data Gap Assessment
Brunswick Smelter, Belledune, NB

BV Labs ID		**NSE PSS for Groundwater - >10m to Marine Surface Water Body[1]**	**FIGQGs 10m to Marine Surface Water Body[2]**	KZF817	KZF818	KZF819	KZF820	KZF821	KZF822	KZF823	KZF824	KZF825	KZF826	KWV903	KZF827	KZF828	KZF828	KZF829
Sampling Date				10/2/2019	10/2/2019	10/2/2019	10/1/2019	10/3/2019	10/2/2019	10/2/2019	10/2/2019	10/2/2019	10/2/2019	9/24/2019	10/2/2019	10/1/2019	10/1/2019	10/1/2019
COC Number				112031	112031	112031	112031	112031	112031	112031	112031	112031	112031	D34712	112031	112031	112031	112031
	Units			**GW30A**	**GW30B**	**GW30C**	**GW31A**	**GW31B**	**GW32**	**GW34**	**GW42**	**GW43**	**GW44**	**GW-45**	**05GW49**	**05GW52**	**05GW52 Lab-Dup**	**05GW53**
Calculated Parameters																		
Dissolved Hardness (CaCO3)	mg/L			836	160	133	342	52.4	3800	930	697	266	1870	353	1590	297		363
Inorganics																		
pH	pH			7.00	8.10	7.51	7.70	8.27	7.80	7.25	7.21	7.82	6.72		7.08	7.80		7.77
Salinity	N/A			<2.0	<2.0	<2.0	<2.0	<2.0	16	2.9	<2.0	<2.0	<2.0		<2.0	<2.0		<2.0
Total Suspended Solids	mg/L			54	6.8	32	38	5.1	6.6	36	480	48	100		510	88		27
Metals (Dissolved)																		
Aluminum	µg/L			60	22	55	63	54	59	58	58	57	59	<10	56	57	58	55
Antimony	µg/L	5000		1.44	0.63	<0.50	<0.50	<0.50	6.15	11.8	<0.50	<0.50	5.09	483	<0.50	0.83	0.69	6.15
Arsenic	µg/L	125	125	354	3.79	1.31	0.94	0.86	73.4	581	8.95	1.92	111	11.8	6.94	8.86	8.95	0.91
Barium	µg/L	5000	500	55.9	10.9	21.2	248	62.1	40.7	87.2	29.3	124	29.5	64.2	15.0	153	154	54.9
Beryllium	µg/L	1000	100	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bismuth	µg/L			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Boron	µg/L	12000	5000	1160	391	389	83	<50	2460	1620	303	64	102	65	152	<50	<50	58
Cadmium	µg/L	1.2	0.12	3790	0.362	0.167	0.818	0.182	59.4	2300	184	0.972	94.5	1830	12.1	0.054	0.058	0.130
Chromium	µg/L	15 (hexavalent)	56 (Total)	2.58	<0.50	2.45	2.03	3.39	2.79	2.31	3.45	3.10	2.93	<0.50	2.52	2.47	2.99	2.37
Cobalt	µg/L			55.3	<0.10	<0.10	<0.10	<0.10	<0.10	25.3	27.3	<0.10	220	5.11	60.5	0.33	0.35	<0.10
Copper	µg/L	20	2	3.95	<0.50	0.57	1.34	<0.50	6.54	3.30	0.79	0.96	7.11	9.96	0.64	0.65	0.56	1.19
Iron	µg/L			11800	369	617	233	264	10.2	2680	12000	13.3	50100	<2.0	16800	136	140	9.3
Lead	µg/L	20	2	6.35	1.27	3.04	5.25	2.86	49.7	12.9	8.98	4.09	145	298	3.39	0.79	0.76	2.61
Lithium	µg/L			54	<20	<20	<20	<20	106	26	<20	<20	39	<20	22	<20	<20	<20
Manganese	µg/L			8550	79.3	229	554	69.6	3.36	6350	3870	12.8	4840	6510	3200	1700	1730	7.39
Mercury	µg/L	0.16	0.016	<0.013	<0.013	<0.013	<0.013	<0.013	0.020	<0.013	<0.013	<0.013	0.028	0.017	<0.013	<0.013		<0.013
Molybdenum	µg/L			4.9	7.6	2.4	<1.0	<1.0	6.8	7.2	<1.0	<1.0	<1.0	1.4	<1.0	4.2	4.2	1.7
Nickel	µg/L	83	83	29.7	1.28	2.49	1.23	0.97	1.63	11.5	12.9	1.50	28.3	23.2	32.4	1.70	1.62	1.03
Phosphorus	µg/L			<50	<50	<50	<50	<50	63	<50	<50	<50	<50	<50	<50	<50	<50	<50
Selenium	µg/L	20	54	1.06	0.83	<0.50	<0.50	<0.50	2.32	3.01	0.51	<0.50	1.95	14.9	<0.50	<0.50	<0.50	5.21
Silicon	µg/L			7710	<1000	<1000	2570	<1000	1520	7830	5990	3150	8120	4610	5340	4840	4690	4830
Silver	µg/L	15	1.5	0.070	<0.050	<0.050	<0.050	<0.050	1.10	0.056	<0.050	<0.050	0.054	<0.050	<0.050	<0.050	<0.050	<0.050
Strontium	µg/L			1440	1370	257	340	237	5530	951	512	250	5390	613	500	872	867	727
Thallium	µg/L	213		3140	0.14	0.54	0.58	0.22	12.2	796	1.08	20.2	19.7	106	1.00	0.10	0.11	0.24
Tin	µg/L			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.7	<1.0	1.2	<1.0	<1.0	<1.0	<1.0
Titanium	µg/L			<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Uranium	µg/L	1000		1.14	4.14	<0.050	0.321	0.547	1.72	<0.050	0.210	0.438	5.36	<0.050	2.25	2.52	2.52	0.176
Vanadium	µg/L	500		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Zinc	µg/L	100	10	18200	7.0	8.2	11.4	8.5	313	12900	7030	68.9	33700	2630	6410	8.4	7.5	8.4
Calcium	mg/L			269	43.0	24.5	129	18.4	278	258	254	96.0	623	132	604	106		134
Magnesium	mg/L			39.9	12.9	17.3	4.7	1.6	755	69.5	15.3	6.3	75.4	5.8	19.9	8.2		7.2
Potassium	mg/L			48.9	2.6	14.8	1.4	1.1	231	90.8	7.6	4.9	3.5	9.1	3.3	5.9		8.7
Sodium	mg/L			457	630	401	22.8	62.8	6170	946	107	61.8	55.8	21.2	47.9	19.6		10.3
Sulphur	mg/L			335	224	146	54	<20	586	455	207	<20	552	110	492	36		39

Notes:

[1] Nova Scotia Environment (NSE) Pathway Specific Standards (PSS) for Groundwater at a Non-Potable Site - Groundwater Discharge to Surface Water, >10m from Surface Water Body, Coarse Soil Type, Discharge to Marine Water, (July 6, 2013)

[2] Federal Interim Groundwater Quality Guidelines (FIGQGs) Tier 2 Water Use/ Exposure Pathway, Marine Life, Coarse Soil Type, applicable at 10m from Surface Water Body (Version 4, June 2016)

Underlined - Exceeds NSE Tier I EQS

Empty Cell = No Value

Table 6
Groundwater Analytical Results - Metals
Hydrogeological Study and Data Gap Assessment
Brunswick Smelter, Belledune, NB

BV Labs ID		**NSE PSS for Groundwater - >10m to Marine Surface Water Body[1]**	**FIGQGs 10m to Marine Surface Water Body[2]**	KZF830	KZF831	KWV863	KZF832	KZF833	KZF834	KZF835	KWV865	KWV901	KZF836	KZF837	KWV864	KWV931	KWV904	KWV905
Sampling Date				10/2/2019	10/2/2019	9/24/2019	10/3/2019	10/2/2019	10/2/2019	10/2/2019	9/24/2019	9/24/2019	10/2/2019	10/1/2019	9/24/2019	9/24/2019	9/24/2019	9/24/2019
COC Number				112031	112031	D34711	112031	112031	112031	112031	D34711	D34712	112031	112031	D34711	D34715	D34712	D34712
	Units			**05GW54**	**05GW59**	**05GW-64**	**05GW68**	**05GW70**	**05GW71**	**05GW72**	**05GW-75**	**QA/QC-3 Field Dup 05GW-75**	**05GW76**	**05GW77**	**05GW-78**	**08GW-79**	**08GW-82**	**08GW-83**
Calculated Parameters																		
Dissolved Hardness (CaCO3)	mg/L			257	3950	561	201	299	327	216	308	294	325	180	1860	240	1220	381
Inorganics																		
pH	pH			7.42	7.67		7.73	7.69	7.45	7.75			7.61	7.82				
Salinity	N/A			<2.0	21		<2.0	<2.0	<2.0	<2.0			<2.0	<2.0				
Total Suspended Solids	mg/L			140	38		270	350	680	11			220	3200				
Metals (Dissolved)																		
Aluminum	µg/L			59	57	625	57	57	64	59	<10	<10	86	54	<10	<10	<10	<10
Antimony	µg/L	5000		0.71	5.10	54.3	<0.50	2.90	0.68	<0.50	2.49	2.48	2.65	<0.50	0.99	<0.50	8.22	4.60
Arsenic	µg/L	125	125	4.42	40.8	229	1.60	577	148	88.2	6.66	4.28	7.49	1.03	22.5	0.59	5.96	4.25
Barium	µg/L	5000	500	40.9	56.7	37.6	130	220	219	83.1	143	138	162	207	138	53.5	32.3	80.2
Beryllium	µg/L	1000	100	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bismuth	µg/L			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Boron	µg/L	12000	5000	216	2460	485	<50	600	2710	6230	<50	64	117	<50	1930	<50	480	53
Cadmium	µg/L	1.2	0.12	39.3	50.4	1010	1.61	8.84	0.219	0.493	42.4	43.0	0.539	1.11	22.7	0.343	40.2	8.41
Chromium	µg/L	15 (hexavalent)	56 (Total)	3.31	3.21	<0.50	2.71	3.68	3.83	3.42	<0.50	<0.50	2.24	3.20	1.05	1.61	<0.50	<0.50
Cobalt	µg/L			0.47	<0.10	29.4	0.13	1.45	<0.10	<0.10	<0.10	<0.10	0.29	0.10	0.12	<0.10	<0.10	<0.10
Copper	µg/L	20	2	8.33	2.71	23.9	2.86	2.60	0.62	<0.50	0.71	0.60	1.72	1.21	3.54	1.37	4.54	1.68
Iron	µg/L			35.9	9.0	30400	13.2	3680	1160	344	<2.0	<2.0	399	21.4	2.7	<2.0	<2.0	<2.0
Lead	µg/L	20	2	28.9	1.78	596	9.92	12.3	2.97	0.85	12.2	4.24	3.19	4.65	14.3	12.5	22.4	40.5
Lithium	µg/L			<20	102	67	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Manganese	µg/L			605	<0.50	2810	17.6	5010	2360	726	2.01	1.49	71.9	73.4	2830	12.7	16.6	6.03
Mercury	µg/L	0.16	0.016	0.017	0.027	0.062	<0.013	<0.013	<0.013	<0.013	0.017	0.017	<0.013	<0.013	0.030	0.017	0.022	0.015
Molybdenum	µg/L			3.3	7.0	1.7	<1.0	1.4	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.6	<1.0	<1.0	<1.0
Nickel	µg/L	83	83	1.71	1.55	76.5	0.95	2.89	1.57	1.26	0.44	0.26	1.69	0.83	0.44	35.5	2.87	0.58
Phosphorus	µg/L			<50	<50	<50	<50	<50	75	80	<50	<50	<50	98	<50	<50	<50	<50
Selenium	µg/L	20	54	<0.50	1.39	35.8	<0.50	1.88	<0.50	0.53	3.08	7.29	<0.50	<0.50	59.6	<0.50	22.9	2.07
Silicon	µg/L			8100	1190	17200	3390	11200	8930	5840	3190	3250	1830	2450	1860	1900	5900	3580
Silver	µg/L	15	1.5	<0.050	0.903	0.174	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.063	<0.050	<0.050	<0.050
Strontium	µg/L			231	5500	448	113	257	301	195	189	172	180	97	2010	93	742	165
Thallium	µg/L	213		7.74	15.8	299	0.65	3.95	0.16	<0.10	3.26	2.81	0.48	0.29	12.5	<0.10	3.23	2.23
Tin	µg/L			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Titanium	µg/L			<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Uranium	µg/L	1000		0.263	2.04	<0.050	0.191	0.408	0.107	0.106	0.552	0.596	0.294	0.197	1.03	0.135	2.03	0.708
Vanadium	µg/L	500		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Zinc	µg/L	100	10	875	192	5390	19.4	189	9.2	13.6	404	435	19.3	9.3	37.6	8.9	738	59.1
Calcium	mg/L			81.7	284	114	75.3	108	113	77.7	109	104	113	69.8	189	92.3	453	144
Magnesium	mg/L			12.9	787	66.8	3.1	7.3	10.6	5.4	8.6	8.4	10.6	1.5	339	2.4	21.0	5.2
Potassium	mg/L			11.6	234	47.9	4.6	6.5	23.0	36.8	2.2	2.2	<1.0	1.2	122	<1.0	7.1	<1.0
Sodium	mg/L			63.6	6310	534	34.9	74.3	192	175	97.8	78.6	19.4	35.3	3400	8.1	95.6	40.4
Sulphur	mg/L			59	598	222	<20	30	<20	74	33	33	<20	<20	331	40	330	33

Notes:

[1] Nova Scotia Environment (NSE) Pathway Specific Standards (PSS) for Groundwater at a Non-Potable Site - Groundwater Discharge to Surface Water, >10m from Surface Water Body, Coarse Soil Type, Discharge to Marine Water, (July 6, 2013)

[2] Federal Interim Groundwater Quality Guidelines (FIGQGs) Tier 2 Water Use/ Exposure Pathway, Marine Life, Coarse Soil Type, applicable at 10m from Surface Water Body (Version 4, June 2016)

Underlined - Exceeds NSE Tier I EQS

Empty Cell = No Value

Table 6
Groundwater Analytical Results - Metals
Hydrogeological Study and Data Gap Assessment
Brunswick Smelter, Belledune, NB

BV Labs ID		**NSE PSS for Groundwater - >10m to Marine Surface Water Body[1]**	**FIGQGs 10m to Marine Surface Water Body[2]**	KWV906	KWV930	KWN916	KWN916	KWV866	KWN917	KWV907	KWV867	KWV900	KWV902	KZF838	KZF839	KZF840	KZF841	KWV908
Sampling Date				9/24/2019	9/24/2019	9/23/2019	9/23/2019	9/24/2019	9/23/2019	9/24/2019	9/24/2019	9/24/2019	9/24/2019	10/2/2019	10/2/2019	10/1/2019	10/1/2019	9/24/2019
COC Number				D34712	D34715	D34696	D34696	D34711	D34696	D34712	D34711	D34712	D34712	112031	112031	112031	112031	D34712
	Units			**08GW-84**	**08GW-88**	**08GW-95**	**08GW-95 Lab-Dup**	**09GW-99**	**09GW-102**	**09GW-103**	**09GW-106**	**09GW-107**	**QA/QC-4 Field Dup 09GW-107**	**09GW-109**	**09GW-110**	**09GW-111**	**09GW-112**	**19GW-114**
Calculated Parameters																		
Dissolved Hardness (CaCO3)	mg/L			397	861			669		185	1030	230	212	176	185	127	273	910
Inorganics																		
pH	pH					6.94			7.39					7.66	7.47	7.37	6.99	
Salinity	N/A					<2.0			<2.0					<2.0	<2.0	<2.0	<2.0	
Total Suspended Solids	mg/L					170			30					100	150	190	160	
Metals (Dissolved)																		
Aluminum	µg/L			<10	<10	16	15	<10	13	<10	<10	<10	<10	60	54	55	55	<10
Antimony	µg/L	5000		14.5	19.4	14.0	13.8	0.50	<0.50	6.05	273	2.62	1.65	14.6	35.9	0.97	0.71	1.99
Arsenic	µg/L	125	125	6.39	5.29	5.76	5.38	5.59	1.34	3.46	16100	7.75	5.58	7.48	22.8	0.64	4.63	12.7
Barium	µg/L	5000	500	63.9	95.9	30.2	30.1	65.0	77.7	131	162	159	151	167	145	151	171	44.3
Beryllium	µg/L	1000	100	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bismuth	µg/L			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Boron	µg/L	12000	5000	473	85	<50	50	94	<50	<50	10200	173	112	<50	185	<50	60	87
Cadmium	µg/L	1.2	0.12	35.0	46.7	26.7	26.1	7.90	0.284	7.96	85.3	114	108	25.1	104	1.01	0.475	7.95
Chromium	µg/L	15 (hexavalent)	56 (Total)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.53	0.65	0.55	0.82	1.92	2.51	2.65	2.74	0.80
Cobalt	µg/L			0.18	0.40	0.33	0.30	<0.10	<0.10	<0.10	2.67	0.30	<0.10	0.88	0.80	<0.10	0.17	3.07
Copper	µg/L	20	2	9.45	4.60	11.7	11.9	<0.50	0.97	2.35	232	3.54	1.52	14.0	66.1	2.29	2.18	2.44
Iron	µg/L			<2.0	3.0	8.9	8.6	20.1	<2.0	<2.0	<2.0	<2.0	<2.0	8.2	64.6	9.6	170	1360
Lead	µg/L	20	2	102	16.3	115	114	1.60	13.9	34.2	74.4	67.2	35.5	153	113	12.2	8.02	1.66
Lithium	µg/L			243	<20	<20	<20	<20	<20	<20	25	<20	<20	<20	<20	<20	<20	<20
Manganese	µg/L			126	124	418	413	10.4	0.66	5.03	360	1.96	1.17	944	280	1.68	88.3	17700
Mercury	µg/L	0.16	0.016	0.017		<0.013	<0.013	0.018	<0.013	0.020	1.900	0.017	0.018	<0.013	<0.013	<0.013	<0.013	0.023
Molybdenum	µg/L			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	145	<1.0	<1.0	<1.0	1.8	<1.0	<1.0	1.8
Nickel	µg/L	83	83	0.68	4.20	4.69	5.30	<0.20	<0.20	<0.20	4.18	0.65	<0.20	1.84	2.02	1.12	1.08	15.2
Phosphorus	µg/L			<50	<50	268	290	<50	<50	<50	156	<50	<50	<50	<50	<50	<50	2890
Selenium	µg/L	20	54	1.61	7.43	15.0	14.4	1.30	1.71	1.16	3520	12.4	4.31	1.77	8.39	0.65	<0.50	1.99
Silicon	µg/L			3400	6400	6680	6690	4130	3630	2380	5140	3190	3020	3720	5690	2970	2880	12900
Silver	µg/L	15	1.5	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	9.26	0.069	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Strontium	µg/L			2620	422	190	187	305	121	161	1850	157	151	111	106	95	182	413
Thallium	µg/L	213		12.1	1.10	20.8	20.9	2.57	<0.10	1.93	244	19.3	13.5	10.5	15.2	0.23	7.19	5.27
Tin	µg/L			<1.0	<1.0	<1.0	<1.0	1.4	1.6	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2.0
Titanium	µg/L			<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Uranium	µg/L	1000		0.811	0.792	0.091	0.080	1.39	0.120	0.394	1.17	0.270	0.288	0.631	0.190	0.321	0.189	1.10
Vanadium	µg/L	500		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Zinc	µg/L	100	10	216	6800	814	828	9.7	6.7	36.7	117	91.6	71.7	55.1	2560	31.6	42.4	92.4
Calcium	mg/L			150	315	135		251	71.1	48.2	187	86.2	79.1	65.6	69.7	47.1	103	279
Magnesium	mg/L			5.1	18.1	15.7		10.2	4.6	15.8	135	3.6	3.5	2.8	2.7	2.2	3.8	52.0
Potassium	mg/L			8.1	3.2	5.4		2.5	<1.0	9.7	411	<1.0	<1.0	4.0	3.1	1.1	1.3	14.9
Sodium	mg/L			36.1	98.8	145	139	39.9	11.8	56.9	6740	35.3	30.7	125	84.9	17.2	8.8	47.6
Sulphur	mg/L			36	205	93		162	46	34	1560	38	30	<20	34	<20	42	269

Notes:

[1] Nova Scotia Environment (NSE) Pathway Specific Standards (PSS) for Groundwater at a Non-Potable Site - Groundwater Discharge to Surface Water, >10m from Surface Water Body, Coarse Soil Type, Discharge to Marine Water, (July 6, 2013)

[2] Federal Interim Groundwater Quality Guidelines (FIGQGs) Tier 2 Water Use/ Exposure Pathway, Marine Life, Coarse Soil Type, applicable at 10m from Surface Water Body (Version 4, June 2016)

Underlined - Exceeds NSE Tier I EQS

Empty Cell = No Value

Table 6
Groundwater Analytical Results - Metals
Hydrogeological Study and Data Gap Assessment
Brunswick Smelter, Belledune, NB

BV Labs ID		NSE PSS for Groundwater - >10m to Marine Surface Water Body[1]	FIGQGs 10m to Marine Surface Water Body[2]	KWV933	KWV929	KWV909	KWN918	KWN922	KWV928	KWV928	KWN919	KWN920	KWV932	KWN921	KZF842	KZF843	KZF854	KZF844
Sampling Date				9/24/2019	9/24/2019	9/24/2019	9/23/2019	9/23/2019	9/24/2019	9/24/2019	9/23/2019	9/23/2019	9/24/2019	9/23/2019	10/2/2019	10/2/2019	10/3/2019	10/2/2019
COC Number				D34715	D34715	D34712	D34696	D34696	D34715	D34715	D34696	D34696	D34715	D34696	112031	112031	112031	112031
	Units			**19GW-116**	**QA/QC-2 Field Dup 19GW-116**	**19GW-117**	**19GW-118**	**QA/QC-1 Field Dup 19GW-118**	**19GW-119**	**19GW-119 Lab-Dup**	**19GW-120**	**19GW-122**	**19GW-123**	**19GW-124**	**19GW-125**	**19GW-126**	**QA/QC-5 Field Dup 19GW-126**	**19GW-127**
Calculated Parameters																		
Dissolved Hardness (CaCO3)	mg/L			1530	1540	122			410				347		377	347	345	630
Inorganics																		
pH	pH						6.91	6.95			5.75	7.00		7.52	7.66	7.55	7.54	8.49
Salinity	N/A						<2.0	<2.0			2.9	<2.0		<2.0	<2.0	<2.0	<2.0	2.3
Total Suspended Solids	mg/L						11	12			240	310		2100	460	610	430	2200
Metals (Dissolved)																		
Aluminum	µg/L			387	388	37	<10	<10	<10	<10	89	<10	14	<10	53	57	63	73
Antimony	µg/L	5000		21.9	21.6	3.17	40.1	34.9	10.5	10.6	2.29	17.6	1.80	11.2	20.9	0.96	0.95	950
Arsenic	µg/L	125	125	90.1	90.1	4.35	28.5	28.1	3.08	3.29	66.0	3.30	1.38	8.77	26.8	7.10	8.40	338
Barium	µg/L	5000	500	42.8	43.4	33.6	2.2	2.7	98.0	99.1	3.8	5.8	72.9	45.2	113	83.4	84.7	46.0
Beryllium	µg/L	1000	100	1.8	1.8	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bismuth	µg/L			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Boron	µg/L	12000	5000	125	127	<50	129	133	<50	<50	225	<50	<50	185	703	295	359	1860
Cadmium	µg/L	1.2	0.12	70.9	71.3	6.36	156	121	77.0	78.9	108	0.850	1.88	0.984	1550	0.160	0.218	29.0
Chromium	µg/L	15 (hexavalent)	56 (Total)	2.05	2.90	<0.50	0.73	0.73	<0.50	<0.50	<0.50	<0.50	0.62	<0.50	2.17	3.18	2.85	3.29
Cobalt	µg/L			198	199	0.46	2.63	2.81	0.23	0.29	368	3.49	1.41	<0.10	22.3	0.53	0.59	0.34
Copper	µg/L	20	2	1.05	3.40	4.61	3.57	4.25	16.9	16.9	30.2	<0.50	5.00	2.48	7.94	<0.50	0.53	11.4
Iron	µg/L			90000	89700	<2.0	<2.0	<2.0	<2.0	<2.0	5.2	89.2	3.2	<2.0	118	3090	3090	10.1
Lead	µg/L	20	2	6.22	7.01	26.1	8.35	7.20	76.4	70.9	4.35	0.41	7.03	7.33	237	0.31	1.45	78.0
Lithium	µg/L			176	179	<20	<20	<20	<20	<20	382	<20	<20	<20	<20	<20	<20	<20
Manganese	µg/L			57200	57500	152	2940	2980	116	120	47600	2610	175	165	272	3040	3070	327
Mercury	µg/L	0.16	0.016	0.027	0.025	0.015	<0.013	<0.013	0.017	0.017	0.190	<0.013	0.018	<0.013	<0.013	<0.013	<0.013	<0.013
Molybdenum	µg/L			14.4	14.9	3.8	<1.0	<1.0	<1.0	<1.0	4.3	2.2	1.7	3.1	8.3	<1.0	<1.0	19.5
Nickel	µg/L	83	83	320	315	3.42	34.8	33.7	7.28	7.51	1210	9.21	6.49	1.35	58.0	1.14	1.49	1.44
Phosphorus	µg/L			34400	35800	<50	18500	19800	70	77	184000	<50	<50	1550	<50	<50	<50	<50
Selenium	µg/L	20	54	7.83	7.68	0.56	16.3	16.3	1.59	1.65	12.5	<0.50	0.94	6.52	3.02	<0.50	<0.50	168
Silicon	µg/L			116000	114000	3140	8250	8160	4970	4880	57400	8410	3770	4580	4290	3140	3180	2690
Silver	µg/L	15	1.5	0.054	0.080	<0.050	<0.050	<0.050	<0.050	<0.050	0.209	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Strontium	µg/L			1270	1280	143	185	181	253	253	69	277	231	134	410	352	360	770
Thallium	µg/L	213		7.32	7.43	1.75	1.61	1.29	0.68	0.71	0.37	0.11	0.22	0.38	1130	1.81	1.48	328
Tin	µg/L			1.9	<1.0	2.2	2.4	<1.0	<1.0	<1.0	<1.0	1.3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Titanium	µg/L			<10	<10	<10	<10	<10	<10	<10	14	<10	<10	<10	<10	<10	<10	<10
Uranium	µg/L	1000		0.402	1.22	0.687	<0.050	<0.050	0.694	0.737	<0.050	0.089	0.972	0.764	0.131	0.064	0.068	0.255
Vanadium	µg/L	500		<10	<10	<10	15	16	<10	<10	21	<10	<10	<10	<10	<10	<10	<10
Zinc	µg/L	100	10	54100	55000	80.3	4120	3730	8980	9110	14100	539	28.0	21.0	6420	24.2	26.1	34.0
Calcium	mg/L			380	382	42.0	160	161	152		447	248	115	87.1	94.9	89.0	88.6	161
Magnesium	mg/L			140	142	4.2	13.3	13.1	7.1		193	22.3	14.5	6.5	34.0	30.2	30.0	55.1
Potassium	mg/L			3500	3510	3.0	3.4	3.5	5.9		3.2	2.8	4.5	3.6	26.5	16.9	17.0	110
Sodium	mg/L			525	509	15.1	102	101	21.7		231	79.9	71.7	246	284	134	133	628
Sulphur	mg/L			2250	2260	<20	134	132	92		344	188	39	80	99	54	53	479

Notes:

[1] Nova Scotia Environment (NSE) Pathway Specific Standards (PSS) for Groundwater at a Non-Potable Site - Groundwater Discharge to Surface Water, >10m from Surface Water Body, Coarse Soil Type, Discharge to Marine Water, (July 6, 2013)

[2] Federal Interim Groundwater Quality Guidelines (FIGQGs) Tier 2 Water Use/ Exposure Pathway, Marine Life, Coarse Soil Type, applicable at 10m from Surface Water Body (Version 4, June 2016)

Underlined - Exceeds NSE Tier I EQS

Empty Cell = No Value

Table 6
Groundwater Analytical Results - Metals
Hydrogeological Study and Data Gap Assessment
Brunswick Smelter, Belledune, NB

BV Labs ID		NSE PSS for Groundwater - >10m to Marine Surface Water Body[1]	FIGQGs 10m to Marine Surface Water Body[2]	KZF845	KZF857	KZF846	KZF847	KZF856	KZF847	KZF848	KZF849	KZF855	KZF850	KZF851	KZF858	KZF852	KZF853
Sampling Date				10/2/2019	10/3/2019	10/2/2019	10/2/2019	10/3/2019	10/2/2019	10/2/2019	10/2/2019	10/3/2019	10/2/2019	10/2/2019	10/3/2019	10/2/2019	10/2/2019
COC Number				112031	112031	112031	112031	112031	112031	112031	112031	112031	112031	112031	112031	112031	112031
	Units			**19GW-128**	**QA/QC-8 Field Dup 19GW-128**	**19GW-129**	**19GW-130**	**QA/QC-7 Field Dup 19GW-130**	**19GW-130 Lab-Dup**	**19GW-131**	**19GW-132**	**QA/QC-6 Field Dup 19GW-132**	**19GW-133**	**19GW-134**	**QA/QC-9 Field Dup 19GW-134**	**MW-1**	**MW-3**
Calculated Parameters																	
Dissolved Hardness (CaCO3)	mg/L			350	346	2750	1440	1440		921	997	988	915	1040	1030	196	197
Inorganics																	
pH	pH			7.89	7.80	7.07	7.48	7.50	7.44	6.85	7.32	7.31	7.06	7.21		7.66	7.47
Salinity	N/A			<2.0	2.0	11	5.7	6.2		2.4	3.5	3.4	2.0	2.6		<2.0	<2.0
Total Suspended Solids	mg/L			9.6	28	490	14	7.6		2300	20	26	130	37		310	190
Metals (Dissolved)																	
Aluminum	µg/L			75	84	57	62	59	61	70	59	57	112	108	118	27	65
Antimony	µg/L	5000		34.2	34.9	4.46	9.04	9.13	9.03	4.11	7.91	7.49	25.7	9.78	9.38	<0.50	<0.50
Arsenic	µg/L	125	125	770	771	3940	1070	1080	1070	6300	1530	1530	176	99.2	96.7	406	280
Barium	µg/L	5000	500	50.6	50.6	40.6	79.6	79.0	79.2	42.8	109	110	54.5	52.7	52.1	120	88.1
Beryllium	µg/L	1000	100	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bismuth	µg/L			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Boron	µg/L	12000	5000	861	865	2670	1090	1090	1100	1720	2040	1990	1060	4030	4050	3170	5370
Cadmium	µg/L	1.2	0.12	60.2	60.1	560	54.3	54.5	54.9	4790	2770	2770	15000	6050	6020	0.085	0.872
Chromium	µg/L	15 (hexavalent)	56 (Total)	3.05	3.76	3.04	2.93	2.05	3.21	3.71	2.52	2.33	4.81	2.88	3.83	1.44	3.32
Cobalt	µg/L			0.34	0.45	17.7	5.77	6.05	5.96	51.5	34.7	35.9	1050	53.0	53.5	<0.10	0.14
Copper	µg/L	20	2	6.92	8.24	0.66	1.16	1.26	1.07	6.37	3.51	3.27	2820	114	115	<0.50	3.19
Iron	µg/L			15.5	20.1	19800	210	210	207	31800	266	276	31.1	685	664	226	1590
Lead	µg/L	20	2	129	134	29.6	5.41	6.63	5.34	6.59	3.81	2.42	486	51.1	50.9	3.46	8.12
Lithium	µg/L			<20	<20	<20	<20	<20	<20	70	70	67	<20	72	73	<20	<20
Manganese	µg/L			596	584	11100	5900	6030	5930	9560	7260	7370	17500	10300	10400	1610	820
Mercury	µg/L	0.16	0.016	<0.013	<0.013	<0.013	<0.013	<0.013		<0.013	<0.013	<0.013	0.027	0.480	<0.013	<0.013	<0.013
Molybdenum	µg/L			9.7	9.9	34.6	29.6	30.1	30.2	21.7	12.9	12.9	10.7	15.1	15.8	<1.0	1.1
Nickel	µg/L	83	83	2.19	2.36	14.0	11.2	10.8	11.1	49.3	31.5	30.4	1070	89.7	81.2	<0.20	1.55
Phosphorus	µg/L			<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	89	334	68	<50
Selenium	µg/L	20	54	26.2	25.9	6.54	6.15	6.21	6.13	2.32	4.08	4.04	213	17.9	16.4	<0.50	<0.50
Silicon	µg/L			2720	2710	5680	3690	3690	3500	11800	7920	8040	9530	5930	6070	4650	6520
Silver	µg/L	15	1.5	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.104	0.154	0.096	<0.050	<0.050
Strontium	µg/L			436	441	2570	2240	2240	2240	803	1440	1450	730	1130	1130	214	183
Thallium	µg/L	213		70.1	70.1	1540	97.6	97.4	97.9	3500	1500	1490	6250	14100	13800	0.16	0.61
Tin	µg/L			2.8	3.1	<1.0	2.8	2.6	2.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Titanium	µg/L			<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Uranium	µg/L	1000		0.118	0.121	1.75	3.76	3.84	3.85	0.226	1.03	0.981	0.374	0.251	0.171	<0.050	0.292
Vanadium	µg/L	500		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Zinc	µg/L	100	10	63.1	64.3	2780	559	570	565	15200	10200	10300	14900	7610	7610	6.8	12.3
Calcium	mg/L			43.8	44.5	604	331	327		227	208	206	311	281	276	67.4	69.3
Magnesium	mg/L			58.4	57.1	303	149	151		86.3	116	115	33.4	82.0	82.9	6.8	5.8
Potassium	mg/L			31.0	31.1	160	57.0	56.7		120	99.5	101	47.8	110	111	51.6	41.7
Sodium	mg/L			551	538	2710	1420	1410		576	922	902	389	806	829	161	188
Sulphur	mg/L			77	72	926	447	448		429	501	497	524	585	598	69	64

Notes:

[1] Nova Scotia Environment (NSE) Pathway Specific Standards (PSS) for Groundwater at a Non-Potable Site - Groundwater Discharge to Surface Water, >10m from Surface Water Body, Coarse Soil Type, Discharge to Marine Water, (July 6, 2013)

[2] Federal Interim Groundwater Quality Guidelines (FIGQGs) Tier 2 Water Use/ Exposure Pathway, Marine Life, Coarse Soil Type, applicable at 10m from Surface Water Body (Version 4, June 2016)

Underlined - Exceeds NSE Tier I EQS

Empty Cell = No Value

Table 7
Groundwater Analytical Results - Petroleum Hydrocarbons
Hydrogeological Study and Data Gap Assessment
Brunswick Smelter, Belledune, NB

Petroleum Hydrocarbons		Benzene	Toluene	Ethylbenzene	Total Xylenes	F1	F2	F3		Modified TPH	Hydrocarbon Resemblance
						C_6 - C_{10} (less BTEX)	$>C_{10}$-C_{16}	$>C_{16}$-C_{21}	$>C_{21}$-$<C_{32}$		
Atlantic RBCA Tier I RBSLs - Industrial, Non-Potable, Coarse Grained [1]		20	20	20	20	NG	NG	NG	NG	20	Gasoline
										20	Diesel/No. 2 Fuel Oil
										20	No. 6 Oil/Lube Oil
Atlantic RBCA Tier 1 ESLs - Protection of Marine Aquatic Life ->200m to Surface Water [2]		150	140	100	91	NG	NG	NG	NG	>SOL	Gas
										>SOL	Diesel/#2
										>SOL	#6 Oil/Lube
Sample ID	**Sample Date**										
09GW-107	9/24/2019	<0.0010	<0.0010	<0.0010	<0.0020	<0.10	<0.050	<0.050	<0.10	<0.10	
09GW-107 Lab Dup	9/24/2019	<0.0010	<0.0010	<0.0010	<0.0020	<0.10	-	-	-	-	
QA/QC-4		<0.0010	<0.0010	<0.0010	<0.0020	<0.10	<0.050	<0.050	<0.10	<0.10	
GW-24	10/3/2019	<0.0010	<0.0010	<0.0010	<0.0020	<0.10	0.36	0.1	<0.10	0.46	One product in the fuel oil range.
GW-27	10/3/2019	<0.0010	<0.0010	<0.0010	<0.0020	<0.10	<0.050	<0.050	<0.10	<0.10	
05GW-71	10/2/2019	<0.0010	<0.0010	<0.0010	<0.0020	<0.10	0.9	0.89	0.36	2.2	Weathered fuel oil fraction.
05GW-72	10/2/2019	<0.0010	<0.0010	<0.0010	<0.0020	<0.10	0.62	0.38	0.17	1.2	One product in the fuel oil range.
MW-1	10/2/2019	<0.0010	<0.0010	<0.0010	<0.0020	<0.10	0.57	0.49	0.22	1.3	One product in the fuel oil range.
MW-3	10/2/2019	<0.0010	<0.0010	<0.0010	<0.0020	<0.10	0.6	0.7	0.36	1.7	One product in the fuel oil range.

Notes:

[1] Atlantic Risk-Based Corrective Action (RBCA) Tier I Risk-Based Screening Levels (RBSLs) for Groundwater - Commercial Land Use, Non-Potable Groundwater Use, Coarse-Grained Soil Type (July 2012, revised January 2015)

[2] Atlantic Risk-Based Corrective Action (RBCA) Tier 1 Groundwater Ecological Screening Levels (ESLs) for Protection of Marine Aquatic Life - Distance to Surface Water <200 metres (July 2012, revised January 2015)

"-" - Not Applicable/Not Analyzed

Results for all parameters are reports in milligrams per liter (mg/L)

NG - No Guideline

BOLD/UNDERLINE - Exceeds Industrial criteria

SOL - is the groundwater concentration representing the solubility limit for the compound

Table 8
Groundwater Analytical Results - Polycyclic Aromatic Hydrocarbons
Hydrogeological Study and Data Gap Assessment
Brunswick Smelter, Belledune, NB

PAHs	Units	FIGQGs Tier 2 Commercial and Industrial land Uses [1]	NSE PSS - Non-Potable, Coarse, Industrial, Vapour Migration Pathway [2]	FIGQGs Tier 2 Marine Life Guidelines- Discharge to Surface Water, 10m from Marine Surface Water Body[3]	NSE PSS - Discharge to Surface Water - >10 m from Marine Surface Water Body[4]	Sample ID	19GW-114	08GW-88
						Sample Date	9/24/2019	9/24/2019
1-Methylnaphthalene	µg/L	38000	38,000	NG	10		<0.050	<0.050
2-Methylnaphthalene	µg/L	38000	38,000	NG	20		<0.050	<0.050
Acenaphthene	µg/L	NG	NG	NG	60		<0.010	<0.010
Acenaphthylene	µg/L	NG	750	NG	60		<0.010	<0.010
Anthracene	µg/L	NG	NG	NG	NG		<0.010	<0.010
Benzo(a)anthracene	µg/L	NG	NG	NG	NG		<0.010	<0.010
Benzo(a)pyrene	µg/L	NG	NG	NG	0.1		<0.010	<0.010
Benzo(b)fluoranthene	µg/L	NG	NG	NG	NG		<0.010	<0.010
Benzo(b/j)fluoranthene	µg/L	NG	NG	NG	NG		<0.010	<0.010
Benzo(g,h,i)perylene	µg/L	NG	NG	NG	NG		<0.010	<0.010
Benzo(j)fluoranthene	µg/L	NG	NG	NG	NG		<0.010	<0.010
Benzo(k)fluoranthene	µg/L	NG	NG	NG	NG		<0.010	<0.010
Chrysene	µg/L	NG	NG	NG	1		<0.010	<0.010
Dibenz(a,h)anthracene	µg/L	NG	NG	NG	NG		<0.010	<0.010
Fluoranthene	µg/L	NG	NG	NG	110		0.017	<0.010
Fluorene	µg/L	NG	NG	NG	120		<0.010	<0.010
Indeno(1,2,3-cd)pyrene	µg/L	NG	NG	NG	NG		<0.010	<0.010
Naphthalene	µg/L	7000	7,000	1.40	14		<0.20	<0.20
Perylene	µg/L	NG	NG	NG	NG		<0.010	<0.010
Phenanthrene	µg/L	NG	NG	NG	46		0.022	<0.010
Pyrene	µg/L	NG	NG	NG	0.2		0.017	<0.010

Notes:

[1]Federal Interim Groundwater Quality Guidelines (FIGQGs) for Commercial and Industrial Land Uses, Tier 2 Water Use/ Exposure Pathway – Inhalation (human health), coarse-grained soil.

[2] Nova Scotia Environment (NSE) Pathway Specific Standards (PSS) for Groundwater - Non-Potable Groundwater, Coarse-Grained Soil, Industrial Land Use, Vapour Migation Pathway (July 6, 2013)

[3]FIGQG Tier 2 – Marine Life guidelines are used for screening purposes where groundwater at 10 metres or greater from a receiving water body is potentially discharging to the water body, in order to evaluate potential effects to nearby marine aquatic life.

[4] Nova Scotia Environment (NSE) Pathway Specific Standards (PSS) for Groundwater - Groundwater Discharging to Surface Water, >10 metres from Surface Water Body, Discharge to Marine Water (July 6, 2013)
Lab Dup - Laboratory Duplicate

NA - Not Analyzed

NG - No Guideline

UNDERLINE - Exceeds Industrial criteria

Table 9
Groundwater Analytical Results - Polychlorinated Biphenyls
Hydrogeological Study and Data Gap Assessment
Brunswick Smelter, Belledune, NB

PCBs	Units	NSE PSS -Non-Potable, Vapour Migration Pathway, Coarse, Industrial[1]	NSE PS for Groundwater, >10m to Surface Water Body, Marine [2]	Sample ID	05GW-75	QA/QC-3 Field Dup of 05GW-75	09GW-103	GW-30A	GW-32
				Sample Date	9/24/2019	9/24/2019	9/24/2019	10/2/2019	10/2/2019
Aroclor 1016	µg/g	NG	NG		<0.050	<0.050	<0.050	<0.050	<0.050
Aroclor 1221	µg/g	NG	NG		<0.050	<0.050	<0.050	<0.050	<0.050
Aroclor 1232	µg/g	NG	NG		<0.050	<0.050	<0.050	<0.050	<0.050
Aroclor 1248	µg/g	NG	NG		<0.050	<0.050	<0.050	<0.050	<0.050
Aroclor 1242	µg/g	NG	NG		<0.050	<0.050	<0.050	<0.050	<0.050
Aroclor 1254	µg/g	NG	NG		<0.050	<0.050	<0.050	<0.050	<0.050
Aroclor 1260	µg/g	NG	NG		<0.050	<0.050	<0.050	<0.050	<0.050
Calculated Total PCB	µg/g	180	NG		<0.050	<0.050	<0.050	<0.050	<0.050

Notes:

[1] Nova Scotia Environment (NSE) Pathway Specific Standards (PSS) for Groundwater - Vapour Migration Pathway, Industrial Land Use, Coarse Soil Type (April 2014)

[2] Nova Scotia Environment (NSE) Pathway Specific Standards (PSS) for Groundwater - Groundwater Discharging to Surface Water, >10 metres from Surface Water Body, Discharge to Marine Water (April 2014)

Lab Dup - Laboratory Duplicate

PCB - Polychlorinated Biphenyls

NG - No Guideline

BOLD/UNDERLINE - Exceeds Industrial criteria

Table 10
Sediment Analytical Results - Metals
Hydrogeological Study and Data Gap Assessment
Brunswick Smelter, Belledune, NB

Metals	UNITS	CCME Sediment Quality Guidelines for the Protection of Aquatic Life [1]		NSE[2]	Sample ID	19SED-1	19SED-QA/QC Field Dup of 19SED-1	19SED-2	19SED-3	19SED-4	19SED-5	19SED-6	19SED-7	19SED-8	19SED-9
		Marine ISQG	Marine PEL		Sample Date	9/26/2019	9/26/2019	9/26/2019	9/26/2019	9/26/2019	9/26/2019	9/26/2019	9/26/2019	9/26/2019	9/26/2019
Acid Extractable Aluminum (Al)	mg/kg	NG	NG			14000	14000	15000	15000	18000	10000	16000	14000	13000	12000
Acid Extractable Antimony (Sb)	mg/kg	NG	NG			54	56	64	70	100	83	79	130	150	130
Acid Extractable Arsenic (As)	mg/kg	7.24	41.6	41.6		**210**	**210**	**350**	**510**	**640**	**1200**	**700**	**1200**	**2000**	**2400**
Acid Extractable Barium (Ba)	mg/kg	NG	NG			49	52	83	210	180	260	220	190	240	550
Acid Extractable Beryllium (Be)	mg/kg	NG	NG			<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Acid Extractable Bismuth (Bi)	mg/kg	NG	NG			29	26	22	25	35	29	39	28	49	56
Acid Extractable Boron (B)	mg/kg	NG	NG			<50	<50	57	52	72	63	52	100	140	130
Acid Extractable Cadmium (Cd)	mg/kg	0.7	4.2	4.2		**230**	**130**	**270**	**240**	**750**	**130**	**150**	**280**	**300**	**430**
Acid Extractable Chromium (Cr)	mg/kg	52.3	160			52	**53**	**59**	**120**	**80**	**56**	**80**	**63**	**71**	**95**
Acid Extractable Cobalt (Co)	mg/kg	NG	NG			34	37	50	110	100	180	100	140	180	260
Acid Extractable Copper (Cu)	mg/kg	18.7	108	108		**590**	**610**	**1200**	**2200**	**2300**	**2900**	**2000**	**2500**	**3600**	**4100**
Acid Extractable Iron (Fe)	mg/kg	NG	NG			47000	50000	76000	170000	150000	210000	170000	160000	200000	240000
Acid Extractable Lead (Pb)	mg/kg	30.2	112	112		**6600**	**7200**	**8500**	**12000**	**17000**	**19000**	**12000**	**24000**	**41000**	**41000**
Acid Extractable Lithium (Li)	mg/kg	NG	NG			22	21	23	19	22	9.1	20	16	11	11
Acid Extractable Manganese (Mn)	mg/kg	NG	NG			540	600	480	820	800	1500	1000	1100	1200	1100
Acid Extractable Mercury (Hg)	mg/kg	0.13	0.7	0.7		**0.73**	**0.57**	**0.96**	**0.77**	**1.2**	**0.59**	**0.62**	**1.3**	**2.5**	**3.6**
Acid Extractable Molybdenum (Mo)	mg/kg	NG	NG			7.8	6.3	11	10	12	23	11	13	12	24
Acid Extractable Nickel (Ni)	mg/kg	NG	NG			40	43	44	29	37	9.7	30	26	20	17
Acid Extractable Rubidium (Rb)	mg/kg	NG	NG			6.3	6.2	8.3	7.7	8.7	6.5	7.9	6.6	4.7	5.4
Acid Extractable Selenium (Se)	mg/kg	NG	NG			4.7	4.0	5.7	4.6	9.1	9.2	5.1	14	17	36
Acid Extractable Silver (Ag)	mg/kg	NG	NG	2.2		15	13	18	21	30	28	17	22	39	34
Acid Extractable Strontium (Sr)	mg/kg	NG	NG			58	54	88	160	130	100	120	150	140	190
Acid Extractable Thallium (Tl)	mg/kg	NG	NG			270	170	290	110	620	140	82	98	110	19
Acid Extractable Tin (Sn)	mg/kg	NG	NG			66	67	100	180	220	520	210	480	670	900
Acid Extractable Uranium (U)	mg/kg	NG	NG			1.1	0.86	1.6	1.7	2.2	2.2	1.8	3.5	4.6	4.1
Acid Extractable Vanadium (V)	mg/kg	NG	NG			54	53	58	51	62	30	55	49	44	40
Acid Extractable Zinc (Zn)	mg/kg	124	271	271		**10000**	**11000**	**19000**	**56000**	**50000**	**92000**	**50000**	**67000**	**99000**	**98000**

Notes:

[1] Canadian Council of Ministers of the Environment Sediment Quality Guideline for the Protection of Marine Aquatic Life, Interim Sediment Quality Guidelines (ISQGs) and Probable Effect Levels (PELs)

[2] Nova Scotia Environment (NSE) Ecological Health Based Standards for Sediments- Marine Aquatic Life

"-" - Not Applicable/Not Analyzed

Lab Dup - Laboratory Duplicate

NG - No Guideline

BOLD/UNDERLINE - Exceeds CCME Marine ISQGs

SHADING - Exceeds the CCME PELs

Table 11
Surface Water - Monitoring Data
Hydrogeological Study and Data Gap Assessment
Brunswick Smelter, Belledune, NB

Surface Water	Date	Northing	Easting	Turbidity	pH	Conductivity (mS/cm)	Temperature °C	DO (mg/L)	Total Dissolved Solids mg/L
19SW-1	26-Sep-19	7656163.646	2549419.46	3.15	7.86	37.3	19.17	3.15	---
19SW-2	26-Sep-19	7656292.167	2549675.18	62.1	7.87	35	24.66	3.88	---
19SW-3	26-Sep-19	7656273.646	2549932.885	5.00	8.01	34.8	13.66	7.71	---
19SW-4	26-Sep-19	7656136.592	2549992.681	6.6	8.13	33.5	12.78	3.12	20.4
19SW-5	26-Sep-19	7656124.95	2550123.914	7.6	8.13	33.9	12.7	---	---

Table 12
Surface Water Analytical Results - Metals
Hydrogeological Study and Data Gap Assessment
Brunswick Smelter, Belledune, NB

Metals	UNITS	CCME Water Quality Guidelines for the Protection of Aquatic Life - Marine[1]	NSE EQS - Marine Water[2]	19SW-1	19SW-1 Lab Dup	19SW-2	19SW-QA/QC Field Dup of 19SW-2	19SW-QA/QC Lab-Dup	19SW-3	19SW-4	19SW-5
				9/26/2019	9/26/2019	9/26/2019	9/26/2019	9/26/2019	9/26/2019	9/26/2019	9/26/2019
Dissolved Aluminum (Al)	ug/L	NG	NG	<10	-	<10	<10	-	<10	<10	<10
Total Aluminum (Al)	ug/L	NG	NG	15	-	121	33	29	13	37	15
Dissolved Antimony (Sb)	ug/L	NG	500	3.93	-	4.07	3.98	-	5.76	5.94	5.92
Total Antimony (Sb)	ug/L	NG	500	4.12	-	5.95	4.36	4.40	5.76	6.37	6.33
Dissolved Arsenic (As)	ug/L	12.5	12.5	**14.2**	-	**14.3**	**14.8**	-	**16.0**	**16.5**	**14.8**
Total Arsenic (As)	ug/L	12.5	12.5	**16.7**	-	**29.6**	**18.3**	**18.7**	**19.8**	**26.3**	**22.8**
Dissolved Barium (Ba)	ug/L	NG	500	35.2	-	35.0	35.0	-	55.2	60.0	58.5
Total Barium (Ba)	ug/L	NG	NG	35.3	-	43.8	37.3	36.9	53.2	61.9	59.4
Dissolved Beryllium (Be)	ug/L	NG	100	<1.0	-	<1.0	<1.0	-	<1.0	<1.0	<1.0
Total Beryllium (Be)	ug/L	NG	100	<1.0	-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Dissolved Bismuth (Bi)	ug/L	NG	NG	<1.0	-	<1.0	<1.0	-	<1.0	<1.0	<1.0
Total Bismuth (Bi)	ug/L	NG	NG	<1.0	-	1.1	<1.0	<1.0	<1.0	<1.0	<1.0
Dissolved Boron (B)	ug/L	NG	1200	**2850**	-	**2790**	**2850**	-	**2690**	**2660**	**2670**
Total Boron (B)	ug/L	NG	1200	**3070**	-	**2950**	**2780**	**2830**	**2830**	**2740**	**2750**
Dissolved Cadmium (Cd)	ug/L	NG	1.2	**34.2**	-	**35.4**	**35.9**	-	**127**	**200**	**170**
Total Cadmium (Cd)	ug/L	0.12	1.2	**36.7**	-	**39.9**	**36.8**	**37.3**	**115**	**208**	**169**
Dissolved Chromium (Cr)	ug/L	NG	1.5	0.82	-	0.53	<0.50	-	<0.50	0.98	1.06
Total Chromium (Cr)	ug/L	NG	1.5	0.74	-	1.16	0.80	0.65	0.90	0.67	1.25
Dissolved Cobalt (Co)	ug/L	NG	NG	<0.10	-	<0.10	<0.10	-	0.83	1.43	1.14
Total Cobalt (Co)	ug/L	NG	NG	<0.10	-	0.28	0.15	0.12	0.83	1.62	1.16
Dissolved Copper (Cu)	ug/L	NG	2	**3.11**	-	**3.54**	**3.77**	-	**8.17**	**6.25**	**4.42**
Total Copper (Cu)	ug/L	NG	2	**5.55**	-	**19.5**	**8.32**	**8.24**	**10.7**	**12.1**	**10.8**
Dissolved Iron (Fe)	ug/L	NG	NG	18.9	-	4.0	8.1	-	34.0	45.9	19.8
Total Iron (Fe)	ug/L	NG	NG	50.7	-	443	118	111	112	272	188
Dissolved Lead (Pb)	ug/L	NG	2	**18.2**	-	**25.1**	**53.1**	-	**53.7**	**34.4**	**34.5**
Total Lead (Pb)	ug/L	NG	2	**35.5**	-	**243**	**72.8**	**71.3**	**94.3**	**99.8**	**92.7**
Dissolved Lithium (Li)	ug/L	NG	NG	114	-	110	113	-	108	105	108
Total Lithium (Li)	ug/L	NG	NG	126	-	121	110	112	116	113	113
Dissolved Manganese (Mn)	ug/L	NG	NG	8.42	-	13.1	12.0	-	127	322	189
Total Manganese (Mn)	ug/L	NG	NG	8.90	-	17.9	12.1	11.4	109	334	177
Dissolved Mercury (Hg)	ug/L	0.016	0.016	0.015	-	<0.013	0.013	-	**0.018**	<0.013	<0.013
Total Mercury (Hg)	ug/L	0.016	0.016	**0.025**	**0.022**	**0.047**	**0.030**	-	**0.020**	**0.022**	**0.020**
Dissolved Molybdenum (Mo)	ug/L	NG	NG	7.4	-	6.9	6.9	-	9.2	9.3	9.2
Total Molybdenum (Mo)	ug/L	NG	NG	7.4	-	7.1	7.2	6.9	9.2	9.4	9.4
Dissolved Nickel (Ni)	ug/L	NG	8.3	0.82	-	0.57	0.36	-	1.12	1.11	0.73
Total Nickel (Ni)	ug/L	NG	8.3	0.93	-	1.21	1.95	1.13	0.86	2.04	1.02
Dissolved Phosphorus (P)	ug/L	NG	NG	76	-	69	66	-	<50	<50	<50
Total Phosphorus (P)	ug/L	NG	NG	79	-	153	92	89	<50	<50	<50
Dissolved Selenium (Se)	ug/L	NG	2	0.62	-	0.77	0.63	-	1.06	0.98	1.00
Total Selenium (Se)	ug/L	NG	2	0.73	-	0.90	0.75	0.82	1.07	1.02	1.08
Dissolved Silicon (Si)	ug/L	NG	NG	<1000	-	1040	1160	-	1210	1330	1280
Total Silicon (Si)	ug/L	NG	NG	1080	-	1200	1060	1040	1190	1380	1720
Dissolved Silver (Ag)	ug/L	NG	1.5	0.119	-	0.126	0.145	-	0.307	0.232	0.115
Total Silver (Ag)	ug/L	NG	1.5	0.264	-	1.03	0.393	0.435	0.583	0.617	0.543
Dissolved Strontium (Sr)	ug/L	NG	NG	4950	-	4790	4660	-	4410	4380	4500
Total Strontium (Sr)	ug/L	NG	NG	5010	-	4770	4780	4750	4570	4420	4480
Dissolved Thallium (Tl)	ug/L	NG	21.3	5.59	-	6.78	6.96	-	**78.8**	**129**	**100**
Total Thallium (Tl)	ug/L	NG	21.3	6.04	-	6.61	6.44	6.46	**69.8**	**135**	**98.5**
Dissolved Tin (Sn)	ug/L	NG	NG	<1.0	-	<1.0	<1.0	-	<1.0	<1.0	<1.0

Table 12
Surface Water Analytical Results - Metals
Hydrogeological Study and Data Gap Assessment
Brunswick Smelter, Belledune, NB

Metals	UNITS	CCME Water Quality Guidelines for the Protection of Aquatic Life - Marine[1]	NSE EQS - Marine Water[2]	19SW-1	19SW-1 Lab Dup	19SW-2	19SW-QA/QC Field Dup of 19SW-2	19SW-QA/QC Lab-Dup	19SW-3	19SW-4	19SW-5
				9/26/2019	9/26/2019	9/26/2019	9/26/2019	9/26/2019	9/26/2019	9/26/2019	9/26/2019
Total Tin (Sn)	ug/L	NG	NG	<1.0	-	1.4	2.0 (2)	<1.0	<1.0	4.9	<1.0
Dissolved Titanium (Ti)	ug/L	NG	NG	<10	-	<10	<10	-	<10	<10	<10
Total Titanium (Ti)	ug/L	NG	NG	<10	-	<10	<10	<10	<10	<10	<10
Dissolved Uranium (U)	ug/L	NG	100	1.89	-	1.87	1.82	-	1.68	1.61	1.62
Total Uranium (U)	ug/L	NG	100	2.00	-	1.88	1.97	1.99	1.72	1.66	1.60
Dissolved Vanadium (V)	ug/L	NG	50	<10	-	<10	<10	-	<10	<10	<10
Total Vanadium (V)	ug/L	NG	50	<10	-	<10	<10	<10	<10	<10	<10
Dissolved Zinc (Zn)	ug/L	NG	10	**205**	-	**187**	**188**	-	**520**	**700**	**614**
Total Zinc (Zn)	ug/L	NG	10	**210**	-	**286**	**217**	**209**	**498**	**771**	**629**
General Chemistry											
Dissolved Calcium (Ca)	mg/L	NG		274	-	269	259	-	269	264	265
Total Calcium (Ca)	mg/L	NG		285	-	271	268	-	275	274	270
Dissolved Magnesium (Mg)	mg/L	NG		797	-	781	781	-	739	705	733
Total Magnesium (Mg)	mg/L	NG		827	-	788	787	-	775	735	734
Dissolved Potassium (K)	mg/L	NG		243	-	239	236	-	225	218	222
Total Potassium (K)	mg/L	NG		251	-	238	239	-	233	226	224
Dissolved Sodium (Na)	mg/L	NG		7470	-	7460	7360	-	6740	6540	6860
Total Sodium (Na)	mg/L	NG		7630	-	7240	6990	7280	6920	6760	6830
Dissolved Sulphur (S)	mg/L	NG		579	-	565	567	-	539	530	540
Total Sulphur (S)	mg/L	NG		609	-	576	561	-	567	552	545
Calculated Parameters	**UNITS**										
Total Hardness (CaCO3)	mg/L	NG		4110	-	3920	3910	-	3880	3710	3690
Dissolved Hardness (CaCO3)	mg/L	NG		3970	-	3890	3860	-	3710	3560	3680
Inorganics											
pH	pH	NG		7.78	-	7.86	7.89	-	7.97	7.89	7.99
Salinity	N/A	NG		22	-	21	22	-	20	20	20
Total Suspended Solids	mg/L	NG		5.6	-	4.6	5.4	-	10	5.6	16

Notes:

[1] Canadian Council of Ministers of the Environment Surface Water Quality Guideline for the Protection of Marine Aquatic Life

[2] Nova Scotia Environment (NSE) Ecological Health Based Standards for Surface Water- Marine Aquatic Life

"-" - Not Applicable/Not Analyzed

Lab Dup - Laboratory Duplicate

NG - No Guideline

BOLD/UNDERLINE - Exceeds CCME and/or NSE EQS Marine Guidelines

Table 13A
Slag Analytical Results - Metals
Hydrogeological Study and Data Gap Assessment
Brunswick Smelter, Belledune, NB

Sampling Date		CCME SQG [1]	NSE Tier 1 EQS [2]	Risk Based SSTL [3]	9/25/2019	9/25/2019	9/25/2019
Metals	**Units**				**19SP-26 (0.6-1.2M)**	**19SP-27 (1.8-2.4M)**	**19SP-28 (0.0-0.6M)**
Aluminum	mg/kg		198000		12000	18000	21000
Antimony	mg/kg		63		130	620	440
Arsenic	mg/kg	31	31	295	1600	2700	1400
Barium	mg/kg	96000	140000		520	600	210
Beryllium	mg/kg	1100	320		<20	<20	<20
Bismuth	mg/kg				29	39	20
Boron	mg/kg		24000		<500	<500	640
Cadmium	mg/kg	192	192	1505	69	190	28
Chromium	mg/kg	2300	2300		90	280	170
Cobalt	mg/kg		250		230	340	51
Copper	mg/kg	16000	16000	104983	3600	3600	4200
Iron	mg/kg		144000		270000	250000	240000
Lead	mg/kg	740	740	3567	30000	33000	15000
Lithium	mg/kg				<20	<20	24
Manganese	mg/kg				4300	3600	15000
Mercury	mg/kg	99	99		<1.0	<1.0	<1.0
Molybdenum	mg/kg		1200		46	100	220
Nickel	mg/kg	2500	2200		<20	<20	<20
Rubidium	mg/kg				<20	<20	28
Selenium	mg/kg	1135	1135		26	22	150
Silver	mg/kg		490	7526	28	78	63
Strontium	mg/kg		122000		470	480	2400
Thallium	mg/kg	1	1	22	2.0	2.0	1.5
Tin	mg/kg		122000		790	1100	490
Uranium	mg/kg	300	300		2.2	4.0	6.5
Vanadium	mg/kg		160		32	37	93
Zinc	mg/kg	140000	47000	466418	110000	110000	110000

Notes:

[1] Canadian Council of Ministers of the Environment Soil Quality Guideline for Industrial Land Use based

[2] Nova Scotia Environment (NSE) Tier 1 Environmental Quality Standards (EQS) for Soil at a Non-Potable

[3] Risk Based Target Level for Protection of Human Health assuming Industrial Worker and/or

Underlined - Exceeds Risk Based SSTL

Empty Cell - No Value

Table 13B
Slag Analytical Results - Metal Leachate Summary
Hydrogeological Study and Data Gap Assessment
Brunswick Smelter, Belledune, NB

New Slag Management Area				
	Leachate Guideline µg/L	**Slag mg/kg**	**Slag Leachable µg/L**	**Slag Leachable µg/L**
		19SP-27 (1.8-2.4m)	**19SP-27 (1.8-2.4m)**	**Lab Duplicate**
Arsenic	2500	2700	260	250
Cadmium	500	190	490	500
Lead	5000	33000	100000	100000
Thallium	NG	2	20	20
Zinc	NG	110000	200000	200000

Notes:

NG No Guideline

Exceeds Leachate Guideline (CEPA 2019)

Table 14
QA/QC Sample Key
Hydrogeological Study and Data Gap Assessment
Brunswick Smelter, Belledune, NB

Groundwater	Duplicate
19GW-118	QA/QC-1
19GW-116	QA/QC-2
05GW-75	QA/QC-3
09GW-107	QA/QC-4
19GW-126	QA/QC-5
19GW-132	QA/QC-6
19GW-130	QA/QC-7
19GW-128	QA/QC-8
19GW-134	QA/QC-9

Soil	Field Duplicate of
19GW-119 (2.7-3.3m)	SOIL-QA/QC-1
19GW-122 (0.6-1.2m)	SOIL-QA/QC-2
19GW-133 (0.0-0.15m)	SOIL-QA/QC-3
19GW-125 (1.2-1.8m)	SOIL QA/QC-4
19SP-22 (1.2-1.8m)	SOIL QA/QC-5
19SP-8 (0.0-0.15m)	SOIL QA/QC-6
19SS-2 (0.05-0.3m)	SOIL QA/QC-7
19SS-1 (0.05-0.3m)	SOIL QA/QC-8
19SS-10 (0.05-0.3m)	SOIL QA/QC-9
19SP-31 0-0.15M (NORM)	SOIL QA/QC-4
19SP-10 0.15-0.3M (NORM)	SOIL QA/QC-5
19SS-22 (0.15-0.3M)	SOIL QA/QC-10

Sediment	Field Duplicate of
19SED-1	19SED-QA/QC

Surface Water	Field Duplicate of
19SW-3	19SW-QA/QC

Table 15A
Soil QA/QC Analytical Results - Metals (mg/kg)
Hydrogeological Study and Data Gap Assessment
Brunswick Smelter, Belledune, NB

Analyte	19GW-119 (2.7-3.3m)	SOIL-QA/QC-1	Relative % Difference	19GW-122 (0.6-1.2m)	SOIL-QA/QC-2	Relative % Difference	19GW-133 (0.0-0.15m)	SOIL-QA/QC-3	Relative % Difference
Aluminum	24000	24000	0.00%	19000	18000	5.41%	16000	15000	6.45%
Antimony	23	240	165.02%	16	28	54.55%	620	750	18.98%
Arsenic	30	190	145.45%	65	110	51.43%	11000	14000	24.00%
Barium	88	91	3.35%	75	81	7.69%	140	120	15.38%
Beryllium	1	1	0.00%	1	1	0.00%	10	10	0.00%
Bismuth	4.0	61	175.38%	11	21	62.50%	290	350	18.75%
Boron	25	25	0.00%	25	25	0.00%	250	250	0.00%
Cadmium	1.3	12	160.90%	54	59	8.85%	1900	2100	10.00%
Chromium	73	62	16.30%	41	39	5.00%	72	72	0.00%
Cobalt	19	17	11.11%	17	17	0.00%	87	100	13.90%
Copper	43	430	163.64%	130	190	37.50%	49000	62000	23.42%
Iron	43000	42000	2.35%	40000	38000	5.13%	47000	45000	4.35%
Lead	1800	17000	161.70%	3400	6300	59.79%	39000	39000	0.00%
Lithium	29	28	3.51%	24	23	4.26%	10	10	0.00%
Manganese	1000	1200	18.18%	1200	1300	8.00%	800	720	10.53%
Mercury	0.05	0.20	120.00%	0.18	0.17	5.71%	21	26	21.28%
Molybdenum	1	2.5	85.71%	2.8	5.3	61.73%	10	10	0.00%
Nickel	49	45	8.51%	43	41	4.76%	190	230	19.05%
Rubidium	7.1	11	43.09%	7.9	7.8	1.27%	10	10	0.00%
Selenium	0.5	5.9	168.75%	0.5	0.5	0.00%	380	430	12.35%
Silver	6.9	74	165.88%	6.1	10	48.45%	89	82	8.19%
Strontium	48	44	8.70%	41	52	23.66%	25	25	0.00%
Thallium	0.25	1.6	145.95%	3.7	3.9	5.26%	780	790	1.27%
Tin	3.7	26	150.17%	5.5	9.2	50.34%	1600	2000	22.22%
Uranium	1.5	11	152.00%	0.99	1.0	1.01%	0.5	0.5	0.00%
Vanadium	90	91	1.10%	67	61	9.38%	49	47	4.17%
Zinc	280	2200	154.84%	3100	3400	9.23%	6200	7900	24.11%

Notes:
Non detected results are represented by 1/2 the detection limit

Table 15A
Soil QA/QC Analytical Results - Metals (mg/kg)
Hydrogeological Study and Data Gap Assessment
Brunswick Smelter, Belledune, NB

Analyte	19GW-125 (1.2-1.8m)	SOIL-QA/QC-4	Relative % Difference	19SP-22 (1.2-1.8m)	SOIL-QA/QC-5	Relative % Difference	19SS-2 (0.05-0.3m)	SOIL-QA/QC-7	Relative % Difference
Aluminum	13000	12000	8.00%	12000	20000	50.00%	19000	20000	5.13%
Antimony	63	1	193.75%	4	330	195.21%	8.1	21	88.66%
Arsenic	220	8.9	184.45%	10	1500	197.35%	93	170	58.56%
Barium	46	41	11.49%	39	350	159.90%	54	56	3.64%
Beryllium	1	1	0.00%	1	1	0.00%	1	1	0.00%
Bismuth	38	1	189.74%	1	18	178.95%	3.2	10	103.03%
Boron	25	25	0.00%	25	1100	191.11%	25	25	0.00%
Cadmium	130	0.15	199.54%	0.15	23	197.41%	11	12	8.70%
Chromium	42	31	30.14%	33	170	134.98%	65	71	8.82%
Cobalt	26	11	81.08%	12	42	111.11%	19	24	23.26%
Copper	410	15	185.88%	13	3900	198.67%	100	260	88.89%
Iron	37000	25000	38.71%	29000	240000	156.88%	38000	41000	7.59%
Lead	7900	21	198.94%	20	16000	199.50%	1200	3700	102.04%
Lithium	21	18	15.38%	16	27	51.16%	29	29	0.00%
Manganese	410	540	27.37%	570	13000	183.20%	750	900	18.18%
Mercury	0.38	0.05	153.49%	0.05	0.05	0.00%	2	3.2	46.15%
Molybdenum	3.2	1	104.76%	1	200	198.01%	1	1	0.00%
Nickel	33	33	0.00%	31	6.0	135.14%	45	50	10.53%
Rubidium	8.7	4.7	59.70%	4.8	28	141.46%	8.4	8.3	1.20%
Selenium	1.9	0.5	116.67%	0.5	140	198.58%	4.3	8.7	67.69%
Silver	10	0.25	190.24%	0.25	74	198.65%	2.4	4.5	60.87%
Strontium	18	43	81.97%	43	2400	192.96%	52	70	29.51%
Thallium	89	0.05	199.78%	0.05	1.3	185.19%	5.6	9.7	53.59%
Tin	44	0.5	195.51%	0.5	450	199.56%	6	18	100.00%
Uranium	1.1	0.35	103.45%	0.37	6.2	177.47%	2.7	5.6	69.88%
Vanadium	46	46	0.00%	57	92	46.98%	88	110	22.22%
Zinc	8100	57	197.20%	54	120000	199.82%	1600	3400	72.00%

Notes:
Non detected results are represented by 1/2 the detection limit

Table 15A
Soil QA/QC Analytical Results - Metals (mg/kg)
Hydrogeological Study and Data Gap Assessment
Brunswick Smelter, Belledune, NB

Analyte	19SS-1 (0.05-0.3m)	SOIL-QA/QC-8	Relative % Difference	19SS-10 (0.05-0.3m)	SOIL-QA/QC-9	Relative % Difference	19SS-22 (0.15-0.3m)	SOIL-QA/QC-10	Relative % Difference
Aluminum	15000	14000	6.90%	23000	20000	13.95%	14000	14000	0.00%
Antimony	120	110	8.70%	16	15	6.45%	7.3	6.8	7.09%
Arsenic	760	840	10.00%	77	79	2.56%	16	13	20.69%
Barium	360	290	21.54%	54	63	15.38%	89	93	4.40%
Beryllium	1	1	0.00%	1	1	0.00%	1	1	0.00%
Bismuth	25	21	17.39%	2.9	4.1	34.29%	1	1	0.00%
Boron	25	25	0.00%	25	25	0.00%	25	25	0.00%
Cadmium	19	17	11.11%	1.9	2.8	38.30%	9.0	7.0	25.00%
Chromium	80	65	20.69%	60	50	18.18%	30	28	6.90%
Cobalt	150	120	22.22%	27	23	16.00%	11	12	8.70%
Copper	2900	2400	18.87%	300	270	10.53%	44	39	12.05%
Iron	200000	170000	16.22%	60000	50000	18.18%	32000	33000	3.08%
Lead	21000	17000	21.05%	840	1300	42.99%	190	100	62.07%
Lithium	15	15	0.00%	35	30	15.38%	19	18	5.41%
Manganese	960	800	18.18%	1400	1200	15.38%	920	1000	8.33%
Mercury	0.05	0.13	88.89%	0.10	0.18	57.14%	0.05	0.05	0.00%
Molybdenum	19	14	30.30%	1	2.1	70.97%	1	1	0.00%
Nickel	16	19	17.14%	62	53	15.65%	24	22	8.70%
Rubidium	9.1	8.2	10.40%	6.9	7.2	4.26%	11	12	8.70%
Selenium	4.8	3.9	20.69%	0.5	0.5	0.00%	0.5	0.5	0.00%
Silver	24	19	23.26%	2.3	3.0	26.42%	1.0	0.69	36.69%
Strontium	140	130	7.41%	17	21	21.05%	13	9.1	35.29%
Thallium	2.8	2.9	3.51%	2.3	2.5	8.33%	0.88	0.60	37.84%
Tin	320	250	24.56%	35	18	64.15%	1.5	1.2	22.22%
Uranium	1.7	1.4	19.35%	1.2	1.3	8.00%	1.2	0.68	55.32%
Vanadium	48	47	2.11%	68	62	9.23%	65	69	5.97%
Zinc	70000	56000	22.22%	720	1200	50.00%	290	260	10.91%

Notes:
Non detected results are represented by 1/2 the detection limit

Table 15B
QA/QC Analytical Results - PCB (mg/kg)
Hydrogeological Study and Data Gap Assessment
Brunswick Smelter, Belledune, NB

Analyte	19SP-8 (0.0-0.15)	Soil-QA/QC-6 Field Dup of 19SP-8 (0.0-0.15)	Relative % Difference
Aroclor 1016	<0.050	<0.050	0.00%
Aroclor 1221	<0.050	<0.050	0.00%
Aroclor 1232	<0.050	<0.050	0.00%
Aroclor 1248	<0.050	<0.050	0.00%
Aroclor 1242	<0.050	<0.050	0.00%
Aroclor 1254	<0.050	<0.050	0.00%
Aroclor 1260	<0.050	<0.050	0.00%
Calculated Total PCB	<0.050	<0.050	0.00%

Table 15C
Groundwater QA/QC Analytical Results - Metals (µg/L)
Hydrogeological Study and Data Gap Assessment
Brunswick Smelter, Belledune, NB

Analyte	*19GW-118*	*QA/QC-1*	*Relative % Difference*	*19GW-116*	*QA-QC-2*	*Relative % Difference*	*05GW-75*	*QA-QC-3*	*Relative % Difference*	*09GW-107*	*QA-QC-4*	*Relative % Difference*	*19GW-126*	*QA-QC-5*	*Relative % Difference*	*19GW-132*	*QA-QC-6*	*Relative % Difference*	*19GW-130*	*QA-QC-7*	*Relative % Difference*	*19GW-128*	*QA-QC-8*	*Relative % Difference*	*19GW-134*	*QA-QC-9*	*Relative % Difference*
Aluminum	<10	<10	0.00%	387	388	0.26%	<10	<10	0.00%	<10	<10	0.00%	<30	<30	#VALUE!	59	57	3.45%	62	59	4.96%	75	84	11.32%	108	118	8.85%
Antimony	40.1	34.9	13.87%	21.9	21.6	1.38%	2.49	2.48	0.40%	2.62	1.65	45.43%	57	63	10.00%	7.91	7.49	5.45%	9.04	9.13	0.99%	34.2	34.9	2.03%	9.78	9.38	4.18%
Arsenic	28.5	28.1	1.41%	90.1	90.1	0.00%	6.66	4.28	43.51%	7.75	5.58	32.56%	0.96	0.95	1.05%	1530	1530	0.00%	1070	1080	0.93%	770	771	0.13%	99.2	96.7	2.55%
Barium	2.2	2.7	20.41%	42.8	43.4	1.39%	143	138	3.56%	159	151	5.16%	7.10	8.40	16.77%	109	110	0.91%	79.6	79.0	0.76%	50.6	50.6	0.00%	52.7	52.1	1.15%
Beryllium	<1.0	<1.0	0.00%	1.8	1.8	0.00%	<1.0	<1.0	0.00%	<1.0	<1.0	0.00%	83.4	84.7	1.55%	<1.0	<1.0	0.00%	<1.0	<1.0	0.00%	<1.0	<1.0	0.00%	<1.0	<1.0	0.00%
Bismuth	<1.0	<1.0	0.00%	<1.0	<1.0	0.00%	<1.0	<1.0	0.00%	<1.0	<1.0	0.00%	<1.0	<1.0	0.00%	<1.0	<1.0	0.00%	<1.0	<1.0	0.00%	<1.0	<1.0	0.00%	<1.0	<1.0	0.00%
Boron	129	133	3.05%	125	127	1.59%	<50	64	#VALUE!	173	112	42.81%	<1.0	<1.0	0.00%	2040	1990	2.48%	1090	1090	0.00%	861	865	0.46%	4030	4050	0.50%
Cadmium	156	121	25.27%	70.9	71.3	0.56%	42.4	43.0	1.41%	114	108	5.41%	295	359	19.57%	2770	2770	0.00%	54.3	54.5	0.37%	60.2	60.1	0.17%	6050	6020	0.50%
Chromium	0.73	0.73	0.00%	2.05	2.90	34.34%	<0.50	<0.50	0.00%	0.55	0.82	39.42%	0.160	0.218	30.69%	2.52	2.33	7.84%	2.93	2.05	35.34%	3.05	3.76	20.85%	2.88	3.83	28.32%
Cobalt	2.63	2.81	6.62%	198	199	0.50%	<0.10	<0.10	0.00%	0.30	<0.10	#VALUE!	3.18	2.85	10.95%	34.7	35.9	3.40%	5.77	6.05	4.74%	0.34	0.45	27.85%	53.0	53.5	0.94%
Copper	3.57	4.25	17.39%	1.05	3.40	105.62%	0.71	0.60	16.79%	3.54	1.52	79.84%	0.53	0.59	10.71%	3.51	3.27	7.08%	1.16	1.26	8.26%	6.92	8.24	17.41%	114	115	0.87%
Iron	<2.0	<2.0	0.00%	90000	89700	0.33%	<2.0	<2.0	0.00%	<2.0	<2.0	0.00%	<0.50	0.53	#VALUE!	266	276	3.69%	210	210	0.00%	15.5	20.1	25.84%	685	664	3.11%
Lead	8.35	7.20	14.79%	6.22	7.01	11.94%	12.2	4.24	96.84%	67.2	35.5	61.73%	3090	3090	0.00%	3.81	2.42	44.62%	5.41	6.63	20.27%	129	134	3.80%	51.1	50.9	0.39%
Lithium	<20	<20	0.00%	176	179	1.69%	<20	<20	0.00%	<20	<20	0.00%	0.31	1.45	129.55%	70	67	4.38%	<20	<20	0.00%	<20	<20	0.00%	72	73	1.38%
Manganese	2940	2980	1.35%	57200	57500	0.52%	2.01	1.49	29.71%	1.96	1.17	50.48%	<20	<20	0.00%	7260	7370	1.50%	5900	6030	2.18%	596	584	2.03%	10300	10400	0.97%
Mercury	<0.013	<0.013	0.00%	0.027	0.025	7.69%	0.017	0.017	0.00%	0.017	0.018	5.71%	3040	3070	0.98%	<0.013	<0.013	0.00%	<0.013	<0.013	0.00%	<0.013	<0.013	0.00%	0.480	<0.013	#VALUE!
molybdenum	<1.0	<1.0	0.00%	14.4	14.9	3.41%	<1.0	<1.0	0.00%	<1.0	<1.0	0.00%	<0.013	<0.013	0.00%	12.9	12.9	0.00%	29.6	30.1	1.68%	9.7	9.9	2.04%	15.1	15.8	4.53%
Nickel	34.8	33.7	3.21%	320	315	1.57%	0.44	0.26	51.43%	0.65	<0.20	#VALUE!	<1.0	<1.0	0.00%	31.5	30.4	3.55%	11.2	10.8	3.64%	2.19	2.36	7.47%	89.7	81.2	9.95%
Phosphorous	18500	19800	6.79%	34400	35800	3.99%	<50	<50	0.00%	<50	<50	0.00%	1.14	1.49	26.62%	<50	<50	0.00%	<50	<50	0.00%	<50	<50	0.00%	89	334	115.84%
Selenium	16.3	16.3	0.00%	7.83	7.68	1.93%	3.08	7.29	81.20%	12.4	4.31	96.83%	<50	<50	0.00%	4.08	4.04	0.99%	6.15	6.21	0.97%	26.2	25.9	1.15%	17.9	16.4	8.75%
Silicon	8250	8160	1.10%	116000	114000	1.74%	3190	3250	1.86%	3190	3020	5.48%	<0.50	<0.50	0.00%	7920	8040	1.50%	3690	3690	0.00%	2720	2710	0.37%	5930	6070	2.33%
Silver	<0.050	<0.050	0.00%	0.054	0.080	38.81%	<0.050	<0.050	0.00%	0.069	<0.050	#VALUE!	3140	3180	1.27%	<0.050	<0.050	0.00%	<0.050	<0.050	0.00%	<0.050	<0.050	0.00%	0.154	0.096	46.40%
Strontium	185	181	2.19%	1270	1280	0.78%	189	172	9.42%	157	151	3.90%	<0.050	<0.050	0.00%	1440	1450	0.69%	2240	2240	0.00%	436	441	1.14%	1130	1130	0.00%
Thallium	1.61	1.29	22.07%	7.32	7.43	1.49%	3.26	2.81	14.83%	19.3	13.5	35.37%	352	360	2.25%	1500	1490	0.67%	97.6	97.4	0.21%	70.1	70.1	0.00%	14100	13800	2.15%
Tin	2.4	<1.0	0.00%	1.9	<1.0	#VALUE!	<1.0	<1.0	0.00%	<1.0	<1.0	0.00%	1.81	1.48	20.06%	<1.0	<1.0	0.00%	2.8	2.6	7.41%	2.8	3.1	10.17%	<1.0	<1.0	0.00%
Titanium	<10	<10	0.00%	<10	<10	0.00%	<10	<10	#VALUE!	<10	<10	0.00%	<1.0	<1.0	0.00%	<10	<10	0.00%	<10	<10	0.00%	<10	<10	0.00%	<10	<10	0.00%
Uranium	<0.050	<0.050	0.00%	0.402	1.22	100.86%	0.552	0.596	0.00%	0.270	0.288	6.45%	<10	<10	0.00%	1.03	0.981	4.87%	3.76	3.84	2.11%	0.118	0.121	2.51%	0.251	0.171	37.91%
Vanadium	15	16	6.45%	<10	<10	0.00%	<10	<10	0.00%	<10	<10	0.00%	0.064	0.068	6.06%	<10	<10	0.00%	<10	<10	0.00%	<10	<10	0.00%	<10	<10	0.00%
Zinc	4120	3730	9.94%	54100	55000	1.65%	404	435	7.39%	91.6	71.7	24.37%	<10	<10	0.00%	10200	10300	0.98%	559	570	1.95%	63.1	64.3	1.88%	7610	7610	0.00%

Table 15D
Groundwater QA/QC Analytical Results - TPH (mg/L)
Hydrogeological Study and Data Gap Assessment
Brunswick Smelter, Belledune, NB

Sample ID	Date	Benzene	Toluene	Ethyl Benzene	Xylene	Total Petroleum Hydrocarbons			Modified TPH	Lab Comments	Relative % Difference (TPH)
						Gasoline (C_6-C_{10})	Fuel Oils (C_{10}-C_{21})	Lube Oils (C_{21}-C_{32})			
09GW-107	24-Sep-19	<0.0010	<0.0010	<0.0010	<0.0020	<0.10	<0.050	<0.050	<0.10	<0.10	0.00%
QA/QC-4	24-Sep-19	<0.0010	<0.0010	<0.0010	<0.0020	<0.10	<0.050	<0.050	<0.10	<0.10	

Table 15E
Groundwater QA/QC Analytical Results - PCBs (µg/L)
Hydrogeological Study and Data Gap Assessment
Brunswick Smelter, Belledune, NB

Analyte	**05GW-75**	**QA/QC-3 Field Dup of 05GW-75**	***Relative % Difference***
Aroclor 1016	<0.050	<0.050	0.00%
Aroclor 1221	<0.050	<0.050	0.00%
Aroclor 1232	<0.050	<0.050	0.00%
Aroclor 1248	<0.050	<0.050	0.00%
Aroclor 1242	<0.050	<0.050	0.00%
Aroclor 1254	<0.050	<0.050	0.00%
Aroclor 1260	<0.050	<0.050	0.00%
Calculated Total PCB	<0.050	<0.050	0.00%

Tables 15F
Sediment QA/QC Analytical Results - Metals (mg/L)
Hydrogeological Study and Data Gap Assessment
Brunswick Smelter, Belledune, NB

Analyte	19SED-1	19SED-QA/QC Field Dup of 19SED-1	Relative % Difference
Aluminum	14000	14000	0.00%
Antimony	54	56	3.64%
Arsenic	**210**	**210**	0.00%
Barium	49	52	5.94%
Beryllium	<2.0	<2.0	0.00%
Bismuth	29	26	10.91%
Boron	<50	<50	0.00%
Cadmium	**230**	**130**	55.56%
Chromium	52	**53**	1.90%
Cobalt	34	37	8.45%
Copper	**590**	**610**	3.33%
Iron	47000	50000	6.19%
Lead	**6600**	**7200**	8.70%
Lithium	22	21	4.65%
Manganese	540	600	10.53%
Mercury	**0.73**	**0.57**	24.62%
Molybdenum	7.8	6.3	21.28%
Nickel	40	43	7.23%
Rubidium	6.3	6.2	1.60%
Selenium	4.7	4.0	16.09%
Silver	15	13	14.29%
Strontium	58	54	7.14%
Thallium	270	170	45.45%
Tin	66	67	1.50%
Uranium	1.1	0.86	24.49%
Vanadium	54	53	1.87%
Zinc	**10000**	**11000**	9.52%

Table 15G
Surface Water QA/QC Analytical Results - Metals (mg/L)
Hydrogeological Study and Data Gap Assessment
Brunswick Smelter, Belledune, NB

Metals	19SW-2	19SW-QA/QC Field Dup of 19SW-2	Relative % Difference
Dissolved Aluminum (Al)	<10	<10	0.00%
Total Aluminum (Al)	121	33	114.29%
Dissolved Antimony (Sb)	4.07	3.98	2.24%
Total Antimony (Sb)	5.95	4.36	30.84%
Dissolved Arsenic (As)	**14.3**	**14.8**	3.44%
Total Arsenic (As)	**29.6**	**18.3**	47.18%
Dissolved Barium (Ba)	35.0	35.0	0.00%
Total Barium (Ba)	43.8	37.3	16.03%
Dissolved Beryllium (Be)	<1.0	<1.0	0.00%
Total Beryllium (Be)	<1.0	<1.0	0.00%
Dissolved Bismuth (Bi)	<1.0	<1.0	0.00%
Total Bismuth (Bi)	1.1	<1.0	#VALUE!
Dissolved Boron (B)	**2790**	**2850**	2.13%
Total Boron (B)	**2950**	**2780**	5.93%
Dissolved Cadmium (Cd)	**35.4**	**35.9**	1.40%
Total Cadmium (Cd)	**39.9**	**36.8**	8.08%
Dissolved Chromium (Cr)	0.53	<0.50	#VALUE!
Total Chromium (Cr)	1.16	0.80	36.73%
Dissolved Cobalt (Co)	<0.10	<0.10	#VALUE!
Total Cobalt (Co)	0.28	0.15	60.47%
Dissolved Copper (Cu)	**3.54**	**3.77**	6.29%
Total Copper (Cu)	**19.5**	**8.32**	80.37%
Dissolved Iron (Fe)	4.0	8.1	67.77%
Total Iron (Fe)	443	118	115.86%
Dissolved Lead (Pb)	**25.1**	**53.1**	71.61%
Total Lead (Pb)	**243**	**72.8**	107.79%
Dissolved Lithium (Li)	110	113	2.69%
Total Lithium (Li)	121	110	9.52%
Dissolved Manganese (Mn)	13.1	12.0	8.76%
Total Manganese (Mn)	17.9	12.1	38.67%
Dissolved Mercury (Hg)	<0.013	0.013	#VALUE!
Total Mercury (Hg)	**0.047**	**0.030**	44.16%
Dissolved Molybdenum (Mo)	6.9	6.9	0.00%
Total Molybdenum (Mo)	7.1	7.2	1.40%
Dissolved Nickel (Ni)	0.57	0.36	45.16%
Total Nickel (Ni)	1.21	1.95	46.84%
Dissolved Phosphorus (P)	69	66	4.44%
Total Phosphorus (P)	153	92	49.80%
Dissolved Selenium (Se)	0.77	0.63	20.00%
Total Selenium (Se)	0.90	0.75	18.18%
Dissolved Silicon (Si)	1040	1160	10.91%
Total Silicon (Si)	1200	1060	12.39%
Dissolved Silver (Ag)	0.126	0.145	14.02%
Total Silver (Ag)	1.03	0.393	89.53%
Dissolved Strontium (Sr)	4790	4660	2.75%
Total Strontium (Sr)	4770	4780	0.21%
Dissolved Thallium (Tl)	6.78	6.96	2.62%
Total Thallium (Tl)	6.61	6.44	2.61%
Dissolved Tin (Sn)	<1.0	<1.0	0.00%
Total Tin (Sn)	1.4	2.0	35.29%
Dissolved Titanium (Ti)	<10	<10	0.00%
Total Titanium (Ti)	<10	<10	0.00%
Dissolved Uranium (U)	1.87	1.82	2.71%
Total Uranium (U)	1.88	1.97	4.68%
Dissolved Vanadium (V)	<10	<10	0.00%
Total Vanadium (V)	<10	<10	0.00%
Dissolved Zinc (Zn)	**187**	**188**	0.53%
Total Zinc (Zn)	**286**	**217**	27.44%

Appendix A
2019 Site Photographs

Photo #1: View of the Site looking northwest from monitor well 05GW76.

Photo #2: View of the newly constructed monitor well 19GW-114 located adjacent to the Coke Fines.

Photo #3: View of the newly constructed monitor well 19GW-118 located adjacent to the acid tank area and the newly constructed bulk pond.

Photo #4: View of the newly constructed monitor well 19GW-120 located within the Material Handling West facility.

Photo #5: View of the newly constructed monitor well 19GW122 located to the north of the acid tanks.

Photo #6: View of the newly constructed monitor well 19GW-126 located to the southeast of the polishing pond.

Photo #7 View of the newly constructed monitor wells 19GW127/19GW-128 located to the north of the Back 50.

Photo #8: View of the newly constructed monitor wells 19GW133/19GW-134 located to the north of the processed sludge and garbage storage area.

Photo #9: View of the newly constructed soil probe 19SP-14 located in the Back 40.

Photo #10: View of the newly constructed soil probe 19SP-19 located north of the cooling recycling pond.

Photo #11: View of the newly constructed soil probe 19SP-26 located on the Slag Pile.

Photo #12: View of groundwater monitoring and purging equipment set up at existing monitor well 05GW-76.

Photo #13: View of groundwater monitoring and purging equipment set up at existing monitor wells 05GW-30 (A, B and C).

Photo #14: View of existing monitor well GW-42.

Photo #15: View of existing monitor well GW-34 located to the south of the lagoon. Note the slag on the beach.

Photo #16: View of sediment sample 19SED-3 collected from the lagoon.

Photo #17: View of conglomerate bedrock recovered from 19GW-134.

Photo #18: View of red sandstone bedrock recovered from 19GW-130

Appendix B
2019 Soil Probe, Monitoring Well Logs and Surveyor Notes

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: Glencore Smelter
PROJECT NUMBER: 11198639
CLIENT: Glencore Canada
LOCATION: Belledune, NB

HOLE DESIGNATION: 19GW-114
DATE COMPLETED: 17 September 2019
DRILLING METHOD: Standard Auger
FIELD PERSONNEL: M.Graves

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING	15.88					
	GROUND SURFACE	15.12					
0.0	SAND - Gravelly, with Silt, Brown, Dry		Bentonite	1		60	21
0.5							
1.0				2		40	15
1.5				3		30	5
2.0				4		20	12
2.5			150 mm PVC casing, screened from 0.6 to 4.2 mbgs	5		10	12
3.0	SAND - Gravelly, brown, wet	12.12		6		10	15
3.5	BEDROCK	11.52		7		0	50
4.0							
4.5	END OF BOREHOLE @ 4.20m BGS	10.92					

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ 09/20/2019

CHEMICAL ANALYSIS (1)

OVERBURDEN LOG 11198639 - GLENCORE.GPJ CRA_CORP.GDT 18/10/19

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: Glencore Smelter
PROJECT NUMBER: 11198639
CLIENT: Glencore Canada
LOCATION: Belledune, NB

HOLE DESIGNATION: 19GW-115
DATE COMPLETED: 17 September 2019
DRILLING METHOD: Standard Auger
FIELD PERSONNEL: M.Graves

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING GROUND SURFACE	14.97 14.18					
0.0	SAND -Gravelly, with silt, light brown, dry		Bentonite	1		25	16
0.5							
1.0				2		0	3
1.5				3		40	5
2.0	Bedrock	12.08	150 mm PVC casing, screened from 0.6 to 4.2 mbgs	4		50	17
2.5						0	50
3.0							
3.5							
4.0	END OF BOREHOLE @ 4.20m BGS	9.98					
4.5							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS (oval)

OVERBURDEN LOG 11198639 - GLENCORE.GPJ CRA_CORP.GDT 18/10/19

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: Glencore Smelter
PROJECT NUMBER: 11198639
CLIENT: Glencore Canada
LOCATION: Belledune, NB

HOLE DESIGNATION: 19GW-116
DATE COMPLETED: 17 September 2019
DRILLING METHOD: Standard Auger
FIELD PERSONNEL: M.Graves

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	GROUND SURFACE TOP OF CASING	11.99 11.80					
0.5	SAND - Gravelly, Brown, Dry		Bentonite	1		75	28
1.0				2		0	24
	SILT - Sandy, Brownish-gray, wet	10.79		3		15	50
1.5	BEDROCK	10.49	150 mm PVC casing, screened from 0.6 to 3.0 mbgs				
2.0							
2.5							
3.0	END OF BOREHOLE @ 3.00m BGS	8.99					

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ 09/20/2019

CHEMICAL ANALYSIS (1)

OVERBURDEN LOG 11198639 - GLENCORE.GPJ CRA_CORP.GDT 18/10/19

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: Glencore Smelter
PROJECT NUMBER: 11198639
CLIENT: Glencore Canada
LOCATION: Belledune, NB

HOLE DESIGNATION: 19GW-117
DATE COMPLETED: 18 September 2019
DRILLING METHOD: Diamond Core
FIELD PERSONNEL: M.Graves

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	GROUND SURFACE TOP OF CASING	5.36 5.23					
0.5	SAND - Gravelly, with Silt, Brown.		Bentonite	1		20	36
				2		20	50
1.0	Bedrock	4.46					
1.5							
2.0			150 mm PVC casing, screened from 0.6 to 3.6 mbgs				
2.5							
3.0							
3.5	END OF BOREHOLE @ 3.60m BGS	1.76					

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ 9/23/2019

CHEMICAL ANALYSIS (1)

OVERBURDEN LOG 11198639 - GLENCORE.GPJ CRA_CORP.GDT 18/10/19

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: Glencore Smelter
PROJECT NUMBER: 11198639
CLIENT: Glencore Canada
LOCATION: Belledune, NB

HOLE DESIGNATION: 19GW-118
DATE COMPLETED: 18 September 2019
DRILLING METHOD: Split Spoon/ Diamond Core
FIELD PERSONNEL: M.Graves

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING	4.32					
	GROUND SURFACE	3.56					
0.0	SAND - Gravelly, with Silt, Brown.		Bentonite	1		25	15
0.5							
1.0				2		40	24
1.5				3		60	19
	Bedrock	1.76	150 mm PVC casing, screened from 0.6 to 3.6 mbgs				
2.0							
2.5							
3.0							
3.5							
	END OF BOREHOLE @ 3.60m BGS	-0.04					

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ 09/20/2019

CHEMICAL ANALYSIS (1)

OVERBURDEN LOG 11198639 - GLENCORE.GPJ CRA_CORP.GDT 18/10/19

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: Glencore Smelter
PROJECT NUMBER: 11198639
CLIENT: Glencore Canada
LOCATION: Belledune, NB

HOLE DESIGNATION: 19GW-119
DATE COMPLETED: 17 September 2019
DRILLING METHOD: Standard Auger
FIELD PERSONNEL: M.Graves

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	GROUND SURFACE TOP OF CASING	8.32 8.13					
0.0	SAND - Gravelly, with Silt, Browm, Moist		Bentonite	1		20	9
0.5							
1.0				2		30	6
1.5				3		30	63
2.0	ROCK- Augered to 2.7	6.52					
2.5			150 mm PVC casing, screened from 0.6 to 4.5 mbgs				
3.0	SAND - Gravelly, with Silt, Browm, Moist	5.62		4		80	7
3.5	BEDROCK	5.02		5		0	50
4.0							
4.5	END OF BOREHOLE @ 4.50m BGS	3.82					

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ 9/23/2019

CHEMICAL ANALYSIS ⬭

OVERBURDEN LOG 11198639 - GLENCORE.GPJ CRA_CORP.GDT 18/10/19

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: Glencore Smelter
PROJECT NUMBER: 11198639
CLIENT: Glencore Canada
LOCATION: Belledune, NB

HOLE DESIGNATION: 19GW-120
DATE COMPLETED: 19 September 2019
DRILLING METHOD: Diamond Core
FIELD PERSONNEL: M.Graves

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING	7.96					
	GROUND SURFACE	7.34					
	GRAVEL - Sandy, Coarse Grained, Gray, Dry (FILL)		Bentonite				
	SAND - Gravelly, with Silt, Brown, Moist	7.04		1		50	8
0.5							
1.0				2		60	28
1.5				3		60	12
	Bedrock	5.54		4		0	50
2.0			150 mm PVC casing, screened from 0.6 to 3.6 mbgs				
2.5							
3.0							
3.5							
	END OF BOREHOLE @ 3.60m BGS	3.74					

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ 09/20/2019

CHEMICAL ANALYSIS (1)

OVERBURDEN LOG 11198639 - GLENCORE.GPJ CRA_CORP.GDT 18/10/19

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: Glencore Smelter
PROJECT NUMBER: 11198639
CLIENT: Glencore Canada
LOCATION: Belledune, NB

HOLE DESIGNATION: 19GW-122
DATE COMPLETED: 18 September 2019
DRILLING METHOD: Diamond Core
FIELD PERSONNEL: M.Graves

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	GROUND SURFACE TOP OF CASING	3.83 3.71					
0.0	SAND - Gravelly, with Silt, Brown, Moist		Bentonite	1		30	16
0.5							
1.0				2		90	25
1.5				3		50	13
2.0			150 mm PVC casing, screened from 0.6 to 3.6 mbgs	4		40	13
2.5	BEDROCK	1.43		5		5	50
3.0							
3.5	END OF BOREHOLE @ 3.60m BGS	0.23					

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ 09/20/2019

CHEMICAL ANALYSIS (⬭)

OVERBURDEN LOG 11198639 - GLENCORE.GPJ CRA_CORP.GDT 18/10/19

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: Glencore Smelter
PROJECT NUMBER: 11198639
CLIENT: Glencore Canada
LOCATION: Belledune, NB

HOLE DESIGNATION: 19GW-123
DATE COMPLETED: 18 September 2019
DRILLING METHOD: Diamond Core
FIELD PERSONNEL: M.Graves

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	GROUND SURFACE TOP OF CASING	3.91 3.82					
0.0	SAND - Gravelly, with Silt, Brown.		Bentonite	1		75	21
1.0				2		0	13
	Bedrock	2.71		3		0	50
			150 mm PVC casing, screened from 0.6 to 3.6 mbgs				
3.5	END OF BOREHOLE @ 3.60m BGS	0.31					

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ 09/20/2019

CHEMICAL ANALYSIS (1)

OVERBURDEN LOG 11198639 - GLENCORE.GPJ CRA_CORP.GDT 18/10/19

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: Glencore Smelter
PROJECT NUMBER: 11198639
CLIENT: Glencore Canada
LOCATION: Belledune, NB

HOLE DESIGNATION: 19GW-124
DATE COMPLETED: 18 September 2019
DRILLING METHOD: Standard Auger
FIELD PERSONNEL: M.Graves

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING GROUND SURFACE	– –					
0.5	Drilled in exact location as damaged well 08MW_98. See 08MW_98 well log for soil description.		Bentonite	1	G	0	0
1.0							
1.5							
2.0			150 mm PVC casing, screened from 0.6 to 3.3 mbgs				
2.5							
3.0							
	END OF BOREHOLE @ 3.30m BGS	3.30					

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ 09/20/2019

CHEMICAL ANALYSIS (G)

OVERBURDEN LOG 11198639 - GLENCORE.GPJ CRA_CORP.GDT 18/10/19

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: Glencore Smelter
PROJECT NUMBER: 11198639
CLIENT: Glencore Canada
LOCATION: Belledune, NB

HOLE DESIGNATION: 19GW-125
DATE COMPLETED: 24 September 2019
DRILLING METHOD: Diamond Core
FIELD PERSONNEL: M.Graves

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING	3.12					
	GROUND SURFACE	2.31					
0.0	SAND - Trace Gravel, Black/Brown, Saturated		Bentonite	1		75	4
0.5							
1.0				2		75	10
1.5				3		50	4
2.0			150 mm PVC casing, screened from 0.6 to 3.6 mbgs	4		30	12
2.5				5		50	18
3.0	BEDROCK	-0.70					
3.5	END OF BOREHOLE @ 3.60m BGS	-1.30					

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ 09/26/2019

CHEMICAL ANALYSIS (4)

OVERBURDEN LOG 11198639 - GLENCORE.GPJ CRA_CORP.GDT 18/10/19

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: Glencore Smelter
PROJECT NUMBER: 11198639
CLIENT: Glencore Canada
LOCATION: Belledune, NB

HOLE DESIGNATION: 19GW-126
DATE COMPLETED: 24 September 2019
DRILLING METHOD: Diamond Core
FIELD PERSONNEL: M.Graves

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING	3.89					
	GROUND SURFACE	3.16					
0.5	SAND - Silty, with Gravel, broen, wet		Bentonite	1		25	25
				2		20	50
1.0	ROCK _Augered to 1.2m	2.36					
	SAND - Silty, with Gravel, broen, wet	1.96		3		25	14
1.5	BEDROCK	1.66					
2.0			150 mm PVC casing, screened from 0.6 to 3.6 mbgs				
2.5							
3.0							
3.5							
	END OF BOREHOLE @ 3.60m BGS	-0.44					

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ 09/26/2019

CHEMICAL ANALYSIS (1)

OVERBURDEN LOG 11198639 - GLENCORE.GPJ CRA_CORP.GDT 18/10/19

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: Glencore Smelter
PROJECT NUMBER: 11198639
CLIENT: Glencore Canada
LOCATION: Belledune, NB

HOLE DESIGNATION: 19GW-127
DATE COMPLETED: 20 September 2019
DRILLING METHOD: Diamond Core
FIELD PERSONNEL: M.Graves

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING GROUND SURFACE	5.34 4.52					
0.5	SAND -Gravelly, with Silt, Brown/Black, Moist		Bentonite	1		50	16
1.0				2		30	10
1.5				3		30	38
2.0	BEDROCK	2.72	150 mm PVC casing, screened from 0.6 to 3.6 mbgs	4		0	50
2.5							
3.0							
3.5	END OF BOREHOLE @ 3.60m BGS	0.92					
4.0							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ 09/26/2019

CHEMICAL ANALYSIS ⬭

OVERBURDEN LOG 11198639 - GLENCORE.GPJ CRA_CORP.GDT 18/10/19

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: Glencore Smelter
PROJECT NUMBER: 11198639
CLIENT: Glencore Canada
LOCATION: Belledune, NB

HOLE DESIGNATION: 19GW-128
DATE COMPLETED: 20 September 2019
DRILLING METHOD: Diamond Core
FIELD PERSONNEL: M.Graves

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING	5.39					
	GROUND SURFACE	4.58					
	SAND - Gravelly, with Silt, Brown/Black, Moist (Assumed from adjacent shallow groundwater well 19GW-127)						
	BEDROCK - Highly Fractured Conglomerate. Diamond Core drilled to 9.0 m	2.78	Bentonite				
			150 mm PVC casing, screened from 4.5 to 9.0 mbgs				
	END OF BOREHOLE @ 9.00m BGS	-4.42					

1 2 3 4 5 6 7 8 9 10

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ 09/26/2019

OVERBURDEN LOG 11198639 - GLENCORE.GPJ CRA_CORP.GDT 18/10/19

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: Glencore Smelter
PROJECT NUMBER: 11198639
CLIENT: Glencore Canada
LOCATION: Belledune, NB

HOLE DESIGNATION: 19GW-129
DATE COMPLETED: 23 September 2019
DRILLING METHOD: Diamond Core
FIELD PERSONNEL: M.Graves

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING GROUND SURFACE	3.98 3.24					
0.5	SAND - Gravelly, with Silt, Brown, Wet		Bentonite	1		30	23
1.0				2		50	25
1.5				3		60	7
2.0			150 mm PVC casing, screened from 0.6 to 3.9 mbgs	4		30	8
2.5				5		30	24
3.0				6		40	33
3.5	BEDROCK END OF BOREHOLE @ 3.60m BGS	-0.36		7		0	50

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ 09/26/2019

CHEMICAL ANALYSIS (1)

OVERBURDEN LOG 11198639 - GLENCORE.GPJ CRA_CORP.GDT 18/10/19

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: Glencore Smelter
PROJECT NUMBER: 11198639
CLIENT: Glencore Canada
LOCATION: Belledune, NB

HOLE DESIGNATION: 19GW-129
DATE COMPLETED: 23 September 2019
DRILLING METHOD: Diamond Core
FIELD PERSONNEL: M.Graves

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE				
				NUMBER	INTERVAL	REC (%)	'N' VALUE	
		-0.76						
4.5								
5.0								
5.5								
6.0								
6.5								
7.0								
7.5								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ 09/26/2019

CHEMICAL ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: Glencore Smelter
PROJECT NUMBER: 11198639
CLIENT: Glencore Canada
LOCATION: Belledune, NB

HOLE DESIGNATION: 19GW-130
DATE COMPLETED: 23 September 2019
DRILLING METHOD: Diamond Core
FIELD PERSONNEL: M.Graves

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING	3.97					
	GROUND SURFACE	3.15					
0.5	SAND - Gravelly, with Silt, Brown, Wet (Assumed from adjacent shallow groundwater well 19GW-129)						
1.0							
1.5							
2.0			Bentonite				
2.5							
3.0							
3.5		-0.45					
4.0	BEDROCK - Highly Fractured Siltstone. Diamond Core drilled to 9.0 m						
4.5							
5.0							
5.5							
6.0							
6.5			150 mm PVC casing, screened from 4.5 to 9.0 mbgs				
7.0							
7.5							
8.0							
8.5							
9.0	END OF BOREHOLE @ 9.00m BGS	-5.85					
9.5							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ 09/26/2019

OVERBURDEN LOG 11198639 - GLENCORE.GPJ CRA_CORP.GDT 18/10/19

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: Glencore Smelter
PROJECT NUMBER: 11198639
CLIENT: Glencore Canada
LOCATION: Belledune, NB

HOLE DESIGNATION: 19GW-131
DATE COMPLETED: 23 September 2019
DRILLING METHOD: Split Spoon/ Diamond Core
FIELD PERSONNEL: M.Graves

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING	3.80					
	GROUND SURFACE	3.20					
	SAND - Gravelly, with Silt, Trace Debris, Brown, Wet.		Bentonite	1		50	9
0.5							
1.0				2		60	43
				3		30	50
1.5	Bedrock	1.70		4		0	50
2.0			150 mm PVC casing, screened from 0.6 to 3.6 mbgs				
2.5							
3.0							
3.5							
	END OF BOREHOLE @ 3.60m BGS	-0.40					

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ 09/26/2019

CHEMICAL ANALYSIS (1)

OVERBURDEN LOG 11198639 - GLENCORE.GPJ CRA_CORP.GDT 18/10/19

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: Glencore Smelter
PROJECT NUMBER: 11198639
CLIENT: Glencore Canada
LOCATION: Belledune, NB

HOLE DESIGNATION: 19GW-132
DATE COMPLETED: 23 September 2019
DRILLING METHOD: Diamond Core
FIELD PERSONNEL: M.Graves

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING	3.80					
	GROUND SURFACE	3.13					
0.5	SAND - Gravelly, with Silt, Trace Debris, Brown, Wet (Assumed from adjacent shallow groundwater well 19GW-131)						
1.5	BEDROCK - Highly Fractured Siltstone. Diamond Core drilled to 9.0 m	1.63	Bentonite				
9.0	END OF BOREHOLE @ 9.00m BGS	-5.87	150 mm PVC casing, screened from 4.5 to 9.0 mbgs				

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ 09/26/2019

OVERBURDEN LOG 11198639 - GLENCORE.GPJ CRA_CORP.GDT 18/10/19

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: Glencore Smelter
PROJECT NUMBER: 11198639
CLIENT: Glencore Canada
LOCATION: Belledune, NB

HOLE DESIGNATION: 19GW-133
DATE COMPLETED: 19 September 2019
DRILLING METHOD: Diamond Core
FIELD PERSONNEL: M.Graves

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING	5.52					
	GROUND SURFACE	4.70					
0	SAND - Silty, with Gravel, trace debris, brown, moist		Bentonite	1		60	23
0.5							
1.0				2		75	31
1.5				3		80	7
			150 mm PVC casing, screened from 0.6 to 3.0 mbgs				
	Bedrock	2.90		4		0	50
2.0							
2.5							
3.0	END OF BOREHOLE @ 3.00m BGS	1.70					

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ 09/26/2019

CHEMICAL ANALYSIS (1)

OVERBURDEN LOG 11198639 - GLENCORE.GPJ CRA_CORP.GDT 18/10/19

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: Glencore Smelter
PROJECT NUMBER: 11198639
CLIENT: Glencore Canada
LOCATION: Belledune, NB

HOLE DESIGNATION: 19GW-134
DATE COMPLETED: 19 September 2019
DRILLING METHOD: Diamond Core
FIELD PERSONNEL: M.Graves

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING	5.39					
	GROUND SURFACE	4.71					
0.5	SAND - Silty, with Gravel, trace debris, brown, moist (Assumed from adjacent shallow groundwater well 19GW-133)						
1.0							
1.5							
2.0		2.91					
2.5	BEDROCK - Highly Fractured Conglomerate. Diamond Core drilled to 9.0 m		Bentonite				
3.0							
3.5							
4.0							
4.5							
5.0							
5.5							
6.0							
6.5			150 mm PVC casing, screened from 4.5 to 9.0 mbgs				
7.0							
7.5							
8.0							
8.5							
9.0		-4.29					
	END OF BOREHOLE @ 9.00m BGS						
9.5							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ 09/26/2019

STRATIGRAPHIC LOG

PROJECT NAME: Glencore Smelter
PROJECT NUMBER: 11198639
CLIENT: Glencore Canada
LOCATION: Belledune, NB

HOLE DESIGNATION: 19SP-1
DATE COMPLETED: 19 September 2019
DRILLING METHOD: Standard Auger
FIELD PERSONNEL: M.Graves

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	SAMPLE NUMBER	SAMPLE INTERVAL	REC (%)	'N' VALUE
	GROUND SURFACE	7.48				
	SAND - Gravelly, with Silt, Brown, Moist		1		55	15
0.5						
			2		20	38
1.0						
1.5			3		60	79
	BEDROCK	5.68				
	END OF BOREHOLE @ 1.80m BGS					
2.0		5.48				

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS (1)

OVERBURDEN LOG 11198639 - GLENCORE.GPJ CRA_CORP.GDT 18/10/19

STRATIGRAPHIC LOG

PROJECT NAME: Glencore Smelter
PROJECT NUMBER: 11198639
CLIENT: Glencore Canada
LOCATION: Belledune, NB

HOLE DESIGNATION: 19SP-11
DATE COMPLETED: 19 September 2019
DRILLING METHOD: Standard Auger
FIELD PERSONNEL: M.Graves

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	GROUND SURFACE	9.97				
	SAND -Gravelly, with Silt, Brown, Moist		1		60	14
0.5						
			2		25	9
1.0						
			3		50	64
1.5	BEDROCK	8.47				
	END OF BOREHOLE @ 1.50m BGS	8.27				

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS (1)

OVERBURDEN LOG 11198639 - GLENCORE.GPJ CRA_CORP.GDT 18/10/19

STRATIGRAPHIC LOG

PROJECT NAME: Glencore Smelter
PROJECT NUMBER: 11198639
CLIENT: Glencore Canada
LOCATION: Belledune, NB

HOLE DESIGNATION: 19SP-13
DATE COMPLETED: 23 September 2019
DRILLING METHOD: Standard Auger
FIELD PERSONNEL: M.Graves

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	GROUND SURFACE	1.99				
0.0	SAND - Gravelly, with Silt, Brown, Wet		1		25	9
0.5						
1.0			2		25	16
1.5			3		50	21
2.0			4		50	42
2.5			5		75	48
3.0	BEDROCK	-1.01				
	END OF BOREHOLE @ 3.00m BGS	-1.21				

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS (2)

OVERBURDEN LOG 11198639 - GLENCORE.GPJ CRA_CORP.GDT 18/10/19

STRATIGRAPHIC LOG

PROJECT NAME: Glencore Smelter
PROJECT NUMBER: 11198639
CLIENT: Glencore Canada
LOCATION: Belledune, NB

HOLE DESIGNATION: 19SP-14
DATE COMPLETED: 20 September 2019
DRILLING METHOD: Standard Auger
FIELD PERSONNEL: M.Graves

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	GROUND SURFACE	4.74				
	SAND - Gravelly, with Silt, Brown, Moist		1		75	19
0.5						
	BEDROCK	4.14				
	END OF BOREHOLE @ 0.60m BGS		2		0	50
		3.94				

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS (1)

OVERBURDEN LOG 11198639 - GLENCORE.GPJ CRA_CORP.GDT 18/10/19

STRATIGRAPHIC LOG

PROJECT NAME: Glencore Smelter
PROJECT NUMBER: 11198639
CLIENT: Glencore Canada
LOCATION: Belledune, NB

HOLE DESIGNATION: 19SP-16
DATE COMPLETED: 20 September 2019
DRILLING METHOD: Standard Auger
FIELD PERSONNEL: M.Graves

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	GROUND SURFACE	5.51				
	SAND -Gravelly, with Silt, Black to Brown, Dry		1		50	51
0.5						
			2		50	76
1.0						
	BEDROCK	4.31				
	END OF BOREHOLE @ 1.20m BGS		3		0	50
		4.11				

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS (2)

OVERBURDEN LOG 11198639 - GLENCORE.GPJ CRA_CORP.GDT 18/10/19

STRATIGRAPHIC LOG

PROJECT NAME: Glencore Smelter
PROJECT NUMBER: 11198639
CLIENT: Glencore Canada
LOCATION: Belledune, NB

HOLE DESIGNATION: 19SP-17
DATE COMPLETED: 19 September 2019
DRILLING METHOD: Standard Auger
FIELD PERSONNEL: M.Graves

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	GROUND SURFACE	5.90				
	SAND - Gravelly, with Debris, trace Silt, Brown/Black, Dry		1		40	71
0.5						
			2		50	16
1.0						
1.5			3		50	14
	BEDROCK	4.10				
	END OF BOREHOLE @ 1.80m BGS		4		0	50
2.0		3.90				

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS (2)

OVERBURDEN LOG 11198639 - GLENCORE.GPJ CRA_CORP.GDT 18/10/19

STRATIGRAPHIC LOG

PROJECT NAME: Glencore Smelter
PROJECT NUMBER: 11198639
CLIENT: Glencore Canada
LOCATION: Belledune, NB

HOLE DESIGNATION: 19SP-18
DATE COMPLETED: 24 September 2019
DRILLING METHOD: Standard Auger
FIELD PERSONNEL: M.Graves

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	GROUND SURFACE	3.16				
	SAND - Gravelly, with Silt, Brown, Dry		1		40	20
0.5						
			2		50	17
1.0						
1.5			3		60	17
	BEDROCK	1.36				
	END OF BOREHOLE @ 1.80m BGS		4		0	50
2.0		1.16				

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS (2)

OVERBURDEN LOG 11198639 - GLENCORE.GPJ CRA_CORP.GDT 18/10/19

STRATIGRAPHIC LOG

PROJECT NAME: Glencore Smelter
PROJECT NUMBER: 11198639
CLIENT: Glencore Canada
LOCATION: Belledune, NB

HOLE DESIGNATION: 19SP-19
DATE COMPLETED: 24 September 2019
DRILLING METHOD: Standard Auger
FIELD PERSONNEL: M.Graves

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	GROUND SURFACE	3.99				
0.0	SAND - Gravelly, with Silt, Brown, Moist		1		40	91
0.5						
1.0			2		30	38
1.5			3		60	47
2.0			4		30	34
2.4	BEDROCK	1.59	5		0	50
2.5	END OF BOREHOLE @ 2.40m BGS	1.39				

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS (1)

OVERBURDEN LOG 11198639 - GLENCORE.GPJ CRA_CORP.GDT 18/10/19

STRATIGRAPHIC LOG

PROJECT NAME: Glencore Smelter
PROJECT NUMBER: 11198639
CLIENT: Glencore Canada
LOCATION: Belledune, NB

HOLE DESIGNATION: 19SP-20
DATE COMPLETED: 24 September 2019
DRILLING METHOD: Standard Auger
FIELD PERSONNEL: M.Graves

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	GROUND SURFACE	3.93				
0	SAND - Silty, Brown, Moist		1		50	17
0.5						
1.0			2		40	18
1.5			3		10	10
2.0			4		20	13
2.5	END OF BOREHOLE @ 2.40m BGS	1.53				

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS (1)

OVERBURDEN LOG 11198639 - GLENCORE.GPJ CRA_CORP.GDT 18/10/19

STRATIGRAPHIC LOG

PROJECT NAME: Glencore Smelter
PROJECT NUMBER: 11198639
CLIENT: Glencore Canada
LOCATION: Belledune, NB

HOLE DESIGNATION: 19SP-21
DATE COMPLETED: 25 September 2019
DRILLING METHOD: Standard Auger
FIELD PERSONNEL: M.Graves

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	GROUND SURFACE	12.25				
	SAND - Gravelly, with Silt, Brown, Dry		1		40	41
0.5						
	BEDROCK	11.65				
	END OF BOREHOLE @ 0.60m BGS		2		0	50
		11.45				

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS (1)

OVERBURDEN LOG 11198639 - GLENCORE.GPJ CRA_CORP.GDT 18/10/19

STRATIGRAPHIC LOG

PROJECT NAME: Glencore Smelter
PROJECT NUMBER: 11198639
CLIENT: Glencore Canada
LOCATION: Belledune, NB

HOLE DESIGNATION: 19SP-22
DATE COMPLETED: 25 September 2019
DRILLING METHOD: Standard Auger
FIELD PERSONNEL: M.Graves

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	GROUND SURFACE	12.07				
0	SAND - Gravelly, with Silt, Brown, Moist		1		60	12
0.5						
1.0			2		10	13
1.5			3		80	20
2.0			4		50	29
2.5	END OF BOREHOLE @ 2.40m BGS	9.67				

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS (1)

OVERBURDEN LOG 11198639 - GLENCORE.GPJ CRA_CORP.GDT 18/10/19

STRATIGRAPHIC LOG

PROJECT NAME: Glencore Smelter
PROJECT NUMBER: 11198639
CLIENT: Glencore Canada
LOCATION: Belledune, NB

HOLE DESIGNATION: 19SP-23
DATE COMPLETED: 25 September 2019
DRILLING METHOD: Standard Auger
FIELD PERSONNEL: M.Graves

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	GROUND SURFACE	12.69				
	SAND - Gravelly, with Silt, Brown, Dry		1		50	13
0.5						
			2		50	11
1.0						
	BEDROCK	11.49				
	END OF BOREHOLE @ 1.20m BGS		3		0	50
		11.29				

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS (1)

OVERBURDEN LOG 11198639 - GLENCORE.GPJ CRA_CORP.GDT 18/10/19

STRATIGRAPHIC LOG

PROJECT NAME: Glencore Smelter
PROJECT NUMBER: 11198639
CLIENT: Glencore Canada
LOCATION: Belledune, NB

HOLE DESIGNATION: 19SP-24
DATE COMPLETED: 25 September 2019
DRILLING METHOD: Standard Auger
FIELD PERSONNEL: M.Graves

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	GROUND SURFACE	12.29				
	SAND - Silty, Brown, Moist		1		50	19
0.5						
			2		50	11
1.0						
1.5			3		60	25
	BEDROCK	10.49				
	END OF BOREHOLE @ 1.80m BGS		4		0	50
2.0		10.29				

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS (1)

OVERBURDEN LOG 11198639 - GLENCORE.GPJ CRA_CORP.GDT 18/10/19

STRATIGRAPHIC LOG

PROJECT NAME: Glencore Smelter
PROJECT NUMBER: 11198639
CLIENT: Glencore Canada
LOCATION: Belledune, NB

HOLE DESIGNATION: 19SP-25
DATE COMPLETED: 25 September 2019
DRILLING METHOD: Standard Auger
FIELD PERSONNEL: M.Graves

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	GROUND SURFACE	12.51				
	SAND - Gravelly, with Silt, Reddish Brown, Dry		1		30	10
0.5						
			2		50	40
1.0						
	BEDROCK	11.31				
	END OF BOREHOLE @ 1.20m BGS		3		0	50
		11.11				

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS (1)

OVERBURDEN LOG 11198639 - GLENCORE.GPJ CRA_CORP.GDT 18/10/19

STRATIGRAPHIC LOG

PROJECT NAME: Glencore Smelter
PROJECT NUMBER: 11198639
CLIENT: Glencore Canada
LOCATION: Belledune, NB

HOLE DESIGNATION: 19SP-26
DATE COMPLETED: 25 September 2019
DRILLING METHOD: Standard Auger
FIELD PERSONNEL: M.Graves

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	GROUND SURFACE	41.91				
0	SLAG - Black		1		25	16
0.5						
1.0			2		75	12
1.5			3		60	6
2.0			4		50	3
2.40	END OF BOREHOLE @ 2.40m BGS	39.51				
2.5						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS (2)

OVERBURDEN LOG 11198639 - GLENCORE.GPJ CRA_CORP.GDT 18/10/19

STRATIGRAPHIC LOG

PROJECT NAME: Glencore Smelter
PROJECT NUMBER: 11198639
CLIENT: Glencore Canada
LOCATION: Belledune, NB

HOLE DESIGNATION: 19SP-27
DATE COMPLETED: 25 September 2019
DRILLING METHOD: Standard Auger
FIELD PERSONNEL: M.Graves

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	GROUND SURFACE	46.09				
0.0	SLAG - Black		1		75	14
0.5						
1.0			2		66	7
1.5			3		50	5
2.0			(4)		60	4
2.4	END OF BOREHOLE @ 2.40m BGS	43.69				
2.5						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS (4)

OVERBURDEN LOG 11198639 - GLENCORE.GPJ CRA_CORP.GDT 18/10/19

STRATIGRAPHIC LOG

PROJECT NAME: Glencore Smelter
PROJECT NUMBER: 11198639
CLIENT: Glencore Canada
LOCATION: Belledune, NB

HOLE DESIGNATION: 19SP-28
DATE COMPLETED: 25 September 2019
DRILLING METHOD: Standard Auger
FIELD PERSONNEL: M.Graves

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	GROUND SURFACE	43.80				
0.0	SLAG - Black		1		75	9
0.5						
1.0			2		50	5
1.5			3		60	3
2.0			4		75	2
2.4	END OF BOREHOLE @ 2.40m BGS	41.40				
2.5						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS (1)

OVERBURDEN LOG 11198639 - GLENCORE.GPJ CRA_CORP.GDT 18/10/19

STRATIGRAPHIC LOG

PROJECT NAME: Glencore Smelter
PROJECT NUMBER: 11198639
CLIENT: Glencore Canada
LOCATION: Belledune, NB

HOLE DESIGNATION: 19SP-3
DATE COMPLETED: 19 September 2019
DRILLING METHOD: Standard Auger
FIELD PERSONNEL: M.Graves

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	GROUND SURFACE	7.48				
	SAND - Gravelly, with Silt, Brown, Moist		1		60	6
0.5						
			2		75	22
1.0						
1.5			3		50	37
	BEDROCK	5.68				
	END OF BOREHOLE @ 1.80m BGS		4		0	50
2.0		5.48				

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS (1)

OVERBURDEN LOG 11198639 - GLENCORE.GPJ CRA_CORP.GDT 18/10/19

STRATIGRAPHIC LOG

PROJECT NAME: Glencore Smelter
PROJECT NUMBER: 11198639
CLIENT: Glencore Canada
LOCATION: Belledune, NB

HOLE DESIGNATION: 19SP-9
DATE COMPLETED: 19 September 2019
DRILLING METHOD: Standard Auger
FIELD PERSONNEL: M.Graves

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	GROUND SURFACE	9.19				
	SAND - Gravelly, with Silt, Brown, Dry		1		70	49
0.5						
			2		40	57
1.0						
	BEDROCK	7.99				
	END OF BOREHOLE @ 1.20m BGS		3		0	50
		7.79				
1.5						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS (1)

OVERBURDEN LOG 11198639 - GLENCORE.GPJ CRA_CORP.GDT 18/10/19

Roy Consulting: Surveyor Notes - August 29, 2019

1150	7655995.432	2550114.881	4.077	236 30c
1149	7655995.365	2550114.926	2.374	218
1148	7655993.004	2550113.773	3.081	236 30a
1147	7655992.986	2550113.741	2.326	218
1146	7655992.922	2550115.5	3.45	236 30b
1145	7655992.863	2550115.464	2.866	218
1144	7656025.772	2549948.069	3.93	236 8a
1143	7656025.877	2549948.092	3.255	218
1142	7656026.676	2549948.039	4.518	236 8b
1141	7656026.603	2549948.026	3.176	218
1140	7656027.538	2549946.385	3.918	236 8c
1139	7656027.531	2549946.38	3.17	218
1138	7656159.103	2549893.127	3.656	236 34
1137	7656159.067	2549893.174	1.899	218
1136	7656276.584	2549602.493	3.393	236 10
1135	7656276.569	2549602.487	2.675	218
1134	7656348.397	2549409.353	3.76	236 54
1133	7656348.41	2549409.414	2.596	218
1132	7656360.98	2549612.921	3.183	236 32
1131	7656361.041	2549613.006	2.242	218
1130	7656538.94	2549829.789	3.566	236 60 destry
1129	7656636.602	2549974.947	3.484	236 59
1128	7656636.564	2549974.908	2.826	218
1127	7655877.589	2550290.123	3.236	236 43
1126	7655877.647	2550290.024	2.835	218
1125	7655746.807	2550381.282	3.456	236 49
1123	7655746.836	2550381.194	3.152	218
1122	7655712.949	2550421.737	4.118	236 63
1121	7655712.908	2550421.558	3.063	218
1120	7655460.714	2550404.54	3.76	236 5 destry
1119	7655566.136	2550505.152	3.363	236 4
1118	7655566.214	2550505.138	3.177	218
1117	7655485.983	2550521.638	4.174	236 112
1116	7655485.892	2550521.562	3.29	218
1115	7655557.916	2549818.596	12.06	236 3b
1114	7655557.99	2549818.632	11.209	218
1113	7655558.534	2549817.341	12.111	236 3a
1112	7655558.545	2549817.383	11.2	218
21666sh	7655615.985	2549835.887	9.855	981
1111	7655651.649	2549708.422	9.674	236 31a
1110	7655651.684	2549708.365	9.419	218
1109	7655653.911	2549707.724	9.831	236 31b
1108	7655653.832	2549707.656	9.535	218
1107	7655684.74	2549612.547	10.783	236 27
1106	7655684.779	2549612.55	9.935	218
1105	7655810.201	2549370.053	11.675	236 1
1104	7655810.195	2549369.982	11.081	218
1103	7655440.392	2549800.976	13.105	236 113
1102	7655440.212	2549800.948	12.177	218
1101	7654882.194	2549454.274	25.552	236 53
1100	7654882.094	2549454.304	24.813	218
1099	7655554.947	2549209.495	15.276	236 51
1098	7655554.911	2549209.408	14.617	218
1097	7655279.971	2549174.679	17.762	236 52
1096	7655280.023	2549174.575	17.063	218
1095	7655394.157	2550807.353	3.275	236 76
1094	7655394.01	2550807.413	2.609	218
1093	7654952.09	2550792.231	7.337	236 77
1092	7654952.13	2550792.273	6.631	218
1091	7655435.264	2550300.654	7.29	236 111
1090	7655435.207	2550300.746	6.23	218
1089	7655542.896	2550249.624	6.293	236 110
1088	7655542.981	2550249.588	5.395	218
1087	7655699.249	2550182.922	4.728	236 109
1086	7655699.13	2550182.846	4.745	218
1085	7655605.088	2550123.824	6.603	236 68
1084	7655605.288	2550123.984	6.709	218
1083	7656228.758	2548534.286	16.403	236 79
1082	7656228.552	2548534.569	15.606	218
1081	7656407.698	2548012.828	16.204	236 99
1080	7656407.508	2548012.86	15.744	218
1079	7656335.91	2548230.066	21.425	236 80
1078	7656335.746	2548230.028	21.057	218
1077	7655739.379	2549998.997	6.36	236 dw72
1076	7655739.642	2549999.082	6.506	218
1075	7655745.36	2549985.359	6.357	236 mw3
1074	7655745.446	2549985.439	6.391	218
1073	7655753.98	2549988.463	7.092	236 mw1

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1072	7655753.904	2549988.438	6.458	218
1071	7655771.675	2549995.813	5.762	236 71
1070	7655771.747	2549995.871	5.805	218
1069	7655799.951	2550025.409	5.541	236 70
1068	7655800.016	2550025.449	5.575	218
1067	7655870.529	2549975.061	4.556	236 65 destry
1066	7655870.572	2549974.947	4.57	218
1065	7655897.567	2549987.105	3.729	236 67
1064	7655897.552	2549987.015	3.74	218
1063	7655991.741	2549814.922	5.977	236 18
1062	7655992.067	2549815.153	4.695	218
1061	7655922.579	2549879.511	4.789	236 73 destryed
1060	7655935.877	2549858.064	4.771	236 74
1059	7655935.994	2549857.901	4.831	218
1058	7655899.853	2549834.118	7.125	236 23
1057	7655899.735	2549834.238	6.785	218
1056	7655866.478	2549772.786	6.791	218
1055	7655866.655	2549774.019	6.746	218
1054	7655867.909	2549783.989	6.687	218
1053	7655861.768	2549780.096	6.825	218
1052	7655887.829	2549713.326	7.701	236 25c
1051	7655887.336	2549714.429	7.569	236 25b
1050	7655887.562	2549714.548	7.691	236 25
1049	7655887.772	2549713.432	6.945	218
1048	7655887.292	2549714.465	6.776	218
1047	7655887.438	2549714.589	6.759	218
1046	7655804.983	2549685.229	7.872	236 27
1045	7655804.955	2549685.174	7.094	218
1044	7655935.063	2549608.108	7.176	236 64
1043	7655934.949	2549608.154	7.194	218
1042	7655917.815	2549587.403	6.909	236 63
1041	7655917.823	2549587.384	6.903	218
1040	7655687.863	2549807.019	7.783	236 107
1039	7655687.774	2549807.032	7.804	218
1038	7656188.044	2549455.181	5.301	236 78
1037	7656187.869	2549455.156	4.444	218
1036	7656117.549	2549576.176	5.845	236 106
1034	7656117.58	2549576.312	4.923	218
1033	7655942.179	2549333.976	10.232	236 104
1032	7655942.069	2549334.118	9.309	218
1031	7655874.083	2549446.856	10.437	236 105
1030	7655874.115	2549446.859	9.515	218
1029	7656072.356	2549462.317	7.096	236 18
1028	7656072.266	2549462.189	6.218	218
1027	7656224.033	2549348.62	5.849	236 12
1026	7656224.085	2549348.615	4.774	218
1025	7656425.61	2549057.553	6.122	236 75
1024	7656425.468	2549057.607	5.382	218
1023	7656495.467	2548383.4	11.633	236 89
1022	7656495.403	2548383.324	11.749	218
1021	7656604.951	2547996.111	11.815	236 91
1020	7656605.041	2547996.267	11.098	218
1019	7656614.591	2548192.099	9.604	236 90
1018	7656614.467	2548192.181	8.876	218
1017	7656621.032	2548320.651	8.266	218
1016	7656621.073	2548320.544	8.275	236 88 cover
1015	7656436.959	2548589.775	9.387	236 45
1014	7656437.072	2548589.747	9.525	218
1013	7656410.716	2548647.087	9.473	236 84 equip
1012	7656391.284	2548690.543	9.65	236 83
1011	7656391.397	2548690.339	9.19	218
1010	7656373.25	2548690.484	9.956	236 82
1009	7656373.322	2548690.396	9.482	218
1008	7656346.483	2548779.168	11.049	236 102
1007	7656346.703	2548779.269	10.213	218
1006	7656467.243	2548766.482	7.404	236 destroy
1005	7656593.208	2548833.637	3.899	236 95
1004	7656593.297	2548833.64	3.967	218
1003	7656523.925	2548926.28	6.123	236 97
1002	7656523.876	2548926.259	6.142	218
1001	7656441.279	2548907.009	8.654	236 81
1000	7656441.147	2548906.985	7.882	218
20	7656484.184	2548875.208	6.427	981

Roy Consulting: Surveyor Notes - October 1, 2019

2080	7655026.413	2548909.11	41.91	227 19sp-26
2079	7654706.9	2548867.127	46.093	227 19sp-27
2078	7654713.044	2549146.237	43.801	227 19sp-28
2077	7655233.903	2549972.453	12.07	227 19sp-22
2076	7655327.665	2549809.661	12.252	227 19sp-21
2075	7655169.039	2550043.723	12.687	227 19sp-23
2074	7655146.085	2550136.906	12.289	227 19sp-24
2073	7655082.24	2550227.616	12.505	227 19sp-25
2072	7655615.221	2550431.951	3.934	227 19sp-20
2071	7655869.841	2550260.693	3.893	236 19gw-126
2070	7655869.823	2550260.762	3.156	218
2069	7655761.469	2550262.701	3.99	227 19sp-19
2068	7656384.523	2549684.376	2.433	227 19ss-7
2067	7656379.984	2549790.298	2.372	227 19ss-6
2066	7656313.71	2549916.309	1.746	227 19ss-3
2065	7656375.226	2549912.396	2.242	227 19ss-5
2064	7656449.001	2550010.971	2.302	227 19ss-4
2063	7656557.239	2549907.799	3.563	227 19ss-9
2062	7656605.182	2549969.985	2.714	227 19ss-10
2061	7656469.959	2549745.414	2.239	227 19ss-8
2060	7656335.447	2549539.458	1.986	227 19sp-13
2059	7656288.011	2549653.712	1.719	227 19ss-2
2058	7656166.409	2549708.804	3.239	218
2057	7656165.146	2549710.049	3.15	218
2056	7656165.158	2549710.107	3.974	236 19gw-130
2055	7656166.455	2549708.787	3.98	236 19gw-129
2054	7656163.096	2549890.698	2.305	218
2053	7656163.112	2549890.675	3.122	236 19gw-125
2052	7656103.225	2549835.733	3.801	236 19gw-131
2051	7656102.453	2549837.141	3.801	236 19gw-132
2050	7656102.392	2549837.134	3.133	218
2049	7656103.267	2549835.692	3.2	218
2048	7656069.727	2550072.334	2.364	227 19ss-1
2047	7656013.685	2550070.61	3.159	227 19sp-18
2046	7656050.598	2549766.974	5.391	236 19gw-134
2045	7656051.489	2549765.928	5.516	236 19gw-133
2044	7656051.539	2549765.979	4.697	218
2043	7656050.695	2549767.064	4.708	218
2042	7656009.416	2549746.592	5.903	227 19sp-17
2040	7656113.415	2549622.012	5.387	236 19gw128
2039	7656114.17	2549620.482	5.338	236 19gw127
2038	7656113.361	2549622.068	4.578	218
2037	7656114.091	2549620.487	4.521	218
2036	7656050.94	2549602.492	5.507	227 19sp-16
2035	7656101.637	2549550.364	4.977	227 19sp-15
2034	7656161.183	2549493.986	4.739	227 19sp-14
2033	7656512.186	2548997.956	5.517	227 19ss11
2032	7656422.669	2548968.254	7.644	227 19ss12
2031	7656357.194	2548944.77	9.258	227 19ss13
2030	7656573.297	2548897.056	3.822	236 19gw-123
2029	7656573.496	2548897.056	3.905	218
2028	7656613.777	2548772.486	3.832	218
2027	7656613.68	2548772.481	3.711	236 19gw-122
2026	7656620.267	2548564.897	4.323	236 19gw-118
2025	7656620.276	2548564.79	3.559	218
2024	7656392.689	2548855.491	9.911	227 19sp-8
2023	7656398.306	2548831.87	9.231	227 19sp-7
2022	7656462.762	2548766.827	16.892	218
2021	7656457.49	2548765.862	28.366	236 19gw124 approx
2020	7656424.408	2548785.561	8.26	227 19sp-4
2019	7656403.448	2548749.233	8.103	227 19sp-5
2018	7656393.088	2548774.956	8.854	227 19sp-6
2017	7656355.263	2548792.594	9.974	227 19sp-11
2016	7656354.747	2548759.14	10.05	227 19sp-10
2015	7656367.058	2548727.78	9.194	227 19sp-9
2014	7656508.962	2548599.64	7.48	227 19sp-1
2013	7656501.278	2548623.786	7.491	227 19sp-2
2012	7656495.564	2548636.535	7.482	227 19sp-3
2011	7656505.223	2548620.111	7.959	236 19gw120
2010	7656505.142	2548619.997	7.338	218
2009	7656630.306	2548428.242	5.228	236 19gw-117
2008	7656630.078	2548428.297	5.359	218
2007	7656547.338	2548504.001	8.128	236 19gw-119
2006	7656547.489	2548503.858	8.319	218
2005	7656481.913	2548405.73	11.799	236 19gw-116
2004	7656482.022	2548405.78	11.933	218
2003	7656481.036	2548257.035	14.966	236 19gw-115
2002	7656480.962	2548256.928	14.18	218
2001	7656478.01	2548090.363	15.881	236 19gw-114
2000	7656478.085	2548090.266	15.122	218

Appendix C
2019 Laboratory Certificates

METHOD SUMMARY

Toxicity Characteristic Leaching Procedure (TCLP)

SOP #: ATL SOP-00035

Reference: USEPA SW846 Method 1311 “Toxicity Characteristic Leaching Procedure”

1. Scope and Application

Leachate is liquid produced from the natural degradation of waste as well as liquid runoff produced by rainwater falling directly on the waste or filtering through the surrounding soil. The content of the leachate depends upon the content of the waste, the moisture of the waste, the amount of rainfall and the pH of the rainwater. Leachate tests simulate the natural leaching process and are used to determine the concentration of contaminants from soil, solid materials and multi-phase wastes that would enter the environment. The TCLP extraction procedure is intended to imitate landfill leachate conditions where solids are contacted with weak organic acids.

2. Summary of Method

A homogeneous (reduced to < 9.5 mm) sample is extracted over an 18-hour period. The buffering capacity of the solid material is determined in order to use the proper extraction fluid to maintain an extraction pH of 5.0. For non-volatile parameters, 100±2 g of sample (as received) is required for leachate extraction. A minimum 400 – 500g of material should be provided. Waste disposal facilities may reject material on the basis of non-representative sample size if smaller weights are used in the analysis. All leachate analysis is performed on the “as received” material. The client must ensure that the material submitted is representative and request any additional pre-treatment (e.g. removal from substrate).

3. Quality Assurance

A minimum of one method blank, one sample duplicate and one post-extraction matrix spike is performed with every twenty samples.

Maxxam
A Bureau Veritas Group Company

Your P.O. #: 73517186
Your Project #: 11198639-04
Site Location: GLENCORE

Attention: Rob Turner

GHD Limited
466 Hodgson Rd
Fredericton , NB
CANADA E3C 2G5

Your C.O.C. #: D 34717, D 34718, D 34720, D 34719

Report Date: 2019/11/07
Report #: R5955540
Version: 3 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9Q9373
Received: 2019/09/25, 09:58

Sample Matrix: Soil
Samples Received: 34

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Benzo(b/j)fluoranthene Sum (soil)	2	N/A	2019/09/30	N/A	Auto Calc.
Metals Leach TCLP/CGSB extraction	1	2019/10/16	2019/10/17	ATL SOP 00058	EPA 6020B R2 m
Metals Leach TCLP/CGSB extraction	4	2019/10/16	2019/10/18	ATL SOP 00058	EPA 6020B R2 m
Metals Leach TCLP/CGSB extraction	1	2019/10/17	2019/10/18	ATL SOP 00058	EPA 6020B R2 m
Metals Leach TCLP/CGSB extraction	1	2019/10/18	2019/10/18	ATL SOP 00058	EPA 6020B R2 m
Metals Leach TCLP/CGSB extraction	2	2019/10/18	2019/10/21	ATL SOP 00058	EPA 6020B R2 m
Metals Solids Acid Extr. ICPMS	10	2019/09/27	2019/10/01	ATL SOP 00058	EPA 6020B R2 m
Metals Solids Acid Extr. ICPMS	8	2019/09/27	2019/10/02	ATL SOP 00058	EPA 6020B R2 m
Metals Solids Acid Extr. ICPMS	9	2019/09/27	2019/10/04	ATL SOP 00058	EPA 6020B R2 m
Metals Solids Acid Extr. ICPMS	1	2019/09/30	2019/10/03	ATL SOP 00058	EPA 6020B R2 m
Metals Solids Acid Extr. ICPMS	3	2019/09/30	2019/10/04	ATL SOP 00058	EPA 6020B R2 m
Metals Solids Acid Extr. ICPMS	1	2019/10/04	2019/10/04	ATL SOP 00058	EPA 6020B R2 m
Moisture	2	N/A	2019/09/27	ATL SOP 00001	OMOE Handbook 1983 m
PAH Compounds by GCMS (SIM) (1)	2	2019/09/27	2019/09/27	ATL SOP 00102	EPA 8270E R6 m
pH (5:1 DI Water Extract)	11	2019/09/30	2019/10/01	ATL SOP 00003	SM 23 4500-H+ B m
Particle size in solids (pipette&sieve) (2)	3	N/A	2019/11/06	ATL SOP 00012	MSAMS'78/WREP-125R3m
TCLP Inorganic extraction - pH	5	N/A	2019/10/16	ATL SOP 00035	EPA 1311 m
TCLP Inorganic extraction - pH	1	N/A	2019/10/17	ATL SOP 00035	EPA 1311 m
TCLP Inorganic extraction - pH	3	N/A	2019/10/18	ATL SOP 00035	EPA 1311 m
TCLP Inorganic extraction - Weight	5	N/A	2019/10/16	ATL SOP 00035	EPA 1311 m
TCLP Inorganic extraction - Weight	1	N/A	2019/10/17	ATL SOP 00035	EPA 1311 m
TCLP Inorganic extraction - Weight	3	N/A	2019/10/18	ATL SOP 00035	EPA 1311 m

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs in writing). All

Your P.O. #: 73517186
Your Project #: 11198639-04
Site Location: GLENCORE

Attention: Rob Turner

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466 Hodgson Rd
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Your C.O.C. #: D 34717, D 34718, D 34720, D 34719

Report Date: 2019/11/07
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Received: 2019/09/25, 09:58

data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by BV Labs, unless otherwise agreed in writing. BV Labs is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) Soils are reported on a dry weight basis unless otherwise specified.
(2) Note: Graphical representation of larger fractions (PHI-4, PHI -3 and PHI -2) not applicable unless these optional parameters are specifically requested.

Encryption Key

AUTHORIZED REPORT
RAPPORT AUTORISÉ

Bureau Veritas Laboratories
07 Nov 2019 15:19:12

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Heather Macumber, Senior Project Manager
Email: Heather.MACUMBER@bvlabs.com
Phone# (902)420-0203 Ext:226

==========

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

BV Labs Job #: B9Q9373
Report Date: 2019/11/07

GHD Limited
Client Project #: 11198639-04
Site Location: GLENCORE
Your P.O. #: 73517186
Sampler Initials: MG

RESULTS OF ANALYSES OF SOIL

BV Labs ID		KWN231			KWN232		KWN233		
Sampling Date		2019/09/17 11:49			2019/09/17 10:07		2019/09/17 10:13		
COC Number		D 34717			D 34717		D 34717		
	UNITS	19GW-114 (1.2-1.8M)	RDL	QC Batch	19GW-115 (0.0-0.15M)	QC Batch	19GW-115 (1.2-1.8M)	RDL	QC Batch
Inorganics									
Moisture	%	19	1.0	6356339			11	1.0	6356339
Sample Weight (as received)	g				100	6388164			
Initial pH	N/A				4.8	6388165			
Final pH	N/A				5.5	6388165			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

BV Labs ID		KWN234		KWN246	KWN247	
Sampling Date		2019/09/17 10:27		2019/09/17 14:36	2019/09/17 14:57	
COC Number		D 34717		D 34718	D 34718	
	UNITS	19GW-115 (1.8-2.4M)	QC Batch	19GW-119 (0.0-0.15M)	19GW-119 (2.7-3.3M)	QC Batch
Inorganics						
Soluble (5:1) pH	pH			5.68	7.83	6362631
Sample Weight (as received)	g	100	6388164			
Initial pH	N/A	4.8	6388165			
Final pH	N/A	4.8	6388165			

QC Batch = Quality Control Batch

BV Labs ID		KWN248	KWN249	KWN250	KWN251	
Sampling Date		2019/09/19 08:32	2019/09/19 08:34	2019/09/18 14:51	2019/09/18 15:14	
COC Number		D 34718	D 34718	D 34718	D 34718	
	UNITS	19GW-120 (0.0-0.15M)	19GW-120 (1.2-1.8M)	19GW-122 (0.0-0.15M)	19GW-122 (0.6-1.2M)	QC Batch
Inorganics						
Soluble (5:1) pH	pH	6.24	6.08	6.52	7.08	6362631

QC Batch = Quality Control Batch

Bureau Veritas Laboratories 200 Bluewater Rd, Suite 105, Bedford, Nova Scotia Canada B4B 1G9 Tel: 902-420-0203 Toll-free: 800-565-7227 Fax: 902-420-8612 www.bvlabs.com

BV Labs Job #: B9Q9373
Report Date: 2019/11/07

GHD Limited
Client Project #: 11198639-04
Site Location: GLENCORE
Your P.O. #: 73517186
Sampler Initials: MG

RESULTS OF ANALYSES OF SOIL

BV Labs ID		KWN251	KWN252		KWN253		
Sampling Date		2019/09/18 15:14	2019/09/18 13:32		2019/09/18 13:34		
COC Number		D 34718	D 34718		D 34718		
	UNITS	19GW-122 (0.6-1.2M) Lab-Dup	19GW-123 (0.0-0.15M)	QC Batch	19GW-123 (0.3-0.6M)	RDL	QC Batch
Inorganics							
Soluble (5:1) pH	pH	7.13	7.75	6362631			
< -1 Phi (2 mm)	%				57	0.10	6394000
< 0 Phi (1 mm)	%				45	0.10	6394000
< +1 Phi (0.5 mm)	%				35	0.10	6394000
< +2 Phi (0.25 mm)	%				26	0.10	6394000
< +3 Phi (0.12 mm)	%				21	0.10	6394000
< +4 Phi (0.062 mm)	%				18	0.10	6394000
< +5 Phi (0.031 mm)	%				15	0.10	6394000
< +6 Phi (0.016 mm)	%				12	0.10	6394000
< +7 Phi (0.0078 mm)	%				8.3	0.10	6394000
< +8 Phi (0.0039 mm)	%				7.2	0.10	6394000
< +9 Phi (0.0020 mm)	%				5.4	0.10	6394000
Gravel	%				43	0.10	6394000
Sand	%				39	0.10	6394000
Silt	%				11	0.10	6394000
Clay	%				7.2	0.10	6394000

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

BV Labs ID		KWN255		KWN256	KWN257	
Sampling Date		2019/09/18 16:11		2019/09/20 08:50	2019/09/20 09:05	
COC Number		D 34720		D 34720	D 34720	
	UNITS	19GW-124 (0.0-0.15M)	QC Batch	19GW-127 (0.0-0.15M)	19GW-127 (1.2-1.8M)	QC Batch
Inorganics						
Soluble (5:1) pH	pH	7.88	6362631			
Sample Weight (as received)	g			100	100	6388164
Initial pH	N/A			4.8	4.8	6388165
Final pH	N/A			5.7	5.3	6388165

QC Batch = Quality Control Batch

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BV Labs Job #: B9Q9373
Report Date: 2019/11/07

GHD Limited
Client Project #: 11198639-04
Site Location: GLENCORE
Your P.O. #: 73517186
Sampler Initials: MG

RESULTS OF ANALYSES OF SOIL

BV Labs ID		KWN257	KWN258		KWN259	
Sampling Date		2019/09/20 09:05	2019/09/19 13:40		2019/09/19 14:05	
COC Number		D 34720	D 34720		D 34720	
	UNITS	19GW-127 (1.2-1.8M) Lab-Dup	19GW-133 (0.0-0.15M)	QC Batch	19GW-133 (1.2-1.8M)	QC Batch
Inorganics						
Sample Weight (as received)	g	100	100	6388164	100	6393098
Initial pH	N/A	4.8	4.9	6388165	4.8	6393100
Final pH	N/A	5.2	5.4	6388165	5.0	6393100

QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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BV Labs Job #: B9Q9373
Report Date: 2019/11/07

GHD Limited
Client Project #: 11198639-04
Site Location: GLENCORE
Your P.O. #: 73517186
Sampler Initials: MG

RESULTS OF ANALYSES OF SOIL

BV Labs ID		KWN260	KWN261	KWN262		KWN263		
Sampling Date		2019/09/19 15:35	2019/09/19 11:15	2019/09/19 11:35		2019/09/19 16:33		
COC Number		D 34720	D 34720	D 34719		D 34719		
	UNITS	19SP-1 (1.2-1.8M)	19SP-3 (1.2-1.8M)	19SP-9 (0.6-1.2M)	QC Batch	19SP-14 (0.0-0.6M)	RDL	QC Batch
Inorganics								
Soluble (5:1) pH	pH	7.10	6.65	7.65	6362631			
Sample Weight (as received)	g					100	N/A	6393098
Initial pH	N/A					4.9		6393100
Final pH	N/A					5.7		6393100
< -1 Phi (2 mm)	%					78	0.10	6394000
< 0 Phi (1 mm)	%					64	0.10	6394000
< +1 Phi (0.5 mm)	%					50	0.10	6394000
< +2 Phi (0.25 mm)	%					39	0.10	6394000
< +3 Phi (0.12 mm)	%					32	0.10	6394000
< +4 Phi (0.062 mm)	%					27	0.10	6394000
< +5 Phi (0.031 mm)	%					22	0.10	6394000
< +6 Phi (0.016 mm)	%					17	0.10	6394000
< +7 Phi (0.0078 mm)	%					12	0.10	6394000
< +8 Phi (0.0039 mm)	%					10	0.10	6394000
< +9 Phi (0.0020 mm)	%					7.8	0.10	6394000
Gravel	%					22	0.10	6394000
Sand	%					51	0.10	6394000
Silt	%					17	0.10	6394000
Clay	%					10	0.10	6394000

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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BV Labs Job #: B9Q9373
Report Date: 2019/11/07

GHD Limited
Client Project #: 11198639-04
Site Location: GLENCORE
Your P.O. #: 73517186
Sampler Initials: MG

RESULTS OF ANALYSES OF SOIL

BV Labs ID		KWN263		KWN264			KWN265	
Sampling Date		2019/09/19 16:33		2019/09/20 08:28			2019/09/19 13:15	
COC Number		D 34719		D 34719			D 34719	
	UNITS	19SP-14 (0.0-0.6M) Lab-Dup	QC Batch	19SP-16 (0.6-1.2M)	RDL	QC Batch	19SP-17 (0.6-1.2M)	QC Batch
Inorganics								
Sample Weight (as received)	g	100	6393098	73	N/A	6391323	100	6393098
Initial pH	N/A	4.9	6393100	5.0		6391325	4.9	6393100
Final pH	N/A	5.7	6393100	5.9		6391325	5.3	6393100
< -1 Phi (2 mm)	%			54	0.10	6394000		
< 0 Phi (1 mm)	%			44	0.10	6394000		
< +1 Phi (0.5 mm)	%			34	0.10	6394000		
< +2 Phi (0.25 mm)	%			26	0.10	6394000		
< +3 Phi (0.12 mm)	%			21	0.10	6394000		
< +4 Phi (0.062 mm)	%			16	0.10	6394000		
< +5 Phi (0.031 mm)	%			13	0.10	6394000		
< +6 Phi (0.016 mm)	%			9.8	0.10	6394000		
< +7 Phi (0.0078 mm)	%			6.3	0.10	6394000		
< +8 Phi (0.0039 mm)	%			5.4	0.10	6394000		
< +9 Phi (0.0020 mm)	%			3.8	0.10	6394000		
Gravel	%			46	0.10	6394000		
Sand	%			38	0.10	6394000		
Silt	%			11	0.10	6394000		
Clay	%			5.4	0.10	6394000		

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

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BV Labs Job #: B9Q9373
Report Date: 2019/11/07

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Sampler Initials: MG

ELEMENTS BY ICP/MS (SOIL)

BV Labs ID		KWN232		KWN234		KWN256		
Sampling Date		2019/09/17 10:07		2019/09/17 10:27		2019/09/20 08:50		
COC Number		D 34717		D 34717		D 34720		
	UNITS	19GW-115 (0.0-0.15M)	RDL	19GW-115 (1.8-2.4M)	RDL	19GW-127 (0.0-0.15M)	RDL	QC Batch
Metals								
Leachable Aluminum (Al)	ug/L	490	100	1600	100	100	100	6388780
Leachable Antimony (Sb)	ug/L	87	20	<20	20	8200	200	6388780
Leachable Arsenic (As)	ug/L	120	20	<20	20	15000	200	6388780
Leachable Barium (Ba)	ug/L	350	50	340	50	220	50	6388780
Leachable Beryllium (Be)	ug/L	<20	20	<20	20	<20	20	6388780
Leachable Boron (B)	ug/L	<500	500	<500	500	1000	500	6388780
Leachable Cadmium (Cd)	ug/L	6500	30	2400	3.0	320	3.0	6388780
Leachable Calcium (Ca)	ug/L	510000	1000	14000	1000	490000	1000	6388780
Leachable Chromium (Cr)	ug/L	<20	20	<20	20	<20	20	6388780
Leachable Cobalt (Co)	ug/L	44	10	<10	10	21	10	6388780
Leachable Copper (Cu)	ug/L	21000	20	39	20	4800	20	6388780
Leachable Iron (Fe)	ug/L	<500	500	<500	500	<500	500	6388780
Leachable Lead (Pb)	ug/L	73000	5.0	1000	5.0	130000	50	6388780
Leachable Lithium (Li)	ug/L	<20	20	<20	20	<20	20	6388780
Leachable Magnesium (Mg)	ug/L	7400	1000	1800	1000	8700	1000	6388780
Leachable Manganese (Mn)	ug/L	3100	20	2100	20	2200	20	6388780
Leachable Molybdenum (Mo)	ug/L	<20	20	<20	20	<20	20	6388780
Leachable Nickel (Ni)	ug/L	72	20	<20	20	98	20	6388780
Leachable Potassium (K)	ug/L	3200	1000	15000	1000	37000	1000	6388780
Leachable Selenium (Se)	ug/L	23	10	<10	10	<10	10	6388780
Leachable Silver (Ag)	ug/L	<5.0	5.0	<5.0	5.0	<5.0	5.0	6388780
Leachable Strontium (Sr)	ug/L	960	50	53	50	780	50	6388780
Leachable Thallium (Tl)	ug/L	260	1.0	6.9	1.0	170	1.0	6388780
Leachable Tin (Sn)	ug/L	<20	20	<20	20	<20	20	6388780
Leachable Uranium (U)	ug/L	1.1	1.0	<1.0	1.0	<1.0	1.0	6388780
Leachable Vanadium (V)	ug/L	<20	20	<20	20	<20	20	6388780
Leachable Zinc (Zn)	ug/L	39000	50	5600	50	46000	50	6388780

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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BV Labs Job #: B9Q9373
Report Date: 2019/11/07

GHD Limited
Client Project #: 11198639-04
Site Location: GLENCORE
Your P.O. #: 73517186
Sampler Initials: MG

ELEMENTS BY ICP/MS (SOIL)

BV Labs ID		KWN257	KWN257		KWN258		
Sampling Date		2019/09/20 09:05	2019/09/20 09:05		2019/09/19 13:40		
COC Number		D 34720	D 34720		D 34720		
	UNITS	19GW-127 (1.2-1.8M)	19GW-127 (1.2-1.8M) Lab-Dup	RDL	19GW-133 (0.0-0.15M)	RDL	QC Batch
Metals							
Leachable Aluminum (Al)	ug/L	260	310	100	740	100	6388780
Leachable Antimony (Sb)	ug/L	100	120	20	99	20	6388780
Leachable Arsenic (As)	ug/L	43	63	20	800	20	6388780
Leachable Barium (Ba)	ug/L	530	500	50	<50	50	6388780
Leachable Beryllium (Be)	ug/L	<20	<20	20	<20	20	6388780
Leachable Boron (B)	ug/L	<500	<500	500	<500	500	6388780
Leachable Cadmium (Cd)	ug/L	150	180	3.0	30000	30	6388780
Leachable Calcium (Ca)	ug/L	280000	210000	1000	140000	1000	6388780
Leachable Chromium (Cr)	ug/L	<20	<20	20	<20	20	6388780
Leachable Cobalt (Co)	ug/L	<10	<10	10	230	10	6388780
Leachable Copper (Cu)	ug/L	<20	<20	20	290000	200	6388780
Leachable Iron (Fe)	ug/L	4400	6000	500	<500	500	6388780
Leachable Lead (Pb)	ug/L	1400	1700	5.0	670000	50	6388780
Leachable Lithium (Li)	ug/L	<20	<20	20	<20	20	6388780
Leachable Magnesium (Mg)	ug/L	12000	13000	1000	1900	1000	6388780
Leachable Manganese (Mn)	ug/L	17000	15000	20	2500	20	6388780
Leachable Molybdenum (Mo)	ug/L	<20	<20	20	<20	20	6388780
Leachable Nickel (Ni)	ug/L	<20	<20	20	390	20	6388780
Leachable Potassium (K)	ug/L	26000	27000	1000	3800	1000	6388780
Leachable Selenium (Se)	ug/L	<10	<10	10	40	10	6388780
Leachable Silver (Ag)	ug/L	<5.0	<5.0	5.0	<5.0	5.0	6388780
Leachable Strontium (Sr)	ug/L	310	260	50	110	50	6388780
Leachable Thallium (Tl)	ug/L	11	12	1.0	11000	100	6388780
Leachable Tin (Sn)	ug/L	<20	<20	20	<20	20	6388780
Leachable Uranium (U)	ug/L	1.2	1.3	1.0	<1.0	1.0	6388780
Leachable Vanadium (V)	ug/L	<20	<20	20	<20	20	6388780
Leachable Zinc (Zn)	ug/L	320	460	50	27000	50	6388780

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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BV Labs Job #: B9Q9373
Report Date: 2019/11/07

GHD Limited
Client Project #: 11198639-04
Site Location: GLENCORE
Your P.O. #: 73517186
Sampler Initials: MG

ELEMENTS BY ICP/MS (SOIL)

BV Labs ID		KWN259		KWN263		KWN263		
Sampling Date		2019/09/19 14:05		2019/09/19 16:33		2019/09/19 16:33		
COC Number		D 34720		D 34719		D 34719		
	UNITS	19GW-133 (1.2-1.8M)	RDL	19SP-14 (0.0-0.6M)	RDL	19SP-14 (0.0-0.6M) Lab-Dup	RDL	QC Batch
Metals								
Leachable Aluminum (Al)	ug/L	2500	100	290	100	280	100	6393264
Leachable Antimony (Sb)	ug/L	<20	20	450	20	590	20	6393264
Leachable Arsenic (As)	ug/L	61	20	820	20	3100 (1)	20	6393264
Leachable Barium (Ba)	ug/L	850	50	200	50	230	50	6393264
Leachable Beryllium (Be)	ug/L	<20	20	<20	20	<20	20	6393264
Leachable Boron (B)	ug/L	<500	500	1400	500	1500	500	6393264
Leachable Cadmium (Cd)	ug/L	140	3.0	16000	30	130000 (1)	300	6393264
Leachable Calcium (Ca)	ug/L	77000	1000	200000	1000	190000	1000	6393264
Leachable Chromium (Cr)	ug/L	<20	20	<20	20	<20	20	6393264
Leachable Cobalt (Co)	ug/L	<10	10	130	10	130	10	6393264
Leachable Copper (Cu)	ug/L	640	20	67000	200	66000	200	6393264
Leachable Iron (Fe)	ug/L	2000	500	<500	500	<500	500	6393264
Leachable Lead (Pb)	ug/L	1100	5.0	180000	50	150000	50	6393264
Leachable Lithium (Li)	ug/L	<20	20	21	20	22	20	6393264
Leachable Magnesium (Mg)	ug/L	4100	1000	88000	1000	92000	1000	6393264
Leachable Manganese (Mn)	ug/L	9700	20	5900	20	5700	20	6393264
Leachable Molybdenum (Mo)	ug/L	<20	20	<20	20	<20	20	6393264
Leachable Nickel (Ni)	ug/L	<20	20	140	20	120	20	6393264
Leachable Potassium (K)	ug/L	6300	1000	12000	1000	11000	1000	6393264
Leachable Selenium (Se)	ug/L	<10	10	170	10	170	10	6393264
Leachable Silver (Ag)	ug/L	<5.0	5.0	<5.0	5.0	<5.0	5.0	6393264
Leachable Strontium (Sr)	ug/L	360	50	470	50	470	50	6393264
Leachable Thallium (Tl)	ug/L	48	1.0	61	1.0	59	1.0	6393264
Leachable Tin (Sn)	ug/L	<20	20	<20	20	<20	20	6393264
Leachable Uranium (U)	ug/L	1.4	1.0	<1.0	1.0	<1.0	1.0	6393264
Leachable Vanadium (V)	ug/L	<20	20	<20	20	<20	20	6393264
Leachable Zinc (Zn)	ug/L	250	50	77000	50	53000 (1)	50	6393264

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
(1) Poor RPD due to sample inhomogeneity. Insufficient sample for re-extraction and re-analysis.

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GHD Limited
Client Project #: 11198639-04
Site Location: GLENCORE
Your P.O. #: 73517186
Sampler Initials: MG

ELEMENTS BY ICP/MS (SOIL)

BV Labs ID		KWN264		KWN265		
Sampling Date		2019/09/20 08:28		2019/09/19 13:15		
COC Number		D 34719		D 34719		
	UNITS	19SP-16 (0.6-1.2M)	QC Batch	19SP-17 (0.6-1.2M)	RDL	QC Batch
Metals						
Leachable Aluminum (Al)	ug/L	170	6391070	960	100	6393264
Leachable Antimony (Sb)	ug/L	1200	6391070	290	20	6393264
Leachable Arsenic (As)	ug/L	580	6391070	570	20	6393264
Leachable Barium (Ba)	ug/L	390	6391070	150	50	6393264
Leachable Beryllium (Be)	ug/L	<20	6391070	<20	20	6393264
Leachable Boron (B)	ug/L	<500	6391070	700	500	6393264
Leachable Cadmium (Cd)	ug/L	4500	6391070	1700	3.0	6393264
Leachable Calcium (Ca)	ug/L	540000	6391070	290000	1000	6393264
Leachable Chromium (Cr)	ug/L	<20	6391070	<20	20	6393264
Leachable Cobalt (Co)	ug/L	<10	6391070	57	10	6393264
Leachable Copper (Cu)	ug/L	800	6391070	3400	20	6393264
Leachable Iron (Fe)	ug/L	<500	6391070	1100	500	6393264
Leachable Lead (Pb)	ug/L	38000	6391070	11000	5.0	6393264
Leachable Lithium (Li)	ug/L	<20	6391070	<20	20	6393264
Leachable Magnesium (Mg)	ug/L	20000	6391070	3400	1000	6393264
Leachable Manganese (Mn)	ug/L	9700	6391070	11000	20	6393264
Leachable Molybdenum (Mo)	ug/L	<20	6391070	20	20	6393264
Leachable Nickel (Ni)	ug/L	25	6391070	49	20	6393264
Leachable Potassium (K)	ug/L	28000	6391070	11000	1000	6393264
Leachable Selenium (Se)	ug/L	56	6391070	82	10	6393264
Leachable Silver (Ag)	ug/L	<5.0	6391070	<5.0	5.0	6393264
Leachable Strontium (Sr)	ug/L	520	6391070	220	50	6393264
Leachable Thallium (Tl)	ug/L	130	6391070	130	1.0	6393264
Leachable Tin (Sn)	ug/L	<20	6391070	<20	20	6393264
Leachable Uranium (U)	ug/L	<1.0	6391070	1.1	1.0	6393264
Leachable Vanadium (V)	ug/L	<20	6391070	<20	20	6393264
Leachable Zinc (Zn)	ug/L	6300	6391070	7400	50	6393264

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

BV Labs Job #: B9Q9373
Report Date: 2019/11/07

GHD Limited
Client Project #: 11198639-04
Site Location: GLENCORE
Your P.O. #: 73517186
Sampler Initials: MG

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

BV Labs ID		KWN229	KWN230		KWN232		
Sampling Date		2019/09/17 11:43	2019/09/17 11:48		2019/09/17 10:07		
COC Number		D 34717	D 34717		D 34717		
	UNITS	19GW-114 (0.0-0.15M)	19GW-114 (0.6-1.2M)	RDL	19GW-115 (0.0-0.15M)	RDL	QC Batch
Metals							
Acid Extractable Aluminum (Al)	mg/kg	30000	28000	10	20000	10	6356323
Acid Extractable Antimony (Sb)	mg/kg	16	6.9	2.0	140	20	6356323
Acid Extractable Arsenic (As)	mg/kg	38	37	2.0	600	20	6356323
Acid Extractable Barium (Ba)	mg/kg	99	100	5.0	110	5.0	6356323
Acid Extractable Beryllium (Be)	mg/kg	<2.0	<2.0	2.0	<2.0	2.0	6356323
Acid Extractable Bismuth (Bi)	mg/kg	3.9	2.6	2.0	54	2.0	6356323
Acid Extractable Boron (B)	mg/kg	<50	<50	50	<50	50	6356323
Acid Extractable Cadmium (Cd)	mg/kg	8.5	18	0.30	220	0.30	6356323
Acid Extractable Chromium (Cr)	mg/kg	74	75	2.0	62	2.0	6356323
Acid Extractable Cobalt (Co)	mg/kg	15	16	1.0	22	1.0	6356323
Acid Extractable Copper (Cu)	mg/kg	92	73	2.0	1700	2.0	6356323
Acid Extractable Iron (Fe)	mg/kg	38000	37000	50	42000	50	6356323
Acid Extractable Lead (Pb)	mg/kg	2300	1800	0.50	11000	5.0	6356323
Acid Extractable Lithium (Li)	mg/kg	23	24	2.0	22	2.0	6356323
Acid Extractable Manganese (Mn)	mg/kg	600	870	2.0	980	2.0	6356323
Acid Extractable Mercury (Hg)	mg/kg	0.46	0.27	0.10	2.4	0.10	6356323
Acid Extractable Molybdenum (Mo)	mg/kg	3.0	3.2	2.0	5.4	2.0	6356323
Acid Extractable Nickel (Ni)	mg/kg	38	44	2.0	51	2.0	6356323
Acid Extractable Rubidium (Rb)	mg/kg	20	17	2.0	8.4	2.0	6356323
Acid Extractable Selenium (Se)	mg/kg	1.0	<1.0	1.0	25	1.0	6356323
Acid Extractable Silver (Ag)	mg/kg	3.0	2.4	0.50	61	5.0	6356323
Acid Extractable Strontium (Sr)	mg/kg	210	210	5.0	77	5.0	6356323
Acid Extractable Thallium (Tl)	mg/kg	2.0	1.9	0.10	54	0.10	6356323
Acid Extractable Tin (Sn)	mg/kg	7.9	6.9	1.0	170	1.0	6356323
Acid Extractable Uranium (U)	mg/kg	35	32	0.10	5.8	0.10	6356323
Acid Extractable Vanadium (V)	mg/kg	120	96	2.0	73	2.0	6356323
Acid Extractable Zinc (Zn)	mg/kg	940	1500	5.0	3700	5.0	6356323

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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GHD Limited
Client Project #: 11198639-04
Site Location: GLENCORE
Your P.O. #: 73517186
Sampler Initials: MG

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

BV Labs ID		KWN234		KWN235		
Sampling Date		2019/09/17 10:27		2019/09/17 13:46		
COC Number		D 34717		D 34717		
	UNITS	19GW-115 (1.8-2.4M)	QC Batch	19GW-116 (0.0-0.15M)	RDL	QC Batch
Metals						
Acid Extractable Aluminum (Al)	mg/kg	20000	6356323	20000	10	6369348
Acid Extractable Antimony (Sb)	mg/kg	4.9	6356323	190	2.0	6369348
Acid Extractable Arsenic (As)	mg/kg	23	6356323	280	2.0	6369348
Acid Extractable Barium (Ba)	mg/kg	58	6356323	63	5.0	6369348
Acid Extractable Beryllium (Be)	mg/kg	<2.0	6356323	<2.0	2.0	6369348
Acid Extractable Bismuth (Bi)	mg/kg	2.1	6356323	56	2.0	6369348
Acid Extractable Boron (B)	mg/kg	<50	6356323	<50	50	6369348
Acid Extractable Cadmium (Cd)	mg/kg	94	6356323	15	0.30	6369348
Acid Extractable Chromium (Cr)	mg/kg	42	6356323	61	2.0	6369348
Acid Extractable Cobalt (Co)	mg/kg	14	6356323	22	1.0	6369348
Acid Extractable Copper (Cu)	mg/kg	28	6356323	410	2.0	6369348
Acid Extractable Iron (Fe)	mg/kg	37000	6356323	46000	50	6369348
Acid Extractable Lead (Pb)	mg/kg	420	6356323	13000	0.50	6369348
Acid Extractable Lithium (Li)	mg/kg	22	6356323	23	2.0	6369348
Acid Extractable Manganese (Mn)	mg/kg	980	6356323	2800	2.0	6369348
Acid Extractable Mercury (Hg)	mg/kg	0.15	6356323	0.38	0.10	6369348
Acid Extractable Molybdenum (Mo)	mg/kg	<2.0	6356323	2.5	2.0	6369348
Acid Extractable Nickel (Ni)	mg/kg	43	6356323	51	2.0	6369348
Acid Extractable Rubidium (Rb)	mg/kg	7.4	6356323	5.9	2.0	6369348
Acid Extractable Selenium (Se)	mg/kg	<1.0	6356323	6.3	1.0	6369348
Acid Extractable Silver (Ag)	mg/kg	2.8	6356323	120	0.50	6369348
Acid Extractable Strontium (Sr)	mg/kg	10	6356323	32	5.0	6369348
Acid Extractable Thallium (Tl)	mg/kg	2.6	6356323	2.0	0.10	6369348
Acid Extractable Tin (Sn)	mg/kg	2.0	6356323	21	1.0	6369348
Acid Extractable Uranium (U)	mg/kg	0.56	6356323	3.0	0.10	6369348
Acid Extractable Vanadium (V)	mg/kg	71	6356323	85	2.0	6369348
Acid Extractable Zinc (Zn)	mg/kg	400	6356323	3800	5.0	6369348

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

BV Labs Job #: B9Q9373
Report Date: 2019/11/07

GHD Limited
Client Project #: 11198639-04
Site Location: GLENCORE
Your P.O. #: 73517186
Sampler Initials: MG

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

BV Labs ID		KWN236		KWN237		
Sampling Date		2019/09/17 13:54		2019/09/17 15:50		
COC Number		D 34717		D 34717		
	UNITS	19GW-116 (1.2-1.5M)	RDL	19GW-117 (0.0-0.15M)	RDL	QC Batch
Metals						
Acid Extractable Aluminum (Al)	mg/kg	23000	10	22000	10	6356395
Acid Extractable Antimony (Sb)	mg/kg	23	2.0	210	2.0	6356395
Acid Extractable Arsenic (As)	mg/kg	30	2.0	350	2.0	6356395
Acid Extractable Barium (Ba)	mg/kg	140	5.0	160	5.0	6356395
Acid Extractable Beryllium (Be)	mg/kg	<2.0	2.0	<2.0	2.0	6356395
Acid Extractable Bismuth (Bi)	mg/kg	6.0	2.0	54	2.0	6356395
Acid Extractable Boron (B)	mg/kg	<50	50	<50	50	6356395
Acid Extractable Cadmium (Cd)	mg/kg	1.9	0.30	50	0.30	6356395
Acid Extractable Chromium (Cr)	mg/kg	47	2.0	51	2.0	6356395
Acid Extractable Cobalt (Co)	mg/kg	2.4	1.0	24	1.0	6356395
Acid Extractable Copper (Cu)	mg/kg	58	2.0	900	2.0	6356395
Acid Extractable Iron (Fe)	mg/kg	24000	50	53000	50	6356395
Acid Extractable Lead (Pb)	mg/kg	1200	0.50	15000	5.0	6356395
Acid Extractable Lithium (Li)	mg/kg	3.8	2.0	26	2.0	6356395
Acid Extractable Manganese (Mn)	mg/kg	170	2.0	1400	2.0	6356395
Acid Extractable Mercury (Hg)	mg/kg	0.54	0.10	1.9	0.10	6356395
Acid Extractable Molybdenum (Mo)	mg/kg	6.3	2.0	5.2	2.0	6356395
Acid Extractable Nickel (Ni)	mg/kg	6.5	2.0	56	2.0	6356395
Acid Extractable Rubidium (Rb)	mg/kg	74	2.0	6.5	2.0	6356395
Acid Extractable Selenium (Se)	mg/kg	1.9	1.0	8.2	1.0	6356395
Acid Extractable Silver (Ag)	mg/kg	9.7	0.50	85	5.0	6356395
Acid Extractable Strontium (Sr)	mg/kg	620	5.0	42	5.0	6356395
Acid Extractable Thallium (Tl)	mg/kg	1.5	0.10	12	0.10	6356395
Acid Extractable Tin (Sn)	mg/kg	5.1	1.0	36	1.0	6356395
Acid Extractable Uranium (U)	mg/kg	21	0.10	1.1	0.10	6356395
Acid Extractable Vanadium (V)	mg/kg	63	2.0	78	2.0	6356395
Acid Extractable Zinc (Zn)	mg/kg	280	5.0	14000	5.0	6356395

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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BV Labs Job #: B9Q9373
Report Date: 2019/11/07

GHD Limited
Client Project #: 11198639-04
Site Location: GLENCORE
Your P.O. #: 73517186
Sampler Initials: MG

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

BV Labs ID		KWN238		KWN244	KWN245		
Sampling Date		2019/09/17 15:59		2019/09/18 09:29	2019/09/18 09:43		
COC Number		D 34717		D 34718	D 34718		
	UNITS	19GW-117 (0.3-0.9M)	QC Batch	19GW-118 (0.0-0.15M)	19GW-118 (1.2-1.8M)	RDL	QC Batch
Metals							
Acid Extractable Aluminum (Al)	mg/kg	21000	6359706	22000	12000	10	6356395
Acid Extractable Antimony (Sb)	mg/kg	35	6359706	27	36	2.0	6356395
Acid Extractable Arsenic (As)	mg/kg	52	6359706	83	40	2.0	6356395
Acid Extractable Barium (Ba)	mg/kg	80	6359706	92	62	5.0	6356395
Acid Extractable Beryllium (Be)	mg/kg	<2.0	6359706	<2.0	<2.0	2.0	6356395
Acid Extractable Bismuth (Bi)	mg/kg	7.6	6359706	16	3.7	2.0	6356395
Acid Extractable Boron (B)	mg/kg	<50	6359706	<50	<50	50	6356395
Acid Extractable Cadmium (Cd)	mg/kg	10	6359706	36	89	0.30	6356395
Acid Extractable Chromium (Cr)	mg/kg	46	6359706	81	33	2.0	6356395
Acid Extractable Cobalt (Co)	mg/kg	16	6359706	21	17	1.0	6356395
Acid Extractable Copper (Cu)	mg/kg	110	6359706	230	79	2.0	6356395
Acid Extractable Iron (Fe)	mg/kg	38000	6359706	42000	32000	50	6356395
Acid Extractable Lead (Pb)	mg/kg	2100	6359706	6000	1500	0.50	6356395
Acid Extractable Lithium (Li)	mg/kg	25	6359706	29	17	2.0	6356395
Acid Extractable Manganese (Mn)	mg/kg	840	6359706	1100	1900	2.0	6356395
Acid Extractable Mercury (Hg)	mg/kg	0.16	6359706	0.40	0.26	0.10	6356395
Acid Extractable Molybdenum (Mo)	mg/kg	<2.0	6359706	<2.0	<2.0	2.0	6356395
Acid Extractable Nickel (Ni)	mg/kg	41	6359706	71	39	2.0	6356395
Acid Extractable Rubidium (Rb)	mg/kg	8.1	6359706	6.8	5.7	2.0	6356395
Acid Extractable Selenium (Se)	mg/kg	<1.0	6359706	2.0	1.3	1.0	6356395
Acid Extractable Silver (Ag)	mg/kg	13	6359706	12	6.6	0.50	6356395
Acid Extractable Strontium (Sr)	mg/kg	28	6359706	56	30	5.0	6356395
Acid Extractable Thallium (Tl)	mg/kg	0.76	6359706	17	6.1	0.10	6356395
Acid Extractable Tin (Sn)	mg/kg	7.5	6359706	12	2.6	1.0	6356395
Acid Extractable Uranium (U)	mg/kg	0.57	6359706	1.6	0.41	0.10	6356395
Acid Extractable Vanadium (V)	mg/kg	79	6359706	84	78	2.0	6356395
Acid Extractable Zinc (Zn)	mg/kg	1600	6359706	3300	1200	5.0	6356395

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Client Project #: 11198639-04
Site Location: GLENCORE
Your P.O. #: 73517186
Sampler Initials: MG

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

BV Labs ID		KWN246		KWN247		
Sampling Date		2019/09/17 14:36		2019/09/17 14:57		
COC Number		D 34718		D 34718		
	UNITS	19GW-119 (0.0-0.15M)	RDL	19GW-119 (2.7-3.3M)	RDL	QC Batch
Metals						
Acid Extractable Aluminum (Al)	mg/kg	17000	10	24000	10	6356395
Acid Extractable Antimony (Sb)	mg/kg	2700	200	23	2.0	6356395
Acid Extractable Arsenic (As)	mg/kg	2100	20	30	2.0	6356395
Acid Extractable Barium (Ba)	mg/kg	59	5.0	88	5.0	6356395
Acid Extractable Beryllium (Be)	mg/kg	<2.0	2.0	<2.0	2.0	6356395
Acid Extractable Bismuth (Bi)	mg/kg	590	20	4.0	2.0	6356395
Acid Extractable Boron (B)	mg/kg	<50	50	<50	50	6356395
Acid Extractable Cadmium (Cd)	mg/kg	98	0.30	1.3	0.30	6356395
Acid Extractable Chromium (Cr)	mg/kg	45	2.0	73	2.0	6356395
Acid Extractable Cobalt (Co)	mg/kg	15	1.0	19	1.0	6356395
Acid Extractable Copper (Cu)	mg/kg	3300	2.0	43	2.0	6356395
Acid Extractable Iron (Fe)	mg/kg	56000	50	43000	50	6356395
Acid Extractable Lead (Pb)	mg/kg	49000	5.0	1800	0.50	6356395
Acid Extractable Lithium (Li)	mg/kg	21	2.0	29	2.0	6356395
Acid Extractable Manganese (Mn)	mg/kg	1800	2.0	1000	2.0	6356395
Acid Extractable Mercury (Hg)	mg/kg	1.3	0.10	<0.10	0.10	6356395
Acid Extractable Molybdenum (Mo)	mg/kg	9.2	2.0	<2.0	2.0	6356395
Acid Extractable Nickel (Ni)	mg/kg	38	2.0	49	2.0	6356395
Acid Extractable Rubidium (Rb)	mg/kg	7.9	2.0	7.1	2.0	6356395
Acid Extractable Selenium (Se)	mg/kg	59	1.0	<1.0	1.0	6356395
Acid Extractable Silver (Ag)	mg/kg	68	5.0	6.9	0.50	6356395
Acid Extractable Strontium (Sr)	mg/kg	26	5.0	48	5.0	6356395
Acid Extractable Thallium (Tl)	mg/kg	6.4	0.10	0.25	0.10	6356395
Acid Extractable Tin (Sn)	mg/kg	310	1.0	3.7	1.0	6356395
Acid Extractable Uranium (U)	mg/kg	2.3	0.10	1.5	0.10	6356395
Acid Extractable Vanadium (V)	mg/kg	50	2.0	90	2.0	6356395
Acid Extractable Zinc (Zn)	mg/kg	21000	5.0	280	5.0	6356395

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

BV Labs Job #: B9Q9373
Report Date: 2019/11/07

GHD Limited
Client Project #: 11198639-04
Site Location: GLENCORE
Your P.O. #: 73517186
Sampler Initials: MG

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

BV Labs ID		KWN248		KWN249		KWN250		
Sampling Date		2019/09/19 08:32		2019/09/19 08:34		2019/09/18 14:51		
COC Number		D 34718		D 34718		D 34718		
	UNITS	19GW-120 (0.0-0.15M)	RDL	19GW-120 (1.2-1.8M)	RDL	19GW-122 (0.0-0.15M)	RDL	QC Batch
Metals								
Acid Extractable Aluminum (Al)	mg/kg	23000	10	22000	10	18000	10	6356323
Acid Extractable Antimony (Sb)	mg/kg	630	20	<2.0	2.0	240	20	6356323
Acid Extractable Arsenic (As)	mg/kg	930	20	14	2.0	810	20	6356323
Acid Extractable Barium (Ba)	mg/kg	250	5.0	62	5.0	110	5.0	6356323
Acid Extractable Beryllium (Be)	mg/kg	<2.0	2.0	<2.0	2.0	<2.0	2.0	6356323
Acid Extractable Bismuth (Bi)	mg/kg	170	2.0	<2.0	2.0	180	2.0	6356323
Acid Extractable Boron (B)	mg/kg	<50	50	<50	50	<50	50	6356323
Acid Extractable Cadmium (Cd)	mg/kg	60	0.30	1.7	0.30	98	0.30	6356323
Acid Extractable Chromium (Cr)	mg/kg	93	2.0	54	2.0	47	2.0	6356323
Acid Extractable Cobalt (Co)	mg/kg	18	1.0	17	1.0	38	1.0	6356323
Acid Extractable Copper (Cu)	mg/kg	1900	2.0	21	2.0	2600	2.0	6356323
Acid Extractable Iron (Fe)	mg/kg	55000	50	40000	50	75000	50	6356323
Acid Extractable Lead (Pb)	mg/kg	42000	5.0	53	0.50	41000	5.0	6356323
Acid Extractable Lithium (Li)	mg/kg	22	2.0	23	2.0	23	2.0	6356323
Acid Extractable Manganese (Mn)	mg/kg	860	2.0	1000	2.0	730	2.0	6356323
Acid Extractable Mercury (Hg)	mg/kg	4.2	0.10	<0.10	0.10	2.8	0.10	6356323
Acid Extractable Molybdenum (Mo)	mg/kg	17	2.0	<2.0	2.0	7.7	2.0	6356323
Acid Extractable Nickel (Ni)	mg/kg	50	2.0	46	2.0	46	2.0	6356323
Acid Extractable Rubidium (Rb)	mg/kg	10	2.0	8.1	2.0	7.4	2.0	6356323
Acid Extractable Selenium (Se)	mg/kg	40	1.0	<1.0	1.0	17	1.0	6356323
Acid Extractable Silver (Ag)	mg/kg	87	5.0	<0.50	0.50	85	5.0	6356323
Acid Extractable Strontium (Sr)	mg/kg	120	5.0	15	5.0	33	5.0	6356323
Acid Extractable Thallium (Tl)	mg/kg	30	0.10	0.15	0.10	120	0.10	6356323
Acid Extractable Tin (Sn)	mg/kg	210	1.0	<1.0	1.0	100	1.0	6356323
Acid Extractable Uranium (U)	mg/kg	9.8	0.10	5.9	0.10	1.7	0.10	6356323
Acid Extractable Vanadium (V)	mg/kg	90	2.0	82	2.0	55	2.0	6356323
Acid Extractable Zinc (Zn)	mg/kg	5800	5.0	260	5.0	18000	5.0	6356323

RDL = Reportable Detection Limit
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BV Labs Job #: B9Q9373
Report Date: 2019/11/07

GHD Limited
Client Project #: 11198639-04
Site Location: GLENCORE
Your P.O. #: 73517186
Sampler Initials: MG

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

BV Labs ID		KWN251		KWN252		
Sampling Date		2019/09/18 15:14		2019/09/18 13:32		
COC Number		D 34718		D 34718		
	UNITS	19GW-122 (0.6-1.2M)	RDL	19GW-123 (0.0-0.15M)	RDL	QC Batch
Metals						
Acid Extractable Aluminum (Al)	mg/kg	19000	10	20000	10	6356323
Acid Extractable Antimony (Sb)	mg/kg	16	2.0	75	2.0	6356323
Acid Extractable Arsenic (As)	mg/kg	65	2.0	300	2.0	6356323
Acid Extractable Barium (Ba)	mg/kg	75	5.0	85	5.0	6356323
Acid Extractable Beryllium (Be)	mg/kg	<2.0	2.0	<2.0	2.0	6356323
Acid Extractable Bismuth (Bi)	mg/kg	11	2.0	75	2.0	6356323
Acid Extractable Boron (B)	mg/kg	<50	50	<50	50	6356323
Acid Extractable Cadmium (Cd)	mg/kg	54	0.30	160	0.30	6356323
Acid Extractable Chromium (Cr)	mg/kg	41	2.0	48	2.0	6356323
Acid Extractable Cobalt (Co)	mg/kg	17	1.0	23	1.0	6356323
Acid Extractable Copper (Cu)	mg/kg	130	2.0	1200	2.0	6356323
Acid Extractable Iron (Fe)	mg/kg	40000	50	44000	50	6356323
Acid Extractable Lead (Pb)	mg/kg	3400	0.50	12000	5.0	6356323
Acid Extractable Lithium (Li)	mg/kg	24	2.0	24	2.0	6356323
Acid Extractable Manganese (Mn)	mg/kg	1200	2.0	820	2.0	6356323
Acid Extractable Mercury (Hg)	mg/kg	0.18	0.10	0.76	0.10	6356323
Acid Extractable Molybdenum (Mo)	mg/kg	2.8	2.0	7.7	2.0	6356323
Acid Extractable Nickel (Ni)	mg/kg	43	2.0	40	2.0	6356323
Acid Extractable Rubidium (Rb)	mg/kg	7.9	2.0	8.3	2.0	6356323
Acid Extractable Selenium (Se)	mg/kg	<1.0	1.0	6.7	1.0	6356323
Acid Extractable Silver (Ag)	mg/kg	6.1	0.50	23	0.50	6356323
Acid Extractable Strontium (Sr)	mg/kg	41	5.0	42	5.0	6356323
Acid Extractable Thallium (Tl)	mg/kg	3.7	0.10	24	0.10	6356323
Acid Extractable Tin (Sn)	mg/kg	5.5	1.0	50	1.0	6356323
Acid Extractable Uranium (U)	mg/kg	0.99	0.10	2.8	0.10	6356323
Acid Extractable Vanadium (V)	mg/kg	67	2.0	68	2.0	6356323
Acid Extractable Zinc (Zn)	mg/kg	3100	5.0	9300	5.0	6356323

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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BV Labs Job #: B9Q9373
Report Date: 2019/11/07

GHD Limited
Client Project #: 11198639-04
Site Location: GLENCORE
Your P.O. #: 73517186
Sampler Initials: MG

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

BV Labs ID		KWN253			KWN255		
Sampling Date		2019/09/18 13:34			2019/09/18 16:11		
COC Number		D 34718			D 34720		
	UNITS	19GW-123 (0.3-0.6M)	RDL	QC Batch	19GW-124 (0.0-0.15M)	RDL	QC Batch
Metals							
Acid Extractable Aluminum (Al)	mg/kg	20000	10	6359706	21000	10	6356323
Acid Extractable Antimony (Sb)	mg/kg	280	20	6359706	140	20	6356323
Acid Extractable Arsenic (As)	mg/kg	970	20	6359706	250	2.0	6356323
Acid Extractable Barium (Ba)	mg/kg	150	5.0	6359706	170	5.0	6356323
Acid Extractable Beryllium (Be)	mg/kg	<2.0	2.0	6359706	<2.0	2.0	6356323
Acid Extractable Bismuth (Bi)	mg/kg	240	20	6359706	63	2.0	6356323
Acid Extractable Boron (B)	mg/kg	<50	50	6359706	<50	50	6356323
Acid Extractable Cadmium (Cd)	mg/kg	210	0.30	6359706	45	0.30	6356323
Acid Extractable Chromium (Cr)	mg/kg	51	2.0	6359706	88	2.0	6356323
Acid Extractable Cobalt (Co)	mg/kg	44	1.0	6359706	21	1.0	6356323
Acid Extractable Copper (Cu)	mg/kg	2600	2.0	6359706	520	2.0	6356323
Acid Extractable Iron (Fe)	mg/kg	81000	50	6359706	37000	50	6356323
Acid Extractable Lead (Pb)	mg/kg	47000	5.0	6359706	19000	5.0	6356323
Acid Extractable Lithium (Li)	mg/kg	25	2.0	6359706	17	2.0	6356323
Acid Extractable Manganese (Mn)	mg/kg	1100	2.0	6359706	580	2.0	6356323
Acid Extractable Mercury (Hg)	mg/kg	3.3	0.10	6359706	0.73	0.10	6356323
Acid Extractable Molybdenum (Mo)	mg/kg	6.3	2.0	6359706	7.7	2.0	6356323
Acid Extractable Nickel (Ni)	mg/kg	47	2.0	6359706	37	2.0	6356323
Acid Extractable Rubidium (Rb)	mg/kg	9.7	2.0	6359706	19	2.0	6356323
Acid Extractable Selenium (Se)	mg/kg	18	1.0	6359706	7.9	1.0	6356323
Acid Extractable Silver (Ag)	mg/kg	94	5.0	6359706	65	5.0	6356323
Acid Extractable Strontium (Sr)	mg/kg	32	5.0	6359706	510	5.0	6356323
Acid Extractable Thallium (Tl)	mg/kg	210	0.10	6359706	11	0.10	6356323
Acid Extractable Tin (Sn)	mg/kg	130	1.0	6359706	86	1.0	6356323
Acid Extractable Uranium (U)	mg/kg	1.8	0.10	6359706	65	0.10	6356323
Acid Extractable Vanadium (V)	mg/kg	64	2.0	6359706	100	2.0	6356323
Acid Extractable Zinc (Zn)	mg/kg	28000	5.0	6359706	5900	5.0	6356323

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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GHD Limited
Client Project #: 11198639-04
Site Location: GLENCORE
Your P.O. #: 73517186
Sampler Initials: MG

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

BV Labs ID		KWN256			KWN257		
Sampling Date		2019/09/20 08:50			2019/09/20 09:05		
COC Number		D 34720			D 34720		
	UNITS	19GW-127 (0.0-0.15M)	RDL	QC Batch	19GW-127 (1.2-1.8M)	RDL	QC Batch
Metals							
Acid Extractable Aluminum (Al)	mg/kg	16000	10	6356323	21000	10	6356395
Acid Extractable Antimony (Sb)	mg/kg	8500	200	6356323	46	2.0	6356395
Acid Extractable Arsenic (As)	mg/kg	8300	200	6356323	110	2.0	6356395
Acid Extractable Barium (Ba)	mg/kg	100	5.0	6356323	84	5.0	6356395
Acid Extractable Beryllium (Be)	mg/kg	<2.0	2.0	6356323	<2.0	2.0	6356395
Acid Extractable Bismuth (Bi)	mg/kg	340	2.0	6356323	3.2	2.0	6356395
Acid Extractable Boron (B)	mg/kg	83	50	6356323	<50	50	6356395
Acid Extractable Cadmium (Cd)	mg/kg	82	0.30	6356323	12	0.30	6356395
Acid Extractable Chromium (Cr)	mg/kg	48	2.0	6356323	76	2.0	6356395
Acid Extractable Cobalt (Co)	mg/kg	23	1.0	6356323	20	1.0	6356395
Acid Extractable Copper (Cu)	mg/kg	73000	200	6356323	86	2.0	6356395
Acid Extractable Iron (Fe)	mg/kg	25000	50	6356323	39000	50	6356395
Acid Extractable Lead (Pb)	mg/kg	44000	5.0	6356323	640	0.50	6356395
Acid Extractable Lithium (Li)	mg/kg	19	2.0	6356323	33	2.0	6356395
Acid Extractable Manganese (Mn)	mg/kg	660	2.0	6356323	1300	2.0	6356395
Acid Extractable Mercury (Hg)	mg/kg	1.8	0.10	6356323	<0.10	0.10	6356395
Acid Extractable Molybdenum (Mo)	mg/kg	<2.0	2.0	6356323	8.4	2.0	6356395
Acid Extractable Nickel (Ni)	mg/kg	120	2.0	6356323	49	2.0	6356395
Acid Extractable Rubidium (Rb)	mg/kg	27	2.0	6356323	7.1	2.0	6356395
Acid Extractable Selenium (Se)	mg/kg	130	1.0	6356323	2.9	1.0	6356395
Acid Extractable Silver (Ag)	mg/kg	90	5.0	6356323	2.1	0.50	6356395
Acid Extractable Strontium (Sr)	mg/kg	66	5.0	6356323	26	5.0	6356395
Acid Extractable Thallium (Tl)	mg/kg	47	0.10	6356323	1.8	0.10	6356395
Acid Extractable Tin (Sn)	mg/kg	100	1.0	6356323	9.8	1.0	6356395
Acid Extractable Uranium (U)	mg/kg	0.91	0.10	6356323	0.40	0.10	6356395
Acid Extractable Vanadium (V)	mg/kg	47	2.0	6356323	92	2.0	6356395
Acid Extractable Zinc (Zn)	mg/kg	9300	5.0	6356323	140	5.0	6356395

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

BV Labs Job #: B9Q9373
Report Date: 2019/11/07

GHD Limited
Client Project #: 11198639-04
Site Location: GLENCORE
Your P.O. #: 73517186
Sampler Initials: MG

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

BV Labs ID		KWN258		KWN259	KWN260		
Sampling Date		2019/09/19 13:40		2019/09/19 14:05	2019/09/19 15:35		
COC Number		D 34720		D 34720	D 34720		
	UNITS	19GW-133 (0.0-0.15M)	RDL	19GW-133 (1.2-1.8M)	19SP-1 (1.2-1.8M)	RDL	QC Batch
Metals							
Acid Extractable Aluminum (Al)	mg/kg	16000	100	30000	22000	10	6356395
Acid Extractable Antimony (Sb)	mg/kg	620	20	5.0	17	2.0	6356395
Acid Extractable Arsenic (As)	mg/kg	11000	200	83	16	2.0	6356395
Acid Extractable Barium (Ba)	mg/kg	140	50	140	49	5.0	6356395
Acid Extractable Beryllium (Be)	mg/kg	<20	20	<2.0	<2.0	2.0	6356395
Acid Extractable Bismuth (Bi)	mg/kg	290	20	<2.0	<2.0	2.0	6356395
Acid Extractable Boron (B)	mg/kg	<500	500	<50	<50	50	6356395
Acid Extractable Cadmium (Cd)	mg/kg	1900	3.0	13	6.4	0.30	6356395
Acid Extractable Chromium (Cr)	mg/kg	72	20	91	66	2.0	6356395
Acid Extractable Cobalt (Co)	mg/kg	87	10	24	18	1.0	6356395
Acid Extractable Copper (Cu)	mg/kg	49000	200	240	28	2.0	6356395
Acid Extractable Iron (Fe)	mg/kg	47000	500	42000	36000	50	6356395
Acid Extractable Lead (Pb)	mg/kg	39000	5.0	440	710	0.50	6356395
Acid Extractable Lithium (Li)	mg/kg	<20	20	38	20	2.0	6356395
Acid Extractable Manganese (Mn)	mg/kg	800	20	1200	1300	2.0	6356395
Acid Extractable Mercury (Hg)	mg/kg	21	1.0	0.21	<0.10	0.10	6356395
Acid Extractable Molybdenum (Mo)	mg/kg	<20	20	<2.0	2.4	2.0	6356395
Acid Extractable Nickel (Ni)	mg/kg	190	20	64	46	2.0	6356395
Acid Extractable Rubidium (Rb)	mg/kg	<20	20	7.3	7.0	2.0	6356395
Acid Extractable Selenium (Se)	mg/kg	380	10	2.4	<1.0	1.0	6356395
Acid Extractable Silver (Ag)	mg/kg	89	5.0	1.3	1.0	0.50	6356395
Acid Extractable Strontium (Sr)	mg/kg	<50	50	35	66	5.0	6356395
Acid Extractable Thallium (Tl)	mg/kg	780	1.0	6.2	0.30	0.10	6356395
Acid Extractable Tin (Sn)	mg/kg	1600	10	9.0	12	1.0	6356395
Acid Extractable Uranium (U)	mg/kg	<1.0	1.0	0.81	42	0.10	6356395
Acid Extractable Vanadium (V)	mg/kg	49	20	120	99	2.0	6356395
Acid Extractable Zinc (Zn)	mg/kg	6200	50	120	530	5.0	6356395

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Report Date: 2019/11/07

GHD Limited
Client Project #: 11198639-04
Site Location: GLENCORE
Your P.O. #: 73517186
Sampler Initials: MG

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

BV Labs ID		KWN261	KWN262			KWN263		
Sampling Date		2019/09/19 11:15	2019/09/19 11:35			2019/09/19 16:33		
COC Number		D 34720	D 34719			D 34719		
	UNITS	19SP-3 (1.2-1.8M)	19SP-9 (0.6-1.2M)	RDL	QC Batch	19SP-14 (0.0-0.6M)	RDL	QC Batch
Metals								
Acid Extractable Aluminum (Al)	mg/kg	19000	16000	10	6356395	17000	100	6359706
Acid Extractable Antimony (Sb)	mg/kg	7.1	22	2.0	6356395	760	20	6359706
Acid Extractable Arsenic (As)	mg/kg	23	46	2.0	6356395	4300	20	6359706
Acid Extractable Barium (Ba)	mg/kg	77	79	5.0	6356395	220	50	6359706
Acid Extractable Beryllium (Be)	mg/kg	<2.0	<2.0	2.0	6356395	<20	20	6359706
Acid Extractable Bismuth (Bi)	mg/kg	2.2	5.4	2.0	6356395	220	20	6359706
Acid Extractable Boron (B)	mg/kg	<50	<50	50	6356395	<500	500	6359706
Acid Extractable Cadmium (Cd)	mg/kg	1.8	18	0.30	6356395	1700	3.0	6359706
Acid Extractable Chromium (Cr)	mg/kg	53	38	2.0	6356395	190	20	6359706
Acid Extractable Cobalt (Co)	mg/kg	16	14	1.0	6356395	59	10	6359706
Acid Extractable Copper (Cu)	mg/kg	37	81	2.0	6356395	17000	20	6359706
Acid Extractable Iron (Fe)	mg/kg	40000	33000	50	6356395	54000	500	6359706
Acid Extractable Lead (Pb)	mg/kg	510	1500	0.50	6356395	34000	5.0	6359706
Acid Extractable Lithium (Li)	mg/kg	23	23	2.0	6356395	<20	20	6359706
Acid Extractable Manganese (Mn)	mg/kg	1000	980	2.0	6356395	1100	20	6359706
Acid Extractable Mercury (Hg)	mg/kg	<0.10	<0.10	0.10	6356395	1.8	1.0	6359706
Acid Extractable Molybdenum (Mo)	mg/kg	<2.0	<2.0	2.0	6356395	<20	20	6359706
Acid Extractable Nickel (Ni)	mg/kg	44	41	2.0	6356395	71	20	6359706
Acid Extractable Rubidium (Rb)	mg/kg	7.8	6.5	2.0	6356395	<20	20	6359706
Acid Extractable Selenium (Se)	mg/kg	<1.0	<1.0	1.0	6356395	340	10	6359706
Acid Extractable Silver (Ag)	mg/kg	2.4	6.0	0.50	6356395	79	5.0	6359706
Acid Extractable Strontium (Sr)	mg/kg	18	14	5.0	6356395	69	50	6359706
Acid Extractable Thallium (Tl)	mg/kg	0.64	1.1	0.10	6356395	45	1.0	6359706
Acid Extractable Tin (Sn)	mg/kg	2.4	5.6	1.0	6356395	1300	10	6359706
Acid Extractable Uranium (U)	mg/kg	1.6	0.59	0.10	6356395	1.5	1.0	6359706
Acid Extractable Vanadium (V)	mg/kg	89	61	2.0	6356395	73	20	6359706
Acid Extractable Zinc (Zn)	mg/kg	200	310	5.0	6356395	12000	50	6359706

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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BV Labs Job #: B9Q9373
Report Date: 2019/11/07

GHD Limited
Client Project #: 11198639-04
Site Location: GLENCORE
Your P.O. #: 73517186
Sampler Initials: MG

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

BV Labs ID		KWN264	KWN264			KWN265		
Sampling Date		2019/09/20 08:28	2019/09/20 08:28			2019/09/19 13:15		
COC Number		D 34719	D 34719			D 34719		
	UNITS	19SP-16 (0.6-1.2M)	19SP-16 (0.6-1.2M) Lab-Dup	RDL	QC Batch	19SP-17 (0.6-1.2M)	RDL	QC Batch
Metals								
Acid Extractable Aluminum (Al)	mg/kg	20000	19000	10	6359706	21000	10	6356395
Acid Extractable Antimony (Sb)	mg/kg	690	490	20	6359706	51	2.0	6356395
Acid Extractable Arsenic (As)	mg/kg	1300	1500	20	6359706	380	2.0	6356395
Acid Extractable Barium (Ba)	mg/kg	230	220	5.0	6359706	120	5.0	6356395
Acid Extractable Beryllium (Be)	mg/kg	<2.0	<2.0	2.0	6359706	<2.0	2.0	6356395
Acid Extractable Bismuth (Bi)	mg/kg	96	81	20	6359706	6.3	2.0	6356395
Acid Extractable Boron (B)	mg/kg	<50	<50	50	6359706	<50	50	6356395
Acid Extractable Cadmium (Cd)	mg/kg	790	630	3.0	6359706	85	0.30	6356395
Acid Extractable Chromium (Cr)	mg/kg	70	67	2.0	6359706	57	2.0	6356395
Acid Extractable Cobalt (Co)	mg/kg	23	25	1.0	6359706	27	1.0	6356395
Acid Extractable Copper (Cu)	mg/kg	2200	2000	2.0	6359706	1100	2.0	6356395
Acid Extractable Iron (Fe)	mg/kg	41000	39000	50	6359706	38000	50	6356395
Acid Extractable Lead (Pb)	mg/kg	22000	18000	5.0	6359706	1700	0.50	6356395
Acid Extractable Lithium (Li)	mg/kg	26	25	2.0	6359706	31	2.0	6356395
Acid Extractable Manganese (Mn)	mg/kg	1500	1400	2.0	6359706	960	2.0	6356395
Acid Extractable Mercury (Hg)	mg/kg	11	9.7	0.10	6359706	1.1	0.10	6356395
Acid Extractable Molybdenum (Mo)	mg/kg	5.6	5.9	2.0	6359706	13	2.0	6356395
Acid Extractable Nickel (Ni)	mg/kg	66	62	2.0	6359706	62	2.0	6356395
Acid Extractable Rubidium (Rb)	mg/kg	18	17	2.0	6359706	6.2	2.0	6356395
Acid Extractable Selenium (Se)	mg/kg	90	78	1.0	6359706	35	1.0	6356395
Acid Extractable Silver (Ag)	mg/kg	84	92	5.0	6359706	8.5	0.50	6356395
Acid Extractable Strontium (Sr)	mg/kg	68	72	5.0	6359706	23	5.0	6356395
Acid Extractable Thallium (Tl)	mg/kg	93	87	0.10	6359706	32	0.10	6356395
Acid Extractable Tin (Sn)	mg/kg	150	110	10	6359706	91	1.0	6356395
Acid Extractable Uranium (U)	mg/kg	0.65	0.66	0.10	6359706	0.59	0.10	6356395
Acid Extractable Vanadium (V)	mg/kg	75	69	2.0	6359706	88	2.0	6356395
Acid Extractable Zinc (Zn)	mg/kg	4800	3800	5.0	6359706	730	5.0	6356395

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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GHD Limited
Client Project #: 11198639-04
Site Location: GLENCORE
Your P.O. #: 73517186
Sampler Initials: MG

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

BV Labs ID		KWN266		KWN267		KWN268		
Sampling Date		2019/09/20 09:05		2019/09/20 09:05		2019/09/20 09:05		
COC Number		D 34719		D 34719		D 34719		
	UNITS	SOIL-QA/QC-1	RDL	SOIL-QA/QC-2	RDL	SOIL-QA/QC-3	RDL	QC Batch
Metals								
Acid Extractable Aluminum (Al)	mg/kg	24000	10	18000	10	15000	100	6356395
Acid Extractable Antimony (Sb)	mg/kg	240	20	28	2.0	750	20	6356395
Acid Extractable Arsenic (As)	mg/kg	190	20	110	2.0	14000	200	6356395
Acid Extractable Barium (Ba)	mg/kg	91	5.0	81	5.0	120	50	6356395
Acid Extractable Beryllium (Be)	mg/kg	<2.0	2.0	<2.0	2.0	<20	20	6356395
Acid Extractable Bismuth (Bi)	mg/kg	61	2.0	21	2.0	350	20	6356395
Acid Extractable Boron (B)	mg/kg	<50	50	<50	50	<500	500	6356395
Acid Extractable Cadmium (Cd)	mg/kg	12	0.30	59	0.30	2100	3.0	6356395
Acid Extractable Chromium (Cr)	mg/kg	62	2.0	39	2.0	72	20	6356395
Acid Extractable Cobalt (Co)	mg/kg	17	1.0	17	1.0	100	10	6356395
Acid Extractable Copper (Cu)	mg/kg	430	2.0	190	2.0	62000	200	6356395
Acid Extractable Iron (Fe)	mg/kg	42000	50	38000	50	45000	500	6356395
Acid Extractable Lead (Pb)	mg/kg	17000	5.0	6300	0.50	39000	5.0	6356395
Acid Extractable Lithium (Li)	mg/kg	28	2.0	23	2.0	<20	20	6356395
Acid Extractable Manganese (Mn)	mg/kg	1200	2.0	1300	2.0	720	20	6356395
Acid Extractable Mercury (Hg)	mg/kg	0.20	0.10	0.17	0.10	26	1.0	6356395
Acid Extractable Molybdenum (Mo)	mg/kg	2.5	2.0	5.3	2.0	<20	20	6356395
Acid Extractable Nickel (Ni)	mg/kg	45	2.0	41	2.0	230	20	6356395
Acid Extractable Rubidium (Rb)	mg/kg	11	2.0	7.8	2.0	<20	20	6356395
Acid Extractable Selenium (Se)	mg/kg	5.9	1.0	<1.0	1.0	430	10	6356395
Acid Extractable Silver (Ag)	mg/kg	74	5.0	10	0.50	82	5.0	6356395
Acid Extractable Strontium (Sr)	mg/kg	44	5.0	52	5.0	<50	50	6356395
Acid Extractable Thallium (Tl)	mg/kg	1.6	0.10	3.9	0.10	790	1.0	6356395
Acid Extractable Tin (Sn)	mg/kg	26	1.0	9.2	1.0	2000	10	6356395
Acid Extractable Uranium (U)	mg/kg	11	0.10	1.0	0.10	<1.0	1.0	6356395
Acid Extractable Vanadium (V)	mg/kg	91	2.0	61	2.0	47	20	6356395
Acid Extractable Zinc (Zn)	mg/kg	2200	5.0	3400	5.0	7900	50	6356395

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

GHD Limited
Client Project #: 11198639-04
Site Location: GLENCORE
Your P.O. #: 73517186
Sampler Initials: MG

SEMI-VOLATILE ORGANICS BY GC-MS (SOIL)

BV Labs ID		KWN231			KWN231		
Sampling Date		2019/09/17 11:49			2019/09/17 11:49		
COC Number		D 34717			D 34717		
	UNITS	19GW-114 (1.2-1.8M)	RDL	QC Batch	19GW-114 (1.2-1.8M) Lab-Dup	RDL	QC Batch
Polyaromatic Hydrocarbons							
1-Methylnaphthalene	mg/kg	<0.010	0.010	6356449	<0.010	0.010	6356449
2-Methylnaphthalene	mg/kg	<0.010	0.010	6356449	<0.010	0.010	6356449
Acenaphthene	mg/kg	<0.010	0.010	6356449	<0.010	0.010	6356449
Acenaphthylene	mg/kg	<0.010	0.010	6356449	<0.010	0.010	6356449
Anthracene	mg/kg	<0.010	0.010	6356449	<0.010	0.010	6356449
Benzo(a)anthracene	mg/kg	0.013	0.010	6356449	0.013	0.010	6356449
Benzo(a)pyrene	mg/kg	0.022	0.010	6356449	<0.010	0.010	6356449
Benzo(b)fluoranthene	mg/kg	0.023	0.010	6356449	0.015	0.010	6356449
Benzo(b/j)fluoranthene	mg/kg	0.036	0.020	6353660			
Benzo(g,h,i)perylene	mg/kg	0.017	0.010	6356449	0.013	0.010	6356449
Benzo(j)fluoranthene	mg/kg	0.012	0.010	6356449	<0.010	0.010	6356449
Benzo(k)fluoranthene	mg/kg	0.017	0.010	6356449	<0.010	0.010	6356449
Chrysene	mg/kg	0.026	0.010	6356449	0.019	0.010	6356449
Dibenz(a,h)anthracene	mg/kg	<0.010	0.010	6356449	<0.010	0.010	6356449
Fluoranthene	mg/kg	0.042	0.010	6356449	0.027	0.010	6356449
Fluorene	mg/kg	<0.010	0.010	6356449	<0.010	0.010	6356449
Indeno(1,2,3-cd)pyrene	mg/kg	0.016	0.010	6356449	<0.010	0.010	6356449
Naphthalene	mg/kg	0.021	0.010	6356449	0.017	0.010	6356449
Perylene	mg/kg	<0.010	0.010	6356449	<0.010	0.010	6356449
Phenanthrene	mg/kg	0.015	0.010	6356449	0.014	0.010	6356449
Pyrene	mg/kg	0.032	0.010	6356449	0.024	0.010	6356449
Surrogate Recovery (%)							
D10-Anthracene	%	94		6356449	96		6356449
D14-Terphenyl (FS)	%	119		6356449	117		6356449
D8-Acenaphthylene	%	108		6356449	108		6356449

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Site Location: GLENCORE
Your P.O. #: 73517186
Sampler Initials: MG

SEMI-VOLATILE ORGANICS BY GC-MS (SOIL)

BV Labs ID		KWN233		
Sampling Date		2019/09/17 10:13		
COC Number		D 34717		
	UNITS	19GW-115 (1.2-1.8M)	RDL	QC Batch
Polyaromatic Hydrocarbons				
1-Methylnaphthalene	mg/kg	<0.010	0.010	6356449
2-Methylnaphthalene	mg/kg	<0.010	0.010	6356449
Acenaphthene	mg/kg	<0.010	0.010	6356449
Acenaphthylene	mg/kg	<0.010	0.010	6356449
Anthracene	mg/kg	<0.010	0.010	6356449
Benzo(a)anthracene	mg/kg	<0.010	0.010	6356449
Benzo(a)pyrene	mg/kg	<0.010	0.010	6356449
Benzo(b)fluoranthene	mg/kg	<0.010	0.010	6356449
Benzo(b/j)fluoranthene	mg/kg	<0.020	0.020	6353660
Benzo(g,h,i)perylene	mg/kg	<0.010	0.010	6356449
Benzo(j)fluoranthene	mg/kg	<0.010	0.010	6356449
Benzo(k)fluoranthene	mg/kg	<0.010	0.010	6356449
Chrysene	mg/kg	<0.010	0.010	6356449
Dibenz(a,h)anthracene	mg/kg	<0.010	0.010	6356449
Fluoranthene	mg/kg	<0.010	0.010	6356449
Fluorene	mg/kg	<0.010	0.010	6356449
Indeno(1,2,3-cd)pyrene	mg/kg	<0.010	0.010	6356449
Naphthalene	mg/kg	<0.010	0.010	6356449
Perylene	mg/kg	<0.010	0.010	6356449
Phenanthrene	mg/kg	0.012	0.010	6356449
Pyrene	mg/kg	<0.010	0.010	6356449
Surrogate Recovery (%)				
D10-Anthracene	%	93		6356449
D14-Terphenyl (FS)	%	100 (1)		6356449
D8-Acenaphthylene	%	110		6356449

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) PAH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.

GHD Limited
Client Project #: 11198639-04
Site Location: GLENCORE
Your P.O. #: 73517186
Sampler Initials: MG

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	15.0°C
Package 2	3.7°C
Package 3	16.0°C
Package 4	16.0°C
Package 5	15.7°C
Package 6	16.7°C

Sample KWN258 [19GW-133 (0.0-0.15M)] : Elevated reporting limits for trace metals due to sample matrix.

Sample KWN263 [19SP-14 (0.0-0.6M)] : Elevated reporting limits for trace metals due to sample matrix.

Sample KWN264 [19SP-16 (0.6-1.2M)] : The minimum weight of 100g for the standard TCLP extraction, as per Reference Method EPA 1311 R1992, could not be achieved due to insufficient sample. Client consent has been received to proceed using the modified TCLP method. The uncertainty of the analysis may be increased, and the reported results may not be suitable for compliance purposes.

Sample KWN268 [SOIL-QA/QC-3] : Elevated reporting limits for trace metals due to sample matrix.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
6356449	D10-Anthracene	2019/09/27	91 (4)	50 - 130	95	50 - 130	87	%		
6356449	D14-Terphenyl (FS)	2019/09/27	95 (5,4)	50 - 130	105	50 - 130	94	%		
6356449	D8-Acenaphthylene	2019/09/27	109 (4)	50 - 130	111	50 - 130	100	%		
6356323	Acid Extractable Aluminum (Al)	2019/10/01					<10	mg/kg	2.0 (1)	35
6356323	Acid Extractable Antimony (Sb)	2019/10/01	NC	75 - 125	108	75 - 125	<2.0	mg/kg	1.6 (1)	35
6356323	Acid Extractable Arsenic (As)	2019/10/01	NC	75 - 125	105	75 - 125	<2.0	mg/kg	6.6 (1)	35
6356323	Acid Extractable Barium (Ba)	2019/10/01	NC	75 - 125	104	75 - 125	<5.0	mg/kg	7.1 (1)	35
6356323	Acid Extractable Beryllium (Be)	2019/10/01	107	75 - 125	100	75 - 125	<2.0	mg/kg	NC (1)	35
6356323	Acid Extractable Bismuth (Bi)	2019/10/01	NC	75 - 125	106	75 - 125	<2.0	mg/kg	17 (1)	35
6356323	Acid Extractable Boron (B)	2019/10/01	97	75 - 125	99	75 - 125	<50	mg/kg	NC (1)	35
6356323	Acid Extractable Cadmium (Cd)	2019/10/01	NC	75 - 125	100	75 - 125	<0.30	mg/kg	7.4 (1)	35
6356323	Acid Extractable Chromium (Cr)	2019/10/01	NC	75 - 125	104	75 - 125	<2.0	mg/kg	4.0 (1)	35
6356323	Acid Extractable Cobalt (Co)	2019/10/01	107	75 - 125	103	75 - 125	<1.0	mg/kg	1.5 (1)	35
6356323	Acid Extractable Copper (Cu)	2019/10/01	NC	75 - 125	100	75 - 125	<2.0	mg/kg	2.8 (1)	35
6356323	Acid Extractable Iron (Fe)	2019/10/01					<50	mg/kg	2.1 (1)	35
6356323	Acid Extractable Lead (Pb)	2019/10/01	NC	75 - 125	105	75 - 125	<0.50	mg/kg	1.8 (1)	35
6356323	Acid Extractable Lithium (Li)	2019/10/01	110	75 - 125	103	75 - 125	<2.0	mg/kg	0.14 (1)	35
6356323	Acid Extractable Manganese (Mn)	2019/10/01	NC	75 - 125	105	75 - 125	<2.0	mg/kg	5.4 (1)	35
6356323	Acid Extractable Mercury (Hg)	2019/10/01	99	75 - 125	102	75 - 125	<0.10	mg/kg	6.3 (1)	35
6356323	Acid Extractable Molybdenum (Mo)	2019/10/01	NC	75 - 125	104	75 - 125	<2.0	mg/kg	4.8 (1)	35
6356323	Acid Extractable Nickel (Ni)	2019/10/01	108	75 - 125	105	75 - 125	<2.0	mg/kg	1.2 (1)	35
6356323	Acid Extractable Rubidium (Rb)	2019/10/01	102	75 - 125	103	75 - 125	<2.0	mg/kg	3.4 (1)	35
6356323	Acid Extractable Selenium (Se)	2019/10/01	101	75 - 125	107	75 - 125	<1.0	mg/kg	5.9 (1)	35
6356323	Acid Extractable Silver (Ag)	2019/10/01	NC	75 - 125	101	75 - 125	<0.50	mg/kg	2.2 (1)	35
6356323	Acid Extractable Strontium (Sr)	2019/10/01	NC	75 - 125	107	75 - 125	<5.0	mg/kg	2.3 (1)	35
6356323	Acid Extractable Thallium (Tl)	2019/10/01	NC	75 - 125	106	75 - 125	<0.10	mg/kg	1.3 (1)	35
6356323	Acid Extractable Tin (Sn)	2019/10/01	NC	75 - 125	110	75 - 125	<1.0	mg/kg	3.7 (1)	35
6356323	Acid Extractable Uranium (U)	2019/10/01	107	75 - 125	113	75 - 125	<0.10	mg/kg	0.29 (1)	35
6356323	Acid Extractable Vanadium (V)	2019/10/01	NC	75 - 125	106	75 - 125	<2.0	mg/kg	4.4 (1)	35
6356323	Acid Extractable Zinc (Zn)	2019/10/01	NC	75 - 125	104	75 - 125	<5.0	mg/kg	3.1 (1)	35
6356339	Moisture	2019/09/27							11 (1)	25

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
6356395	Acid Extractable Aluminum (Al)	2019/10/02					<10	mg/kg		
6356395	Acid Extractable Antimony (Sb)	2019/10/02	NC (2)	75 - 125	114	75 - 125	<2.0	mg/kg		
6356395	Acid Extractable Arsenic (As)	2019/10/02	NC (2)	75 - 125	107	75 - 125	<2.0	mg/kg		
6356395	Acid Extractable Barium (Ba)	2019/10/02	NC (2)	75 - 125	110	75 - 125	<5.0	mg/kg		
6356395	Acid Extractable Beryllium (Be)	2019/10/02	104 (2)	75 - 125	104	75 - 125	<2.0	mg/kg		
6356395	Acid Extractable Bismuth (Bi)	2019/10/02	NC (2)	75 - 125	108	75 - 125	<2.0	mg/kg		
6356395	Acid Extractable Boron (B)	2019/10/02	90 (2)	75 - 125	96	75 - 125	<50	mg/kg		
6356395	Acid Extractable Cadmium (Cd)	2019/10/02	109 (2)	75 - 125	101	75 - 125	<0.30	mg/kg		
6356395	Acid Extractable Chromium (Cr)	2019/10/02	NC (2)	75 - 125	106	75 - 125	<2.0	mg/kg		
6356395	Acid Extractable Cobalt (Co)	2019/10/02	104 (2)	75 - 125	108	75 - 125	<1.0	mg/kg		
6356395	Acid Extractable Copper (Cu)	2019/10/02	NC (2)	75 - 125	104	75 - 125	<2.0	mg/kg		
6356395	Acid Extractable Iron (Fe)	2019/10/02					<50	mg/kg		
6356395	Acid Extractable Lead (Pb)	2019/10/02	NC (2)	75 - 125	108	75 - 125	<0.50	mg/kg		
6356395	Acid Extractable Lithium (Li)	2019/10/02	107 (2)	75 - 125	109	75 - 125	<2.0	mg/kg		
6356395	Acid Extractable Manganese (Mn)	2019/10/02	NC (2)	75 - 125	106	75 - 125	<2.0	mg/kg		
6356395	Acid Extractable Mercury (Hg)	2019/10/02	104 (2)	75 - 125	105	75 - 125	<0.10	mg/kg		
6356395	Acid Extractable Molybdenum (Mo)	2019/10/02	137 (3,2)	75 - 125	113	75 - 125	<2.0	mg/kg		
6356395	Acid Extractable Nickel (Ni)	2019/10/02	103 (2)	75 - 125	107	75 - 125	<2.0	mg/kg		
6356395	Acid Extractable Rubidium (Rb)	2019/10/02	99 (2)	75 - 125	106	75 - 125	<2.0	mg/kg		
6356395	Acid Extractable Selenium (Se)	2019/10/02	102 (2)	75 - 125	102	75 - 125	<1.0	mg/kg		
6356395	Acid Extractable Silver (Ag)	2019/10/02	NC (2)	75 - 125	107	75 - 125	<0.50	mg/kg		
6356395	Acid Extractable Strontium (Sr)	2019/10/02	115 (2)	75 - 125	109	75 - 125	<5.0	mg/kg		
6356395	Acid Extractable Thallium (Tl)	2019/10/02	129 (3,2)	75 - 125	109	75 - 125	<0.10	mg/kg		
6356395	Acid Extractable Tin (Sn)	2019/10/02	NC (2)	75 - 125	106	75 - 125	<1.0	mg/kg		
6356395	Acid Extractable Uranium (U)	2019/10/02	113 (2)	75 - 125	115	75 - 125	<0.10	mg/kg		
6356395	Acid Extractable Vanadium (V)	2019/10/02	NC (2)	75 - 125	110	75 - 125	<2.0	mg/kg		
6356395	Acid Extractable Zinc (Zn)	2019/10/02	NC (2)	75 - 125	104	75 - 125	<5.0	mg/kg		
6356449	1-Methylnaphthalene	2019/09/27	108 (4)	50 - 130	113	50 - 130	<0.010	mg/kg	NC (6)	50
6356449	2-Methylnaphthalene	2019/09/27	101 (4)	50 - 130	106	50 - 130	<0.010	mg/kg	NC (6)	50
6356449	Acenaphthene	2019/09/27	105 (4)	50 - 130	110	50 - 130	<0.010	mg/kg	NC (6)	50
6356449	Acenaphthylene	2019/09/27	105 (4)	50 - 130	106	50 - 130	<0.010	mg/kg	NC (6)	50

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
6356449	Anthracene	2019/09/27	102 (4)	50 - 130	107	50 - 130	<0.010	mg/kg	NC (6)	50
6356449	Benzo(a)anthracene	2019/09/27	94 (4)	50 - 130	102	50 - 130	<0.010	mg/kg	2.0 (6)	50
6356449	Benzo(a)pyrene	2019/09/27	99 (4)	50 - 130	101	50 - 130	<0.010	mg/kg	NC (6)	50
6356449	Benzo(b)fluoranthene	2019/09/27	98 (4)	50 - 130	106	50 - 130	<0.010	mg/kg	43 (6)	50
6356449	Benzo(g,h,i)perylene	2019/09/27	95 (4)	50 - 130	103	50 - 130	<0.010	mg/kg	24 (6)	50
6356449	Benzo(j)fluoranthene	2019/09/27	95 (4)	50 - 130	105	50 - 130	<0.010	mg/kg	22 (6)	50
6356449	Benzo(k)fluoranthene	2019/09/27	101 (4)	50 - 130	108	50 - 130	<0.010	mg/kg	NC (6)	50
6356449	Chrysene	2019/09/27	95 (4)	50 - 130	103	50 - 130	<0.010	mg/kg	28 (6)	50
6356449	Dibenz(a,h)anthracene	2019/09/27	99 (4)	50 - 130	106	50 - 130	<0.010	mg/kg	NC (6)	50
6356449	Fluoranthene	2019/09/27	94 (4)	50 - 130	103	50 - 130	<0.010	mg/kg	41 (6)	50
6356449	Fluorene	2019/09/27	104 (4)	50 - 130	108	50 - 130	<0.010	mg/kg	NC (6)	50
6356449	Indeno(1,2,3-cd)pyrene	2019/09/27	97 (4)	50 - 130	103	50 - 130	<0.010	mg/kg	49 (6)	50
6356449	Naphthalene	2019/09/27	106 (4)	50 - 130	111	50 - 130	<0.010	mg/kg	20 (6)	50
6356449	Perylene	2019/09/27	98 (4)	50 - 130	104	50 - 130	<0.010	mg/kg	NC (6)	50
6356449	Phenanthrene	2019/09/27	104 (4)	50 - 130	111	50 - 130	<0.010	mg/kg	8.5 (6)	50
6356449	Pyrene	2019/09/27	94 (4)	50 - 130	103	50 - 130	<0.010	mg/kg	27 (6)	50
6359706	Acid Extractable Aluminum (Al)	2019/10/04					<10	mg/kg	8.0 (8)	35
6359706	Acid Extractable Antimony (Sb)	2019/10/04	NC (7)	75 - 125	116	75 - 125	<2.0	mg/kg	34 (8)	35
6359706	Acid Extractable Arsenic (As)	2019/10/04	NC (7)	75 - 125	103	75 - 125	<2.0	mg/kg	11 (8)	35
6359706	Acid Extractable Barium (Ba)	2019/10/04	NC (7)	75 - 125	119	75 - 125	<5.0	mg/kg	8.0 (8)	35
6359706	Acid Extractable Beryllium (Be)	2019/10/04	108 (7)	75 - 125	102	75 - 125	<2.0	mg/kg	NC (8)	35
6359706	Acid Extractable Bismuth (Bi)	2019/10/04	NC (7)	75 - 125	108	75 - 125	<2.0	mg/kg	17 (8)	35
6359706	Acid Extractable Boron (B)	2019/10/04	106 (7)	75 - 125	93	75 - 125	<50	mg/kg	NC (8)	35
6359706	Acid Extractable Cadmium (Cd)	2019/10/04	NC (7)	75 - 125	100	75 - 125	<0.30	mg/kg	23 (8)	35
6359706	Acid Extractable Chromium (Cr)	2019/10/04	NC (7)	75 - 125	101	75 - 125	<2.0	mg/kg	3.3 (8)	35
6359706	Acid Extractable Cobalt (Co)	2019/10/04	102 (7)	75 - 125	101	75 - 125	<1.0	mg/kg	8.7 (8)	35
6359706	Acid Extractable Copper (Cu)	2019/10/04	NC (7)	75 - 125	98	75 - 125	<2.0	mg/kg	12 (8)	35
6359706	Acid Extractable Iron (Fe)	2019/10/04					<50	mg/kg	4.6 (8)	35
6359706	Acid Extractable Lead (Pb)	2019/10/04	NC (7)	75 - 125	108	75 - 125	<0.50	mg/kg	18 (8)	35
6359706	Acid Extractable Lithium (Li)	2019/10/04	116 (7)	75 - 125	106	75 - 125	<2.0	mg/kg	3.8 (8)	35
6359706	Acid Extractable Manganese (Mn)	2019/10/04	NC (7)	75 - 125	105	75 - 125	<2.0	mg/kg	5.4 (8)	35

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
6359706	Acid Extractable Mercury (Hg)	2019/10/04	NC (7)	75 - 125	105	75 - 125	<0.10	mg/kg	11 (8)	35
6359706	Acid Extractable Molybdenum (Mo)	2019/10/04	NC (7)	75 - 125	103	75 - 125	<2.0	mg/kg	4.9 (8)	35
6359706	Acid Extractable Nickel (Ni)	2019/10/04	NC (7)	75 - 125	103	75 - 125	<2.0	mg/kg	7.4 (8)	35
6359706	Acid Extractable Rubidium (Rb)	2019/10/04	105 (7)	75 - 125	105	75 - 125	<2.0	mg/kg	7.0 (8)	35
6359706	Acid Extractable Selenium (Se)	2019/10/04	NC (7)	75 - 125	98	75 - 125	<1.0	mg/kg	15 (8)	35
6359706	Acid Extractable Silver (Ag)	2019/10/04	NC (7)	75 - 125	105	75 - 125	<0.50	mg/kg	9.2 (8)	35
6359706	Acid Extractable Strontium (Sr)	2019/10/04	NC (7)	75 - 125	104	75 - 125	<5.0	mg/kg	5.9 (8)	35
6359706	Acid Extractable Thallium (Tl)	2019/10/04	NC (7)	75 - 125	109	75 - 125	<0.10	mg/kg	7.0 (8)	35
6359706	Acid Extractable Tin (Sn)	2019/10/04	NC (7)	75 - 125	114	75 - 125	<1.0	mg/kg	30 (8)	35
6359706	Acid Extractable Uranium (U)	2019/10/04	119 (7)	75 - 125	114	75 - 125	<0.10	mg/kg	1.6 (8)	35
6359706	Acid Extractable Vanadium (V)	2019/10/04	NC (7)	75 - 125	103	75 - 125	<2.0	mg/kg	8.0 (8)	35
6359706	Acid Extractable Zinc (Zn)	2019/10/04	NC (7)	75 - 125	101	75 - 125	<5.0	mg/kg	24 (8)	35
6362631	Soluble (5:1) pH	2019/10/01							0.70 (9)	N/A
6369348	Acid Extractable Aluminum (Al)	2019/10/04					<10	mg/kg	7.1 (1)	35
6369348	Acid Extractable Antimony (Sb)	2019/10/04	98	75 - 125	109	75 - 125	<2.0	mg/kg	NC (1)	35
6369348	Acid Extractable Arsenic (As)	2019/10/04	107	75 - 125	104	75 - 125	<2.0	mg/kg	NC (1)	35
6369348	Acid Extractable Barium (Ba)	2019/10/04	108	75 - 125	102	75 - 125	<5.0	mg/kg	6.8 (1)	35
6369348	Acid Extractable Beryllium (Be)	2019/10/04	110	75 - 125	103	75 - 125	<2.0	mg/kg	NC (1)	35
6369348	Acid Extractable Bismuth (Bi)	2019/10/04	111	75 - 125	99	75 - 125	<2.0	mg/kg	NC (1)	35
6369348	Acid Extractable Boron (B)	2019/10/04	113	75 - 125	100	75 - 125	<50	mg/kg	NC (1)	35
6369348	Acid Extractable Cadmium (Cd)	2019/10/04	107	75 - 125	101	75 - 125	<0.30	mg/kg	NC (1)	35
6369348	Acid Extractable Chromium (Cr)	2019/10/04	108	75 - 125	102	75 - 125	<2.0	mg/kg	7.3 (1)	35
6369348	Acid Extractable Cobalt (Co)	2019/10/04	110	75 - 125	104	75 - 125	<1.0	mg/kg	1.6 (1)	35
6369348	Acid Extractable Copper (Cu)	2019/10/04	108	75 - 125	102	75 - 125	<2.0	mg/kg	0.99 (1)	35
6369348	Acid Extractable Iron (Fe)	2019/10/04					<50	mg/kg	4.5 (1)	35
6369348	Acid Extractable Lead (Pb)	2019/10/04	111	75 - 125	100	75 - 125	<0.50	mg/kg	2.4 (1)	35
6369348	Acid Extractable Lithium (Li)	2019/10/04	115	75 - 125	107	75 - 125	<2.0	mg/kg	12 (1)	35
6369348	Acid Extractable Manganese (Mn)	2019/10/04	NC	75 - 125	106	75 - 125	<2.0	mg/kg	4.7 (1)	35
6369348	Acid Extractable Mercury (Hg)	2019/10/04	104	75 - 125	102	75 - 125	<0.10	mg/kg	NC (1)	35
6369348	Acid Extractable Molybdenum (Mo)	2019/10/04	108	75 - 125	105	75 - 125	<2.0	mg/kg	NC (1)	35
6369348	Acid Extractable Nickel (Ni)	2019/10/04	111	75 - 125	104	75 - 125	<2.0	mg/kg	6.7 (1)	35

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
6369348	Acid Extractable Rubidium (Rb)	2019/10/04	107	75 - 125	103	75 - 125	<2.0	mg/kg	8.0 (1)	35
6369348	Acid Extractable Selenium (Se)	2019/10/04	109	75 - 125	105	75 - 125	<1.0	mg/kg	NC (1)	35
6369348	Acid Extractable Silver (Ag)	2019/10/04	104	75 - 125	103	75 - 125	<0.50	mg/kg	NC (1)	35
6369348	Acid Extractable Strontium (Sr)	2019/10/04	116	75 - 125	105	75 - 125	<5.0	mg/kg	22 (1)	35
6369348	Acid Extractable Thallium (Tl)	2019/10/04	110	75 - 125	100	75 - 125	<0.10	mg/kg	NC (1)	35
6369348	Acid Extractable Tin (Sn)	2019/10/04	108	75 - 125	107	75 - 125	<1.0	mg/kg	NC (1)	35
6369348	Acid Extractable Uranium (U)	2019/10/04	115	75 - 125	98	75 - 125	<0.10	mg/kg	5.0 (1)	35
6369348	Acid Extractable Vanadium (V)	2019/10/04	NC	75 - 125	100	75 - 125	<2.0	mg/kg	5.9 (1)	35
6369348	Acid Extractable Zinc (Zn)	2019/10/04	112	75 - 125	104	75 - 125	<5.0	mg/kg	4.8 (1)	35
6388164	Sample Weight (as received)	2019/10/16					NA	g	0.076 (10)	N/A
6388780	Leachable Aluminum (Al)	2019/10/18					<100	ug/L	18 (10)	35
6388780	Leachable Antimony (Sb)	2019/10/18	104	75 - 125	101	75 - 125	<20	ug/L	11 (10)	35
6388780	Leachable Arsenic (As)	2019/10/18	102	75 - 125	102	75 - 125	<20	ug/L	NC (10)	35
6388780	Leachable Barium (Ba)	2019/10/18	100	75 - 125	98	75 - 125	<50	ug/L	5.4 (10)	35
6388780	Leachable Beryllium (Be)	2019/10/18	101	75 - 125	99	75 - 125	<20	ug/L	NC (10)	35
6388780	Leachable Boron (B)	2019/10/18	97	75 - 125	99	75 - 125	<500	ug/L	NC (10)	35
6388780	Leachable Cadmium (Cd)	2019/10/18	97	75 - 125	97	75 - 125	<3.0	ug/L	18 (10)	35
6388780	Leachable Calcium (Ca)	2019/10/18					<1000	ug/L	26 (10)	35
6388780	Leachable Chromium (Cr)	2019/10/18	100	75 - 125	99	75 - 125	<20	ug/L	NC (10)	35
6388780	Leachable Cobalt (Co)	2019/10/18	100	75 - 125	99	75 - 125	<10	ug/L	NC (10)	35
6388780	Leachable Copper (Cu)	2019/10/18	97	75 - 125	97	75 - 125	<20	ug/L	NC (10)	35
6388780	Leachable Iron (Fe)	2019/10/18					<500	ug/L	30 (10)	35
6388780	Leachable Lead (Pb)	2019/10/18	NC	75 - 125	97	75 - 125	<5.0	ug/L	20 (10)	35
6388780	Leachable Lithium (Li)	2019/10/18	106	75 - 125	104	75 - 125	<20	ug/L	NC (10)	35
6388780	Leachable Magnesium (Mg)	2019/10/18					<1000	ug/L	2.2 (10)	35
6388780	Leachable Manganese (Mn)	2019/10/18	101	75 - 125	100	75 - 125	<20	ug/L	6.9 (10)	35
6388780	Leachable Molybdenum (Mo)	2019/10/18	103	75 - 125	102	75 - 125	<20	ug/L	NC (10)	35
6388780	Leachable Nickel (Ni)	2019/10/18	99	75 - 125	98	75 - 125	<20	ug/L	NC (10)	35
6388780	Leachable Potassium (K)	2019/10/18					<1000	ug/L	4.1 (10)	35
6388780	Leachable Selenium (Se)	2019/10/18	102	75 - 125	102	75 - 125	<10	ug/L	NC (10)	35
6388780	Leachable Silver (Ag)	2019/10/18	95	75 - 125	95	75 - 125	<5.0	ug/L	NC (10)	35

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
6388780	Leachable Strontium (Sr)	2019/10/18	102	75 - 125	101	75 - 125	<50	ug/L	17 (10)	35
6388780	Leachable Thallium (Tl)	2019/10/18	97	75 - 125	95	75 - 125	<1.0	ug/L	11 (10)	35
6388780	Leachable Tin (Sn)	2019/10/18	101	75 - 125	99	75 - 125	<20	ug/L	NC (10)	35
6388780	Leachable Uranium (U)	2019/10/18	107	75 - 125	105	75 - 125	<1.0	ug/L	11 (10)	35
6388780	Leachable Vanadium (V)	2019/10/18	101	75 - 125	101	75 - 125	<20	ug/L	NC (10)	35
6388780	Leachable Zinc (Zn)	2019/10/18	NC	75 - 125	99	75 - 125	<50	ug/L	35 (10)	35
6391070	Leachable Aluminum (Al)	2019/10/18					<100	ug/L		
6391070	Leachable Antimony (Sb)	2019/10/18	103	75 - 125	102	75 - 125	<20	ug/L		
6391070	Leachable Arsenic (As)	2019/10/18	101	75 - 125	100	75 - 125	<20	ug/L		
6391070	Leachable Barium (Ba)	2019/10/18	98	75 - 125	98	75 - 125	<50	ug/L		
6391070	Leachable Beryllium (Be)	2019/10/18	100	75 - 125	97	75 - 125	<20	ug/L		
6391070	Leachable Boron (B)	2019/10/18	97	75 - 125	96	75 - 125	<500	ug/L		
6391070	Leachable Cadmium (Cd)	2019/10/18	96	75 - 125	96	75 - 125	<3.0	ug/L		
6391070	Leachable Calcium (Ca)	2019/10/18					<1000	ug/L		
6391070	Leachable Chromium (Cr)	2019/10/18	97	75 - 125	97	75 - 125	<20	ug/L		
6391070	Leachable Cobalt (Co)	2019/10/18	98	75 - 125	98	75 - 125	<10	ug/L		
6391070	Leachable Copper (Cu)	2019/10/18	95	75 - 125	95	75 - 125	<20	ug/L		
6391070	Leachable Iron (Fe)	2019/10/18					<500	ug/L		
6391070	Leachable Lead (Pb)	2019/10/18	103	75 - 125	96	75 - 125	<5.0	ug/L		
6391070	Leachable Lithium (Li)	2019/10/18	104	75 - 125	103	75 - 125	<20	ug/L		
6391070	Leachable Magnesium (Mg)	2019/10/18					<1000	ug/L		
6391070	Leachable Manganese (Mn)	2019/10/18	101	75 - 125	99	75 - 125	<20	ug/L		
6391070	Leachable Molybdenum (Mo)	2019/10/18	101	75 - 125	99	75 - 125	<20	ug/L		
6391070	Leachable Nickel (Ni)	2019/10/18	98	75 - 125	97	75 - 125	<20	ug/L		
6391070	Leachable Potassium (K)	2019/10/18					<1000	ug/L		
6391070	Leachable Selenium (Se)	2019/10/18	100	75 - 125	99	75 - 125	<10	ug/L		
6391070	Leachable Silver (Ag)	2019/10/18	93	75 - 125	94	75 - 125	<5.0	ug/L		
6391070	Leachable Strontium (Sr)	2019/10/18	101	75 - 125	101	75 - 125	<50	ug/L		
6391070	Leachable Thallium (Tl)	2019/10/18	97	75 - 125	94	75 - 125	<1.0	ug/L		
6391070	Leachable Tin (Sn)	2019/10/18	103	75 - 125	101	75 - 125	<20	ug/L		
6391070	Leachable Uranium (U)	2019/10/18	108	75 - 125	104	75 - 125	<1.0	ug/L		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
6391070	Leachable Vanadium (V)	2019/10/18	100	75 - 125	99	75 - 125	<20	ug/L		
6391070	Leachable Zinc (Zn)	2019/10/18	NC	75 - 125	100	75 - 125	<50	ug/L		
6391323	Sample Weight (as received)	2019/10/17					NA	g		
6393098	Sample Weight (as received)	2019/10/18					NA	g	0.044 (11)	N/A
6393264	Leachable Aluminum (Al)	2019/10/22					<100	ug/L	5.4 (11)	35
6393264	Leachable Antimony (Sb)	2019/10/22	NC (12)	75 - 125	99	75 - 125	<20	ug/L	27 (11)	35
6393264	Leachable Arsenic (As)	2019/10/22	98 (12)	75 - 125	99	75 - 125	<20	ug/L	116 (13,11)	35
6393264	Leachable Barium (Ba)	2019/10/22	99 (12)	75 - 125	98	75 - 125	<50	ug/L	14 (11)	35
6393264	Leachable Beryllium (Be)	2019/10/22	104 (12)	75 - 125	102	75 - 125	<20	ug/L	NC (11)	35
6393264	Leachable Boron (B)	2019/10/22	100 (12)	75 - 125	101	75 - 125	<500	ug/L	3.7 (11)	35
6393264	Leachable Cadmium (Cd)	2019/10/22	NC (12)	75 - 125	95	75 - 125	<3.0	ug/L	155 (13,11)	35
6393264	Leachable Calcium (Ca)	2019/10/22					<1000	ug/L	4.5 (11)	35
6393264	Leachable Chromium (Cr)	2019/10/22	99 (12)	75 - 125	98	75 - 125	<20	ug/L	NC (11)	35
6393264	Leachable Cobalt (Co)	2019/10/22	99 (12)	75 - 125	98	75 - 125	<10	ug/L	3.2 (11)	35
6393264	Leachable Copper (Cu)	2019/10/22	NC (12)	75 - 125	96	75 - 125	<20	ug/L	1.4 (11)	35
6393264	Leachable Iron (Fe)	2019/10/22					<500	ug/L	NC (11)	35
6393264	Leachable Lead (Pb)	2019/10/22	NC (12)	75 - 125	98	75 - 125	<5.0	ug/L	22 (11)	35
6393264	Leachable Lithium (Li)	2019/10/22	107 (12)	75 - 125	110	75 - 125	<20	ug/L	8.2 (11)	35
6393264	Leachable Magnesium (Mg)	2019/10/22					<1000	ug/L	4.9 (11)	35
6393264	Leachable Manganese (Mn)	2019/10/22	NC (12)	75 - 125	100	75 - 125	<20	ug/L	3.2 (11)	35
6393264	Leachable Molybdenum (Mo)	2019/10/22	104 (12)	75 - 125	102	75 - 125	<20	ug/L	NC (11)	35
6393264	Leachable Nickel (Ni)	2019/10/22	100 (12)	75 - 125	99	75 - 125	<20	ug/L	9.9 (11)	35
6393264	Leachable Potassium (K)	2019/10/22					<1000	ug/L	9.3 (11)	35
6393264	Leachable Selenium (Se)	2019/10/22	101 (12)	75 - 125	98	75 - 125	<10	ug/L	1.5 (11)	35
6393264	Leachable Silver (Ag)	2019/10/22	94 (12)	75 - 125	94	75 - 125	<5.0	ug/L	NC (11)	35
6393264	Leachable Strontium (Sr)	2019/10/22	100 (12)	75 - 125	99	75 - 125	<50	ug/L	0.94 (11)	35
6393264	Leachable Thallium (Tl)	2019/10/22	99 (12)	75 - 125	96	75 - 125	<1.0	ug/L	3.4 (11)	35
6393264	Leachable Tin (Sn)	2019/10/22	99 (12)	75 - 125	97	75 - 125	<20	ug/L	NC (11)	35
6393264	Leachable Uranium (U)	2019/10/22	104 (12)	75 - 125	102	75 - 125	<1.0	ug/L	NC (11)	35
6393264	Leachable Vanadium (V)	2019/10/22	104 (12)	75 - 125	100	75 - 125	<20	ug/L	NC (11)	35
6393264	Leachable Zinc (Zn)	2019/10/22	NC (12)	75 - 125	101	75 - 125	<50	ug/L	37 (13,11)	35

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
6394000	Clay	2019/11/07							2.8 (1)	35
6394000	Gravel	2019/11/07							NC (1)	35
6394000	Sand	2019/11/07							14 (1)	35
6394000	Silt	2019/11/07							10 (1)	35

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Duplicate Parent ID

(2) Matrix Spike Parent ID [KWN235-01]

(3) Matrix Spike exceeds acceptance limits, sample inhomogeneity suspected.

(4) Matrix Spike Parent ID [KWN231-01]

(5) PAH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.

(6) Duplicate Parent ID [KWN231-01]

(7) Matrix Spike Parent ID [KWN264-01]

(8) Duplicate Parent ID [KWN264-01]

(9) Duplicate Parent ID [KWN251-01]

(10) Duplicate Parent ID [KWN257-01]

(11) Duplicate Parent ID [KWN263-01]

(12) Matrix Spike Parent ID [KWN265-01]

(13) Poor RPD due to sample inhomogeneity. Insufficient sample for re-extraction and re-analysis.

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BV Labs Job #: B9Q9373
Report Date: 2019/11/07

GHD Limited
Client Project #: 11198639-04
Site Location: GLENCORE
Your P.O. #: 73517186
Sampler Initials: MG

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Gina Thompson, Inorganics General Chemistry Supervisor

Mike MacGillivray, Scientific Specialist (Inorganics)

Rosemarie MacDonald, Scientific Specialist (Organics)

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports.
For Service Group specific validation please refer to the Validation Signature Page.

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CHAIN OF CUSTODY RECORD

COC #: D34717 Page 1 of 4

Invoice Information		Report Information (if differs from invoice)		Project Information (where applicable)		Turnaround Time (TAT) Required
Company Name:	GHD	Company Name:		Quotation #:		☑ Regular TAT (5 business days) Most analyses
Contact Name:	ROB TURNER	Contact Name:		P.O. #:	735/7186	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address:	466 HODGSON ROAD FREDERICTON NB	Address:		Project #:	11198639-04	IF RUSH please specify date (Surcharges will be applied)
Postal Code:	E3A 2S5	Postal Code:		Site Location:	GLENCORE	DATE REQUIRED:
Phone:	506-458-1248 Fax: 506-462-7646	Phone:	Fax:	Site #:		
Email:	rob.turner@ghd.com	Email:		Sampled By:	MIKE GRAVES	

Laboratory Use Only

CUSTODY SEAL Present	CUSTODY SEAL Intact	COOLER TEMPERATURES	COOLER TEMPERATURES
		ACTR	

COOLING MEDIA PRESENT Y / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED & PRESERVED	LAB FILTRATION REQUIRED	RCAP-MS (Total Metals) Well / Surface water	RCAP-MS (Dissolved Metals) Ground waters	Metals (Water): Total Digest (Default Method) for well water & surface water	Metals (Water): Dissolved for ground water	Metals (Water): Mercury (CIRCLE) TOTAL / DISSOLVED	Metals (Soil): Metals & Mercury Default Acid Extractable (Available) Digest	Metals (Soil): Metals Total Digest - for Ocean sediments (HNO3/HF/HClO4)	Metals (Soil): Mercury Low level by Cold Vapour AA	Metals (Soil): Hot Water Soluble Boron (required for CCME Agricultural/ Landfill)	RBCA Hydrocarbons (BTEX, C6-C32)	Hydrocarbons Soil (Potable), NS Fuel Oil Spill Policy Low Level BTEX, C6-C32	CCME Hydrocarbons (CWS-PHC F1/BTEX, F2-F4)	NB Potable Water BTEX, VPH, Low level T.E.H	PAHs (Default for water/soil)	~~PAHs (FWAL / CCME Sediment)~~ GRAIN SIZE	PCBs	~~VOCs~~ pH	Total Coliform/E.coli (Presence/Absence)	Total Coliform/E.Coli (Count)	[crossed out]	HOLD- DO NOT ANALYZE	Regulatory Requirements (Specify) / COMMENTS
1	19GW-114 (0.0-0.15m)	2019/09/17	11:43	SOIL	1	N	N						✓																
2	19GW-114 (0.6-1.2m)	2019/09/17	11:48	SOIL	1	N	N						✓														✓		LIMITED SAMPLE
3	19GW-114 (1.2-1.8m)	2019/09/17	11:49	SOIL	1	N	N														✓								
4	19GW-115 (0.0-0.15m)	2019/09/17	10:07	SOIL	1	N	N						✓																
5	19GW-115 (1.2-1.8m)	2019/09/17	10:13	SOIL	1	N	N														✓								
6	19GW-115 (1.8-2.4m)	2019/09/17	10:27	SOIL	1	N	N						✓																
7	19GW-116 (0.0-0.15m)	2019/09/17	13:46	SOIL	1	N	N						✓																
8	19GW-116 (1.2-1.5m)	2019/09/17	13:54	SOIL	1	N	N						✓																
9	19GW-117 (0.0-0.15m)	2019/09/17	15:50	SOIL	1	N	N						✓																
10	19GW-117 (0.3-0.7m)	2019/09/17	15:59	SOIL	1	N	N						✓																

Regulatory Requirements (Specify): Shipped from FREDTON

BV: Note: Hold samples for possible metal leachate

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
Mike Graves / MIKE GRAVES	2019/09/23	10:00	[signature]			B9Q9373

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CHAIN OF CUSTODY RECORD

COC #: D34718 Page 2 of 4

Invoice Information	Report Information (if differs from invoice)	Project Information (where applicable)	Turnaround Time (TAT) Required
Company Name: GHD	Company Name: SAME	Quotation #:	☑ Regular TAT (5 business days) Most analyses
Contact Name: ROB TURNER	Contact Name:	P.O. #: 7357186	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 466 HODGSON ROAD FREDERICTON, NB Postal Code: E3C 2Y5	Address: Postal Code:	Project #: 11198639-04	IF RUSH please specify date (Surcharges will be applied)
Phone: 506-458-1846 Fax: 506-462-7046	Phone: Fax:	Site Location: GLENCORE	DATE REQUIRED:
Email: rob.turner@ghd.com	Email:	Site #:	
		Sampled By: MIKE GRAVES	

Laboratory Use Only

CUSTODY SEAL Present	CUSTODY SEAL Intact	COOLER TEMPERATURES	COOLER TEMPERATURES
		ACTR	

COOLING MEDIA PRESENT Y / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED & PRESERVED	LAB FILTRATION REQUIRED	RCAP-MS (Total Metals) Well / Surface water	RCAP-MS (Dissolved Metals) Ground waters	Metals (Water): Total Digest (Default Method) for well water & surface water	Metals (Water): Dissolved for ground water	Metals (Water): Mercury (CIRCLE) TOTAL / DISSOLVED	Metals (Soil): Metals & Mercury Default: Aqua Regia Extractable (Available) Digest	Metals (Soil): Metals Total Digest (for Ocean sediments (HNO3/HF/HClO4)	Metals (Soil): Mercury Low level by Cold Vapour AA	Metals (Soil): Hot Water Soluble Boron (required for CCME Agricultural/ Landfill)	RBCA Hydrocarbons (BTEX, C6-C32)	Hydrocarbons Soil (Potable), NS Fuel Oil Spill Policy Low Level BTEX, C6-C32	CCME Hydrocarbons (CWS-PHC F2/BTEX, F2-F4)	NB Potable Water BTEX, VPH, Low level T.E.H	PAHs (Default for water/soil)	PAHs (PWAC/CCME Sediment)	PCBs	VOCs pH	Total Coliform/E.coli (Presence/Absence)	Total Coliform/E.Coli (Count)	Regulatory Requirements (Specify)	COMMENTS
1	19GW-118 (0.0-0.15m)	2019/09/18	09:29	SOIL	1	N	N						✓														Shipped from FREDTON	Note: Hold samples for possible metal leachate
2	19GW-118 (1.2-1.8m)	2019/09/17	09:43	SOIL	1	N	N						✓															
3	19GW-119 (0.0-0.15m)	2019/09/17	14:36	SOIL	1	N	N						✓												✓			
4	19GW-119 (2.7-3.3m)	2019/09/17	14:57	SOIL	1	N	N						✓												✓			
5	19GW-120 (0.0-0.15m)	2019/09/19	08:32	SOIL	1	N	N						✓												✓			
6	19GW-120 (1.2-1.8m)	2019/09/19	08:34	SOIL	1	N	N						✓												✓			
7	19GW-122 (0.0-0.15m)	2019/09/18	14:51	SOIL	1	N	N						✓												✓			
8	19GW-122 (0.6-1.2m)	2019/09/18	15:14	SOIL	1	N	N						✓												✓			
9	19GW-123 (0.0-0.15m)	2019/09/18	13:32	SOIL	1	N	N						✓												✓			
10	19GW-123 (0.3-0.6m)	2019/09/18	13:34	SOIL	1	N	N						✓										✓					LIMITED SAMPLE

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY:(Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
Mike Graves / MIKE GRAVES	2019/09/23	10:02				B999373

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49-55 Elizabeth Avenue, St John's, NL A1A 1W9 Tel: 709-754-0203 Fax: 709-754-8612 Toll Free: 1-888-492-7227
465 George Street, Unit G, Sydney, NS B1P 1K5 Tel: 902-567-1255 Fax: 902-539-8504 Toll Free: 1-888-535-7770
www.maxxam.ca E-mail: Customerservicebedford@maxxam.ca

ATL FCD 00149 / 22

CHAIN OF CUSTODY RECORD

COC #: D34720 Page 3 of 4

Invoice Information	Report Information (if differs from invoice)	Project Information (where applicable)	Turnaround Time (TAT) Required
Company Name: GHD	Company Name:	Quotation #:	✓ Regular TAT (5 business days) Most analyses
Contact Name: ROB TURNER	Contact Name:	P.O. #: 75517186	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 466 HODGSON ROAD	Address: SAME	Project #: 11198639-04	IF RUSH please specify date (Surcharges will be applied)
FREDERICTON, NB Postal Code: E3C 2G5	Postal Code:	Site Location: GLENCOE	DATE REQUIRED:
Phone: 506-458-1948 Fax: 506-462-7646	Phone: Fax:	Site #:	
Email: rob.turner@ghd.com	Email:	Sampled By: MIKE GRAVES	

Laboratory Use Only

CUSTODY SEAL Present	CUSTODY SEAL Intact	COOLER TEMPERATURES	COOLER TEMPERATURES
		AC+R	

COOLING MEDIA PRESENT Y / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED & PRESERVED	LAB FILTRATION REQUIRED	RCAP-MS [Total Metals] Well / Surface water	RCAP-MS [Dissolved Metals] Ground waters	Metals (Water): Total Digest (Default Method) for well water & surface water	Metals (Water): Dissolved for ground water	Metals (Water): Mercury [CIRCLE] TOTAL / DISSOLVED	Metals (Soil): Metals & Mercury Default Acid Extractable (Available) Digest	Metals (Soil): Metals Total Digest -for Ocean sediments (HNO3/HF/HClO4)	Metals (Soil): Mercury Low level by Cold Vapour AA	Metals (Soil): Hot Water Soluble Boron (required for CCME Agricultural/ Landfill)	RBCA Hydrocarbons (BTEX, C6-C32)	Hydrocarbons Soil (Potable), NS Fuel Oil Spill Policy Low Level BTEX ,C6-C32	CCME Hydrocarbons (CWS-PHC F1/BTEX, F2-F4)	NB Potable Water BTEX, VPH, Low level T.E.H	PAHs (Default for water/soil)	PAHs (SWAC/CCME Sediment) GRAIN SIZE	PCBs	VOCs pH	Total Coliform/E.coli (Presence/Absence)	Total Coliform/E.Coli (Count)	[illegible]	HOLD- DO NOT ANALYZE	Regulatory Requirements (Specify): Shipped from FREDTON
1	19GW-124 (0.0-0.15m)	2019/09/18	~~15:11~~	SOIL	1	N	N						✓												✓					COMMENTS: Note: Hold samples for possible metal leachate
2	19GW-127 (0.0-0.15m)	2019/09/20	08:55	SOIL	1	N	N						✓																	
3	19GW-127 (1.2-1.8m)	2019/09/20	09:05	SOIL	1	N	N						✓																	
4	19GW-133 (0.0-0.15m)	2019/09/19	13:46	SOIL	1	N	N						✓																	
5	19GW-133 (1.2-1.8m)	2019/09/19	14:05	SOIL	1	N	N						✓																	
6	~~19SP-1 (0.0-0.15m)~~	~~2019/09/19~~	~~15:33~~	~~SOIL~~	~~2~~	~~N~~	~~N~~						~~✓~~												✓					
7	19SP-1 (1.2-1.8m)	2019/09/19	15:35	SOIL	2	N	N						✓												✓					
8	~~19SP-3 (0.0-0.15m)~~	~~2019/09/19~~	~~11:01~~	~~SOIL~~	~~2~~	~~N~~	~~N~~						~~✓~~												✓					
9	19SP-3 (1.2-1.8m)	2019/09/19	11:15	SOIL	2	N	N						✓												✓					
10	~~19SP-7 (0.0-0.15m)~~	~~2019/09/19~~	~~11:31~~	~~SOIL~~	~~1~~	~~N~~	~~N~~						~~✓~~												✓					~~EMPTY SAMPLE~~

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY:(Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
Mike Graves / MIKE GRAVES	2019/09/23	10:00	[illegible]			B909373

Unless otherwise agreed to in writing, work submitted on this Chain of Custody is subject to Maxxam's standard Terms and Conditions. Signing of this Chain of Custody document is acknowledgment and acceptance of our terms which are available for viewing at www.maxxam.ca/terms.

White: Maxxam Pink: Client

Maxxam
A Bureau Veritas Group Company

200 Bluewater Road, Suite 105, Bedford, Nova Scotia B4B 1G9 Tel: 902-420-0203 Fax: 902-420-8612 Toll Free: 1-800-565-7227
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465 George Street, Unit G, Sydney, NS B1P 1K5 Tel: 902-567-1255 Fax: 902-539-6504 Toll Free: 1-888-535-7770
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ATL FCD 00149 / 22

CHAIN OF CUSTODY RECORD

COC #: D34719 Page 4 of 4

Invoice Information		Report Information (if differs from invoice)		Project Information (where applicable)		Turnaround Time (TAT) Required
Company Name:	GHD	Company Name:	SAME	Quotation #:		✓ Regular TAT (5 business days) Most analyses
Contact Name:	ROB TURNER	Contact Name:		P.O. #:	73517186	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address:	466 HODGSON ROAD, FREDERICTON, NB Postal Code: E3C 2G5	Address:	Postal Code:	Project #:	11198639-04	IF RUSH please specify date (Surcharges will be applied)
Phone:	506-458-1248 Fax: 506 462-7646	Phone:	Fax:	Site Location:	GLENCORE	DATE REQUIRED:
Email:	rob.turner@ghd.com	Email:		Site #:		
				Sampled By:	MIKE GRAVES	

Laboratory Use Only

CUSTODY SEAL Present	Intact	COOLER TEMPERATURES	COOLER TEMPERATURES
		ACTR	

COOLING MEDIA PRESENT Y / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested: # OF CONTAINERS SUBMITTED; FIELD FILTERED & PRESERVED; LAB FILTRATION REQUIRED; RCAP-MS (Total Metals) Well / Surface water; RCAP-MS (Dissolved Metals) Ground waters; Metals (Water): Total Digest (Default Method) for well water & surface water; Dissolved for ground water; Mercury (CIRCLE) TOTAL / DISSOLVED; Metals (Soil): Metals & Mercury Default Acid Extractable (Available) Digest; Metals Total Digest -for Ocean sediments (HNO3/HF/HClO4); Mercury Low level by Cold Vapour AA; Hot Water Soluble Boron (required for CCME Agricultural/ Landfill); RBCA Hydrocarbons (BTEX, C6-C32); Hydrocarbons Soil (Potable), NS Fuel Oil Spill Policy Low Level BTEX, C6-C32; CCME Hydrocarbons (CWS-PHC F1/BTEX, F2-F4); NB Potable Water BTEX, VPH, Low level T.E.H; PAHs (Default for water/soil); ~~PAHs (CCME Sediment)~~ GRAIN SIZE; PCBs; ~~VOCs~~ pH; Total Coliform/E.coli (Presence/Absence); Total Coliform/E.Coli (Count); [crossed out]; HOLD- DO NOT ANALYZE

Regulatory Requirements (Specify): Shipped from FREDTON

#	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED & PRESERVED	LAB FILTRATION REQUIRED	Metals & Mercury Default Acid Extractable (Available) Digest	GRAIN SIZE	pH	[crossed out column]	COMMENTS
1	19SP-9 (0.6-1.2m)	2019/09/19	11:35	Soil	2	N	N	✓		✓	✓	LIMITED SAMPLE
2	~~19SP-11 (0.0-0.75m)~~	~~2019/09/19~~	~~15:52~~	~~Soil~~	~~2~~	~~N~~	~~N~~	~~✓~~		~~✓~~		~~LIMITED SAMPLE~~
3	~~19SP-11 (1.2-1.8m)~~	~~2019/09/19~~	~~15:59~~	~~Soil~~	~~2~~	~~N~~	~~N~~	~~✓~~		~~✓~~		~~LIMITED SAMPLE~~
4	19SP-14 (0.0-0.6m)	2019/09/19	16:33	Soil	2	N	N	✓	✓		✓	LIMITED SAMPLE
5	19SP-16 (0.6-1.2m)	2019/09/26	08:28	Soil	2	N	N	✓	✓		✓	LIMITED SAMPLE
6	19SP-17 (0.6-1.2m)	2019/09/19	13:15	Soil	1	N	N	✓				
7	SOIL-QA/QC-1	2019/09/20	09:05	Soil	1	N	N	✓				Note: Hold Sample
8	SOIL-QA/QC-2	2019/09/20	09:05	Soil	1	N	N	✓				for possible metal
9	SOIL-QA/QC-3	2019/09/20	09:05	Soil	1	N	N	✓				leachate
10		1										

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
Mike Graves / MIKE GRAVES	2019/09/23	10:00	E Powell			B9Q9373

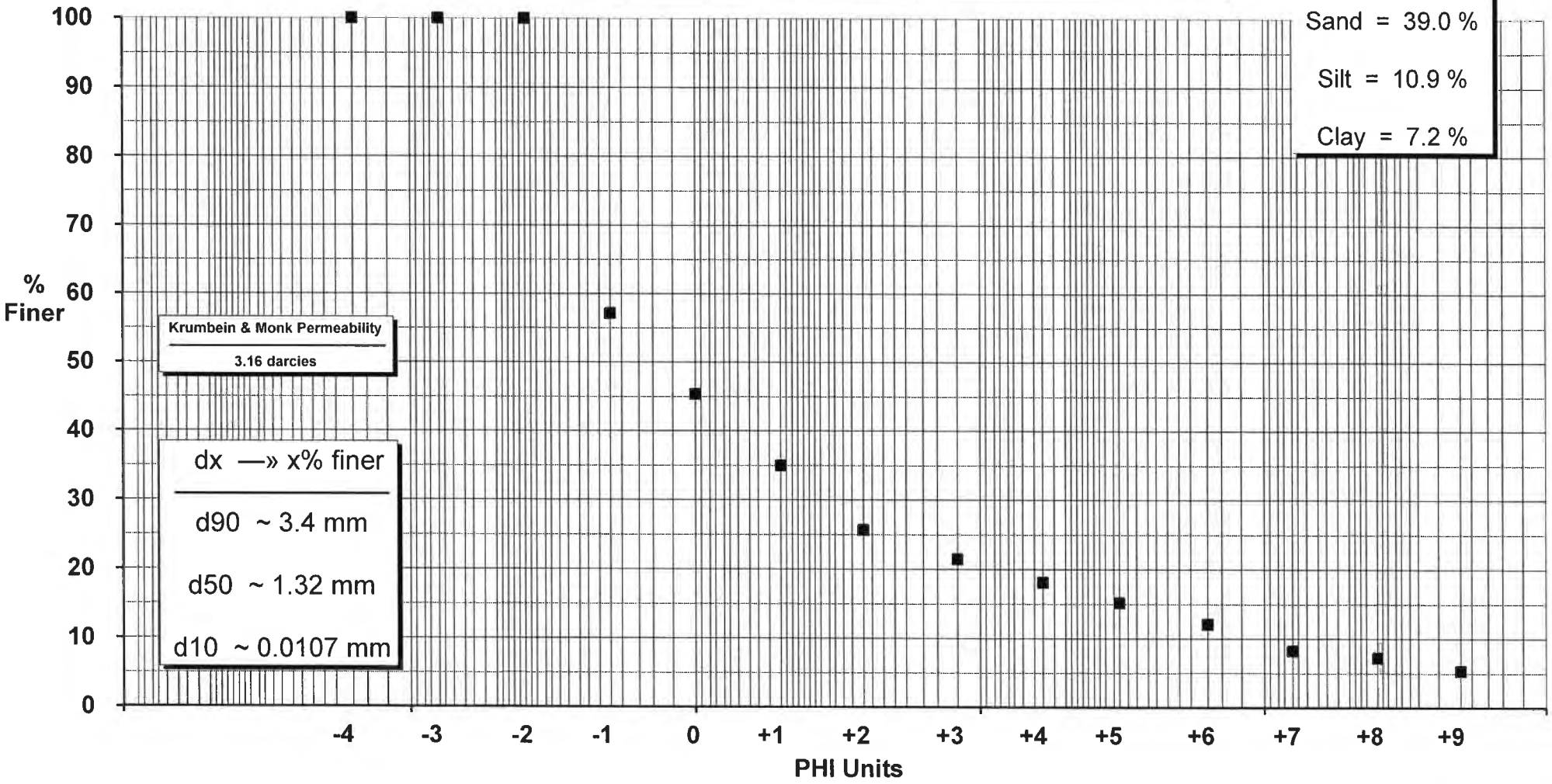
White: Maxxam Pink: Client

BV Labs ID: KWN253-01

19GW-123 (0.3-0.6M)

Percent Coarser than 75 µm (PHI = 3.737)	Percent Coarser than 50 µm (PHI = 4.322)
81.0 %	82.8 %

Wentworth	
Gravel	42.9 %
Sand	39.0 %
Silt	10.9 %
Clay	7.2 %



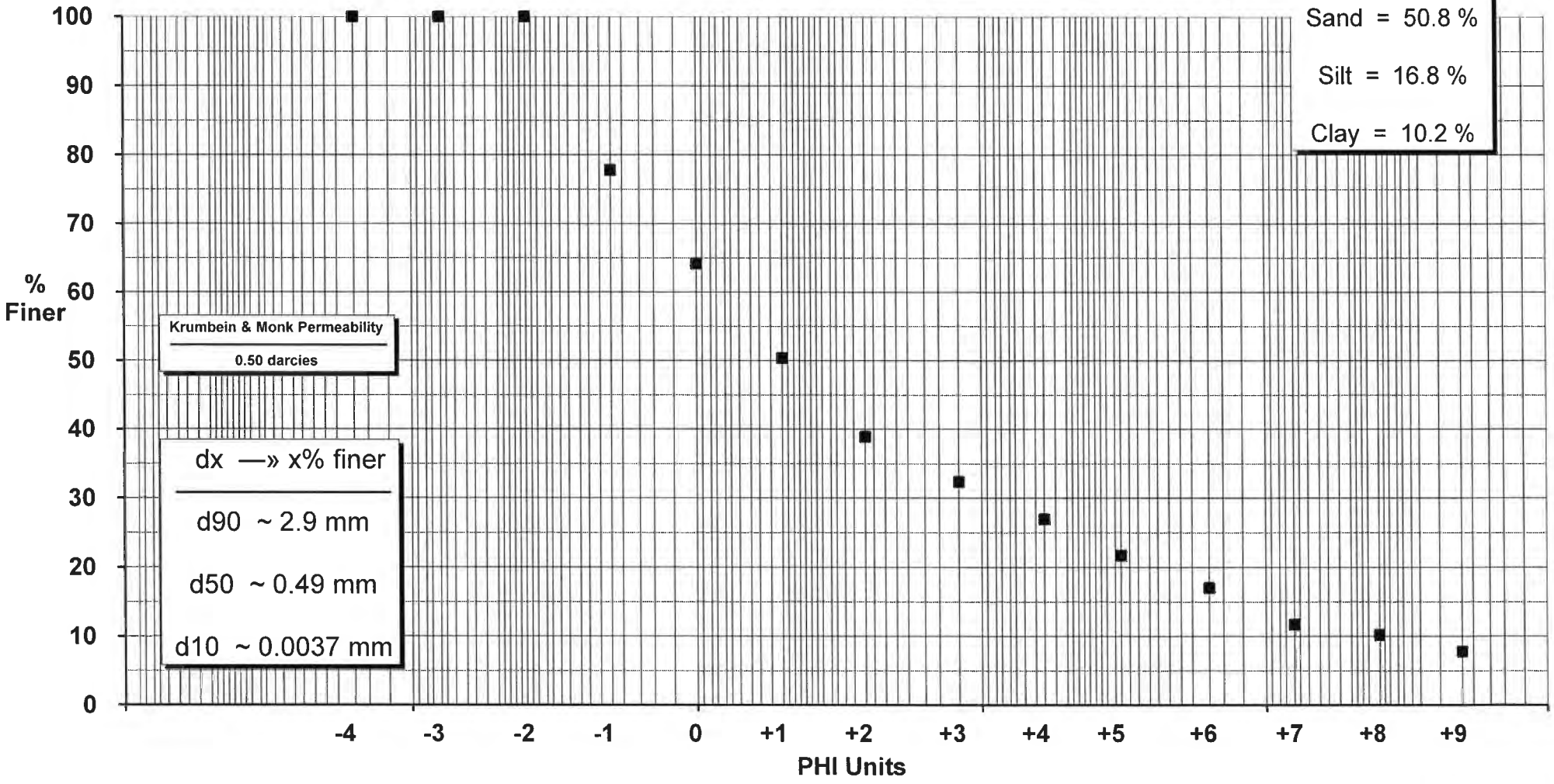
Approved

BV Labs ID: KWN263-01

19SP-14 (0.0-0.6M)

Percent Coarser than 75 µm (PHI = 3.737)	Percent Coarser than 50 µm (PHI = 4.322)
71.6 %	74.8 %

Wentworth	
Gravel	22.2 %
Sand	50.8 %
Silt	16.8 %
Clay	10.2 %



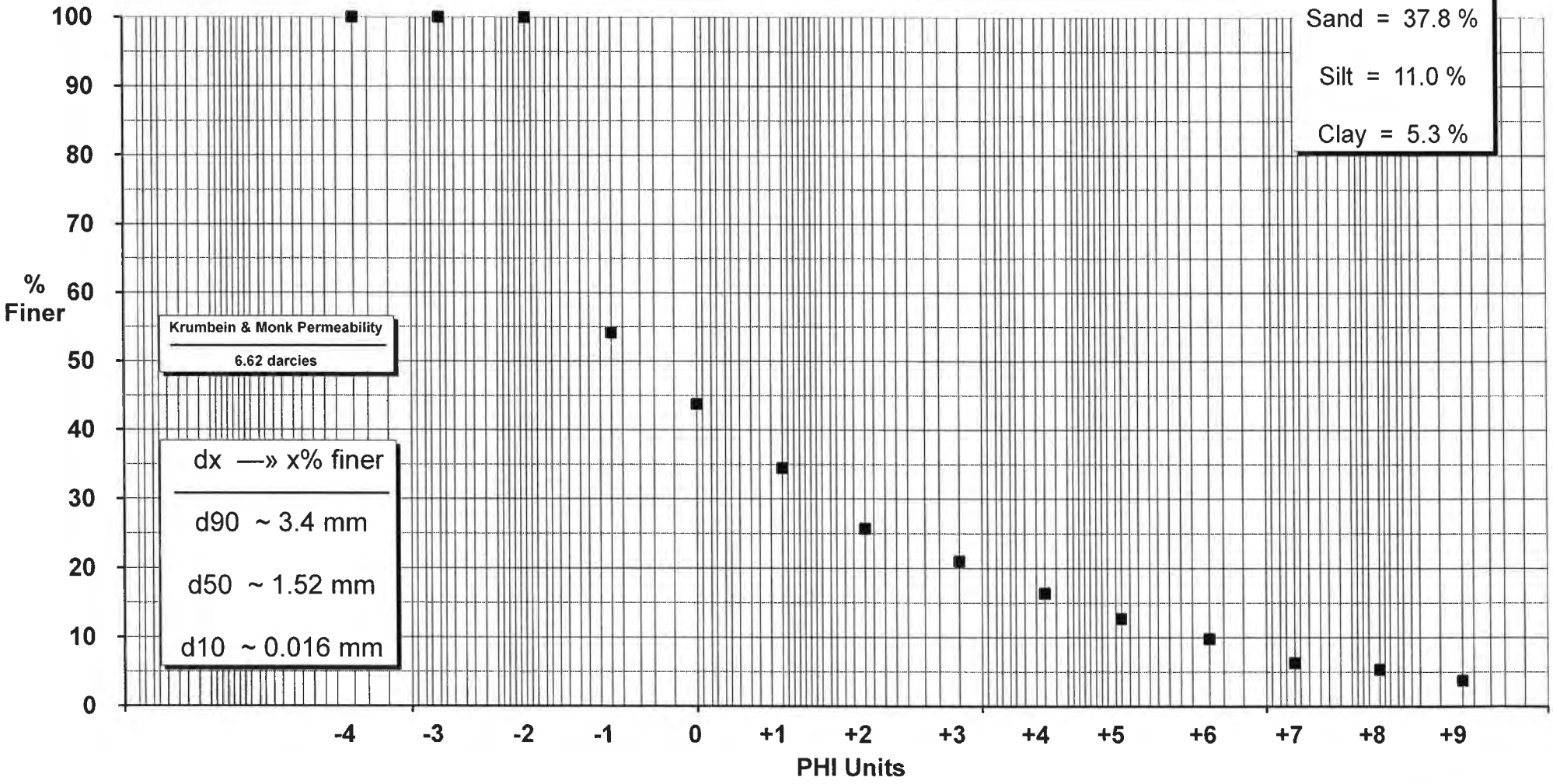
Approved

BV Labs ID: KWN264-01

19SP-16 (0.6-1.2M)

Percent Coarser than 75 µm (PHI = 3.737)	Percent Coarser than 50 µm (PHI = 4.322)
82.4 %	84.8 %

Wentworth	
Gravel	45.9 %
Sand	37.8 %
Silt	11.0 %
Clay	5.3 %



Approved

Your P.O. #: 73517254
Your Project #: 11198639-06
Site Location: BELLEDUNE
Your C.O.C. #: D 34709, D 34684, D34691

Attention: Troy Small

GHD Limited
466 Hodgson Rd
Fredericton , NB
CANADA E3C 2G5

Report Date: 2019/10/24
Report #: R5934513
Version: 5 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9Q8613
Received: 2019/09/25, 09:58

Sample Matrix: Soil
Samples Received: 22

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Metals Leach TCLP/CGSB extraction	3	2019/10/16	2019/10/17	ATL SOP 00058	EPA 6020B R2 m
Metals Leach TCLP/CGSB extraction	1	2019/10/17	2019/10/18	ATL SOP 00058	EPA 6020B R2 m
Metals Leach TCLP/CGSB extraction	1	2019/10/18	2019/10/21	ATL SOP 00058	EPA 6020B R2 m
Metals Solids Acid Extr. ICPMS	9	2019/09/27	2019/10/01	ATL SOP 00058	EPA 6020B R2 m
pH (5:1 DI Water Extract)	9	2019/09/30	2019/10/01	ATL SOP 00003	SM 23 4500-H+ B m
NORM Group Analysis (1)	2	N/A	2019/10/04	BQL SOP-00007	Gamma Spectrometry
NORM Group Analysis (1)	15	N/A	2019/10/05	BQL SOP-00007	Gamma Spectrometry
NORM Group Analysis (1)	5	N/A	2019/10/06	BQL SOP-00007	Gamma Spectrometry
NORM Group Analysis (1)	1	N/A	2019/10/09	BQL SOP-00007	Gamma Spectrometry
NORM Group Analysis (1)	1	N/A	2019/10/10	BQL SOP-00007	Gamma Spectrometry
NORM Group Analysis (1)	2	N/A	2019/10/11	BQL SOP-00007	Gamma Spectrometry
NORM Group Analysis (1)	1	N/A	2019/10/17	BQL SOP-00007	Gamma Spectrometry
NORM Group Analysis (1)	1	N/A	2019/10/22	BQL SOP-00007	Gamma Spectrometry
TCLP Inorganic extraction - pH	5	N/A	2019/09/27	ATL SOP 00035	EPA 1311 m
TCLP Inorganic extraction - pH	1	N/A	2019/10/01	ATL SOP 00035	EPA 1311 m
TCLP Inorganic extraction - pH	3	N/A	2019/10/16	ATL SOP 00035	EPA 1311 m
TCLP Inorganic extraction - pH	1	N/A	2019/10/17	ATL SOP 00035	EPA 1311 m
TCLP Inorganic extraction - Weight	5	N/A	2019/09/27	ATL SOP 00035	EPA 1311 m
TCLP Inorganic extraction - Weight	1	N/A	2019/10/01	ATL SOP 00035	EPA 1311 m
TCLP Inorganic extraction - Weight	3	N/A	2019/10/16	ATL SOP 00035	EPA 1311 m
TCLP Inorganic extraction - Weight	1	N/A	2019/10/17	ATL SOP 00035	EPA 1311 m

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied.

Your P.O. #: 73517254
Your Project #: 11198639-06
Site Location: BELLEDUNE
Your C.O.C. #: D 34709, D 34684, D34691

Attention: Troy Small

GHD Limited
466 Hodgson Rd
Fredericton , NB
CANADA E3C 2G5

Report Date: 2019/10/24
Report #: R5934513
Version: 5 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9Q8613
Received: 2019/09/25, 09:58

BV Labs has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by BV Labs, unless otherwise agreed in writing. BV Labs is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by Bureau Veritas Laboratories Kitimat

Encryption Key

AUTHORIZED REPORT
RAPPORT AUTORISÉ

Bureau Veritas Laboratories
24 Oct 2019 15:46:41

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Heather Macumber, Senior Project Manager
Email: Heather.MACUMBER@bvlabs.com
Phone# (902)420-0203 Ext:226

==========

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

BV Labs Job #: B9Q8613
Report Date: 2019/10/24

GHD Limited
Client Project #: 11198639-06
Site Location: BELLEDUNE
Your P.O. #: 73517254

RESULTS OF ANALYSES OF SOIL

BV Labs ID		KWI778			KWI778			KWI779		
Sampling Date		2019/09/18			2019/09/18			2019/09/18		
COC Number		D 34709			D 34709			D 34709		
	UNITS	19SP-1 0-0.15M	RDL	QC Batch	19SP-1 0-0.15M Lab-Dup	RDL	QC Batch	19SP-1 0-0.15-0.30M	RDL	QC Batch
Inorganics										
Soluble (5:1) pH	pH	8.25	N/A	6362631				7.43	N/A	6362631
Sample Weight (as received)	g							100	N/A	6388164
Initial pH	N/A							4.8		6388165
Final pH	N/A							5.9		6388165
RADIONUCLIDE										
Lead-210	Bq/g	<0.10	0.10	6368434	<0.10	0.10	6368434	<0.10	0.10	6368434
Potassium-40	Bq/g	<1.0	1.0	6368434	<1.0	1.0	6368434	<1.0	1.0	6368434
Radium-226	Bq/g	<0.10	0.10	6368434	<0.10	0.10	6368434	<0.10	0.10	6368434
Radium-228	Bq/g	<0.10	0.10	6368434	<0.10	0.10	6368434	<0.10	0.10	6368434
Thorium-228	Bq/g	<0.10	0.10	6368434	<0.10	0.10	6368434	<0.10	0.10	6368434
Thorium-230	Bq/g	<0.80	0.80	6368434	<0.80	0.80	6368434	<0.80	0.80	6368434
Thorium-234	Bq/g	<0.050	0.050	6368434	<0.050	0.050	6368434	<0.050	0.050	6368434
Uranium-235	Bq/g	<0.10	0.10	6368434	<0.10	0.10	6368434	<0.10	0.10	6368434

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

Bureau Veritas Laboratories 200 Bluewater Rd, Suite 105, Bedford, Nova Scotia Canada B4B 1G9 Tel: 902-420-0203 Toll-free: 800-565-7227 Fax: 902-420-8612 www.bvlabs.com

BV Labs Job #: B9Q8613
Report Date: 2019/10/24

GHD Limited
Client Project #: 11198639-06
Site Location: BELLEDUNE
Your P.O. #: 73517254

RESULTS OF ANALYSES OF SOIL

BV Labs ID		KWI780			KWI781			KWI782		
Sampling Date		2019/09/18			2019/09/18			2019/09/18		
COC Number		D 34709			D 34709			D 34709		
	UNITS	19SP-3 0-0.15M	RDL	QC Batch	19SP-3 0.15-0.3M	RDL	QC Batch	19SP-5 0-0.15M	RDL	QC Batch
Inorganics										
Soluble (5:1) pH	pH	6.68	N/A	6362631	5.96	N/A	6362631	6.86	N/A	6362631
Sample Weight (as received)	g				100	N/A	6388164	100	N/A	6356111
Initial pH	N/A				4.8		6388165	4.9		6356112
Final pH	N/A				5.4		6388165	5.3		6356112
RADIONUCLIDE										
Lead-210	Bq/g	<0.10	0.10	6368434	<0.10	0.10	6368434	<0.10	0.10	6368434
Lead-210	Bq/L							<1.0	1.0	6370557
Lead-212	Bq/L							<0.10	0.10	6370557
Potassium-40	Bq/g	<1.0	1.0	6368434	<1.0	1.0	6368434	<1.0	1.0	6368434
Radium-226	Bq/g	<0.10	0.10	6368434	<0.10	0.10	6368434	<0.10	0.10	6368434
Radium-226	Bq/L							<1.0	1.0	6370557
Radium-228	Bq/g	<0.10	0.10	6368434	<0.10	0.10	6368434	<0.10	0.10	6368434
Radium-228	Bq/L							<0.50	0.50	6370557
Thorium-228	Bq/g	<0.10	0.10	6368434	<0.10	0.10	6368434	<0.10	0.10	6368434
Thorium-230	Bq/g	<0.80	0.80	6368434	<0.80	0.80	6368434	<0.80	0.80	6368434
Thorium-230	Bq/L							<5.0	5.0	6370557
Thorium-234	Bq/g	<0.050	0.050	6368434	0.150	0.050	6368434	<0.050	0.050	6368434
Thorium-234	Bq/L							<1.0	1.0	6370557
Uranium-235	Bq/g	<0.10	0.10	6368434	<0.10	0.10	6368434	<0.10	0.10	6368434
Uranium-235	Bq/L							<0.50	0.50	6370557

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

Bureau Veritas Laboratories 200 Bluewater Rd, Suite 105, Bedford, Nova Scotia Canada B4B 1G9 Tel: 902-420-0203 Toll-free: 800-565-7227 Fax: 902-420-8612 www.bvlabs.com

BV Labs Job #: B9Q8613
Report Date: 2019/10/24

GHD Limited
Client Project #: 11198639-06
Site Location: BELLEDUNE
Your P.O. #: 73517254

RESULTS OF ANALYSES OF SOIL

BV Labs ID		KWI783			KWI784			KWI784	
Sampling Date		2019/09/18			2019/09/18			2019/09/18	
COC Number		D 34709			D 34709			D 34709	
	UNITS	19SP-5 0.15-0.3M	RDL	QC Batch	19SP-2 0-0.15M	RDL	QC Batch	19SP-2 0-0.15M Lab-Dup	QC Batch
Inorganics									
Soluble (5:1) pH	pH	7.01	N/A	6362631					
Sample Weight (as received)	g				100	N/A	6356111	100	6356111
Initial pH	N/A				4.8		6356112	4.9	6356112
Final pH	N/A				5.9		6356112	6.0	6356112
RADIONUCLIDE									
Lead-210	Bq/g	<0.10	0.10	6368434	<0.10	0.10	6368434		
Lead-210	Bq/L				<1.0	1.0	6370557		
Lead-212	Bq/L				<0.10	0.10	6370557		
Potassium-40	Bq/g	<1.0	1.0	6368434	<1.0	1.0	6368434		
Radium-226	Bq/g	<0.10	0.10	6368434	<0.10	0.10	6368434		
Radium-226	Bq/L				<1.0	1.0	6370557		
Radium-228	Bq/g	<0.10	0.10	6368434	<0.10	0.10	6368434		
Radium-228	Bq/L				<0.50	0.50	6370557		
Thorium-228	Bq/g	<0.10	0.10	6368434	<0.10	0.10	6368434		
Thorium-230	Bq/g	<0.80	0.80	6368434	<0.80	0.80	6368434		
Thorium-230	Bq/L				<5.0	5.0	6370557		
Thorium-234	Bq/g	<0.050	0.050	6368434	<0.050	0.050	6368434		
Thorium-234	Bq/L				<1.0	1.0	6370557		
Uranium-235	Bq/g	<0.10	0.10	6368434	<0.10	0.10	6368434		
Uranium-235	Bq/L				<0.50	0.50	6370557		

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

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BV Labs Job #: B9Q8613
Report Date: 2019/10/24

GHD Limited
Client Project #: 11198639-06
Site Location: BELLEDUNE
Your P.O. #: 73517254

RESULTS OF ANALYSES OF SOIL

BV Labs ID		KWI785			KWI786	KWI787		
Sampling Date		2019/09/18			2019/09/18	2019/09/18		
COC Number		D 34709			D 34709	D 34709		
	UNITS	19SP-4 0-0.15M	RDL	QC Batch	19SP-6 0-0.15M	19SP-10 0-0.15M	RDL	QC Batch
Inorganics								
Sample Weight (as received)	g	100	N/A	6362110				
Initial pH	N/A	4.9		6362115				
Final pH	N/A	5.5		6362115				
RADIONUCLIDE								
Lead-210	Bq/g	<0.10	0.10	6368434	0.13	<0.10	0.10	6368434
Lead-210	Bq/L	<1.0	1.0	6370557				
Lead-212	Bq/L	<0.10	0.10	6370557				
Potassium-40	Bq/g	<1.0	1.0	6368434	<1.0	<1.0	1.0	6368434
Radium-226	Bq/g	<0.10	0.10	6368434	0.20	<0.10	0.10	6368434
Radium-226	Bq/L	<1.0	1.0	6370557				
Radium-228	Bq/g	<0.10	0.10	6368434	<0.10	<0.10	0.10	6368434
Radium-228	Bq/L	<0.50	0.50	6370557				
Thorium-228	Bq/g	<0.10	0.10	6368434	<0.10	<0.10	0.10	6368434
Thorium-230	Bq/g	<0.80	0.80	6368434	<0.80	<0.80	0.80	6368434
Thorium-230	Bq/L	<5.0	5.0	6370557				
Thorium-234	Bq/g	0.050	0.050	6368434	0.120	0.070	0.050	6368434
Thorium-234	Bq/L	<1.0	1.0	6370557				
Uranium-235	Bq/g	<0.10	0.10	6368434	<0.10	<0.10	0.10	6368434
Uranium-235	Bq/L	<0.50	0.50	6370557				

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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BV Labs Job #: B9Q8613
Report Date: 2019/10/24

GHD Limited
Client Project #: 11198639-06
Site Location: BELLEDUNE
Your P.O. #: 73517254

RESULTS OF ANALYSES OF SOIL

BV Labs ID		KWI974			KWI975			KWI976		
Sampling Date		2019/09/18			2019/09/18			2019/09/18		
COC Number		D 34684			D 34684			D 34684		
	UNITS	19SP-9 0-0.15M	RDL	QC Batch	19SP-11 0-0.15M	RDL	QC Batch	19SP-11 1.2-1.8M	RDL	QC Batch
Inorganics										
Soluble (5:1) pH	pH	7.55	N/A	6362631	6.56	N/A	6362631	6.48	N/A	6362631
Sample Weight (as received)	g	100	N/A	6388164				91	N/A	6391323
Initial pH	N/A	4.9		6388165				4.9		6391325
Final pH	N/A	4.8		6388165				4.9		6391325
RADIONUCLIDE										
Lead-210	Bq/g	<0.10	0.10	6368434	<0.10	0.10	6368434	<0.10	0.10	6368434
Potassium-40	Bq/g	<1.0	1.0	6368434	<1.0	1.0	6368434	<1.0	1.0	6368434
Radium-226	Bq/g	<0.10	0.10	6368434	<0.10	0.10	6368434	<0.10	0.10	6368434
Radium-228	Bq/g	<0.10	0.10	6368434	<0.10	0.10	6368434	<0.10	0.10	6368434
Thorium-228	Bq/g	<0.10	0.10	6368434	<0.10	0.10	6368434	<0.10	0.10	6368434
Thorium-230	Bq/g	<0.80	0.80	6368434	<0.80	0.80	6368434	<0.80	0.80	6368434
Thorium-234	Bq/g	<0.050	0.050	6368434	<0.050	0.050	6368434	<0.050	0.050	6368434
Uranium-235	Bq/g	<0.10	0.10	6368434	<0.10	0.10	6368434	<0.10	0.10	6368434

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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BV Labs Job #: B9Q8613
Report Date: 2019/10/24

GHD Limited
Client Project #: 11198639-06
Site Location: BELLEDUNE
Your P.O. #: 73517254

RESULTS OF ANALYSES OF SOIL

BV Labs ID		KWI977			KWI978			KWI979		
Sampling Date		2019/09/18			2019/09/18			2019/09/18		
COC Number		D 34684			D 34684			D 34684		
	UNITS	19SP-12 0-0.15M	RDL	QC Batch	19SP-12 0.15-0.3M	RDL	QC Batch	19SP-31 0-0.15M	RDL	QC Batch
Inorganics										
Sample Weight (as received)	g	100	N/A	6356111				100	N/A	6356111
Initial pH	N/A	4.8		6356112				4.8		6356112
Final pH	N/A	5.0		6356112				5.0		6356112
RADIONUCLIDE										
Lead-210	Bq/g	<0.10	0.10	6368434	<0.10	0.10	6368434	<0.10	0.10	6368434
Lead-210	Bq/L	<1.0	1.0	6370557				<1.0	1.0	6370557
Lead-212	Bq/L	<0.10	0.10	6370557				<0.10	0.10	6370557
Potassium-40	Bq/g	<1.0	1.0	6368434	<1.0	1.0	6368434	<1.0	1.0	6368434
Radium-226	Bq/g	<0.10	0.10	6368434	<0.10	0.10	6368434	<0.10	0.10	6368434
Radium-226	Bq/L	<1.0	1.0	6370557				<1.0	1.0	6370557
Radium-228	Bq/g	<0.10	0.10	6368434	<0.10	0.10	6368434	<0.10	0.10	6368434
Radium-228	Bq/L	<0.50	0.50	6370557				<0.50	0.50	6370557
Thorium-228	Bq/g	<0.10	0.10	6368434	<0.10	0.10	6368434	<0.10	0.10	6368434
Thorium-230	Bq/g	<0.80	0.80	6368434	<0.80	0.80	6368434	<0.80	0.80	6368434
Thorium-230	Bq/L	<5.0	5.0	6370557				<5.0	5.0	6370557
Thorium-234	Bq/g	<0.050	0.050	6368434	<0.050	0.050	6368434	<0.050	0.050	6368434
Thorium-234	Bq/L	<1.0	1.0	6370557				<1.0	1.0	6370557
Uranium-235	Bq/g	<0.10	0.10	6368434	<0.10	0.10	6368434	<0.10	0.10	6368434
Uranium-235	Bq/L	<0.50	0.50	6370557				<0.50	0.50	6370557

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Report Date: 2019/10/24

GHD Limited
Client Project #: 11198639-06
Site Location: BELLEDUNE
Your P.O. #: 73517254

RESULTS OF ANALYSES OF SOIL

BV Labs ID		KWI980			KWI981			KWI982		
Sampling Date		2019/09/18			2019/09/18			2019/09/18		
COC Number		D 34684			D 34684			D 34684		
	UNITS	19SP-31 0.15-0.3M	RDL	QC Batch	19SP-32 0-0.15M	RDL	QC Batch	19SP-32 0.15-0.3M	RDL	QC Batch
Inorganics										
Sample Weight (as received)	g				100	N/A	6356111			
Initial pH	N/A				4.8		6356112			
Final pH	N/A				4.9		6356112			
RADIONUCLIDE										
Lead-210	Bq/g	<0.10	0.10	6368434	<0.10	0.10	6368434	<0.10	0.10	6368434
Lead-210	Bq/L				<1.0	1.0	6370557			
Lead-212	Bq/L				<0.10	0.10	6370557			
Potassium-40	Bq/g	<1.0	1.0	6368434	<1.0	1.0	6368434	<1.0	1.0	6368434
Radium-226	Bq/g	<0.10	0.10	6368434	<0.10	0.10	6368434	<0.10	0.10	6368434
Radium-226	Bq/L				<1.0	1.0	6370557			
Radium-228	Bq/g	<0.10	0.10	6368434	<0.10	0.10	6368434	<0.10	0.10	6368434
Radium-228	Bq/L				<0.50	0.50	6370557			
Thorium-228	Bq/g	<0.10	0.10	6368434	<0.10	0.10	6368434	<0.10	0.10	6368434
Thorium-230	Bq/g	<0.80	0.80	6368434	<0.80	0.80	6368434	<0.80	0.80	6368434
Thorium-230	Bq/L				<5.0	5.0	6370557			
Thorium-234	Bq/g	<0.050	0.050	6368434	<0.050	0.050	6368434	<0.050	0.050	6368434
Thorium-234	Bq/L				<1.0	1.0	6370557			
Uranium-235	Bq/g	<0.10	0.10	6368434	<0.10	0.10	6368434	<0.10	0.10	6368434
Uranium-235	Bq/L				<0.50	0.50	6370557			

RDL = Reportable Detection Limit
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N/A = Not Applicable

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Report Date: 2019/10/24

GHD Limited
Client Project #: 11198639-06
Site Location: BELLEDUNE
Your P.O. #: 73517254

RESULTS OF ANALYSES OF SOIL

BV Labs ID		KWI983	KWJ003	KWJ004		
Sampling Date		2019/09/18	2019/09/18	2019/09/18		
COC Number		D 34684	D34691	D34691		
	UNITS	SOIL QA/QC-4	SOIL QA/QC-5	19SP-10 0.15-0.3M	RDL	QC Batch
RADIONUCLIDE						
Lead-210	Bq/g	<0.10	<0.10	<0.10	0.10	6368435
Potassium-40	Bq/g	<1.0	<1.0	<1.0	1.0	6368435
Radium-226	Bq/g	0.11	<0.10	0.14	0.10	6368435
Radium-228	Bq/g	<0.10	<0.10	<0.10	0.10	6368435
Thorium-228	Bq/g	<0.10	<0.10	<0.10	0.10	6368435
Thorium-230	Bq/g	<0.80	<0.80	<0.80	0.80	6368435
Thorium-234	Bq/g	0.280	<0.050	0.400	0.050	6368435
Uranium-235	Bq/g	<0.10	<0.10	<0.10	0.10	6368435

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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GHD Limited
Client Project #: 11198639-06
Site Location: BELLEDUNE
Your P.O. #: 73517254

ELEMENTS BY ICP/MS (SOIL)

BV Labs ID		KWI779	KWI781			KWI782		
Sampling Date		2019/09/18	2019/09/18			2019/09/18		
COC Number		D 34709	D 34709			D 34709		
	UNITS	19SP-1 0-0.15-0.30M	19SP-3 0.15-0.3M	RDL	QC Batch	19SP-5 0-0.15M	RDL	QC Batch
Metals								
Leachable Aluminum (Al)	ug/L	110	1700	100	6388780	1400	100	6393264
Leachable Antimony (Sb)	ug/L	90	330	20	6388780	500	20	6393264
Leachable Arsenic (As)	ug/L	42	180	20	6388780	280	20	6393264
Leachable Barium (Ba)	ug/L	180	74	50	6388780	310	50	6393264
Leachable Beryllium (Be)	ug/L	<20	<20	20	6388780	<20	20	6393264
Leachable Boron (B)	ug/L	<500	<500	500	6388780	<500	500	6393264
Leachable Cadmium (Cd)	ug/L	200	280	3.0	6388780	1500	3.0	6393264
Leachable Calcium (Ca)	ug/L	650000	380000	1000	6388780	310000	1000	6393264
Leachable Chromium (Cr)	ug/L	<20	<20	20	6388780	<20	20	6393264
Leachable Cobalt (Co)	ug/L	<10	<10	10	6388780	28	10	6393264
Leachable Copper (Cu)	ug/L	130	1300	20	6388780	19000	20	6393264
Leachable Iron (Fe)	ug/L	<500	<500	500	6388780	<500	500	6393264
Leachable Lead (Pb)	ug/L	3900	7000	5.0	6388780	460000	50	6393264
Leachable Lithium (Li)	ug/L	<20	<20	20	6388780	<20	20	6393264
Leachable Magnesium (Mg)	ug/L	6500	5500	1000	6388780	4500	1000	6393264
Leachable Manganese (Mn)	ug/L	2900	2800	20	6388780	6100	20	6393264
Leachable Molybdenum (Mo)	ug/L	<20	<20	20	6388780	<20	20	6393264
Leachable Nickel (Ni)	ug/L	<20	27	20	6388780	67	20	6393264
Leachable Potassium (K)	ug/L	2400	2300	1000	6388780	2700	1000	6393264
Leachable Selenium (Se)	ug/L	<10	<10	10	6388780	<10	10	6393264
Leachable Silver (Ag)	ug/L	<5.0	<5.0	5.0	6388780	<5.0	5.0	6393264
Leachable Strontium (Sr)	ug/L	490	440	50	6388780	440	50	6393264
Leachable Thallium (Tl)	ug/L	4.7	4.9	1.0	6388780	45	1.0	6393264
Leachable Tin (Sn)	ug/L	<20	<20	20	6388780	<20	20	6393264
Leachable Uranium (U)	ug/L	<1.0	3.9	1.0	6388780	4.3	1.0	6393264
Leachable Vanadium (V)	ug/L	<20	<20	20	6388780	<20	20	6393264
Leachable Zinc (Zn)	ug/L	4200	12000	50	6388780	35000	50	6393264

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

ELEMENTS BY ICP/MS (SOIL)

BV Labs ID		KWI974		KWI976		
Sampling Date		2019/09/18		2019/09/18		
COC Number		D 34684		D 34684		
	UNITS	19SP-9 0-0.15M	QC Batch	19SP-11 1.2-1.8M	RDL	QC Batch
Metals						
Leachable Aluminum (Al)	ug/L	750	6388780	1300	100	6391070
Leachable Antimony (Sb)	ug/L	98	6388780	49	20	6391070
Leachable Arsenic (As)	ug/L	48	6388780	26	20	6391070
Leachable Barium (Ba)	ug/L	550	6388780	470	50	6391070
Leachable Beryllium (Be)	ug/L	<20	6388780	<20	20	6391070
Leachable Boron (B)	ug/L	<500	6388780	<500	500	6391070
Leachable Cadmium (Cd)	ug/L	270	6388780	22	3.0	6391070
Leachable Calcium (Ca)	ug/L	51000	6388780	34000	1000	6391070
Leachable Chromium (Cr)	ug/L	<20	6388780	<20	20	6391070
Leachable Cobalt (Co)	ug/L	<10	6388780	<10	10	6391070
Leachable Copper (Cu)	ug/L	570	6388780	130	20	6391070
Leachable Iron (Fe)	ug/L	<500	6388780	<500	500	6391070
Leachable Lead (Pb)	ug/L	20000	6388780	4100	5.0	6391070
Leachable Lithium (Li)	ug/L	<20	6388780	<20	20	6391070
Leachable Magnesium (Mg)	ug/L	3100	6388780	5800	1000	6391070
Leachable Manganese (Mn)	ug/L	1400	6388780	560	20	6391070
Leachable Molybdenum (Mo)	ug/L	<20	6388780	<20	20	6391070
Leachable Nickel (Ni)	ug/L	<20	6388780	<20	20	6391070
Leachable Potassium (K)	ug/L	3200	6388780	3200	1000	6391070
Leachable Selenium (Se)	ug/L	<10	6388780	<10	10	6391070
Leachable Silver (Ag)	ug/L	<5.0	6388780	<5.0	5.0	6391070
Leachable Strontium (Sr)	ug/L	99	6388780	95	50	6391070
Leachable Thallium (Tl)	ug/L	1.2	6388780	<1.0	1.0	6391070
Leachable Tin (Sn)	ug/L	<20	6388780	<20	20	6391070
Leachable Uranium (U)	ug/L	1.1	6388780	1.8	1.0	6391070
Leachable Vanadium (V)	ug/L	<20	6388780	<20	20	6391070
Leachable Zinc (Zn)	ug/L	2100	6388780	1000	50	6391070

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

BV Labs Job #: B9Q8613
Report Date: 2019/10/24

GHD Limited
Client Project #: 11198639-06
Site Location: BELLEDUNE
Your P.O. #: 73517254

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

BV Labs ID		KWI778	KWI779	KWI780		KWI781		
Sampling Date		2019/09/18	2019/09/18	2019/09/18		2019/09/18		
COC Number		D 34709	D 34709	D 34709		D 34709		
	UNITS	19SP-1 0-0.15M	19SP-1 0-0.15-0.30M	19SP-3 0-0.15M	RDL	19SP-3 0.15-0.3M	RDL	QC Batch
Metals								
Acid Extractable Aluminum (Al)	mg/kg	50000	25000	25000	10	24000	10	6356323
Acid Extractable Antimony (Sb)	mg/kg	28	53	42	2.0	320	20	6356323
Acid Extractable Arsenic (As)	mg/kg	67	130	90	2.0	640	20	6356323
Acid Extractable Barium (Ba)	mg/kg	120	91	94	5.0	190	5.0	6356323
Acid Extractable Beryllium (Be)	mg/kg	<2.0	<2.0	<2.0	2.0	<2.0	2.0	6356323
Acid Extractable Bismuth (Bi)	mg/kg	9.1	21	18	2.0	100	2.0	6356323
Acid Extractable Boron (B)	mg/kg	<50	<50	<50	50	<50	50	6356323
Acid Extractable Cadmium (Cd)	mg/kg	18	35	23	0.30	54	0.30	6356323
Acid Extractable Chromium (Cr)	mg/kg	300	92	57	2.0	88	2.0	6356323
Acid Extractable Cobalt (Co)	mg/kg	41	20	18	1.0	15	1.0	6356323
Acid Extractable Copper (Cu)	mg/kg	210	250	220	2.0	900	2.0	6356323
Acid Extractable Iron (Fe)	mg/kg	69000	42000	42000	50	53000	50	6356323
Acid Extractable Lead (Pb)	mg/kg	3000	5000	4100	0.50	27000	5.0	6356323
Acid Extractable Lithium (Li)	mg/kg	42	25	26	2.0	21	2.0	6356323
Acid Extractable Manganese (Mn)	mg/kg	1500	1100	970	2.0	870	2.0	6356323
Acid Extractable Mercury (Hg)	mg/kg	1.3	1.2	0.33	0.10	1.9	0.10	6356323
Acid Extractable Molybdenum (Mo)	mg/kg	<2.0	<2.0	<2.0	2.0	8.3	2.0	6356323
Acid Extractable Nickel (Ni)	mg/kg	120	54	47	2.0	41	2.0	6356323
Acid Extractable Rubidium (Rb)	mg/kg	<2.0	8.2	12	2.0	13	2.0	6356323
Acid Extractable Selenium (Se)	mg/kg	5.4	3.8	1.9	1.0	17	1.0	6356323
Acid Extractable Silver (Ag)	mg/kg	13	23	17	0.50	91	5.0	6356323
Acid Extractable Strontium (Sr)	mg/kg	76	63	43	5.0	100	5.0	6356323
Acid Extractable Thallium (Tl)	mg/kg	1.8	7.5	5.0	0.10	26	0.10	6356323
Acid Extractable Tin (Sn)	mg/kg	4.3	12	10	1.0	170	1.0	6356323
Acid Extractable Uranium (U)	mg/kg	0.20	2.8	4.5	0.10	38	0.10	6356323
Acid Extractable Vanadium (V)	mg/kg	220	98	89	2.0	98	2.0	6356323
Acid Extractable Zinc (Zn)	mg/kg	870	1400	1500	5.0	4900	5.0	6356323

RDL = Reportable Detection Limit
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BV Labs Job #: B9Q8613
Report Date: 2019/10/24

GHD Limited
Client Project #: 11198639-06
Site Location: BELLEDUNE
Your P.O. #: 73517254

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

BV Labs ID		KWI781		KWI782		KWI783		KWI974		
Sampling Date		2019/09/18		2019/09/18		2019/09/18		2019/09/18		
COC Number		D 34709		D 34709		D 34709		D 34684		
	UNITS	19SP-3 0.15-0.3M Lab-Dup	RDL	19SP-5 0-0.15M	RDL	19SP-5 0.15-0.3M	RDL	19SP-9 0-0.15M	RDL	QC Batch
Metals										
Acid Extractable Aluminum (Al)	mg/kg	23000	10	24000	10	30000	10	18000	10	6356323
Acid Extractable Antimony (Sb)	mg/kg	310	20	1100	20	430	20	24	2.0	6356323
Acid Extractable Arsenic (As)	mg/kg	590	20	1400	20	620	20	53	2.0	6356323
Acid Extractable Barium (Ba)	mg/kg	200	5.0	220	5.0	290	5.0	90	5.0	6356323
Acid Extractable Beryllium (Be)	mg/kg	<2.0	2.0	<2.0	2.0	<2.0	2.0	<2.0	2.0	6356323
Acid Extractable Bismuth (Bi)	mg/kg	120	2.0	200	20	120	2.0	6.7	2.0	6356323
Acid Extractable Boron (B)	mg/kg	<50	50	<50	50	<50	50	<50	50	6356323
Acid Extractable Cadmium (Cd)	mg/kg	58	0.30	180	0.30	74	0.30	24	0.30	6356323
Acid Extractable Chromium (Cr)	mg/kg	92	2.0	100	2.0	79	2.0	42	2.0	6356323
Acid Extractable Cobalt (Co)	mg/kg	15	1.0	32	1.0	32	1.0	15	1.0	6356323
Acid Extractable Copper (Cu)	mg/kg	880	2.0	9300	20	2500	2.0	86	2.0	6356323
Acid Extractable Iron (Fe)	mg/kg	51000	50	63000	50	71000	50	35000	50	6356323
Acid Extractable Lead (Pb)	mg/kg	27000	5.0	48000	5.0	28000	5.0	1600	0.50	6356323
Acid Extractable Lithium (Li)	mg/kg	21	2.0	24	2.0	31	2.0	22	2.0	6356323
Acid Extractable Manganese (Mn)	mg/kg	830	2.0	2000	2.0	2000	2.0	990	2.0	6356323
Acid Extractable Mercury (Hg)	mg/kg	2.1	0.10	5.2	0.10	2.7	0.10	0.14	0.10	6356323
Acid Extractable Molybdenum (Mo)	mg/kg	8.8	2.0	16	2.0	8.0	2.0	<2.0	2.0	6356323
Acid Extractable Nickel (Ni)	mg/kg	42	2.0	85	2.0	56	2.0	43	2.0	6356323
Acid Extractable Rubidium (Rb)	mg/kg	13	2.0	9.5	2.0	4.9	2.0	7.6	2.0	6356323
Acid Extractable Selenium (Se)	mg/kg	18	1.0	100	1.0	34	1.0	1.5	1.0	6356323
Acid Extractable Silver (Ag)	mg/kg	89	5.0	82	5.0	85	5.0	9.9	0.50	6356323
Acid Extractable Strontium (Sr)	mg/kg	100	5.0	160	5.0	98	5.0	17	5.0	6356323
Acid Extractable Thallium (Tl)	mg/kg	26	0.10	36	0.10	22	0.10	1.2	0.10	6356323
Acid Extractable Tin (Sn)	mg/kg	170	1.0	310	1.0	140	1.0	4.2	1.0	6356323
Acid Extractable Uranium (U)	mg/kg	38	0.10	5.0	0.10	2.5	0.10	0.74	0.10	6356323
Acid Extractable Vanadium (V)	mg/kg	100	2.0	99	2.0	160	2.0	63	2.0	6356323
Acid Extractable Zinc (Zn)	mg/kg	5100	5.0	9600	5.0	4500	5.0	350	5.0	6356323

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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GHD Limited
Client Project #: 11198639-06
Site Location: BELLEDUNE
Your P.O. #: 73517254

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

BV Labs ID		KWI975	KWI976		
Sampling Date		2019/09/18	2019/09/18		
COC Number		D 34684	D 34684		
	UNITS	19SP-11 0-0.15M	19SP-11 1.2-1.8M	RDL	QC Batch
Metals					
Acid Extractable Aluminum (Al)	mg/kg	29000	20000	10	6356323
Acid Extractable Antimony (Sb)	mg/kg	100	17	2.0	6356323
Acid Extractable Arsenic (As)	mg/kg	170	50	2.0	6356323
Acid Extractable Barium (Ba)	mg/kg	100	69	5.0	6356323
Acid Extractable Beryllium (Be)	mg/kg	<2.0	<2.0	2.0	6356323
Acid Extractable Bismuth (Bi)	mg/kg	21	4.1	2.0	6356323
Acid Extractable Boron (B)	mg/kg	<50	<50	50	6356323
Acid Extractable Cadmium (Cd)	mg/kg	19	3.4	0.30	6356323
Acid Extractable Chromium (Cr)	mg/kg	59	40	2.0	6356323
Acid Extractable Cobalt (Co)	mg/kg	18	13	1.0	6356323
Acid Extractable Copper (Cu)	mg/kg	310	120	2.0	6356323
Acid Extractable Iron (Fe)	mg/kg	44000	33000	50	6356323
Acid Extractable Lead (Pb)	mg/kg	6600	1300	0.50	6356323
Acid Extractable Lithium (Li)	mg/kg	26	21	2.0	6356323
Acid Extractable Manganese (Mn)	mg/kg	920	650	2.0	6356323
Acid Extractable Mercury (Hg)	mg/kg	0.51	0.13	0.10	6356323
Acid Extractable Molybdenum (Mo)	mg/kg	2.2	<2.0	2.0	6356323
Acid Extractable Nickel (Ni)	mg/kg	52	40	2.0	6356323
Acid Extractable Rubidium (Rb)	mg/kg	11	9.6	2.0	6356323
Acid Extractable Selenium (Se)	mg/kg	4.4	<1.0	1.0	6356323
Acid Extractable Silver (Ag)	mg/kg	39	6.8	0.50	6356323
Acid Extractable Strontium (Sr)	mg/kg	32	14	5.0	6356323
Acid Extractable Thallium (Tl)	mg/kg	4.2	0.80	0.10	6356323
Acid Extractable Tin (Sn)	mg/kg	26	5.8	1.0	6356323
Acid Extractable Uranium (U)	mg/kg	4.9	1.3	0.10	6356323
Acid Extractable Vanadium (V)	mg/kg	80	56	2.0	6356323
Acid Extractable Zinc (Zn)	mg/kg	1600	310	5.0	6356323

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	15.0°C
Package 2	3.7°C
Package 3	16.0°C
Package 4	16.0°C
Package 5	15.7°C
Package 6	16.7°C

Revised Report - TCLP + Metals analysis added to the below listed samples as per requested fromRob T. HWS Oct 11/19

19SP-1 0.15-0.3m (KWI779)
19SP-3 0.15-0.3m (KWI781)
19SP-5 0-0.15m (KWI782)
19SP-9 0-0.15m (KWI974)
19SP-11 1.2-1.8m (KWI976)

Sample KWI976 [19SP-11 1.2-1.8M] : The minimum weight of 100g for the standard TCLP extraction, as per Reference Method EPA 1311 R1992, could not be achieved due to insufficient sample. Client consent has been received to proceed using the modified TCLP method. The uncertainty of the analysis may be increased, and the reported results may not be suitable for compliance purposes.

Results relate only to the items tested.

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BV Labs Job #: B9Q8613
Report Date: 2019/10/24

QUALITY ASSURANCE REPORT

GHD Limited
Client Project #: 11198639-06
Site Location: BELLEDUNE
Your P.O. #: 73517254

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
6356111	Sample Weight (as received)	2019/09/27					NA	g	0.077 (2)	N/A		
6356323	Acid Extractable Aluminum (Al)	2019/10/01					<10	mg/kg	2.0 (4)	35		
6356323	Acid Extractable Antimony (Sb)	2019/10/01	NC (3)	75 - 125	108	75 - 125	<2.0	mg/kg	1.6 (4)	35		
6356323	Acid Extractable Arsenic (As)	2019/10/01	NC (3)	75 - 125	105	75 - 125	<2.0	mg/kg	6.6 (4)	35		
6356323	Acid Extractable Barium (Ba)	2019/10/01	NC (3)	75 - 125	104	75 - 125	<5.0	mg/kg	7.1 (4)	35		
6356323	Acid Extractable Beryllium (Be)	2019/10/01	107 (3)	75 - 125	100	75 - 125	<2.0	mg/kg	NC (4)	35		
6356323	Acid Extractable Bismuth (Bi)	2019/10/01	NC (3)	75 - 125	106	75 - 125	<2.0	mg/kg	17 (4)	35		
6356323	Acid Extractable Boron (B)	2019/10/01	97 (3)	75 - 125	99	75 - 125	<50	mg/kg	NC (4)	35		
6356323	Acid Extractable Cadmium (Cd)	2019/10/01	NC (3)	75 - 125	100	75 - 125	<0.30	mg/kg	7.4 (4)	35		
6356323	Acid Extractable Chromium (Cr)	2019/10/01	NC (3)	75 - 125	104	75 - 125	<2.0	mg/kg	4.0 (4)	35		
6356323	Acid Extractable Cobalt (Co)	2019/10/01	107 (3)	75 - 125	103	75 - 125	<1.0	mg/kg	1.5 (4)	35		
6356323	Acid Extractable Copper (Cu)	2019/10/01	NC (3)	75 - 125	100	75 - 125	<2.0	mg/kg	2.8 (4)	35		
6356323	Acid Extractable Iron (Fe)	2019/10/01					<50	mg/kg	2.1 (4)	35		
6356323	Acid Extractable Lead (Pb)	2019/10/01	NC (3)	75 - 125	105	75 - 125	<0.50	mg/kg	1.8 (4)	35		
6356323	Acid Extractable Lithium (Li)	2019/10/01	110 (3)	75 - 125	103	75 - 125	<2.0	mg/kg	0.14 (4)	35		
6356323	Acid Extractable Manganese (Mn)	2019/10/01	NC (3)	75 - 125	105	75 - 125	<2.0	mg/kg	5.4 (4)	35		
6356323	Acid Extractable Mercury (Hg)	2019/10/01	99 (3)	75 - 125	102	75 - 125	<0.10	mg/kg	6.3 (4)	35		
6356323	Acid Extractable Molybdenum (Mo)	2019/10/01	NC (3)	75 - 125	104	75 - 125	<2.0	mg/kg	4.8 (4)	35		
6356323	Acid Extractable Nickel (Ni)	2019/10/01	108 (3)	75 - 125	105	75 - 125	<2.0	mg/kg	1.2 (4)	35		
6356323	Acid Extractable Rubidium (Rb)	2019/10/01	102 (3)	75 - 125	103	75 - 125	<2.0	mg/kg	3.4 (4)	35		
6356323	Acid Extractable Selenium (Se)	2019/10/01	101 (3)	75 - 125	107	75 - 125	<1.0	mg/kg	5.9 (4)	35		
6356323	Acid Extractable Silver (Ag)	2019/10/01	NC (3)	75 - 125	101	75 - 125	<0.50	mg/kg	2.2 (4)	35		
6356323	Acid Extractable Strontium (Sr)	2019/10/01	NC (3)	75 - 125	107	75 - 125	<5.0	mg/kg	2.3 (4)	35		
6356323	Acid Extractable Thallium (Tl)	2019/10/01	NC (3)	75 - 125	106	75 - 125	<0.10	mg/kg	1.3 (4)	35		
6356323	Acid Extractable Tin (Sn)	2019/10/01	NC (3)	75 - 125	110	75 - 125	<1.0	mg/kg	3.7 (4)	35		
6356323	Acid Extractable Uranium (U)	2019/10/01	107 (3)	75 - 125	113	75 - 125	<0.10	mg/kg	0.29 (4)	35		
6356323	Acid Extractable Vanadium (V)	2019/10/01	NC (3)	75 - 125	106	75 - 125	<2.0	mg/kg	4.4 (4)	35		
6356323	Acid Extractable Zinc (Zn)	2019/10/01	NC (3)	75 - 125	104	75 - 125	<5.0	mg/kg	3.1 (4)	35		
6362110	Sample Weight (as received)	2019/10/01					NA	g	0.052 (1)	N/A		
6362631	Soluble (5:1) pH	2019/10/01							0.70 (1)	N/A		
6368434	Lead-210	2019/10/04					<0.10	Bq/g	NC (5)	N/A	102	74 - 126
6368434	Potassium-40	2019/10/04					<1.0	Bq/g	NC (5)	N/A	90	74 - 126

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
6368434	Radium-226	2019/10/04					<0.10	Bq/g	NC (5)	N/A	88	74 - 126
6368434	Radium-228	2019/10/04					<0.10	Bq/g	NC (5)	N/A	99	74 - 126
6368434	Thorium-228	2019/10/04					<0.10	Bq/g	NC (5)	N/A	100	74 - 126
6368434	Thorium-230	2019/10/04					<0.80	Bq/g	NC (5)	N/A	104	74 - 126
6368434	Thorium-234	2019/10/04					<0.050	Bq/g	NC (5)	N/A	106	74 - 126
6368434	Uranium-235	2019/10/04					<0.10	Bq/g	NC (5)	N/A	96	74 - 126
6368435	Lead-210	2019/10/05					<0.10	Bq/g	NC (1)	N/A	103	74 - 126
6368435	Potassium-40	2019/10/05					<1.0	Bq/g	NC (1)	N/A	100	74 - 126
6368435	Radium-226	2019/10/05					<0.10	Bq/g	NC (1)	N/A	97	74 - 126
6368435	Radium-228	2019/10/05					<0.10	Bq/g	NC (1)	N/A	100	74 - 126
6368435	Thorium-228	2019/10/05					<0.10	Bq/g	NC (1)	N/A	103	74 - 126
6368435	Thorium-230	2019/10/05					<0.80	Bq/g	NC (1)	N/A	94	74 - 126
6368435	Thorium-234	2019/10/05					<0.050	Bq/g	NC (1)	N/A	102	74 - 126
6368435	Uranium-235	2019/10/05					<0.10	Bq/g	NC (1)	N/A	105	74 - 126
6370557	Lead-210	2019/10/08					<1.0	Bq/L			93	74 - 126
6370557	Lead-212	2019/10/08					<0.10	Bq/L			105	N/A
6370557	Radium-226	2019/10/08					<1.0	Bq/L			96	74 - 126
6370557	Radium-228	2019/10/08					<0.50	Bq/L			104	74 - 126
6370557	Thorium-230	2019/10/08					<5.0	Bq/L			107	74 - 126
6370557	Thorium-234	2019/10/08					<1.0	Bq/L			100	74 - 126
6370557	Uranium-235	2019/10/08					<0.50	Bq/L			108	74 - 126
6388164	Sample Weight (as received)	2019/10/16					NA	g	0.076 (1)	N/A		
6388780	Leachable Aluminum (Al)	2019/10/18					<100	ug/L	18 (1)	35		
6388780	Leachable Antimony (Sb)	2019/10/18	104	75 - 125	101	75 - 125	<20	ug/L	11 (1)	35		
6388780	Leachable Arsenic (As)	2019/10/18	102	75 - 125	102	75 - 125	<20	ug/L	NC (1)	35		
6388780	Leachable Barium (Ba)	2019/10/18	100	75 - 125	98	75 - 125	<50	ug/L	5.4 (1)	35		
6388780	Leachable Beryllium (Be)	2019/10/18	101	75 - 125	99	75 - 125	<20	ug/L	NC (1)	35		
6388780	Leachable Boron (B)	2019/10/18	97	75 - 125	99	75 - 125	<500	ug/L	NC (1)	35		
6388780	Leachable Cadmium (Cd)	2019/10/18	97	75 - 125	97	75 - 125	<3.0	ug/L	18 (1)	35		
6388780	Leachable Calcium (Ca)	2019/10/18					<1000	ug/L	26 (1)	35		
6388780	Leachable Chromium (Cr)	2019/10/18	100	75 - 125	99	75 - 125	<20	ug/L	NC (1)	35		
6388780	Leachable Cobalt (Co)	2019/10/18	100	75 - 125	99	75 - 125	<10	ug/L	NC (1)	35		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
6388780	Leachable Copper (Cu)	2019/10/18	97	75 - 125	97	75 - 125	<20	ug/L	NC (1)	35		
6388780	Leachable Iron (Fe)	2019/10/18					<500	ug/L	30 (1)	35		
6388780	Leachable Lead (Pb)	2019/10/18	NC	75 - 125	97	75 - 125	<5.0	ug/L	20 (1)	35		
6388780	Leachable Lithium (Li)	2019/10/18	106	75 - 125	104	75 - 125	<20	ug/L	NC (1)	35		
6388780	Leachable Magnesium (Mg)	2019/10/18					<1000	ug/L	2.2 (1)	35		
6388780	Leachable Manganese (Mn)	2019/10/18	101	75 - 125	100	75 - 125	<20	ug/L	6.9 (1)	35		
6388780	Leachable Molybdenum (Mo)	2019/10/18	103	75 - 125	102	75 - 125	<20	ug/L	NC (1)	35		
6388780	Leachable Nickel (Ni)	2019/10/18	99	75 - 125	98	75 - 125	<20	ug/L	NC (1)	35		
6388780	Leachable Potassium (K)	2019/10/18					<1000	ug/L	4.1 (1)	35		
6388780	Leachable Selenium (Se)	2019/10/18	102	75 - 125	102	75 - 125	<10	ug/L	NC (1)	35		
6388780	Leachable Silver (Ag)	2019/10/18	95	75 - 125	95	75 - 125	<5.0	ug/L	NC (1)	35		
6388780	Leachable Strontium (Sr)	2019/10/18	102	75 - 125	101	75 - 125	<50	ug/L	17 (1)	35		
6388780	Leachable Thallium (Tl)	2019/10/18	97	75 - 125	95	75 - 125	<1.0	ug/L	11 (1)	35		
6388780	Leachable Tin (Sn)	2019/10/18	101	75 - 125	99	75 - 125	<20	ug/L	NC (1)	35		
6388780	Leachable Uranium (U)	2019/10/18	107	75 - 125	105	75 - 125	<1.0	ug/L	11 (1)	35		
6388780	Leachable Vanadium (V)	2019/10/18	101	75 - 125	101	75 - 125	<20	ug/L	NC (1)	35		
6388780	Leachable Zinc (Zn)	2019/10/18	NC	75 - 125	99	75 - 125	<50	ug/L	35 (1)	35		
6391070	Leachable Aluminum (Al)	2019/10/18					<100	ug/L				
6391070	Leachable Antimony (Sb)	2019/10/18	103	75 - 125	102	75 - 125	<20	ug/L				
6391070	Leachable Arsenic (As)	2019/10/18	101	75 - 125	100	75 - 125	<20	ug/L				
6391070	Leachable Barium (Ba)	2019/10/18	98	75 - 125	98	75 - 125	<50	ug/L				
6391070	Leachable Beryllium (Be)	2019/10/18	100	75 - 125	97	75 - 125	<20	ug/L				
6391070	Leachable Boron (B)	2019/10/18	97	75 - 125	96	75 - 125	<500	ug/L				
6391070	Leachable Cadmium (Cd)	2019/10/18	96	75 - 125	96	75 - 125	<3.0	ug/L				
6391070	Leachable Calcium (Ca)	2019/10/18					<1000	ug/L				
6391070	Leachable Chromium (Cr)	2019/10/18	97	75 - 125	97	75 - 125	<20	ug/L				
6391070	Leachable Cobalt (Co)	2019/10/18	98	75 - 125	98	75 - 125	<10	ug/L				
6391070	Leachable Copper (Cu)	2019/10/18	95	75 - 125	95	75 - 125	<20	ug/L				
6391070	Leachable Iron (Fe)	2019/10/18					<500	ug/L				
6391070	Leachable Lead (Pb)	2019/10/18	103	75 - 125	96	75 - 125	<5.0	ug/L				
6391070	Leachable Lithium (Li)	2019/10/18	104	75 - 125	103	75 - 125	<20	ug/L				
6391070	Leachable Magnesium (Mg)	2019/10/18					<1000	ug/L				

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
6391070	Leachable Manganese (Mn)	2019/10/18	101	75 - 125	99	75 - 125	<20	ug/L				
6391070	Leachable Molybdenum (Mo)	2019/10/18	101	75 - 125	99	75 - 125	<20	ug/L				
6391070	Leachable Nickel (Ni)	2019/10/18	98	75 - 125	97	75 - 125	<20	ug/L				
6391070	Leachable Potassium (K)	2019/10/18					<1000	ug/L				
6391070	Leachable Selenium (Se)	2019/10/18	100	75 - 125	99	75 - 125	<10	ug/L				
6391070	Leachable Silver (Ag)	2019/10/18	93	75 - 125	94	75 - 125	<5.0	ug/L				
6391070	Leachable Strontium (Sr)	2019/10/18	101	75 - 125	101	75 - 125	<50	ug/L				
6391070	Leachable Thallium (Tl)	2019/10/18	97	75 - 125	94	75 - 125	<1.0	ug/L				
6391070	Leachable Tin (Sn)	2019/10/18	103	75 - 125	101	75 - 125	<20	ug/L				
6391070	Leachable Uranium (U)	2019/10/18	108	75 - 125	104	75 - 125	<1.0	ug/L				
6391070	Leachable Vanadium (V)	2019/10/18	100	75 - 125	99	75 - 125	<20	ug/L				
6391070	Leachable Zinc (Zn)	2019/10/18	NC	75 - 125	100	75 - 125	<50	ug/L				
6391323	Sample Weight (as received)	2019/10/17					NA	g				
6393264	Leachable Aluminum (Al)	2019/10/22					<100	ug/L	5.4 (1)	35		
6393264	Leachable Antimony (Sb)	2019/10/22	NC	75 - 125	99	75 - 125	<20	ug/L	27 (1)	35		
6393264	Leachable Arsenic (As)	2019/10/22	98	75 - 125	99	75 - 125	<20	ug/L	116 (6,1)	35		
6393264	Leachable Barium (Ba)	2019/10/22	99	75 - 125	98	75 - 125	<50	ug/L	14 (1)	35		
6393264	Leachable Beryllium (Be)	2019/10/22	104	75 - 125	102	75 - 125	<20	ug/L	NC (1)	35		
6393264	Leachable Boron (B)	2019/10/22	100	75 - 125	101	75 - 125	<500	ug/L	3.7 (1)	35		
6393264	Leachable Cadmium (Cd)	2019/10/22	NC	75 - 125	95	75 - 125	<3.0	ug/L	155 (6,1)	35		
6393264	Leachable Calcium (Ca)	2019/10/22					<1000	ug/L	4.5 (1)	35		
6393264	Leachable Chromium (Cr)	2019/10/22	99	75 - 125	98	75 - 125	<20	ug/L	NC (1)	35		
6393264	Leachable Cobalt (Co)	2019/10/22	99	75 - 125	98	75 - 125	<10	ug/L	3.2 (1)	35		
6393264	Leachable Copper (Cu)	2019/10/22	NC	75 - 125	96	75 - 125	<20	ug/L	1.4 (1)	35		
6393264	Leachable Iron (Fe)	2019/10/22					<500	ug/L	NC (1)	35		
6393264	Leachable Lead (Pb)	2019/10/22	NC	75 - 125	98	75 - 125	<5.0	ug/L	22 (1)	35		
6393264	Leachable Lithium (Li)	2019/10/22	107	75 - 125	110	75 - 125	<20	ug/L	8.2 (1)	35		
6393264	Leachable Magnesium (Mg)	2019/10/22					<1000	ug/L	4.9 (1)	35		
6393264	Leachable Manganese (Mn)	2019/10/22	NC	75 - 125	100	75 - 125	<20	ug/L	3.2 (1)	35		
6393264	Leachable Molybdenum (Mo)	2019/10/22	104	75 - 125	102	75 - 125	<20	ug/L	NC (1)	35		
6393264	Leachable Nickel (Ni)	2019/10/22	100	75 - 125	99	75 - 125	<20	ug/L	9.9 (1)	35		
6393264	Leachable Potassium (K)	2019/10/22					<1000	ug/L	9.3 (1)	35		

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
6393264	Leachable Selenium (Se)	2019/10/22	101	75 - 125	98	75 - 125	<10	ug/L	1.5 (1)	35		
6393264	Leachable Silver (Ag)	2019/10/22	94	75 - 125	94	75 - 125	<5.0	ug/L	NC (1)	35		
6393264	Leachable Strontium (Sr)	2019/10/22	100	75 - 125	99	75 - 125	<50	ug/L	0.94 (1)	35		
6393264	Leachable Thallium (Tl)	2019/10/22	99	75 - 125	96	75 - 125	<1.0	ug/L	3.4 (1)	35		
6393264	Leachable Tin (Sn)	2019/10/22	99	75 - 125	97	75 - 125	<20	ug/L	NC (1)	35		
6393264	Leachable Uranium (U)	2019/10/22	104	75 - 125	102	75 - 125	<1.0	ug/L	NC (1)	35		
6393264	Leachable Vanadium (V)	2019/10/22	104	75 - 125	100	75 - 125	<20	ug/L	NC (1)	35		
6393264	Leachable Zinc (Zn)	2019/10/22	NC	75 - 125	101	75 - 125	<50	ug/L	37 (6,1)	35		

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Duplicate Parent ID

(2) Duplicate Parent ID [KWI784-03]

(3) Matrix Spike Parent ID [KWI781-01]

(4) Duplicate Parent ID [KWI781-01]

(5) Duplicate Parent ID [KWI778-02]

(6) Poor RPD due to sample inhomogeneity. Insufficient sample for re-extraction and re-analysis.

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BV Labs Job #: B9Q8613
Report Date: 2019/10/24

GHD Limited
Client Project #: 11198639-06
Site Location: BELLEDUNE
Your P.O. #: 73517254

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Eric Dearman, Scientific Specialist

Kurt Headrick, Ph.D., C. Chem., Laboratory Manager

Mike MacGillivray, Scientific Specialist (Inorganics)

Robert Allen, Scientific Specialist

Steven Simpson, Lab Director

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CHAIN OF CUSTODY RECORD

COC #: D34709 Page 1 of 3

Invoice Information	Report Information (if differs from invoice)	Project Information (where applicable)	Turnaround Time (TAT) Required
Company Name: GHD	Company Name:	Quotation #:	[X] Regular TAT (5 business days) Most analyses
Contact Name: Troy Small / Cherie Babineau	Contact Name:	P.O. #: 735172 54	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 466 Hodgson Rd. Fredericton NB Postal Code: E3C 2G5	Address: Postal Code:	Project #: 11198639-06	IF RUSH please specify date (Surcharges will be applied)
Phone: Fax:	Phone: Fax:	Site Location: Belledune	DATE REQUIRED:
Email: troy.small@ghd.com cherie.babineau@ghd.com	Email:	Site #:	
Laboratory Use Only		Sampled By: Cody Ross/J.R. Call	

CUSTODY SEAL Present	CUSTODY SEAL Intact	COOLER TEMPERATURES	COOLER TEMPERATURES
		ACTR	

COOLING MEDIA PRESENT Y / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED &PRESERVED	LAB FILTRATION REQUIRED	RCAP-MS (Total Metals) Well / Surface water	RCAP-MS (Dissolved Metals) Ground waters	Metals (Water): Total Digest: (Default Method) for well water & surface water	Metals (Water): Dissolved for ground water	Metals (Water): Mercury (CIRCLE) TOTAL / DISSOLVED	Metals (Soil): Metals & Mercury Default Acid Extractable (Available) Digest	Metals (Soil): Metals Total Digest -for Ocean sediments (HNO3/HF/HClO4)	Metals (Soil): Mercury Low level (w) Cold Vapour AA	Metals (Soil): Hot Water Soluble Boron (required for CCME Agricultural/ Landfill)	RBCA Hydrocarbons (BTEX, CS-F32)	Hydrocarbons Soil (Potable), MS Fuel Oil Spill Policy Low Level BTEX, CS-F32	CCME Hydrocarbons (CWS-PHC F1/BTEX, F2-F4)	NB Potable Water BTEX, VPH, Low level T.E.H.	PAHs (Default for water/soil)	PAHs (FWAL /CCME Sediment)	PCBs	VOCs	Total Coliform/E.coli (Presence/Absence)	Total Coliform/E.Coli (Count)	HOLD- DO NOT ANALYZE	Regulatory Requirements (Specify)	COMMENTS
													Hold for Metal Leachate															Shipped from FREDTON	
1	19SP-1 0-0.15m	19/09/18	/	Soil	4								X														X		pH, NORM
2	19SP-1 0.15-0.30m		/		3								X														X		pH, NORM
3	19SP-3 0-0.15m		/		4								X														X		pH, NORM
4	19SP-3 0.15-0.3m		/		4								X														X		pH, NORM
5	19SP-5 0-0.15m		/		4								X														X		pH, NORM, NORM Leachate
6	19SP-5 0.15-0.3m		/		4								X														X		pH, NORM
7	19SP-2 0-0.15m		/		4																								NORM, NORM Leachate
8	19SP-4 0-0.15m		/		3																								NORM, NORM Leachate
9	19SP-6 0-0.15m		/		2																								NORM
10	19SP-10 0-0.15		/		2																								NORM

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY:(Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
Troy Small	2019/09/19	3:00				B9Q8613
Troy Small						

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ATL FCD 00149 / 22

CHAIN OF CUSTODY RECORD

COC #: D34684 Page 2 of 3

Invoice Information	Report Information (if differs from invoice)	Project Information (where applicable)	Turnaround Time (TAT) Required
Company Name: GHD	Company Name:	Quotation #:	X Regular TAT (5 business days) Most analyses
Contact Name: Troy Small / Cherie Babineau	Contact Name:	P.O. #: 7351 7254	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 46b Hodgson Rd. Fton, NB Postal Code: E3C 2G5	Address: Postal Code:	Project #: 11198639-06	IF RUSH please specify date (Surcharges will be applied)
Phone: Fax:	Phone: Fax:	Site Location: Belledune	DATE REQUIRED:
Email: troy.small@ghd.com cherie.babineau@ghd.com	Email:	Site #:	
		Sampled By: Cody Ross / JR Wall	

Laboratory Use Only

CUSTODY SEAL Present	CUSTODY SEAL Intact	COOLER TEMPERATURES	COOLER TEMPERATURES
		ACTR	

COOLING MEDIA PRESENT Y / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED & PRESERVED	LAB FILTRATION REQUIRED	RCAP-MS (Total Metals) Well / Surface water	RCAP-MS (Dissolved Metals) Ground waters	Metals (Water): Total Digest (Default Method) for well water & surface water	Metals (Water): Dissolved for ground water	Metals (Water): Mercury (CIRCLE) TOTAL / DISSOLVED	Metals (Soil): Metals & Mercury (Default Aqua Regia Extractable (Available) Digest	Metals (Soil): Metals Total Digest (for Ocean Sediments HNO3/HF/HClO4)	Metals (Soil): Mercury Low level by Cold Vapour AA	Metals (Soil): Hot Water Soluble Boron (required for CCME Agricultural/ Landfill)	RBCA Hydrocarbons (BTEX, C6-C32)	Hydrocarbons Soil (Portable), NS Fuel Oil Spill Policy Low Level BTEX, C6-C32	CCME Hydrocarbons (CWS-PHC F1/BTEX, F2-F4)	NB Potable Water BTEX, VPH, Low level T.E.H	PAHs (Default for water/soil)	PAHs (PAH, /CCME Sediment)	PCBs	VOCs	Total Coliform/E.coli (Presence/Absence)	Total Coliform/E.coli (Count)	HOLD for Metal Leachate	HOLD- DO NOT ANALYZE	Regulatory Requirements (Specify)	COMMENTS
																													Shipped from FREDTON	
1	19SP-9 0-0.15m	A/09/18		Soil	2								X														X		pH, NORM
2	19SP-11 0-0.15m				2								X														X		pH, NORM
3	19SP-11 1.2-1.8m				2								X														X		pH, NORM
4	19SP-12 0-0.15m				4																								NORM, NORM Leachate
5	19SP-12 0.15-0.3m				1																								NORM
6	19SP-31 0-0.15m				4																								NORM, NORM Leachate
7	19SP-31 0.15-0.3m				1																								NORM
8	19SP-32 0-0.15m				4																								NORM, NORM Leachate
9	19SP-32 0.15-0.3m				1																								NORM
10	QA/QC-4				2																								NORM

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY:(Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
Troy Small	2019/09/23	3:00pm				B908613
Troy Small						

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CHAIN OF CUSTODY RECORD

COC #: D34691 Page 3 of 3

Invoice Information	Report Information (if differs from invoice)	Project Information (where applicable)	Turnaround Time (TAT) Required
Company Name: GHD	Company Name:	Quotation #:	[X] Regular TAT (5 business days) Most analyses
Contact Name: Troy Small / Cherie Robineau	Contact Name:	P.O. #: 7351 7254	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 466 Hodgson Road	Address:	Project #: 11198639-06	IF RUSH please specify date (Surcharges will be applied)
Fredericton, NB Postal Code: E3C 2G5	Postal Code:	Site Location: Belledune	DATE REQUIRED:
Phone: Fax:	Phone: Fax:	Site #:	
Email: troy.small@ghd.com cherie.robineau@ghd.com	Email:	Sampled By: Cody Ross / JR Wall	

Laboratory Use Only

CUSTODY SEAL Present	CUSTODY SEAL Intact	COOLER TEMPERATURES	COOLER TEMPERATURES
		ACTR	

COOLING MEDIA PRESENT Y / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED &PRESERVED	LAB FILTRATION REQUIRED	RCAP-MS [Total Metals] Well / Surface water	RCAP-MS [Dissolved Metals] Ground waters	Metals (Water): Total Digest (Default Method) for well water & surface water	Metals (Water): Dissolved for ground water	Metals (Water): Mercury [CIRCLE] TOTAL / DISSOLVED	Metals (Soil): Metals & Mercury Default: Aqua Regia Extractable (Available) Digest	Metals (Soil): Metals Total Digest -for Ocean sediments (HNO3/HF/HClO4)	Metals (Soil): Mercury low level by Cold Vapour AA	Metals (Soil): Hot Water Soluble Boron (required for CCME Agricultural/Landfill)	RBCA Hydrocarbons (BTEX, C6-C32)	Hydrocarbons Soil (Potable), NS Fuel Oil Spill Policy Low Level BTEX, C6-C32	CCME Hydrocarbons (CWS PHC F2/BTEX, F2-F4)	MB Potable Water BTEX, VPH, Low level T.E.H	PAHs (Default for water/soil)	PAHs (FWAL /CCME Sediment)	PCBs	VOCs	Total Coliform/E.coli (Presence/Absence)	Total Coliform/E.coli (Count)		HOLD- DO NOT ANALYZE	Regulatory Requirements (Specify) / COMMENTS
1	Soil QA/QC -5	19/09/18		Soil	2																							
2	195P-10 0.15-0.3	19/09/18		Soil	2																							NORM / NORM
3																												
4																												
5																												
6																												
7																												
8																												
9																												
10																												

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY:(Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
Troy Small	2019/09/19	3:00				B908613
Troy Small						

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Your P.O. #: 73517186
Your Project #: 11198639-04
Site Location: BELLEDENE SMETTER
Your C.O.C. #: D34696

Attention: Troy Small

GHD Limited
466 Hodgson Rd
Fredericton , NB
CANADA E3C 2G5

Report Date: 2019/10/22
Report #: R5930968
Version: 4 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9Q9518
Received: 2019/09/24, 09:59

Sample Matrix: Water
Samples Received: 7

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Mercury - Dissolved (CVAA,LL)	7	2019/09/27	2019/09/30	ATL SOP 00026	EPA 245.1 R3 m
ICP-OES Dissolved Metals in Water (1)	7	N/A	2019/10/03	BBY7SOP-00018	EPA 6010d m
Na, K, Ca, Mg, S by CRC ICPMS (diss.) (1)	7	N/A	2019/10/01	BBY WI-00033	Auto Calc
Elements by ICPMS (dissolved) - Seawater (1)	7	N/A	2019/10/01	BBY7SOP-00002	BCMOE BCLM Nov 2015
pH (3)	4	N/A	2019/09/27	ATL SOP 00003	SM 23 4500-H+ B m
pH (3)	2	N/A	2019/10/01	ATL SOP 00003	SM 23 4500-H+ B m
pH (3)	1	N/A	2019/10/02	ATL SOP 00003	SM 23 4500-H+ B m
NORM Group Analysis (2)	2	N/A	2019/10/17	BQL SOP-00007	Gamma Spectrometry
NORM Group Analysis (2)	2	N/A	2019/10/18	BQL SOP-00007	Gamma Spectrometry
NORM Group Analysis (2)	2	N/A	2019/10/19	BQL SOP-00007	Gamma Spectrometry
NORM Group Analysis (2)	1	N/A	2019/10/20	BQL SOP-00007	Gamma Spectrometry
Salinity (4)	7	N/A	2019/10/01		SM 22 2520B
Total Suspended Solids	7	2019/09/30	2019/10/01	ATL SOP 00007	SM 23 2540D m

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by BV Labs, unless otherwise agreed in writing. BV Labs is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.

Your P.O. #: 73517186
Your Project #: 11198639-04
Site Location: BELLEDENE SMETTER
Your C.O.C. #: D34696

Attention: Troy Small

GHD Limited
466 Hodgson Rd
Fredericton , NB
CANADA E3C 2G5

Report Date: 2019/10/22
Report #: R5930968
Version: 4 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9Q9518
Received: 2019/09/24, 09:59

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by Bedford to Burnaby - Offsite
(2) This test was performed by Bureau Veritas Laboratories Kitimat
(3) The APHA Standard Method require pH to be analyzed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the APHA Standard Method holding time.
(4) Non-accredited test method

Encryption Key

Melissa DiPinto
Project Manager
22 Oct 2019 12:33:12

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Heather Macumber, Senior Project Manager
Email: Heather.MACUMBER@bvlabs.com
Phone# (902)420-0203 Ext:226

==========

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BV Labs Job #: B9Q9518
Report Date: 2019/10/22

GHD Limited
Client Project #: 11198639-04
Site Location: BELLEDENE SMETTER
Your P.O. #: 73517186
Sampler Initials: MT

RESULTS OF ANALYSES OF WATER

BV Labs ID		KWN916			KWN916			KWN917		
Sampling Date		2019/09/23			2019/09/23			2019/09/23		
COC Number		D34696			D34696			D34696		
	UNITS	08GW-95	RDL	QC Batch	08GW-95 Lab-Dup	RDL	QC Batch	09GW-102	RDL	QC Batch
Inorganics										
pH	pH	6.94	N/A	6356971				7.39	N/A	6363133
Salinity	N/A	<2.0	2.0	6359774				<2.0	2.0	6359774
Total Suspended Solids	mg/L	170	10	6359835				30	2.0	6359835
Metals										
Dissolved Aluminum (Al)	ug/L	16	10	6369100	15	10	6369100	13	10	6369100
Dissolved Antimony (Sb)	ug/L	14.0	0.50	6369100	13.8	0.50	6369100	<0.50	0.50	6369100
Dissolved Arsenic (As)	ug/L	5.76	0.50	6369100	5.38	0.50	6369100	1.34	0.50	6369100
Dissolved Barium (Ba)	ug/L	30.2	1.0	6369100	30.1	1.0	6369100	77.7	1.0	6369100
Dissolved Beryllium (Be)	ug/L	<1.0	1.0	6369100	<1.0	1.0	6369100	<1.0	1.0	6369100
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	6369100	<1.0	1.0	6369100	<1.0	1.0	6369100
Dissolved Boron (B)	ug/L	<50	50	6369100	50	50	6369100	<50	50	6369100
Dissolved Cadmium (Cd)	ug/L	26.7	0.050	6369100	26.1	0.050	6369100	0.284	0.050	6369100
Dissolved Chromium (Cr)	ug/L	<0.50	0.50	6369100	<0.50	0.50	6369100	<0.50	0.50	6369100
Dissolved Cobalt (Co)	ug/L	0.33	0.10	6369100	0.30	0.10	6369100	<0.10	0.10	6369100
Dissolved Copper (Cu)	ug/L	11.7	0.50	6369100	11.9	0.50	6369100	0.97	0.50	6369100
Dissolved Iron (Fe)	ug/L	8.9	2.0	6369100	8.6	2.0	6369100	<2.0	2.0	6369100
Dissolved Lead (Pb)	ug/L	115	0.10	6369100	114	0.10	6369100	13.9	0.10	6369100
Dissolved Lithium (Li)	ug/L	<20	20	6369100	<20	20	6369100	<20	20	6369100
Dissolved Manganese (Mn)	ug/L	418	0.50	6369100	413	0.50	6369100	0.66	0.50	6369100
Dissolved Molybdenum (Mo)	ug/L	<1.0	1.0	6369100	<1.0	1.0	6369100	<1.0	1.0	6369100
Dissolved Nickel (Ni)	ug/L	4.69	0.20	6369100	5.30	0.20	6369100	<0.20	0.20	6369100
Dissolved Phosphorus (P)	ug/L	268	50	6369100	290	50	6369100	<50	50	6369100
Dissolved Selenium (Se)	ug/L	15.0	0.50	6369100	14.4	0.50	6369100	1.71	0.50	6369100
Dissolved Silicon (Si)	ug/L	6680	1000	6369100	6690	1000	6369100	3630	1000	6369100
Dissolved Silver (Ag)	ug/L	<0.050	0.050	6369100	<0.050	0.050	6369100	<0.050	0.050	6369100
Dissolved Strontium (Sr)	ug/L	190	10	6369100	187	10	6369100	121	10	6369100
Dissolved Thallium (Tl)	ug/L	20.8	0.10	6369100	20.9	0.10	6369100	<0.10	0.10	6369100
Dissolved Tin (Sn)	ug/L	<1.0	1.0	6369100	<1.0	1.0	6369100	1.6	1.0	6369100
Dissolved Titanium (Ti)	ug/L	<10	10	6369100	<10	10	6369100	<10	10	6369100
Dissolved Uranium (U)	ug/L	0.091	0.050	6369100	0.080	0.050	6369100	0.120	0.050	6369100
Dissolved Vanadium (V)	ug/L	<10	10	6369100	<10	10	6369100	<10	10	6369100
Dissolved Zinc (Zn)	ug/L	814	1.0	6369100	828	1.0	6369100	6.7	1.0	6369100

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

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BV Labs Job #: B9Q9518
Report Date: 2019/10/22

GHD Limited
Client Project #: 11198639-04
Site Location: BELLEDENE SMETTER
Your P.O. #: 73517186
Sampler Initials: MT

RESULTS OF ANALYSES OF WATER

BV Labs ID		KWN916			KWN916			KWN917		
Sampling Date		2019/09/23			2019/09/23			2019/09/23		
COC Number		D34696			D34696			D34696		
	UNITS	08GW-95	RDL	QC Batch	08GW-95 Lab-Dup	RDL	QC Batch	09GW-102	RDL	QC Batch
Dissolved Calcium (Ca)	mg/L	135	1.0	6369101				71.1	1.0	6369101
Dissolved Magnesium (Mg)	mg/L	15.7	1.0	6369101				4.6	1.0	6369101
Dissolved Potassium (K)	mg/L	5.4	1.0	6369101				<1.0	1.0	6369101
Dissolved Sodium (Na)	mg/L	145	1.0	6369102	139	1.0	6369102	11.8	1.0	6369102
Dissolved Sulphur (S)	mg/L	93	20	6369101				46	20	6369101
RADIONUCLIDE										
Lead-210	Bq/L	<1.0	1.0	6370557				<1.0	1.0	6370557
Lead-212	Bq/L	<0.10	0.10	6370557				<0.10	0.10	6370557
Radium-226	Bq/L	<1.0	1.0	6370557				<1.0	1.0	6370557
Radium-228	Bq/L	<0.50	0.50	6370557				<0.50	0.50	6370557
Thorium-230	Bq/L	<5.0	5.0	6370557				<5.0	5.0	6370557
Thorium-234	Bq/L	<1.0	1.0	6370557				<1.0	1.0	6370557
Uranium-235	Bq/L	<0.50	0.50	6370557				<0.50	0.50	6370557

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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BV Labs Job #: B9Q9518
Report Date: 2019/10/22

GHD Limited
Client Project #: 11198639-04
Site Location: BELLEDENE SMETTER
Your P.O. #: 73517186
Sampler Initials: MT

RESULTS OF ANALYSES OF WATER

BV Labs ID		KWN918			KWN919			KWN920		
Sampling Date		2019/09/23			2019/09/23			2019/09/23		
COC Number		D34696			D34696			D34696		
	UNITS	19GW-118	RDL	QC Batch	19GW-120	RDL	QC Batch	19GW-122	RDL	QC Batch
Inorganics										
pH	pH	6.91	N/A	6356971	5.75	N/A	6364217	7.00	N/A	6356963
Salinity	N/A	<2.0	2.0	6359774	2.9	2.0	6359774	<2.0	2.0	6359774
Total Suspended Solids	mg/L	11	1.0	6359835	240	5.0	6359835	310	10	6359835
Metals										
Dissolved Aluminum (Al)	ug/L	<10	10	6369100	89	10	6369100	<10	10	6369100
Dissolved Antimony (Sb)	ug/L	40.1	0.50	6369100	2.29	0.50	6369100	17.6	0.50	6369100
Dissolved Arsenic (As)	ug/L	28.5	0.50	6369100	66.0	0.50	6369100	3.30	0.50	6369100
Dissolved Barium (Ba)	ug/L	2.2	1.0	6369100	3.8	1.0	6369100	5.8	1.0	6369100
Dissolved Beryllium (Be)	ug/L	<1.0	1.0	6369100	<1.0	1.0	6369100	<1.0	1.0	6369100
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	6369100	<1.0	1.0	6369100	<1.0	1.0	6369100
Dissolved Boron (B)	ug/L	129	50	6369100	225	50	6369100	<50	50	6369100
Dissolved Cadmium (Cd)	ug/L	156	0.050	6369100	108	0.050	6369100	0.850	0.050	6369100
Dissolved Chromium (Cr)	ug/L	0.73	0.50	6369100	<0.50	0.50	6369100	<0.50	0.50	6369100
Dissolved Cobalt (Co)	ug/L	2.63	0.10	6369100	368	0.10	6369100	3.49	0.10	6369100
Dissolved Copper (Cu)	ug/L	3.57	0.50	6369100	30.2	0.50	6369100	<0.50	0.50	6369100
Dissolved Iron (Fe)	ug/L	<2.0	2.0	6369100	5.2	2.0	6369100	89.2	2.0	6369100
Dissolved Lead (Pb)	ug/L	8.35	0.10	6369100	4.35	0.10	6369100	0.41	0.10	6369100
Dissolved Lithium (Li)	ug/L	<20	20	6369100	382	20	6369100	<20	20	6369100
Dissolved Manganese (Mn)	ug/L	2940	0.50	6369100	47600	0.50	6369100	2610	0.50	6369100
Dissolved Molybdenum (Mo)	ug/L	<1.0	1.0	6369100	4.3	1.0	6369100	2.2	1.0	6369100
Dissolved Nickel (Ni)	ug/L	34.8	0.20	6369100	1210	0.20	6369100	9.21	0.20	6369100
Dissolved Phosphorus (P)	ug/L	18500	50	6369100	184000	50	6369100	<50	50	6369100
Dissolved Selenium (Se)	ug/L	16.3	0.50	6369100	12.5	0.50	6369100	<0.50	0.50	6369100
Dissolved Silicon (Si)	ug/L	8250	1000	6369100	57400	1000	6369100	8410	1000	6369100
Dissolved Silver (Ag)	ug/L	<0.050	0.050	6369100	0.209	0.050	6369100	<0.050	0.050	6369100
Dissolved Strontium (Sr)	ug/L	185	10	6369100	69	10	6369100	277	10	6369100
Dissolved Thallium (Tl)	ug/L	1.61	0.10	6369100	0.37	0.10	6369100	0.11	0.10	6369100
Dissolved Tin (Sn)	ug/L	2.4	1.0	6369100	<1.0	1.0	6369100	1.3	1.0	6369100
Dissolved Titanium (Ti)	ug/L	<10	10	6369100	14	10	6369100	<10	10	6369100
Dissolved Uranium (U)	ug/L	<0.050	0.050	6369100	<0.050	0.050	6369100	0.089	0.050	6369100
Dissolved Vanadium (V)	ug/L	15	10	6369100	21	10	6369100	<10	10	6369100
Dissolved Zinc (Zn)	ug/L	4120	1.0	6369100	14100	1.0	6369100	539	1.0	6369100
Dissolved Calcium (Ca)	mg/L	160	1.0	6369101	447	1.0	6369101	248	1.0	6369101

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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BV Labs Job #: B9Q9518
Report Date: 2019/10/22

GHD Limited
Client Project #: 11198639-04
Site Location: BELLEDENE SMETTER
Your P.O. #: 73517186
Sampler Initials: MT

RESULTS OF ANALYSES OF WATER

BV Labs ID		KWN918			KWN919			KWN920		
Sampling Date		2019/09/23			2019/09/23			2019/09/23		
COC Number		D34696			D34696			D34696		
	UNITS	19GW-118	RDL	QC Batch	19GW-120	RDL	QC Batch	19GW-122	RDL	QC Batch
Dissolved Magnesium (Mg)	mg/L	13.3	1.0	6369101	193	1.0	6369101	22.3	1.0	6369101
Dissolved Potassium (K)	mg/L	3.4	1.0	6369101	3.2	1.0	6369101	2.8	1.0	6369101
Dissolved Sodium (Na)	mg/L	102	1.0	6369102	231	1.0	6369102	79.9	1.0	6369102
Dissolved Sulphur (S)	mg/L	134	20	6369101	344	20	6369101	188	20	6369101
RADIONUCLIDE										
Lead-210	Bq/L	<1.0	1.0	6370557	<1.0	1.0	6370557	<1.0	1.0	6370557
Lead-212	Bq/L	<0.10	0.10	6370557	<0.10	0.10	6370557	<0.10	0.10	6370557
Radium-226	Bq/L	<1.0	1.0	6370557	<1.0	1.0	6370557	<1.0	1.0	6370557
Radium-228	Bq/L	<0.50	0.50	6370557	<0.50	0.50	6370557	<0.50	0.50	6370557
Thorium-230	Bq/L	<5.0	5.0	6370557	<5.0	5.0	6370557	<5.0	5.0	6370557
Thorium-234	Bq/L	<1.0	1.0	6370557	<1.0	1.0	6370557	<1.0	1.0	6370557
Uranium-235	Bq/L	<0.50	0.50	6370557	<0.50	0.50	6370557	<0.50	0.50	6370557

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Report Date: 2019/10/22

GHD Limited
Client Project #: 11198639-04
Site Location: BELLEDENE SMETTER
Your P.O. #: 73517186
Sampler Initials: MT

RESULTS OF ANALYSES OF WATER

BV Labs ID		KWN921			KWN922		
Sampling Date		2019/09/23			2019/09/23		
COC Number		D34696			D34696		
	UNITS	19GW-124	RDL	QC Batch	QA/QC-1	RDL	QC Batch
Inorganics							
pH	pH	7.52	N/A	6363133	6.95	N/A	6356963
Salinity	N/A	<2.0	2.0	6359774	<2.0	2.0	6359774
Total Suspended Solids	mg/L	2100	50	6359835	12	1.0	6359835
Metals							
Dissolved Aluminum (Al)	ug/L	<10	10	6369100	<10	10	6369100
Dissolved Antimony (Sb)	ug/L	11.2	0.50	6369100	34.9	0.50	6369100
Dissolved Arsenic (As)	ug/L	8.77	0.50	6369100	28.1	0.50	6369100
Dissolved Barium (Ba)	ug/L	45.2	1.0	6369100	2.7	1.0	6369100
Dissolved Beryllium (Be)	ug/L	<1.0	1.0	6369100	<1.0	1.0	6369100
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	6369100	<1.0	1.0	6369100
Dissolved Boron (B)	ug/L	185	50	6369100	133	50	6369100
Dissolved Cadmium (Cd)	ug/L	0.984	0.050	6369100	121	0.050	6369100
Dissolved Chromium (Cr)	ug/L	<0.50	0.50	6369100	0.73	0.50	6369100
Dissolved Cobalt (Co)	ug/L	<0.10	0.10	6369100	2.81	0.10	6369100
Dissolved Copper (Cu)	ug/L	2.48	0.50	6369100	4.25	0.50	6369100
Dissolved Iron (Fe)	ug/L	<2.0	2.0	6369100	<2.0	2.0	6369100
Dissolved Lead (Pb)	ug/L	7.33	0.10	6369100	7.20	0.10	6369100
Dissolved Lithium (Li)	ug/L	<20	20	6369100	<20	20	6369100
Dissolved Manganese (Mn)	ug/L	165	0.50	6369100	2980	0.50	6369100
Dissolved Molybdenum (Mo)	ug/L	3.1	1.0	6369100	<1.0	1.0	6369100
Dissolved Nickel (Ni)	ug/L	1.35	0.20	6369100	33.7	0.20	6369100
Dissolved Phosphorus (P)	ug/L	1550	50	6369100	19800	50	6369100
Dissolved Selenium (Se)	ug/L	6.52	0.50	6369100	16.3	0.50	6369100
Dissolved Silicon (Si)	ug/L	4580	1000	6369100	8160	1000	6369100
Dissolved Silver (Ag)	ug/L	<0.050	0.050	6369100	<0.050	0.050	6369100
Dissolved Strontium (Sr)	ug/L	134	10	6369100	181	10	6369100
Dissolved Thallium (Tl)	ug/L	0.38	0.10	6369100	1.29	0.10	6369100
Dissolved Tin (Sn)	ug/L	<1.0	1.0	6369100	<1.0	1.0	6369100
Dissolved Titanium (Ti)	ug/L	<10	10	6369100	<10	10	6369100
Dissolved Uranium (U)	ug/L	0.764	0.050	6369100	<0.050	0.050	6369100
Dissolved Vanadium (V)	ug/L	<10	10	6369100	16	10	6369100
Dissolved Zinc (Zn)	ug/L	21.0	1.0	6369100	3730	1.0	6369100
Dissolved Calcium (Ca)	mg/L	87.1	1.0	6369101	161	1.0	6369101

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N/A = Not Applicable

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BV Labs Job #: B9Q9518
Report Date: 2019/10/22

GHD Limited
Client Project #: 11198639-04
Site Location: BELLEDENE SMETTER
Your P.O. #: 73517186
Sampler Initials: MT

RESULTS OF ANALYSES OF WATER

BV Labs ID		KWN921			KWN922		
Sampling Date		2019/09/23			2019/09/23		
COC Number		D34696			D34696		
	UNITS	19GW-124	RDL	QC Batch	QA/QC-1	RDL	QC Batch
Dissolved Magnesium (Mg)	mg/L	6.5	1.0	6369101	13.1	1.0	6369101
Dissolved Potassium (K)	mg/L	3.6	1.0	6369101	3.5	1.0	6369101
Dissolved Sodium (Na)	mg/L	246	1.0	6369102	101	1.0	6369102
Dissolved Sulphur (S)	mg/L	80	20	6369101	132	20	6369101
RADIONUCLIDE							
Lead-210	Bq/L	<1.0	1.0	6370557	<1.0	1.0	6370557
Lead-212	Bq/L	<0.10	0.10	6370557	<0.10	0.10	6370557
Radium-226	Bq/L	<1.0	1.0	6370557	<1.0	1.0	6370557
Radium-228	Bq/L	<0.50	0.50	6370557	<0.50	0.50	6370557
Thorium-230	Bq/L	<5.0	5.0	6370557	<5.0	5.0	6370557
Thorium-234	Bq/L	<1.0	1.0	6370557	<1.0	1.0	6370557
Uranium-235	Bq/L	<0.50	0.50	6370557	<0.50	0.50	6370557

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Report Date: 2019/10/22

GHD Limited
Client Project #: 11198639-04
Site Location: BELLEDENE SMETTER
Your P.O. #: 73517186
Sampler Initials: MT

MERCURY BY COLD VAPOUR AA (WATER)

BV Labs ID		KWN916	KWN916	KWN917	KWN918	KWN919	KWN920	KWN921		
Sampling Date		2019/09/23	2019/09/23	2019/09/23	2019/09/23	2019/09/23	2019/09/23	2019/09/23		
COC Number		D34696	D34696	D34696	D34696	D34696	D34696	D34696		
	UNITS	**08GW-95**	**08GW-95 Lab-Dup**	**09GW-102**	**19GW-118**	**19GW-120**	**19GW-122**	**19GW-124**	**RDL**	**QC Batch**
Metals										
Dissolved Mercury (Hg)	ug/L	<0.013	<0.013	<0.013	<0.013	0.19	<0.013	<0.013	0.013	6356457

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

BV Labs ID		KWN922		
Sampling Date		2019/09/23		
COC Number		D34696		
	UNITS	**QA/QC-1**	**RDL**	**QC Batch**
Metals				
Dissolved Mercury (Hg)	ug/L	<0.013	0.013	6356457

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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BV Labs Job #: B9Q9518
Report Date: 2019/10/22

GHD Limited
Client Project #: 11198639-04
Site Location: BELLEDENE SMETTER
Your P.O. #: 73517186
Sampler Initials: MT

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	8.7°C

Results relate only to the items tested.

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BV Labs Job #: B9Q9518
Report Date: 2019/10/22

QUALITY ASSURANCE REPORT

GHD Limited
Client Project #: 11198639-04
Site Location: BELLEDENE SMETTER
Your P.O. #: 73517186
Sampler Initials: MT

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
6356457	Dissolved Mercury (Hg)	2019/09/30	100 (1)	80 - 120	101	80 - 120	<0.013	ug/L	NC (2)	20		
6356963	pH	2019/09/27							0.98 (3)	N/A	101	97 - 103
6356971	pH	2019/09/27							0.40 (3)	N/A	101	97 - 103
6359774	Salinity	2019/10/01					<2.0	N/A	NC (3)	25	101	80 - 120
6359835	Total Suspended Solids	2019/10/01					<1.0	mg/L	3.6 (3)	20	97	N/A
6363133	pH	2019/10/01							1.2 (3)	N/A	100	97 - 103
6364217	pH	2019/10/02							0.16 (3)	N/A	100	97 - 103
6369100	Dissolved Aluminum (Al)	2019/10/01	101 (4)	80 - 135	100	80 - 120	<10	ug/L	3.1 (5)	25		
6369100	Dissolved Antimony (Sb)	2019/10/01	NC (4)	80 - 120	98	80 - 120	<0.50	ug/L	2.0 (5)	25		
6369100	Dissolved Arsenic (As)	2019/10/01	98 (4)	80 - 120	100	80 - 120	<0.50	ug/L	6.8 (5)	25		
6369100	Dissolved Barium (Ba)	2019/10/01	98 (4)	80 - 120	98	80 - 120	<1.0	ug/L	0.27 (5)	25		
6369100	Dissolved Beryllium (Be)	2019/10/01	105 (4)	80 - 120	102	80 - 120	<1.0	ug/L	NC (5)	25		
6369100	Dissolved Bismuth (Bi)	2019/10/01	108 (4)	80 - 120	102	80 - 120	<1.0	ug/L	NC (5)	25		
6369100	Dissolved Boron (B)	2019/10/01	101 (4)	80 - 120	99	80 - 120	<50	ug/L	0.82 (5)	25		
6369100	Dissolved Cadmium (Cd)	2019/10/01	103 (4)	80 - 120	101	80 - 120	<0.050	ug/L	2.2 (5)	25		
6369100	Dissolved Chromium (Cr)	2019/10/01	102 (4)	80 - 120	99	80 - 120	<0.50	ug/L	NC (5)	25		
6369100	Dissolved Cobalt (Co)	2019/10/01	103 (4)	80 - 120	98	80 - 120	<0.10	ug/L	8.2 (5)	25		
6369100	Dissolved Copper (Cu)	2019/10/01	111 (4)	80 - 120	102	80 - 120	<0.50	ug/L	1.3 (5)	25		
6369100	Dissolved Iron (Fe)	2019/10/01	102 (4)	80 - 135	98	80 - 120	<10	ug/L	3.6 (5)	25		
6369100	Dissolved Lead (Pb)	2019/10/01	NC (4)	80 - 120	97	80 - 120	<0.10	ug/L	0.36 (5)	25		
6369100	Dissolved Lithium (Li)	2019/10/01	107 (4)	80 - 120	104	80 - 120	<20	ug/L	NC (5)	25		
6369100	Dissolved Manganese (Mn)	2019/10/01	NC (4)	80 - 120	100	80 - 120	<0.50	ug/L	1.1 (5)	25		
6369100	Dissolved Molybdenum (Mo)	2019/10/01	94 (4)	80 - 120	101	80 - 120	<1.0	ug/L	NC (5)	25		
6369100	Dissolved Nickel (Ni)	2019/10/01	108 (4)	80 - 120	100	80 - 120	<0.20	ug/L	12 (5)	25		
6369100	Dissolved Phosphorus (P)	2019/10/01					<50	ug/L	8.1 (5)	25		
6369100	Dissolved Selenium (Se)	2019/10/01	102 (4)	80 - 120	102	80 - 120	<0.50	ug/L	3.9 (5)	25		
6369100	Dissolved Silicon (Si)	2019/10/01					<1000	ug/L	0.046 (5)	25		
6369100	Dissolved Silver (Ag)	2019/10/01	102 (4)	80 - 120	100	80 - 120	<0.050	ug/L	NC (5)	25		
6369100	Dissolved Strontium (Sr)	2019/10/01	NC (4)	80 - 120	90	80 - 120	<10	ug/L	1.7 (5)	25		
6369100	Dissolved Thallium (Tl)	2019/10/01	NC (4)	80 - 120	97	80 - 120	<0.10	ug/L	0.64 (5)	25		
6369100	Dissolved Tin (Sn)	2019/10/01	96 (4)	80 - 120	101	80 - 120	<1.0	ug/L	NC (5)	25		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
6369100	Dissolved Titanium (Ti)	2019/10/01	96 (4)	80 - 120	102	80 - 120	<10	ug/L	NC (5)	25		
6369100	Dissolved Uranium (U)	2019/10/01	97 (4)	80 - 120	97	80 - 120	<0.050	ug/L	13 (5)	25		
6369100	Dissolved Vanadium (V)	2019/10/01	98 (4)	80 - 120	99	80 - 120	<10	ug/L	NC (5)	25		
6369100	Dissolved Zinc (Zn)	2019/10/01	NC (4)	80 - 120	108	80 - 120	<5.0	ug/L	1.6 (5)	25		
6369102	Dissolved Sodium (Na)	2019/10/03	NC (4)	80 - 120	100	80 - 120	<0.10	mg/L	4.0 (5)	20		
6370557	Lead-210	2019/10/08					<1.0	Bq/L			93	74 - 126
6370557	Lead-212	2019/10/08					<0.10	Bq/L			105	N/A
6370557	Radium-226	2019/10/08					<1.0	Bq/L			96	74 - 126
6370557	Radium-228	2019/10/08					<0.50	Bq/L			104	74 - 126
6370557	Thorium-230	2019/10/08					<5.0	Bq/L			107	74 - 126
6370557	Thorium-234	2019/10/08					<1.0	Bq/L			100	74 - 126
6370557	Uranium-235	2019/10/08					<0.50	Bq/L			108	74 - 126

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Matrix Spike Parent ID [KWN917-05]

(2) Duplicate Parent ID [KWN916-05]

(3) Duplicate Parent ID

(4) Matrix Spike Parent ID [KWN916-04]

(5) Duplicate Parent ID [KWN916-04]

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BV Labs Job #: B9Q9518
Report Date: 2019/10/22

GHD Limited
Client Project #: 11198639-04
Site Location: BELLEDENE SMETTER
Your P.O. #: 73517186
Sampler Initials: MT

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Colleen Acker, Scientific Service Specialist

Mike MacGillivray, Scientific Specialist (Inorganics)

Rob Reinert, B.Sc., Scientific Specialist

Steven Simpson, Lab Director

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For Service Group specific validation please refer to the Validation Signature Page.

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465 George Street, Unit G, Sydney, NS B1P 1K5 Tel: 902-567-1255 Fax: 902-539-6504 Toll Free: 1-888-535-7770
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ATL FCD 00149 / 22

CHAIN OF CUSTODY RECORD

COC #: D34696 Page 1 of 1

Invoice Information	Report Information (if differs from invoice)	Project Information (where applicable)	Turnaround Time (TAT) Required
Company Name: GHD	Company Name:	Quotation #:	Regular TAT (5 business days) Most analyses
Contact Name: Troy SMALL, Charie Babineau	Contact Name:	P.O. #: 73517186	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 466 Hodgson Road	Address:	Project #: 11198639-4	IF RUSH please specify date (Surcharges will be applied)
Fredericton Postal Code: E3C 2G5	Postal Code:	Site Location: Belledune Smelter	DATE REQUIRED:
Phone: Fax:	Phone: Fax:	Site #:	
Email: troy.small@ghd.com charie.babineau@ghd.com	Email:	Sampled By: Mario Theriault	

Laboratory Use Only

CUSTODY SEAL Present	CUSTODY SEAL Intact	COOLER TEMPERATURES	COOLER TEMPERATURES
		9, 8, 9	

COOLING MEDIA PRESENT Y / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED & PRESERVED	LAB FILTRATION REQUIRED	RCAP-MS [Total Metals] Well / Surface water	RCAP-MS [Dissolved Metals] Ground waters	Metals (Water): Total Digest (Default Method) for well water & surface water	Metals (Water): Dissolved for ground water	Metals (Water): Mercury (CIRCLE) TOTAL / DISSOLVED	Metals (Soil): Metals & Mercury Default: Acid Extractable (Available) Digest	Metals (Soil): Metals Total Digest - for Ocean sediments (HNO3/HF/HClO4)	Metals (Soil): Mercury Low level by Cold Vapour AA	Metals (Soil): Hot Water Soluble Boron (required for CCME Agricultural/ Landfill)	RBCA Hydrocarbons (BTEX, C6-C32)	Hydrocarbons Soil (Potable), NS Fuel Oil Spill Policy Low Level BTEX, C6-C32	CCME Hydrocarbons (CWS-PHC F1/BTEX, F2-F4)	NB Potable Water BTEX, VPH, Low level T.E.H	PAHs (Default for water/soil)	PAHs (FWAL /CCME Sediment)	PCBs	VOCs	Total Coliform/E.coli (Presence/Absence)	Total Coliform/E.Coli (Count)		HOLD- DO NOT ANALYZE	Regulatory Requirements (Specify) / COMMENTS
1	08GW-95	19/09/23	/	GW	5	Y	N				X	X																pH, TSS, Salinity, NORM
2	09GW-102	19/09/23	/	GW	5	Y	N				X	X																" " " "
3	196W-118	19/09/23	/	GW	5	Y	N				X	X																" " " "
4	19GW-120	19/09/23	/	GW	5	Y	N				X	X																" " " "
5	19GW-122	19/09/23	/	GW	5	Y	N				X	X																" " " "
6	19GW-124	19/09/23	/	GW	5	Y	N				X	X																" " " "
7	QA/QC-1	19/09/23	/	GW	5	Y	N				X	X																" " " "
8																												2019 SEP 24 9:59
9																												
10																												

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY:(Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
	19/09/23	5:03	metals/Hg only			B9Q9518
Mario Theriault						

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ATL FCD 00149 / 22

CHAIN OF CUSTODY RECORD

COC #: D34696 Page 1 of 1

Invoice Information	Report Information (if differs from Invoice)	Project Information (where applicable)	Turnaround Time (TAT) Required
Company Name: GHD	Company Name:	Quotation #:	Regular TAT (5 business days) Most analyses
Contact Name: Troy SMALL, Chanie Babineau	Contact Name:	P.O. #: 73517186	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 466 Hodgson Road Fredericton Postal Code: E3C 2G5	Address: Postal Code:	Project #: 11198639-4	IF RUSH please specify date (Surcharges will be applied)
Phone: Fax:	Phone: Fax:	Site Location: Belledune Smelter	DATE REQUIRED:
Email: troy.small@ghd.com chanie.babineau@ghd.com	Email:	Site #:	
		Sampled By: Mario Theriault	

Laboratory Use Only

CUSTODY SEAL Present	CUSTODY SEAL Intact	COOLER TEMPERATURES	COOLER TEMPERATURES
		9, 8, 9	

COOLING MEDIA PRESENT Y / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED &PRESERVED	LAB FILTRATION REQUIRED	RCAP-MS [Total Metals] Well / Surface water	RCAP-MS [Dissolved Metals] Ground waters	Metals (Water): Total Digest: [Default Method] for well water & surface water	Metals (Water): Dissolved for ground water	Metals (Water): Mercury (CIRCLE): TOTAL / DISSOLVED	Metals (Soil): Metals & Mercury Aqua Regia Acid Extractible (Available) Digest	Metals (Soil): Metals Total Digest - for Ocean sediments (HNO3/HF/HNO3)	Metals (Soil): Mercury Low level by Cold Vapour AA	Metals (Soil): Hot Water Soluble Boron (required for CCME Agricultural/ Landfill)	RBCA Hydrocarbons (BTEX, C6-C32)	Hydrocarbons Soil (Potable), NS Fuel Oil Spill Policy Low Level BTEX, C6-C32	CCME Hydrocarbons (CWS PHC F1/BTEX, F2-F4)	NB Potable Water BTEX, VPH, Low level T.E.H	PAHs (Default for water/soil)	PAHs (FWAL /CCME Sediment)	PCBs	VOCs	Total Coliform/E.coli (Presence/Absence)	Total Coliform/E.Coli (Count)		HOLD- DO NOT ANALYZE	Regulatory Requirements (Specify) / COMMENTS
1	08GW-95	19/09/23	/	GW	5	Y	N				X	X																pH, TSS, Salinity-NXRM
2	096W-102	19/09/23	/	GW	5	Y	N				X	X																
3	196W-118	19/09/23	/	GW	5	Y	N				X	X																
4	19GW-120	19/09/23	/	GW	5	Y	N				X	X																
5	19GW-122	19/09/23	/	GW	5	Y	N				X	X																
6	19GW-124	19/09/23	/	GW	5	Y	N				X	X																
7	QA/QC-1	19/09/23	/	GW	5	Y	N				X	X																
8																												
9																												
10																												

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY:(Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
Mario Theriault	19/09/23	5:03	metals / Hg only			B9Q9518

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White: Maxxam Pink: Client

Your P.O. #: 73517186
Your Project #: 11198639-04
Site Location: BELLEDUNE SMELTER
Your C.O.C. #: D34711, D34712, D34715

Attention: Rob Turner

GHD Limited
466 Hodgson Rd
Fredericton , NB
CANADA E3C 2G5

Report Date: 2019/10/07
Report #: R5910595
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9R1009
Received: 2019/09/26, 09:29

Sample Matrix: Water
Samples Received: 26

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Benzo(b/j)fluoranthene Sum (water)	2	N/A	2019/10/01	N/A	Auto Calc.
TEH in Water (PIRI)	2	2019/10/03	2019/10/03	ATL SOP 00113	Atl. RBCA v3.1 m
Mercury - Dissolved (CVAA,LL)	1	2019/10/02	2019/10/04	ATL SOP 00026	EPA 245.1 R3 m
Mercury - Dissolved (CVAA,LL)	25	2019/10/03	2019/10/04	ATL SOP 00026	EPA 245.1 R3 m
Hardness (calculated as CaCO3) (1)	6	N/A	2019/10/03	BBY WI-00033	Auto Calc
Hardness (calculated as CaCO3) (1)	20	N/A	2019/10/04	BBY WI-00033	Auto Calc
ICP-OES Dissolved Metals in Water (1)	26	N/A	2019/10/04	BBY7SOP-00018	EPA 6010d m
Na, K, Ca, Mg, S by CRC ICPMS (diss.) (1)	6	N/A	2019/10/03	BBY WI-00033	Auto Calc
Na, K, Ca, Mg, S by CRC ICPMS (diss.) (1)	20	N/A	2019/10/04	BBY WI-00033	Auto Calc
Elements by ICPMS (dissolved) - Seawater (1)	26	N/A	2019/10/03	BBY7SOP-00002	BCMOE BCLM Nov 2015
PAH in Water by GC/MS (SIM)	2	2019/09/30	2019/10/01	ATL SOP 00103	EPA 8270E R6 m
PCBs in water by GC/ECD	3	2019/10/01	2019/10/02	ATL SOP 00107	EPA 8082A m
PCB Aroclor sum (water)	3	N/A	2019/10/02	N/A	Auto Calc.
ModTPH (T1) Calc. for Water	2	N/A	2019/10/04	N/A	Atl. RBCA v3 m
VPH in Water (PIRI)	2	N/A	2019/10/01	ATL SOP 00130	Atl. RBCA v3.1 m

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by BV Labs, unless otherwise agreed in writing. BV Labs is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.

Your P.O. #: 73517186
Your Project #: 11198639-04
Site Location: BELLEDUNE SMELTER
Your C.O.C. #: D34711, D34712, D34715

Attention: Rob Turner

GHD Limited
466 Hodgson Rd
Fredericton , NB
CANADA E3C 2G5

Report Date: 2019/10/07
Report #: R5910595
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9R1009
Received: 2019/09/26, 09:29

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) This test was performed by Bedford to Burnaby - Offsite

Encryption Key

Melissa DiPinto
Project Manager
07 Oct 2019 12:47:06

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Heather Macumber, Senior Project Manager
Email: Heather.MACUMBER@bvlabs.com
Phone# (902)420-0203 Ext:226

==========

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BV Labs Job #: B9R1009
Report Date: 2019/10/07

GHD Limited
Client Project #: 11198639-04
Site Location: BELLEDUNE SMELTER
Your P.O. #: 73517186
Sampler Initials: MT

RESULTS OF ANALYSES OF WATER

BV Labs ID		KWV858			KWV858			KWV859	KWV860		
Sampling Date		2019/09/24			2019/09/24			2019/09/24	2019/09/24		
COC Number		D34711			D34711			D34711	D34711		
	UNITS	GW-18	RDL	QC Batch	GW-18 Lab-Dup	RDL	QC Batch	GW-23	GW-25	RDL	QC Batch
Calculated Parameters											
Dissolved Hardness (CaCO3)	mg/L	1070	0.50	6363947				881	1960	0.50	6363947
Metals											
Dissolved Aluminum (Al)	ug/L	<10	10	6371607	<10	10	6371607	841	703	10	6371607
Dissolved Antimony (Sb)	ug/L	77.7	0.50	6371607	78.2	0.50	6371607	27.9	31.7	0.50	6371607
Dissolved Arsenic (As)	ug/L	3450	0.50	6371607	3430	0.50	6371607	8740	15200	0.50	6371607
Dissolved Barium (Ba)	ug/L	45.0	1.0	6371607	44.4	1.0	6371607	48.6	67.5	1.0	6371607
Dissolved Beryllium (Be)	ug/L	<1.0	1.0	6371607	<1.0	1.0	6371607	<1.0	<1.0	1.0	6371607
Dissolved Bismuth (Bi)	ug/L	3.6	1.0	6371607	3.5	1.0	6371607	<1.0	<1.0	1.0	6371607
Dissolved Boron (B)	ug/L	1700	50	6371607	1710	50	6371607	2030	2210	50	6371607
Dissolved Cadmium (Cd)	ug/L	13600	0.050	6371607	13500	0.050	6371607	416000	22300	0.050	6371607
Dissolved Chromium (Cr)	ug/L	<0.50	0.50	6371607	<0.50	0.50	6371607	<0.50	1.62	0.50	6371607
Dissolved Cobalt (Co)	ug/L	62.1	0.10	6371607	61.9	0.10	6371607	84.1	14.2	0.10	6371607
Dissolved Copper (Cu)	ug/L	0.62	0.50	6371607	0.51	0.50	6371607	5.02	25.2	0.50	6371607
Dissolved Iron (Fe)	ug/L	114000	2.0	6371607	116000	2.0	6371607	10600	14600	2.0	6371607
Dissolved Lead (Pb)	ug/L	1730	0.10	6371607	1730	0.10	6371607	886	2410	0.10	6371607
Dissolved Lithium (Li)	ug/L	30	20	6371607	30	20	6371607	93	47	20	6371607
Dissolved Manganese (Mn)	ug/L	9370	0.50	6371607	9160	0.50	6371607	29100	2000	0.50	6371607
Dissolved Molybdenum (Mo)	ug/L	3.4	1.0	6371607	3.4	1.0	6371607	<1.0	3.0	1.0	6371607
Dissolved Nickel (Ni)	ug/L	71.5	0.20	6371607	71.9	0.20	6371607	97.0	28.7	0.20	6371607
Dissolved Phosphorus (P)	ug/L	<50	50	6371607	<50	50	6371607	112	<50	50	6371607
Dissolved Selenium (Se)	ug/L	2.83	0.50	6371607	3.03	0.50	6371607	22.1	28.1	0.50	6371607
Dissolved Silicon (Si)	ug/L	11700	1000	6371607	11800	1000	6371607	10700	12100	1000	6371607
Dissolved Silver (Ag)	ug/L	<0.050	0.050	6371607	<0.050	0.050	6371607	0.778	2.30	0.050	6371607
Dissolved Strontium (Sr)	ug/L	674	10	6371607	661	10	6371607	564	2100	10	6371607
Dissolved Thallium (Tl)	ug/L	7530	0.10	6371607	7500	0.10	6371607	49200	32800	0.10	6371607
Dissolved Tin (Sn)	ug/L	<1.0	1.0	6371607	<1.0	1.0	6371607	<1.0	<1.0	1.0	6371607
Dissolved Titanium (Ti)	ug/L	<10	10	6371607	<10	10	6371607	<10	<10	10	6371607
Dissolved Uranium (U)	ug/L	<0.050	0.050	6371607	<0.050	0.050	6371607	<0.050	<0.050	0.050	6371607
Dissolved Vanadium (V)	ug/L	<10	10	6371607	<10	10	6371607	<10	<10	10	6371607
Dissolved Zinc (Zn)	ug/L	41700	1.0	6371607	42100	1.0	6371607	166000	12500	1.0	6371607
Dissolved Calcium (Ca)	mg/L	312	1.0	6371606				308	236	1.0	6371606
Dissolved Magnesium (Mg)	mg/L	71.2	1.0	6371606				26.8	332	1.0	6371606
Dissolved Potassium (K)	mg/L	128	1.0	6371606				603	222	1.0	6371606

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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BV Labs Job #: B9R1009
Report Date: 2019/10/07

GHD Limited
Client Project #: 11198639-04
Site Location: BELLEDUNE SMELTER
Your P.O. #: 73517186
Sampler Initials: MT

RESULTS OF ANALYSES OF WATER

BV Labs ID		KWV858			KWV858			KWV859	KWV860		
Sampling Date		2019/09/24			2019/09/24			2019/09/24	2019/09/24		
COC Number		D34711			D34711			D34711	D34711		
	UNITS	GW-18	RDL	QC Batch	GW-18 Lab-Dup	RDL	QC Batch	GW-23	GW-25	RDL	QC Batch
Dissolved Sodium (Na)	mg/L	670	5.0	6371605	705	5.0	6371605	411	4180	5.0	6371605
Dissolved Sulphur (S)	mg/L	434	20	6371606				696	527	20	6371606

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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Sampler Initials: MT

RESULTS OF ANALYSES OF WATER

BV Labs ID		KWV861	KWV862	KWV863	KWV864	KWV865	KWV866	KWV867		
Sampling Date		2019/09/24	2019/09/24	2019/09/24	2019/09/24	2019/09/24	2019/09/24	2019/09/24		
COC Number		D34711	D34711	D34711	D34711	D34711	D34711	D34711		
	UNITS	**GW-25C**	**GW-12**	**05GW-64**	**05GW-78**	**05GW-75**	**09GW-99**	**09GW-106**	**RDL**	**QC Batch**
Calculated Parameters										
Dissolved Hardness (CaCO3)	mg/L	1840	167	561	1860	308	669	1030	0.50	6363947
Metals										
Dissolved Aluminum (Al)	ug/L	371	<10	625	<10	<10	<10	<10	10	6371607
Dissolved Antimony (Sb)	ug/L	10.1	4.49	54.3	0.99	2.49	0.50	273	0.50	6371607
Dissolved Arsenic (As)	ug/L	12000	17.7	229	22.5	6.66	5.59	16100	0.50	6371607
Dissolved Barium (Ba)	ug/L	76.4	67.1	37.6	138	143	65.0	162	1.0	6371607
Dissolved Beryllium (Be)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	6371607
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	6371607
Dissolved Boron (B)	ug/L	2340	<50	485	1930	<50	94	10200	50	6371607
Dissolved Cadmium (Cd)	ug/L	22400	16.9	1010	22.7	42.4	7.90	85.3	0.050	6371607
Dissolved Chromium (Cr)	ug/L	2.51	<0.50	<0.50	1.05	<0.50	<0.50	0.65	0.50	6371607
Dissolved Cobalt (Co)	ug/L	8.67	<0.10	29.4	0.12	<0.10	<0.10	2.67	0.10	6371607
Dissolved Copper (Cu)	ug/L	8.74	1.49	23.9	3.54	0.71	<0.50	232	0.50	6371607
Dissolved Iron (Fe)	ug/L	21200	<2.0	30400	2.7	<2.0	20.1	<2.0	2.0	6371607
Dissolved Lead (Pb)	ug/L	288	12.4	596	14.3	12.2	1.60	74.4	0.10	6371607
Dissolved Lithium (Li)	ug/L	35	<20	67	<20	<20	<20	25	20	6371607
Dissolved Manganese (Mn)	ug/L	2100	1.14	2810	2830	2.01	10.4	360	0.50	6371607
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	1.7	1.6	<1.0	<1.0	145	1.0	6371607
Dissolved Nickel (Ni)	ug/L	27.5	<0.20	76.5	0.44	0.44	<0.20	4.18	0.20	6371607
Dissolved Phosphorus (P)	ug/L	<50	255	<50	<50	<50	<50	156	50	6371607
Dissolved Selenium (Se)	ug/L	20.3	0.76	35.8	59.6	3.08	1.30	3520	0.50	6371607
Dissolved Silicon (Si)	ug/L	10800	2590	17200	1860	3190	4130	5140	1000	6371607
Dissolved Silver (Ag)	ug/L	0.189	<0.050	0.174	0.063	<0.050	<0.050	9.26	0.050	6371607
Dissolved Strontium (Sr)	ug/L	2020	131	448	2010	189	305	1850	10	6371607
Dissolved Thallium (Tl)	ug/L	27600	4.28	299	12.5	3.26	2.57	244	0.10	6371607
Dissolved Tin (Sn)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	1.4	<1.0	1.0	6371607
Dissolved Titanium (Ti)	ug/L	<10	<10	<10	<10	<10	<10	<10	10	6371607
Dissolved Uranium (U)	ug/L	<0.050	0.120	<0.050	1.03	0.552	1.39	1.17	0.050	6371607
Dissolved Vanadium (V)	ug/L	<10	<10	<10	<10	<10	<10	<10	10	6371607
Dissolved Zinc (Zn)	ug/L	11000	16.9	5390	37.6	404	9.7	117	1.0	6371607
Dissolved Calcium (Ca)	mg/L	185	61.9	114	189	109	251	187	1.0	6371606
Dissolved Magnesium (Mg)	mg/L	333	3.0	66.8	339	8.6	10.2	135	1.0	6371606
Dissolved Potassium (K)	mg/L	206	<1.0	47.9	122	2.2	2.5	411	1.0	6371606
Dissolved Sodium (Na)	mg/L	4130	19.2	534	3400	97.8	39.9	6740	5.0	6371605

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Report Date: 2019/10/07

GHD Limited
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Site Location: BELLEDUNE SMELTER
Your P.O. #: 73517186
Sampler Initials: MT

RESULTS OF ANALYSES OF WATER

BV Labs ID		KWV861	KWV862	KWV863	KWV864	KWV865	KWV866	KWV867		
Sampling Date		2019/09/24	2019/09/24	2019/09/24	2019/09/24	2019/09/24	2019/09/24	2019/09/24		
COC Number		D34711	D34711	D34711	D34711	D34711	D34711	D34711		
	UNITS	**GW-25C**	**GW-12**	**05GW-64**	**05GW-78**	**05GW-75**	**09GW-99**	**09GW-106**	**RDL**	**QC Batch**
Dissolved Sulphur (S)	mg/L	553	<20	222	331	33	162	1560	20	6371606

RDL = Reportable Detection Limit
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Sampler Initials: MT

RESULTS OF ANALYSES OF WATER

BV Labs ID		KWV900	KWV901	KWV902	KWV903	KWV904	KWV905	KWV906		
Sampling Date		2019/09/24	2019/09/24	2019/09/24	2019/09/24	2019/09/24	2019/09/24	2019/09/24		
COC Number		D34712	D34712	D34712	D34712	D34712	D34712	D34712		
	UNITS	**09GW-107**	**QA/QC-3**	**QA/QC-4**	**GW-45**	**08GW-82**	**08GW-83**	**08GW-84**	**RDL**	**QC Batch**
Calculated Parameters										
Dissolved Hardness (CaCO3)	mg/L	230	294	212	353	1220	381	397	0.50	6363947
Metals										
Dissolved Aluminum (Al)	ug/L	<10	<10	<10	<10	<10	<10	<10	10	6371607
Dissolved Antimony (Sb)	ug/L	2.62	2.48	1.65	483	8.22	4.60	14.5	0.50	6371607
Dissolved Arsenic (As)	ug/L	7.75	4.28	5.58	11.8	5.96	4.25	6.39	0.50	6371607
Dissolved Barium (Ba)	ug/L	159	138	151	64.2	32.3	80.2	63.9	1.0	6371607
Dissolved Beryllium (Be)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	6371607
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	6371607
Dissolved Boron (B)	ug/L	173	64	112	65	480	53	473	50	6371607
Dissolved Cadmium (Cd)	ug/L	114	43.0	108	1830	40.2	8.41	35.0	0.050	6371607
Dissolved Chromium (Cr)	ug/L	0.55	<0.50	0.82	<0.50	<0.50	<0.50	<0.50	0.50	6371607
Dissolved Cobalt (Co)	ug/L	0.30	<0.10	<0.10	5.11	<0.10	<0.10	0.18	0.10	6371607
Dissolved Copper (Cu)	ug/L	3.54	0.60	1.52	9.96	4.54	1.68	9.45	0.50	6371607
Dissolved Iron (Fe)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	6371607
Dissolved Lead (Pb)	ug/L	67.2	4.24	35.5	298	22.4	40.5	102	0.10	6371607
Dissolved Lithium (Li)	ug/L	<20	<20	<20	<20	<20	<20	243	20	6371607
Dissolved Manganese (Mn)	ug/L	1.96	1.49	1.17	6510	16.6	6.03	126	0.50	6371607
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	1.4	<1.0	<1.0	<1.0	1.0	6371607
Dissolved Nickel (Ni)	ug/L	0.65	0.26	<0.20	23.2	2.87	0.58	0.68	0.20	6371607
Dissolved Phosphorus (P)	ug/L	<50	<50	<50	<50	<50	<50	<50	50	6371607
Dissolved Selenium (Se)	ug/L	12.4	7.29	4.31	14.9	22.9	2.07	1.61	0.50	6371607
Dissolved Silicon (Si)	ug/L	3190	3250	3020	4610	5900	3580	3400	1000	6371607
Dissolved Silver (Ag)	ug/L	0.069	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	6371607
Dissolved Strontium (Sr)	ug/L	157	172	151	613	742	165	2620	10	6371607
Dissolved Thallium (Tl)	ug/L	19.3	2.81	13.5	106	3.23	2.23	12.1	0.10	6371607
Dissolved Tin (Sn)	ug/L	<1.0	<1.0	<1.0	1.2	<1.0	<1.0	<1.0	1.0	6371607
Dissolved Titanium (Ti)	ug/L	<10	<10	<10	<10	<10	<10	<10	10	6371607
Dissolved Uranium (U)	ug/L	0.270	0.596	0.288	<0.050	2.03	0.708	0.811	0.050	6371607
Dissolved Vanadium (V)	ug/L	<10	<10	<10	<10	<10	<10	<10	10	6371607
Dissolved Zinc (Zn)	ug/L	91.6	435	71.7	2630	738	59.1	216	1.0	6371607
Dissolved Calcium (Ca)	mg/L	86.2	104	79.1	132	453	144	150	1.0	6371606
Dissolved Magnesium (Mg)	mg/L	3.6	8.4	3.5	5.8	21.0	5.2	5.1	1.0	6371606
Dissolved Potassium (K)	mg/L	<1.0	2.2	<1.0	9.1	7.1	<1.0	8.1	1.0	6371606
Dissolved Sodium (Na)	mg/L	35.3	78.6	30.7	21.2	95.6	40.4	36.1	5.0	6371605

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Report Date: 2019/10/07

GHD Limited
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Site Location: BELLEDUNE SMELTER
Your P.O. #: 73517186
Sampler Initials: MT

RESULTS OF ANALYSES OF WATER

BV Labs ID		KWV900	KWV901	KWV902	KWV903	KWV904	KWV905	KWV906		
Sampling Date		2019/09/24	2019/09/24	2019/09/24	2019/09/24	2019/09/24	2019/09/24	2019/09/24		
COC Number		D34712	D34712	D34712	D34712	D34712	D34712	D34712		
	UNITS	**09GW-107**	**QA/QC-3**	**QA/QC-4**	**GW-45**	**08GW-82**	**08GW-83**	**08GW-84**	**RDL**	**QC Batch**
Dissolved Sulphur (S)	mg/L	38	33	30	110	330	33	36	20	6371606

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Sampler Initials: MT

RESULTS OF ANALYSES OF WATER

BV Labs ID		KWV907	KWV908	KWV909		KWV928			KWV928		
Sampling Date		2019/09/24	2019/09/24	2019/09/24		2019/09/24			2019/09/24		
COC Number		D34712	D34712	D34712		D34715			D34715		
	UNITS	09GW-103	19GW-114	19GW-117	QC Batch	19GW-119	RDL	QC Batch	19GW-119 Lab-Dup	RDL	QC Batch
Calculated Parameters											
Dissolved Hardness (CaCO3)	mg/L	185	910	122	6363947	410	0.50	6363947			
Metals											
Dissolved Aluminum (Al)	ug/L	<10	<10	37	6371607	<10	10	6371611	<10	10	6371611
Dissolved Antimony (Sb)	ug/L	6.05	1.99	3.17	6371607	10.5	0.50	6371611	10.6	0.50	6371611
Dissolved Arsenic (As)	ug/L	3.46	12.7	4.35	6371607	3.08	0.50	6371611	3.29	0.50	6371611
Dissolved Barium (Ba)	ug/L	131	44.3	33.6	6371607	98.0	1.0	6371611	99.1	1.0	6371611
Dissolved Beryllium (Be)	ug/L	<1.0	<1.0	<1.0	6371607	<1.0	1.0	6371611	<1.0	1.0	6371611
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	6371607	<1.0	1.0	6371611	<1.0	1.0	6371611
Dissolved Boron (B)	ug/L	<50	87	<50	6371607	<50	50	6371611	<50	50	6371611
Dissolved Cadmium (Cd)	ug/L	7.96	7.95	6.36	6371607	77.0	0.050	6371611	78.9	0.050	6371611
Dissolved Chromium (Cr)	ug/L	1.53	0.80	<0.50	6371607	<0.50	0.50	6371611	<0.50	0.50	6371611
Dissolved Cobalt (Co)	ug/L	<0.10	3.07	0.46	6371607	0.23	0.10	6371611	0.29	0.10	6371611
Dissolved Copper (Cu)	ug/L	2.35	2.44	4.61	6371607	16.9	0.50	6371611	16.9	0.50	6371611
Dissolved Iron (Fe)	ug/L	<2.0	1360	<2.0	6371607	<2.0	2.0	6371611	<2.0	2.0	6371611
Dissolved Lead (Pb)	ug/L	34.2	1.66	26.1	6371607	76.4	0.10	6371611	70.9	0.10	6371611
Dissolved Lithium (Li)	ug/L	<20	<20	<20	6371607	<20	20	6371611	<20	20	6371611
Dissolved Manganese (Mn)	ug/L	5.03	17700	152	6371607	116	0.50	6371611	120	0.50	6371611
Dissolved Molybdenum (Mo)	ug/L	<1.0	1.8	3.8	6371607	<1.0	1.0	6371611	<1.0	1.0	6371611
Dissolved Nickel (Ni)	ug/L	<0.20	15.2	3.42	6371607	7.28	0.20	6371611	7.51	0.20	6371611
Dissolved Phosphorus (P)	ug/L	<50	2890	<50	6371607	70	50	6371611	77	50	6371611
Dissolved Selenium (Se)	ug/L	1.16	1.99	0.56	6371607	1.59	0.50	6371611	1.65	0.50	6371611
Dissolved Silicon (Si)	ug/L	2380	12900	3140	6371607	4970	1000	6371611	4880	1000	6371611
Dissolved Silver (Ag)	ug/L	<0.050	<0.050	<0.050	6371607	<0.050	0.050	6371611	<0.050	0.050	6371611
Dissolved Strontium (Sr)	ug/L	161	413	143	6371607	253	10	6371611	253	10	6371611
Dissolved Thallium (Tl)	ug/L	1.93	5.27	1.75	6371607	0.68	0.10	6371611	0.71	0.10	6371611
Dissolved Tin (Sn)	ug/L	<1.0	2.0	2.2	6371607	<1.0	1.0	6371611	<1.0	1.0	6371611
Dissolved Titanium (Ti)	ug/L	<10	<10	<10	6371607	<10	10	6371611	<10	10	6371611
Dissolved Uranium (U)	ug/L	0.394	1.10	0.687	6371607	0.694	0.050	6371611	0.737	0.050	6371611
Dissolved Vanadium (V)	ug/L	<10	<10	<10	6371607	<10	10	6371611	<10	10	6371611
Dissolved Zinc (Zn)	ug/L	36.7	92.4	80.3	6371607	8980	1.0	6371611	9110	1.0	6371611
Dissolved Calcium (Ca)	mg/L	48.2	279	42.0	6371606	152	1.0	6371606			
Dissolved Magnesium (Mg)	mg/L	15.8	52.0	4.2	6371606	7.1	1.0	6371606			
Dissolved Potassium (K)	mg/L	9.7	14.9	3.0	6371606	5.9	1.0	6371606			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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GHD Limited
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Sampler Initials: MT

RESULTS OF ANALYSES OF WATER

BV Labs ID		KWV907	KWV908	KWV909		KWV928			KWV928		
Sampling Date		2019/09/24	2019/09/24	2019/09/24		2019/09/24			2019/09/24		
COC Number		D34712	D34712	D34712		D34715			D34715		
	UNITS	09GW-103	19GW-114	19GW-117	QC Batch	19GW-119	RDL	QC Batch	19GW-119 Lab-Dup	RDL	QC Batch
Dissolved Sodium (Na)	mg/L	56.9	47.6	15.1	6371605	21.7	5.0	6371609			
Dissolved Sulphur (S)	mg/L	34	269	<20	6371606	92	20	6371606			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
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RESULTS OF ANALYSES OF WATER

BV Labs ID		KWV929	KWV930	KWV931	KWV932	KWV933		
Sampling Date		2019/09/24	2019/09/24	2019/09/24	2019/09/24	2019/09/24		
COC Number		D34715	D34715	D34715	D34715	D34715		
	UNITS	**QA/QC-2**	**08GW-88**	**08GW-79**	**19GW-123**	**19GW-116**	**RDL**	**QC Batch**
Calculated Parameters								
Dissolved Hardness (CaCO3)	mg/L	1540	861	240	347	1530	0.50	6363947
Metals								
Dissolved Aluminum (Al)	ug/L	388	<10	<10	14	387	10	6371611
Dissolved Antimony (Sb)	ug/L	21.6	19.4	<0.50	1.80	21.9	0.50	6371611
Dissolved Arsenic (As)	ug/L	90.1	5.29	0.59	1.38	90.1	0.50	6371611
Dissolved Barium (Ba)	ug/L	43.4	95.9	53.5	72.9	42.8	1.0	6371611
Dissolved Beryllium (Be)	ug/L	1.8	<1.0	<1.0	<1.0	1.8	1.0	6371611
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	6371611
Dissolved Boron (B)	ug/L	127	85	<50	<50	125	50	6371611
Dissolved Cadmium (Cd)	ug/L	71.3	46.7	0.343	1.88	70.9	0.050	6371611
Dissolved Chromium (Cr)	ug/L	2.90	<0.50	1.61	0.62	2.05	0.50	6371611
Dissolved Cobalt (Co)	ug/L	199	0.40	<0.10	1.41	198	0.10	6371611
Dissolved Copper (Cu)	ug/L	3.40	4.60	1.37	5.00	1.05	0.50	6371611
Dissolved Iron (Fe)	ug/L	89700	3.0	<2.0	3.2	90000	2.0	6371611
Dissolved Lead (Pb)	ug/L	7.01	16.3	12.5	7.03	6.22	0.10	6371611
Dissolved Lithium (Li)	ug/L	179	<20	<20	<20	176	20	6371611
Dissolved Manganese (Mn)	ug/L	57500	124	12.7	175	57200	0.50	6371611
Dissolved Molybdenum (Mo)	ug/L	14.9	<1.0	<1.0	1.7	14.4	1.0	6371611
Dissolved Nickel (Ni)	ug/L	315	4.20	35.5	6.49	320	0.20	6371611
Dissolved Phosphorus (P)	ug/L	35800	<50	<50	<50	34400	50	6371611
Dissolved Selenium (Se)	ug/L	7.68	7.43	<0.50	0.94	7.83	0.50	6371611
Dissolved Silicon (Si)	ug/L	114000	6400	1900	3770	116000	1000	6371611
Dissolved Silver (Ag)	ug/L	0.080	<0.050	<0.050	<0.050	0.054	0.050	6371611
Dissolved Strontium (Sr)	ug/L	1280	422	93	231	1270	10	6371611
Dissolved Thallium (Tl)	ug/L	7.43	1.10	<0.10	0.22	7.32	0.10	6371611
Dissolved Tin (Sn)	ug/L	<1.0	<1.0	<1.0	<1.0	1.9	1.0	6371611
Dissolved Titanium (Ti)	ug/L	<10	<10	<10	<10	<10	10	6371611
Dissolved Uranium (U)	ug/L	1.22	0.792	0.135	0.972	0.402	0.050	6371611
Dissolved Vanadium (V)	ug/L	<10	<10	<10	<10	<10	10	6371611
Dissolved Zinc (Zn)	ug/L	55000	6800	8.9	28.0	54100	1.0	6371611
Dissolved Calcium (Ca)	mg/L	382	315	92.3	115	380	1.0	6371606
Dissolved Magnesium (Mg)	mg/L	142	18.1	2.4	14.5	140	1.0	6371606
Dissolved Potassium (K)	mg/L	3510	3.2	<1.0	4.5	3500	1.0	6371606
Dissolved Sodium (Na)	mg/L	509	98.8	8.1	71.7	525	5.0	6371609

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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BV Labs Job #: B9R1009
Report Date: 2019/10/07

GHD Limited
Client Project #: 11198639-04
Site Location: BELLEDUNE SMELTER
Your P.O. #: 73517186
Sampler Initials: MT

RESULTS OF ANALYSES OF WATER

BV Labs ID		KWV929	KWV930	KWV931	KWV932	KWV933		
Sampling Date		2019/09/24	2019/09/24	2019/09/24	2019/09/24	2019/09/24		
COC Number		D34715	D34715	D34715	D34715	D34715		
	UNITS	**QA/QC-2**	**08GW-88**	**08GW-79**	**19GW-123**	**19GW-116**	**RDL**	**QC Batch**
Dissolved Sulphur (S)	mg/L	2260	205	40	39	2250	20	6371606

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Report Date: 2019/10/07

GHD Limited
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Sampler Initials: MT

MERCURY BY COLD VAPOUR AA (WATER)

BV Labs ID		KWV858	KWV858	KWV859	KWV860	KWV861	KWV862	KWV863		
Sampling Date		2019/09/24	2019/09/24	2019/09/24	2019/09/24	2019/09/24	2019/09/24	2019/09/24		
COC Number		D34711	D34711	D34711	D34711	D34711	D34711	D34711		
	UNITS	GW-18	GW-18 Lab-Dup	GW-23	GW-25	GW-25C	GW-12	05GW-64	RDL	QC Batch
Metals										
Dissolved Mercury (Hg)	ug/L	0.030	0.033	0.32	1.4	0.13	0.018	0.062	0.013	6367194

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

BV Labs ID		KWV864	KWV865	KWV866	KWV867	KWV900	KWV901	KWV902		
Sampling Date		2019/09/24	2019/09/24	2019/09/24	2019/09/24	2019/09/24	2019/09/24	2019/09/24		
COC Number		D34711	D34711	D34711	D34711	D34712	D34712	D34712		
	UNITS	05GW-78	05GW-75	09GW-99	09GW-106	09GW-107	QA/QC-3	QA/QC-4	RDL	QC Batch
Metals										
Dissolved Mercury (Hg)	ug/L	0.030	0.017	0.018	1.9	0.017	0.017	0.018	0.013	6367194

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

BV Labs ID		KWV903	KWV904	KWV905	KWV906	KWV907	KWV908	KWV909		
Sampling Date		2019/09/24	2019/09/24	2019/09/24	2019/09/24	2019/09/24	2019/09/24	2019/09/24		
COC Number		D34712	D34712	D34712	D34712	D34712	D34712	D34712		
	UNITS	GW-45	08GW-82	08GW-83	08GW-84	09GW-103	19GW-114	19GW-117	RDL	QC Batch
Metals										
Dissolved Mercury (Hg)	ug/L	0.017	0.022	0.015	0.017	0.020	0.023	0.015	0.013	6367194

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

BV Labs ID		KWV928	KWV928	KWV929	KWV930	KWV931	KWV932	KWV933		
Sampling Date		2019/09/24	2019/09/24	2019/09/24	2019/09/24	2019/09/24	2019/09/24	2019/09/24		
COC Number		D34715	D34715	D34715	D34715	D34715	D34715	D34715		
	UNITS	19GW-119	19GW-119 Lab-Dup	QA/QC-2	08GW-88	08GW-79	19GW-123	19GW-116	RDL	QC Batch
Metals										
Dissolved Mercury (Hg)	ug/L	0.017	0.017	0.025	0.017	0.017	0.018	0.027	0.013	6367201

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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Sampler Initials: MT

SEMI-VOLATILE ORGANICS BY GC-MS (WATER)

BV Labs ID		KWV908	KWV930		
Sampling Date		2019/09/24	2019/09/24		
COC Number		D34712	D34715		
	UNITS	19GW-114	08GW-88	RDL	QC Batch
Polyaromatic Hydrocarbons					
1-Methylnaphthalene	ug/L	<0.050	<0.050	0.050	6359566
2-Methylnaphthalene	ug/L	<0.050	<0.050	0.050	6359566
Acenaphthene	ug/L	<0.010	<0.010	0.010	6359566
Acenaphthylene	ug/L	<0.010	<0.010	0.010	6359566
Anthracene	ug/L	<0.010	<0.010	0.010	6359566
Benzo(a)anthracene	ug/L	<0.010	<0.010	0.010	6359566
Benzo(a)pyrene	ug/L	<0.010	<0.010	0.010	6359566
Benzo(b)fluoranthene	ug/L	<0.010	<0.010	0.010	6359566
Benzo(b/j)fluoranthene	ug/L	<0.020	<0.020	0.020	6356230
Benzo(g,h,i)perylene	ug/L	<0.010	<0.010	0.010	6359566
Benzo(j)fluoranthene	ug/L	<0.010	<0.010	0.010	6359566
Benzo(k)fluoranthene	ug/L	<0.010	<0.010	0.010	6359566
Chrysene	ug/L	<0.010	<0.010	0.010	6359566
Dibenz(a,h)anthracene	ug/L	<0.010	<0.010	0.010	6359566
Fluoranthene	ug/L	0.017	<0.010	0.010	6359566
Fluorene	ug/L	<0.010	<0.010	0.010	6359566
Indeno(1,2,3-cd)pyrene	ug/L	<0.010	<0.010	0.010	6359566
Naphthalene	ug/L	<0.20	<0.20	0.20	6359566
Perylene	ug/L	<0.010	<0.010	0.010	6359566
Phenanthrene	ug/L	0.022	<0.010	0.010	6359566
Pyrene	ug/L	0.017	<0.010	0.010	6359566
Surrogate Recovery (%)					
D10-Anthracene	%	94	106		6359566
D14-Terphenyl	%	81 (1)	95 (1)		6359566
D8-Acenaphthylene	%	88	96		6359566

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) PAH sample contained sediment.

BV Labs Job #: B9R1009
Report Date: 2019/10/07

GHD Limited
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Sampler Initials: MT

ATLANTIC RBCA HYDROCARBONS (WATER)

BV Labs ID		KWV900			KWV900			KWV902		
Sampling Date		2019/09/24			2019/09/24			2019/09/24		
COC Number		D34712			D34712			D34712		
	UNITS	09GW-107	RDL	QC Batch	09GW-107 Lab-Dup	RDL	QC Batch	QA/QC-4	RDL	QC Batch
Petroleum Hydrocarbons										
Benzene	mg/L	<0.0010	0.0010	6361920	<0.0010	0.0010	6361920	<0.0010	0.0010	6361920
Toluene	mg/L	<0.0010	0.0010	6361920	<0.0010	0.0010	6361920	<0.0010	0.0010	6361920
Ethylbenzene	mg/L	<0.0010	0.0010	6361920	<0.0010	0.0010	6361920	<0.0010	0.0010	6361920
Total Xylenes	mg/L	<0.0020	0.0020	6361920	<0.0020	0.0020	6361920	<0.0020	0.0020	6361920
C6 - C10 (less BTEX)	mg/L	<0.10	0.10	6361920	<0.10	0.10	6361920	<0.10	0.10	6361920
>C10-C16 Hydrocarbons	mg/L	<0.050	0.050	6366831				<0.050	0.050	6366831
>C16-C21 Hydrocarbons	mg/L	<0.050	0.050	6366831				<0.050	0.050	6366831
>C21-<C32 Hydrocarbons	mg/L	<0.10	0.10	6366831				<0.10	0.10	6366831
Modified TPH (Tier1)	mg/L	<0.10	0.10	6356252				<0.10	0.10	6356252
Reached Baseline at C32	mg/L	NA	N/A	6366831				NA	N/A	6366831
Hydrocarbon Resemblance	mg/L	NA	N/A	6366831				NA	N/A	6366831
Surrogate Recovery (%)										
Isobutylbenzene - Extractable	%	109		6366831				109		6366831
n-Dotriacontane - Extractable	%	112		6366831				112		6366831
Isobutylbenzene - Volatile	%	107		6361920	105		6361920	109		6361920

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

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BV Labs Job #: B9R1009
Report Date: 2019/10/07

GHD Limited
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Site Location: BELLEDUNE SMELTER
Your P.O. #: 73517186
Sampler Initials: MT

POLYCHLORINATED BIPHENYLS BY GC-ECD (WATER)

BV Labs ID		KWV865	KWV901	KWV907		
Sampling Date		2019/09/24	2019/09/24	2019/09/24		
COC Number		D34711	D34712	D34712		
	UNITS	05GW-75	QA/QC-3	09GW-103	RDL	QC Batch
PCBs						
Aroclor 1016	ug/L	<0.050	<0.050	<0.050	0.050	6361899
Aroclor 1221	ug/L	<0.050	<0.050	<0.050	0.050	6361899
Aroclor 1232	ug/L	<0.050	<0.050	<0.050	0.050	6361899
Aroclor 1248	ug/L	<0.050	<0.050	<0.050	0.050	6361899
Aroclor 1242	ug/L	<0.050	<0.050	<0.050	0.050	6361899
Aroclor 1254	ug/L	<0.050	<0.050	<0.050	0.050	6361899
Aroclor 1260	ug/L	<0.050	<0.050	<0.050	0.050	6361899
Calculated Total PCB	ug/L	<0.050	<0.050	<0.050	0.050	6356596
Surrogate Recovery (%)						
Decachlorobiphenyl	%	72 (1)	60 (1)	84		6361899

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) PCB sample contained sediment.

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GHD Limited
Client Project #: 11198639-04
Site Location: BELLEDUNE SMELTER
Your P.O. #: 73517186
Sampler Initials: MT

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	1.3°C
Package 2	3.0°C
Package 3	4.7°C
Package 4	2.0°C

RESULTS OF ANALYSES OF WATER

Sample KWV858 [GW-18] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KWV859 [GW-23] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KWV860 [GW-25] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KWV861 [GW-25C] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KWV862 [GW-12] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KWV863 [05GW-64] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KWV864 [05GW-78] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KWV865 [05GW-75] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KWV866 [09GW-99] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KWV867 [09GW-106] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KWV900 [09GW-107] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KWV901 [QA/QC-3] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KWV902 [QA/QC-4] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KWV903 [GW-45] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KWV904 [08GW-82] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KWV905 [08GW-83] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KWV906 [08GW-84] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KWV907 [09GW-103] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KWV908 [19GW-114] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KWV909 [19GW-117] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KWV928 [19GW-119] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KWV929 [QA/QC-2] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KWV930 [08GW-88] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KWV931 [08GW-79] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KWV932 [19GW-123] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KWV933 [19GW-116] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
6359566	D10-Anthracene	2019/09/30	97	50 - 130	106	50 - 130	118	%		
6359566	D14-Terphenyl	2019/09/30	89	50 - 130	99	50 - 130	103	%		
6359566	D8-Acenaphthylene	2019/09/30	89	50 - 130	99	50 - 130	104	%		
6361899	Decachlorobiphenyl	2019/10/02	69 (2,3)	30 - 130	41	30 - 130	42	%		
6361920	Isobutylbenzene - Volatile	2019/10/01	105 (4)	70 - 130	106	70 - 130	107	%		
6366831	Isobutylbenzene - Extractable	2019/10/03	109	70 - 130	105	70 - 130	105	%		
6366831	n-Dotriacontane - Extractable	2019/10/03	112	70 - 130	120	70 - 130	110	%		
6359566	1-Methylnaphthalene	2019/09/30	90	50 - 130	108	50 - 130	<0.050	ug/L	NC (1)	40
6359566	2-Methylnaphthalene	2019/09/30	83	50 - 130	99	50 - 130	<0.050	ug/L	NC (1)	40
6359566	Acenaphthene	2019/09/30	92	50 - 130	102	50 - 130	<0.010	ug/L	NC (1)	40
6359566	Acenaphthylene	2019/09/30	90	50 - 130	99	50 - 130	<0.010	ug/L	NC (1)	40
6359566	Anthracene	2019/09/30	89	50 - 130	101	50 - 130	<0.010	ug/L	NC (1)	40
6359566	Benzo(a)anthracene	2019/09/30	98	50 - 130	108	50 - 130	<0.010	ug/L	NC (1)	40
6359566	Benzo(a)pyrene	2019/09/30	86	50 - 130	91	50 - 130	<0.010	ug/L	NC (1)	40
6359566	Benzo(b)fluoranthene	2019/09/30	94	50 - 130	102	50 - 130	<0.010	ug/L	NC (1)	40
6359566	Benzo(g,h,i)perylene	2019/09/30	90	50 - 130	95	50 - 130	<0.010	ug/L	NC (1)	40
6359566	Benzo(j)fluoranthene	2019/09/30	91	50 - 130	97	50 - 130	<0.010	ug/L	NC (1)	40
6359566	Benzo(k)fluoranthene	2019/09/30	89	50 - 130	96	50 - 130	<0.010	ug/L	NC (1)	40
6359566	Chrysene	2019/09/30	98	50 - 130	105	50 - 130	<0.010	ug/L	NC (1)	40
6359566	Dibenz(a,h)anthracene	2019/09/30	84	50 - 130	87	50 - 130	<0.010	ug/L	NC (1)	40
6359566	Fluoranthene	2019/09/30	93	50 - 130	102	50 - 130	<0.010	ug/L	NC (1)	40
6359566	Fluorene	2019/09/30	90	50 - 130	98	50 - 130	<0.010	ug/L	NC (1)	40
6359566	Indeno(1,2,3-cd)pyrene	2019/09/30	84	50 - 130	91	50 - 130	<0.010	ug/L	NC (1)	40
6359566	Naphthalene	2019/09/30	86	50 - 130	100	50 - 130	<0.20	ug/L	NC (1)	40
6359566	Perylene	2019/09/30	90	50 - 130	96	50 - 130	<0.010	ug/L	NC (1)	40
6359566	Phenanthrene	2019/09/30	100	50 - 130	109	50 - 130	<0.010	ug/L	NC (1)	40
6359566	Pyrene	2019/09/30	94	50 - 130	106	50 - 130	<0.010	ug/L	NC (1)	40
6361899	Aroclor 1016	2019/10/02					<0.050	ug/L	NC (1)	40
6361899	Aroclor 1221	2019/10/02					<0.050	ug/L	NC (1)	40
6361899	Aroclor 1232	2019/10/02					<0.050	ug/L	NC (1)	40
6361899	Aroclor 1242	2019/10/02					<0.050	ug/L	NC (1)	40

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
6361899	Aroclor 1248	2019/10/02					<0.050	ug/L	NC (1)	40
6361899	Aroclor 1254	2019/10/02	105 (3)	70 - 130	107	70 - 130	<0.050	ug/L	NC (1)	40
6361899	Aroclor 1260	2019/10/02					<0.050	ug/L	NC (1)	40
6361920	Benzene	2019/10/01	99 (4)	70 - 130	108	70 - 130	<0.0010	mg/L	NC (5)	40
6361920	C6 - C10 (less BTEX)	2019/10/01					<0.10	mg/L	NC (5)	40
6361920	Ethylbenzene	2019/10/01	98 (4)	70 - 130	109	70 - 130	<0.0010	mg/L	NC (5)	40
6361920	Toluene	2019/10/01	98 (4)	70 - 130	106	70 - 130	<0.0010	mg/L	NC (5)	40
6361920	Total Xylenes	2019/10/01	98 (4)	70 - 130	107	70 - 130	<0.0020	mg/L	NC (5)	40
6366831	>C10-C16 Hydrocarbons	2019/10/03	100	70 - 130	101	70 - 130	<0.050	mg/L	NC (1)	40
6366831	>C16-C21 Hydrocarbons	2019/10/03	92	70 - 130	93	70 - 130	<0.050	mg/L	NC (1)	40
6366831	>C21-<C32 Hydrocarbons	2019/10/03	103	70 - 130	110	70 - 130	<0.10	mg/L	NC (1)	40
6367194	Dissolved Mercury (Hg)	2019/10/04	95 (6)	80 - 120	98	80 - 120	<0.013	ug/L	11 (7)	20
6367201	Dissolved Mercury (Hg)	2019/10/04	89 (8)	80 - 120	99	80 - 120	<0.013	ug/L	0 (9)	20
6371605	Dissolved Sodium (Na)	2019/10/04			108	80 - 120	<0.10	mg/L	5.1 (10)	20
6371607	Dissolved Aluminum (Al)	2019/10/03	100 (11)	80 - 135	102	80 - 120	<10	ug/L	NC (10)	25
6371607	Dissolved Antimony (Sb)	2019/10/03	NC (11)	80 - 120	97	80 - 120	<0.50	ug/L	0.65 (10)	25
6371607	Dissolved Arsenic (As)	2019/10/03	NC (11)	80 - 120	98	80 - 120	<0.50	ug/L	0.53 (10)	25
6371607	Dissolved Barium (Ba)	2019/10/03	97 (11)	80 - 120	100	80 - 120	<1.0	ug/L	1.4 (10)	25
6371607	Dissolved Beryllium (Be)	2019/10/03	98 (11)	80 - 120	98	80 - 120	<1.0	ug/L	NC (10)	25
6371607	Dissolved Bismuth (Bi)	2019/10/03	99 (11)	80 - 120	100	80 - 120	<1.0	ug/L	2.2 (10)	25
6371607	Dissolved Boron (B)	2019/10/03	NC (11)	80 - 120	95	80 - 120	<50	ug/L	0.56 (10)	25
6371607	Dissolved Cadmium (Cd)	2019/10/03	NC (11)	80 - 120	99	80 - 120	<0.050	ug/L	0.89 (10)	25
6371607	Dissolved Chromium (Cr)	2019/10/03	100 (11)	80 - 120	97	80 - 120	<0.50	ug/L	NC (10)	25
6371607	Dissolved Cobalt (Co)	2019/10/03	98 (11)	80 - 120	97	80 - 120	<0.10	ug/L	0.31 (10)	25
6371607	Dissolved Copper (Cu)	2019/10/03	105 (11)	80 - 120	100	80 - 120	<0.50	ug/L	21 (10)	25
6371607	Dissolved Iron (Fe)	2019/10/03	NC (11)	80 - 135	98	80 - 120	<10	ug/L	1.1 (10)	25
6371607	Dissolved Lead (Pb)	2019/10/03	NC (11)	80 - 120	98	80 - 120	<0.10	ug/L	0.050 (10)	25
6371607	Dissolved Lithium (Li)	2019/10/03	94 (11)	80 - 120	97	80 - 120	<20	ug/L	0.65 (10)	25
6371607	Dissolved Manganese (Mn)	2019/10/03	NC (11)	80 - 120	99	80 - 120	<0.50	ug/L	2.3 (10)	25
6371607	Dissolved Molybdenum (Mo)	2019/10/03	92 (11)	80 - 120	96	80 - 120	<1.0	ug/L	0.30 (10)	25
6371607	Dissolved Nickel (Ni)	2019/10/03	103 (11)	80 - 120	99	80 - 120	<0.20	ug/L	0.53 (10)	25

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
6371607	Dissolved Phosphorus (P)	2019/10/03					<50	ug/L	NC (10)	25
6371607	Dissolved Selenium (Se)	2019/10/03	98 (11)	80 - 120	101	80 - 120	<0.50	ug/L	6.8 (10)	25
6371607	Dissolved Silicon (Si)	2019/10/03					<1000	ug/L	1.0 (10)	25
6371607	Dissolved Silver (Ag)	2019/10/03	97 (11)	80 - 120	96	80 - 120	<0.050	ug/L	NC (10)	25
6371607	Dissolved Strontium (Sr)	2019/10/03	NC (11)	80 - 120	88	80 - 120	<10	ug/L	1.9 (10)	25
6371607	Dissolved Thallium (Tl)	2019/10/03	NC (11)	80 - 120	98	80 - 120	<0.10	ug/L	0.46 (10)	25
6371607	Dissolved Tin (Sn)	2019/10/03	94 (11)	80 - 120	94	80 - 120	<1.0	ug/L	NC (10)	25
6371607	Dissolved Titanium (Ti)	2019/10/03	95 (11)	80 - 120	101	80 - 120	<10	ug/L	NC (10)	25
6371607	Dissolved Uranium (U)	2019/10/03	97 (11)	80 - 120	98	80 - 120	<0.050	ug/L	NC (10)	25
6371607	Dissolved Vanadium (V)	2019/10/03	96 (11)	80 - 120	96	80 - 120	<10	ug/L	NC (10)	25
6371607	Dissolved Zinc (Zn)	2019/10/03	NC (11)	80 - 120	102	80 - 120	<5.0	ug/L	0.85 (10)	25
6371609	Dissolved Sodium (Na)	2019/10/04	NC	80 - 120	109	80 - 120	<0.10	mg/L		
6371611	Dissolved Aluminum (Al)	2019/10/03	100 (12)	80 - 135	95	80 - 120	<10	ug/L	NC (13)	25
6371611	Dissolved Antimony (Sb)	2019/10/03	NC (12)	80 - 120	98	80 - 120	<0.50	ug/L	1.7 (13)	25
6371611	Dissolved Arsenic (As)	2019/10/03	92 (12)	80 - 120	93	80 - 120	<0.50	ug/L	6.9 (13)	25
6371611	Dissolved Barium (Ba)	2019/10/03	98 (12)	80 - 120	96	80 - 120	<1.0	ug/L	1.1 (13)	25
6371611	Dissolved Beryllium (Be)	2019/10/03	100 (12)	80 - 120	93	80 - 120	<1.0	ug/L	NC (13)	25
6371611	Dissolved Bismuth (Bi)	2019/10/03	105 (12)	80 - 120	96	80 - 120	<1.0	ug/L	NC (13)	25
6371611	Dissolved Boron (B)	2019/10/03	99 (12)	80 - 120	93	80 - 120	<50	ug/L	NC (13)	25
6371611	Dissolved Cadmium (Cd)	2019/10/03	98 (12)	80 - 120	94	80 - 120	<0.050	ug/L	2.4 (13)	25
6371611	Dissolved Chromium (Cr)	2019/10/03	100 (12)	80 - 120	95	80 - 120	<0.50	ug/L	NC (13)	25
6371611	Dissolved Cobalt (Co)	2019/10/03	101 (12)	80 - 120	94	80 - 120	<0.10	ug/L	24 (13)	25
6371611	Dissolved Copper (Cu)	2019/10/03	107 (12)	80 - 120	99	80 - 120	<0.50	ug/L	0.073 (13)	25
6371611	Dissolved Iron (Fe)	2019/10/03	99 (12)	80 - 135	96	80 - 120	<10	ug/L	NC (13)	25
6371611	Dissolved Lead (Pb)	2019/10/03	98 (12)	80 - 120	95	80 - 120	<0.10	ug/L	7.4 (13)	25
6371611	Dissolved Lithium (Li)	2019/10/03	97 (12)	80 - 120	91	80 - 120	<20	ug/L	NC (13)	25
6371611	Dissolved Manganese (Mn)	2019/10/03	NC (12)	80 - 120	94	80 - 120	<0.50	ug/L	2.8 (13)	25
6371611	Dissolved Molybdenum (Mo)	2019/10/03	87 (12)	80 - 120	92	80 - 120	<1.0	ug/L	NC (13)	25
6371611	Dissolved Nickel (Ni)	2019/10/03	107 (12)	80 - 120	96	80 - 120	<0.20	ug/L	3.1 (13)	25
6371611	Dissolved Phosphorus (P)	2019/10/03					<50	ug/L	9.6 (13)	25
6371611	Dissolved Selenium (Se)	2019/10/03	95 (12)	80 - 120	97	80 - 120	<0.50	ug/L	3.7 (13)	25

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
6371611	Dissolved Silicon (Si)	2019/10/03					<1000	ug/L	1.8 (13)	25
6371611	Dissolved Silver (Ag)	2019/10/03	100 (12)	80 - 120	92	80 - 120	<0.050	ug/L	NC (13)	25
6371611	Dissolved Strontium (Sr)	2019/10/03	NC (12)	80 - 120	84	80 - 120	<10	ug/L	0.20 (13)	25
6371611	Dissolved Thallium (Tl)	2019/10/03	99 (12)	80 - 120	94	80 - 120	<0.10	ug/L	3.1 (13)	25
6371611	Dissolved Tin (Sn)	2019/10/03	96 (12)	80 - 120	94	80 - 120	<1.0	ug/L	NC (13)	25
6371611	Dissolved Titanium (Ti)	2019/10/03	94 (12)	80 - 120	97	80 - 120	<10	ug/L	NC (13)	25
6371611	Dissolved Uranium (U)	2019/10/03	95 (12)	80 - 120	94	80 - 120	<0.050	ug/L	6.0 (13)	25
6371611	Dissolved Vanadium (V)	2019/10/03	95 (12)	80 - 120	93	80 - 120	<10	ug/L	NC (13)	25

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
6371611	Dissolved Zinc (Zn)	2019/10/03	NC (12)	80 - 120	100	80 - 120	<5.0	ug/L	1.4 (13)	25

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Duplicate Parent ID

(2) PCB sample contained sediment.

(3) Matrix Spike Parent ID [KWV865-05]

(4) Matrix Spike Parent ID [KWV902-06]

(5) Duplicate Parent ID [KWV900-06]

(6) Matrix Spike Parent ID [KWV859-04]

(7) Duplicate Parent ID [KWV858-04]

(8) Matrix Spike Parent ID [KWV929-04]

(9) Duplicate Parent ID [KWV928-04]

(10) Duplicate Parent ID [KWV858-03]

(11) Matrix Spike Parent ID [KWV858-03]

(12) Matrix Spike Parent ID [KWV928-03]

(13) Duplicate Parent ID [KWV928-03]

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BV Labs Job #: B9R1009
Report Date: 2019/10/07

GHD Limited
Client Project #: 11198639-04
Site Location: BELLEDUNE SMELTER
Your P.O. #: 73517186
Sampler Initials: MT

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Andy Lu, Ph.D., P.Chem., Scientific Specialist

Eric Dearman, Scientific Specialist

Rosemarie MacDonald, Scientific Specialist (Organics)

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports.
For Service Group specific validation please refer to the Validation Signature Page.

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CHAIN OF CUSTODY RECORD

COC #: D34711 Page 1 of 3

Invoice Information		Report Information (if differs from invoice)		Project Information (where applicable)		Turnaround Time (TAT) Required
Company Name:	GHD	Company Name:		Quotation #:		[X] Regular TAT (5 business days) Most analyses
Contact Name:	Rob Turner	Contact Name:		P.O. #:	73517186	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address:	466 Hodgson Road, Fredericton NB Postal Code: E3C-2G5	Address:	Postal Code:	Project #:	11198639-04	IF RUSH please specify date (Surcharges will be applied)
				Site Location:	Belledune Smelter	
Phone:	Fax:	Phone:	Fax:	Site #:		DATE REQUIRED:
Email:	rob.turner@ghd.com	Email:		Sampled By:	Marco Theriault	

Laboratory Use Only

CUSTODY SEAL Present	Intact	COOLER TEMPERATURES	COOLER TEMPERATURES
		ACTR	

COOLING MEDIA PRESENT Y / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested

#	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED & PRESERVED	LAB FILTRATION REQUIRED	RCAP-MS (Total Metals) Well / Surface water	RCAP-MS (Dissolved Metals) Ground waters	Metals (Water): Total Digest (Default Method) for well water & surface water	Metals (Water): Dissolved for ground water	Metals (Water): Mercury (CIRCLE) TOTAL / DISSOLVED	Metals (Soil): Metals & Mercury Default Acid Extractable (Available) Digest	Metals (Soil): Metals Total Digest -for Ocean sediments (HNO3/HF/HClO4)	Metals (Soil): Mercury Low level by Cold Vapour AA	Hot Water Soluble Boron (required for CCME Agricultural/ Landfill)	RBCA Hydrocarbons (BTEX, C6-C32)	Hydrocarbons Soil (Potable), NS Fuel Oil Spill Policy Low Level BTEX, C6-C32	CCME Hydrocarbons (CWS-PHC F1/BTEX, F2-F4)	NB Potable Water BTEX, VPH, Low level T.E.H	PAHs (Default for water/soil)	PAHs (FWAL /CCME Sediment)	PCBs	VOCs	Total Coliform/E.coli (Presence/Absence)	Total Coliform/E.Coli (Count)		HOLD- DO NOT ANALYZE	COMMENTS
1	GW-18	19/09/24	✓	GW	4	Y	N				X	X																	Please send
2	GW-23	19/09/24	✓	GW	4	Y	N				X	X																	metals/Hg samples
3	GW-25	19/09/24	✓	GW	4	Y	N				X	X																	to your Barnaby
4	GW-25C	19/09/24	✓	GW	4	Y	N				X	X																	lab for upscating
5	GW-17	19/09/24	✓	GW	4	Y	N				X	X																	potential seawater
6	05GW-64	19/09/24	✓	GW	4	Y	N				X	X																	and maintain detection
7	05GW-78	19/09/24	✓	GW	4	Y	N				X	X																	level.
8	05GW-75	19/09/24	✓	GW	6	Y	N				X	X											X						
9	09GW-99	19/09/24	✓	GW	4	Y	N				X	X																	
10	09GW-106	19/09/24	✓	GW	4	Y	N				X	X																	

Regulatory Requirements (Specify)

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
[signature] Marco Theriault	2019/09/24	9:43	[signature]			B9R1009

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CHAIN OF CUSTODY RECORD

COC #: D34712 Page 2 of 3

Invoice Information	Report Information (if differs from invoice)	Project Information (where applicable)	Turnaround Time (TAT) Required
Company Name: GAD	Company Name:	Quotation #:	☐ Regular TAT (5 business days) Most Analyses
Contact Name: Rob Turner	Contact Name:	P.O. #: 73517186	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 461 Madison Road Fredericton NB Postal Code: E3C 2G5	Address: Postal Code:	Project #: 1119863 9-04	IF RUSH please specify date (Surcharges will be applied)
Phone: Fax:	Phone: Fax:	Site Location: Belledune Smelter	DATE REQUIRED:
Email: Rob.Turner@ghd.com	Email:	Site #:	
		Sampled By: Mario Theriault	

Laboratory Use Only

CUSTODY SEAL Present	CUSTODY SEAL Intact	COOLER TEMPERATURES	COOLER TEMPERATURES
		ACTR	

COOLING MEDIA PRESENT Y / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED & PRESERVED	LAB FILTRATION REQUIRED	RCAP-MS (Total Metals) Well / Surface water	RCAP-MS (Dissolved Metals) Ground waters	Metals (Water): Total Digest (Default Method) for well water & surface water	Metals (Water): Dissolved for ground water	Metals (Water): Mercury (CIRCLE) TOTAL / DISSOLVED	Metals (Soil): Metals & Mercury Default Aqua Regia Extractable (Available) Digest	Metals (Soil): Metals Total Digest - for Ocean Sediments (HNO3/HF/HClO4)	Metals (Soil): Mercury Low level by Cold Vapour AA	Metals (Soil): Hot Water Soluble Boron (required for CCME Agricultural/ Landfill)	RBCA Hydrocarbons (BTEX, C6-C32)	Hydrocarbons Soil (Potable), NS Fuel Oil Spill Policy Low Level BTEX C6-C32	CCME Hydrocarbons (CWS-PHC F1/BTEX, F2-F4)	NB Potable Water BTEX, VPH, Low level T.E.H	PAHs (Default for water/soil)	PAHs (RWAL /CCME Sediment)	PCBs	VOCs	Total Coliform/E.coli (Presence/Absence)	Total Coliform/E Coli (Count)		HOLD- DO NOT ANALYZE	Regulatory Requirements (Specify): Shipped from FREDTON	COMMENTS
1	09GW-107	19/09/24	✓	GW	9	Y	N				X	X					X												Metals/Hg to Barnaby
2	QA/QC-3	19/09/24	✓	GW	6	Y	N				X	X											X						
3	QA/QC-4	19/09/24	✓	GW	9	Y	N				X	X					X												
4	GW-45	19/09/24	✓	GW	4	Y	N				X	X																	
5	08GW-82	19/09/24	✓	GW	4	Y	N				X	X																	
6	08GW-83	19/09/24	✓	GW	4	Y	N				X	X																	
7	08GW-84	19/09/24	✓	GW	4	Y	N				X	X																	
8	09GW-103	19/09/24	✓	GW	6	Y	N				X	X												X					
9	19GW-114	19/09/23	✓	GW	6	Y	N				X	X										X							
10	19GW-117	19/09/23		GW	4	Y	N				X	X																	

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
	2019/09/24	9:43				B9R1009
Mario Theriault						

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CHAIN OF CUSTODY RECORD

COC #: D34715 Page 2 of 3

Invoice Information	Report Information (if differs from invoice)	Project Information (where applicable)	Turnaround Time (TAT) Required
Company Name: GHD	Company Name:	Quotation #:	☐ Regular TAT (5 business days) Most analyses
Contact Name: Rob Turner	Contact Name:	P.O. #: 73517186	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: Fredericton NB 466 Hodgson Rd Postal Code: E3C2G5	Address: Postal Code:	Project #: 11096139-04	IF RUSH please specify date (Surcharges will be applied)
Phone: Fax:	Phone: Fax:	Site Location: Belledune Smelter	DATE REQUIRED:
Email: rob.turner@ghd.com	Email:	Site #:	
		Sampled By: Marie Thériault	

Laboratory Use Only

CUSTODY SEAL Present	CUSTODY SEAL Intact	COOLER TEMPERATURES	COOLER TEMPERATURES
		ACTR	

COOLING MEDIA PRESENT Y / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED & PRESERVED	LAB FILTRATION REQUIRED	RCAP-MS (Total Metals) Well / Surface water	RCAP-MS (Dissolved Metals) Ground waters	Metals (Water): Total Digest (Default: Method for well water & surface water)	Metals (Water): Dissolved for ground water	Metals (Water): Mercury (CIRCLE) TOTAL / DISSOLVED	Metals (Soil): Metals & Mercury (Default: Aqua Regia Extractable (Available) Digest)	Metals (Soil): Metals Total Digest - for Ocean sediments (HF/HClO3/HNO3/HCl)	Metals (Soil): Mercury Low level by Cold Vapour AA	Metals (Soil): Hot Water Soluble Boron (required for CCME Agricultural/ Landfill)	RBCA Hydrocarbons (BTEX, C6-C32)	Hydrocarbons Soil (Potable), NS Fuel Oil Spill Policy Low Level BTEX ,C6-C32	CCME Hydrocarbons (CWS-PHC F1/BTEX, F2-F4)	NB Potable Water BTEX, VPH, Low level T.E.H	PAHs (Default for water/soil)	PAHs (FWAL /CCME Sediments)	PCBs	VOCs	Total Coliform/E.coli (Presence/Absence)	Total Coliform/E.Coli (Count)		HOLD- DO NOT ANALYZE	Regulatory Requirements (Specify)	COMMENTS
																													Shipped from FREDTON
1	19GW-119	19/09/23		GW	4	Y	N				X	X																	Metals/Hg to Barnaby
2	QA/QC-2	19/09/23		GW	4	Y	N				X	X																	
3	08GW-88	19/09/23		GW	6	Y	N				X	X									X								
4	08GW-79	19/09/23		GW	4	Y	N				X	X																	
5	08GW-123	19/09/23		GW	4	Y	N				X	X																	
6	19GW-116	19/09/23		GW	4	Y	N				X	X																	
7																													
8																													
9																													
10																													

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY:(Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
	2019/09/24	9:43				B9R1009
Marie Thériault						

Unless otherwise agreed to in writing, work submitted on this Chain of Custody is subject to Maxxam's standard Terms and Conditions. Signing of this Chain of Custody document is acknowledgment and acceptance of our terms which are available for viewing at www.maxxam.ca/terms.

White: Maxxam Pink: Client

Your P.O. #: 73517186
Your Project #: 11198639-04
Site Location: Glencore
Your C.O.C. #: 112031

Attention: Rob Turner

GHD Limited
466 Hodgson Rd
Fredericton , NB
CANADA E3C 2G5

Report Date: 2019/10/21
Report #: R5929110
Version: 2 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9S2147
Received: 2019/10/08, 09:39

Sample Matrix: Water
Samples Received: 50

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
TEH in Water (PIRI)	3	2019/10/10	2019/10/10	ATL SOP 00113	Atl. RBCA v3.1 m
TEH in Water (PIRI)	3	2019/10/10	2019/10/11	ATL SOP 00113	Atl. RBCA v3.1 m
Mercury - Dissolved (CVAA,LL)	1	2019/10/11	2019/10/15	ATL SOP 00026	EPA 245.1 R3 m
Mercury - Dissolved (CVAA,LL)	49	2019/10/16	2019/10/17	ATL SOP 00026	EPA 245.1 R3 m
Hardness (calculated as CaCO3) (1)	43	N/A	2019/10/17	BBY WI-00033	Auto Calc
Hardness (calculated as CaCO3) (1)	7	N/A	2019/10/18	BBY WI-00033	Auto Calc
ICP-OES Dissolved Metals in Water (1)	50	N/A	2019/10/15	BBY7SOP-00018	EPA 6010d m
Na, K, Ca, Mg, S by CRC ICPMS (diss.) (1)	43	N/A	2019/10/17	BBY WI-00033	Auto Calc
Na, K, Ca, Mg, S by CRC ICPMS (diss.) (1)	7	N/A	2019/10/18	BBY WI-00033	Auto Calc
Elements by ICPMS (dissolved) - Seawater (1)	50	N/A	2019/10/17	BBY7SOP-00002	BCMOE BCLM Nov 2015
PCBs in water by GC/ECD	2	2019/10/11	2019/10/15	ATL SOP 00107	EPA 8082A m
PCB Aroclor sum (water)	2	N/A	2019/10/15	N/A	Auto Calc.
pH (2)	32	N/A	2019/10/10	ATL SOP 00003	SM 23 4500-H+ B m
pH (2)	17	N/A	2019/10/15	ATL SOP 00003	SM 23 4500-H+ B m
Salinity (3)	30	N/A	2019/10/10		SM 22 2520B
Salinity (3)	10	N/A	2019/10/11		SM 22 2520B
Salinity (3)	9	N/A	2019/10/17		SM 22 2520B
ModTPH (T1) Calc. for Water	6	N/A	2019/10/15	N/A	Atl. RBCA v3 m
Total Suspended Solids	1	2019/10/08	2019/10/10	ATL SOP 00007	SM 23 2540D m
Total Suspended Solids	5	2019/10/08	2019/10/11	ATL SOP 00007	SM 23 2540D m
Total Suspended Solids	4	2019/10/09	2019/10/10	ATL SOP 00007	SM 23 2540D m
Total Suspended Solids	9	2019/10/09	2019/10/15	ATL SOP 00007	SM 23 2540D m
Total Suspended Solids	20	2019/10/09	2019/10/18	ATL SOP 00007	SM 23 2540D m
Total Suspended Solids	10	2019/10/10	2019/10/16	ATL SOP 00007	SM 23 2540D m
VPH in Water (PIRI)	5	N/A	2019/10/11	ATL SOP 00130	Atl. RBCA v3.1 m
VPH in Water (PIRI)	1	N/A	2019/10/12	ATL SOP 00130	Atl. RBCA v3.1 m

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in BV Labs profession using

Your P.O. #: 73517186
Your Project #: 11198639-04
Site Location: Glencore
Your C.O.C. #: 112031

Attention: Rob Turner

GHD Limited
466 Hodgson Rd
Fredericton , NB
CANADA E3C 2G5

Report Date: 2019/10/21
Report #: R5929110
Version: 2 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9S2147
Received: 2019/10/08, 09:39

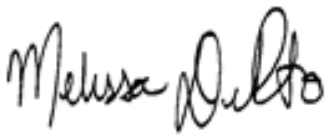
accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by BV Labs, unless otherwise agreed in writing. BV Labs is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by Bedford to Burnaby - Offsite
(2) The APHA Standard Method require pH to be analyzed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the APHA Standard Method holding time.
(3) Non-accredited test method

Encryption Key



Melissa DiPinto
Project Manager
21 Oct 2019 16:56:07

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Heather Macumber, Senior Project Manager
Email: Heather.MACUMBER@bvlabs.com
Phone# (902)420-0203 Ext:226

==========

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

BV Labs Job #: B9S2147
Report Date: 2019/10/21

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186

RESULTS OF ANALYSES OF WATER

BV Labs ID		KZF809			KZF809			KZF810		
Sampling Date		2019/10/03			2019/10/03			2019/10/03		
COC Number		112031			112031			112031		
	UNITS	GW-1	RDL	QC Batch	GW-1 Lab-Dup	RDL	QC Batch	GW3B	RDL	QC Batch
Calculated Parameters										
Dissolved Hardness (CaCO3)	mg/L	306	0.50	6390047				169	0.50	6390047
Inorganics										
pH	pH	7.67	N/A	6380957				7.43	N/A	6380964
Salinity	N/A	<2.0	2.0	6379715				<2.0	2.0	6379715
Total Suspended Solids	mg/L	17	1.0	6380057				290	10	6380057
Metals										
Dissolved Aluminum (Al)	ug/L	57	10	6394571	60	10	6394571	56	10	6394571
Dissolved Antimony (Sb)	ug/L	2.03	0.50	6394571	1.81	0.50	6394571	<0.50	0.50	6394571
Dissolved Arsenic (As)	ug/L	1.33	0.50	6394571	0.89	0.50	6394571	1.08	0.50	6394571
Dissolved Barium (Ba)	ug/L	264	1.0	6394571	263	1.0	6394571	125	1.0	6394571
Dissolved Beryllium (Be)	ug/L	<1.0	1.0	6394571	<1.0	1.0	6394571	<1.0	1.0	6394571
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	6394571	<1.0	1.0	6394571	<1.0	1.0	6394571
Dissolved Boron (B)	ug/L	54	50	6394571	52	50	6394571	<50	50	6394571
Dissolved Cadmium (Cd)	ug/L	0.703	0.050	6394571	0.693	0.050	6394571	0.569	0.050	6394571
Dissolved Chromium (Cr)	ug/L	2.45	0.50	6394571	2.92	0.50	6394571	2.59	0.50	6394571
Dissolved Cobalt (Co)	ug/L	<0.10	0.10	6394571	<0.10	0.10	6394571	<0.10	0.10	6394571
Dissolved Copper (Cu)	ug/L	1.74	0.50	6394571	1.84	0.50	6394571	1.20	0.50	6394571
Dissolved Iron (Fe)	ug/L	9.9	2.0	6394571	13.4	2.0	6394571	11.3	2.0	6394571
Dissolved Lead (Pb)	ug/L	4.67	0.10	6394571	4.67	0.10	6394571	4.02	0.10	6394571
Dissolved Lithium (Li)	ug/L	<20	20	6394571	<20	20	6394571	<20	20	6394571
Dissolved Manganese (Mn)	ug/L	1.19	0.50	6394571	1.18	0.50	6394571	4.46	0.50	6394571
Dissolved Molybdenum (Mo)	ug/L	1.8	1.0	6394571	1.7	1.0	6394571	<1.0	1.0	6394571
Dissolved Nickel (Ni)	ug/L	1.25	0.20	6394571	1.38	0.20	6394571	1.20	0.20	6394571
Dissolved Phosphorus (P)	ug/L	<50	50	6394571	<50	50	6394571	<50	50	6394571
Dissolved Selenium (Se)	ug/L	<0.50	0.50	6394571	<0.50	0.50	6394571	<0.50	0.50	6394571
Dissolved Silicon (Si)	ug/L	3620	1000	6394571	3790	1000	6394571	2970	1000	6394571
Dissolved Silver (Ag)	ug/L	<0.050	0.050	6394571	<0.050	0.050	6394571	<0.050	0.050	6394571
Dissolved Strontium (Sr)	ug/L	570	10	6394571	569	10	6394571	111	10	6394571
Dissolved Thallium (Tl)	ug/L	0.27	0.10	6394571	0.26	0.10	6394571	0.20	0.10	6394571
Dissolved Tin (Sn)	ug/L	<1.0	1.0	6394571	<1.0	1.0	6394571	<1.0	1.0	6394571
Dissolved Titanium (Ti)	ug/L	<10	10	6394571	<10	10	6394571	<10	10	6394571
Dissolved Uranium (U)	ug/L	0.429	0.050	6394571	0.410	0.050	6394571	0.169	0.050	6394571
Dissolved Vanadium (V)	ug/L	<10	10	6394571	<10	10	6394571	<10	10	6394571

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

Bureau Veritas Laboratories 200 Bluewater Rd, Suite 105, Bedford, Nova Scotia Canada B4B 1G9 Tel: 902-420-0203 Toll-free: 800-565-7227 Fax: 902-420-8612 www.bvlabs.com

BV Labs Job #: B9S2147
Report Date: 2019/10/21

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186

RESULTS OF ANALYSES OF WATER

BV Labs ID		KZF809			KZF809			KZF810		
Sampling Date		2019/10/03			2019/10/03			2019/10/03		
COC Number		112031			112031			112031		
	UNITS	GW-1	RDL	QC Batch	GW-1 Lab-Dup	RDL	QC Batch	GW3B	RDL	QC Batch
Dissolved Zinc (Zn)	ug/L	10.4	1.0	6394571	8.9	1.0	6394571	11.8	1.0	6394571
Dissolved Calcium (Ca)	mg/L	114	1.0	6394569				63.2	1.0	6394569
Dissolved Magnesium (Mg)	mg/L	5.1	1.0	6394569				2.7	1.0	6394569
Dissolved Potassium (K)	mg/L	2.2	1.0	6394569				1.2	1.0	6394569
Dissolved Sodium (Na)	mg/L	22.4	1.0	6394570	22.4	1.0	6394570	9.7	1.0	6394570
Dissolved Sulphur (S)	mg/L	51	20	6394569				<20	20	6394569

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

Bureau Veritas Laboratories 200 Bluewater Rd, Suite 105, Bedford, Nova Scotia Canada B4B 1G9 Tel: 902-420-0203 Toll-free: 800-565-7227 Fax: 902-420-8612 www.bvlabs.com

BV Labs Job #: B9S2147
Report Date: 2019/10/21

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186

RESULTS OF ANALYSES OF WATER

BV Labs ID		KZF811		KZF812			KZF813			KZF813		
Sampling Date		2019/10/02		2019/10/02			2019/10/02			2019/10/02		
COC Number		112031		112031			112031			112031		
	UNITS	GW8A	RDL	GW8B	RDL	QC Batch	GW8C	RDL	QC Batch	GW8C Lab-Dup	RDL	QC Batch
Calculated Parameters												
Dissolved Hardness (CaCO3)	mg/L	1560	0.50	991	0.50	6390047	1100	0.50	6390047			
Inorganics												
pH	pH	5.86	N/A	5.66	N/A	6380964	6.08	N/A	6386166			
Salinity	N/A	3.3	2.0	3.0	2.0	6379715	2.3	2.0	6379715			
Total Suspended Solids	mg/L	190	5.0	60	10	6377421	40	10	6377421	46	10	6377421
Metals												
Dissolved Aluminum (Al)	ug/L	493	10	59	10	6394571	101	10	6394571			
Dissolved Antimony (Sb)	ug/L	4.06	0.50	<0.50	0.50	6394571	1.38	0.50	6394571			
Dissolved Arsenic (As)	ug/L	1820	0.50	59.3	0.50	6394571	2310	0.50	6394571			
Dissolved Barium (Ba)	ug/L	39.8	1.0	45.7	1.0	6394571	41.2	1.0	6394571			
Dissolved Beryllium (Be)	ug/L	<1.0	1.0	<1.0	1.0	6394571	<1.0	1.0	6394571			
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	<1.0	1.0	6394571	<1.0	1.0	6394571			
Dissolved Boron (B)	ug/L	1470	50	414	50	6394571	1380	50	6394571			
Dissolved Cadmium (Cd)	ug/L	42300	0.050	1250	0.050	6394571	31400 (1)	0.25	6394571			
Dissolved Chromium (Cr)	ug/L	4.42	0.50	2.53	0.50	6394571	1.34	0.50	6394571			
Dissolved Cobalt (Co)	ug/L	128	0.10	1.78	0.10	6394571	71.9	0.10	6394571			
Dissolved Copper (Cu)	ug/L	408	0.50	1.48	0.50	6394571	<0.50	0.50	6394571			
Dissolved Iron (Fe)	ug/L	15000	2.0	65800	2.0	6394571	75900	2.0	6394571			
Dissolved Lead (Pb)	ug/L	272	0.10	1.56	0.10	6394571	17.8	0.10	6394571			
Dissolved Lithium (Li)	ug/L	54	20	128	20	6394571	48	20	6394571			
Dissolved Manganese (Mn)	ug/L	19900	0.50	7290	0.50	6394571	18200	0.50	6394571			
Dissolved Molybdenum (Mo)	ug/L	2.2	1.0	<1.0	1.0	6394571	2.7	1.0	6394571			
Dissolved Nickel (Ni)	ug/L	105	0.20	1.53	0.20	6394571	52.0	0.20	6394571			
Dissolved Phosphorus (P)	ug/L	144	50	<50	50	6394571	121	50	6394571			
Dissolved Selenium (Se)	ug/L	6.46	0.50	3.49	0.50	6394571	2.68	0.50	6394571			
Dissolved Silicon (Si)	ug/L	7600	1000	3060	1000	6394571	6020	1000	6394571			
Dissolved Silver (Ag)	ug/L	0.947	0.050	0.050	0.050	6394571	0.073	0.050	6394571			
Dissolved Strontium (Sr)	ug/L	1660	10	5080	10	6394571	1330	10	6394571			
Dissolved Thallium (Tl)	ug/L	6400 (2)	0.50	491	0.10	6394571	4700	0.10	6394571			
Dissolved Tin (Sn)	ug/L	<1.0	1.0	<1.0	1.0	6394571	<1.0	1.0	6394571			
Dissolved Titanium (Ti)	ug/L	<10	10	<10	10	6394571	<10	10	6394571			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
(1) RDL raised due to concentration over linear range for Cd, sample dilution required.
(2) RDL raised due to concentration over linear range for Tl, sample dilution required.

Bureau Veritas Laboratories 200 Bluewater Rd, Suite 105, Bedford, Nova Scotia Canada B4B 1G9 Tel: 902-420-0203 Toll-free: 800-565-7227 Fax: 902-420-8612 www.bvlabs.com

BV Labs Job #: B9S2147
Report Date: 2019/10/21

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186

RESULTS OF ANALYSES OF WATER

BV Labs ID		KZF811		KZF812			KZF813			KZF813		
Sampling Date		2019/10/02		2019/10/02			2019/10/02			2019/10/02		
COC Number		112031		112031			112031			112031		
	UNITS	GW8A	RDL	GW8B	RDL	QC Batch	GW8C	RDL	QC Batch	GW8C Lab-Dup	RDL	QC Batch
Dissolved Uranium (U)	ug/L	0.087	0.050	<0.050	0.050	6394571	0.064	0.050	6394571			
Dissolved Vanadium (V)	ug/L	<10	10	<10	10	6394571	<10	10	6394571			
Dissolved Zinc (Zn)	ug/L	63600	1.0	2980	1.0	6394571	36300	1.0	6394571			
Dissolved Calcium (Ca)	mg/L	427	1.0	295	1.0	6394569	312	1.0	6394569			
Dissolved Magnesium (Mg)	mg/L	119	1.0	61.9	1.0	6394569	77.8	1.0	6394569			
Dissolved Potassium (K)	mg/L	131	1.0	23.9	1.0	6394569	113	1.0	6394569			
Dissolved Sodium (Na)	mg/L	680	1.0	879	1.0	6394570	635	1.0	6394570			
Dissolved Sulphur (S)	mg/L	587	20	280	20	6394569	429	20	6394569			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

Bureau Veritas Laboratories 200 Bluewater Rd, Suite 105, Bedford, Nova Scotia Canada B4B 1G9 Tel: 902-420-0203 Toll-free: 800-565-7227 Fax: 902-420-8612 www.bvlabs.com

BV Labs Job #: B9S2147
Report Date: 2019/10/21

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186

RESULTS OF ANALYSES OF WATER

BV Labs ID		KZF814			KZF815			KZF816		
Sampling Date		2019/10/02			2019/10/03			2019/10/03		
COC Number		112031			112031			112031		
	UNITS	GW10	RDL	QC Batch	GW24	RDL	QC Batch	GW27	RDL	QC Batch
Calculated Parameters										
Dissolved Hardness (CaCO3)	mg/L	282	0.50	6390047	91.6	0.50	6390047	33.9	0.50	6390047
Inorganics										
pH	pH	7.58	N/A	6380957	7.84	N/A	6380964	9.87	N/A	6380957
Salinity	N/A	<2.0	2.0	6379715	<2.0	2.0	6379715	<2.0	2.0	6379715
Total Suspended Solids	mg/L	7.2	1.0	6377421	2200	17	6380057	23	2.0	6380057
Metals										
Dissolved Aluminum (Al)	ug/L	59	10	6394571	65	10	6394571	272	10	6394571
Dissolved Antimony (Sb)	ug/L	0.79	0.50	6394571	4.80	0.50	6394571	68.0	0.50	6394571
Dissolved Arsenic (As)	ug/L	14.5	0.50	6394571	1680	0.50	6394571	9330	0.50	6394571
Dissolved Barium (Ba)	ug/L	57.8	1.0	6394571	25.2	1.0	6394571	52.7	1.0	6394571
Dissolved Beryllium (Be)	ug/L	<1.0	1.0	6394571	<1.0	1.0	6394571	<1.0	1.0	6394571
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	6394571	<1.0	1.0	6394571	1.6	1.0	6394571
Dissolved Boron (B)	ug/L	887	50	6394571	1300	50	6394571	2530	50	6394571
Dissolved Cadmium (Cd)	ug/L	23.6	0.050	6394571	978	0.050	6394571	73.3	0.050	6394571
Dissolved Chromium (Cr)	ug/L	3.56	0.50	6394571	2.08	0.50	6394571	3.45	0.50	6394571
Dissolved Cobalt (Co)	ug/L	1.84	0.10	6394571	3.15	0.10	6394571	0.61	0.10	6394571
Dissolved Copper (Cu)	ug/L	20.1	0.50	6394571	4.34	0.50	6394571	100	0.50	6394571
Dissolved Iron (Fe)	ug/L	41.3	2.0	6394571	614	2.0	6394571	160	2.0	6394571
Dissolved Lead (Pb)	ug/L	2.06	0.10	6394571	251	0.10	6394571	461	0.10	6394571
Dissolved Lithium (Li)	ug/L	<20	20	6394571	<20	20	6394571	<20	20	6394571
Dissolved Manganese (Mn)	ug/L	757	0.50	6394571	1120	0.50	6394571	84.4	0.50	6394571
Dissolved Molybdenum (Mo)	ug/L	11.5	1.0	6394571	35.3	1.0	6394571	190	1.0	6394571
Dissolved Nickel (Ni)	ug/L	2.27	0.20	6394571	5.47	0.20	6394571	6.51	0.20	6394571
Dissolved Phosphorus (P)	ug/L	<50	50	6394571	<50	50	6394571	718	50	6394571
Dissolved Selenium (Se)	ug/L	<0.50	0.50	6394571	2.89	0.50	6394571	19.8	0.50	6394571
Dissolved Silicon (Si)	ug/L	6170	1000	6394571	5700	1000	6394571	2720	1000	6394571
Dissolved Silver (Ag)	ug/L	0.111	0.050	6394571	0.283	0.050	6394571	3.36	0.050	6394571
Dissolved Strontium (Sr)	ug/L	299	10	6394571	78	10	6394571	31	10	6394571
Dissolved Thallium (Tl)	ug/L	16.5	0.10	6394571	4400	0.10	6394571	184	0.10	6394571
Dissolved Tin (Sn)	ug/L	<1.0	1.0	6394571	<1.0	1.0	6394571	1.3	1.0	6394571
Dissolved Titanium (Ti)	ug/L	<10	10	6394571	<10	10	6394571	<10	10	6394571
Dissolved Uranium (U)	ug/L	0.317	0.050	6394571	0.107	0.050	6394571	1.61	0.050	6394571
Dissolved Vanadium (V)	ug/L	<10	10	6394571	<10	10	6394571	42	10	6394571
Dissolved Zinc (Zn)	ug/L	2970	1.0	6394571	1460	1.0	6394571	66.4	1.0	6394571

RDL = Reportable Detection Limit
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BV Labs Job #: B9S2147
Report Date: 2019/10/21

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186

RESULTS OF ANALYSES OF WATER

BV Labs ID		KZF814			KZF815			KZF816		
Sampling Date		2019/10/02			2019/10/03			2019/10/03		
COC Number		112031			112031			112031		
	UNITS	GW10	RDL	QC Batch	GW24	RDL	QC Batch	GW27	RDL	QC Batch
Dissolved Calcium (Ca)	mg/L	86.0	1.0	6394569	31.8	1.0	6394569	13.6	1.0	6394569
Dissolved Magnesium (Mg)	mg/L	16.4	1.0	6394569	3.0	1.0	6394569	<1.0	1.0	6394569
Dissolved Potassium (K)	mg/L	13.7	1.0	6394569	24.6	1.0	6394569	2.9	1.0	6394569
Dissolved Sodium (Na)	mg/L	264	1.0	6394570	216	1.0	6394570	411	1.0	6394570
Dissolved Sulphur (S)	mg/L	84	20	6394569	94	20	6394569	80	20	6394569

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Report Date: 2019/10/21

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186

RESULTS OF ANALYSES OF WATER

BV Labs ID		KZF816			KZF817		KZF818		KZF819		
Sampling Date		2019/10/03			2019/10/02		2019/10/02		2019/10/02		
COC Number		112031			112031		112031		112031		
	UNITS	GW27 Lab-Dup	RDL	QC Batch	GW30A	RDL	GW30B	RDL	GW30C	RDL	QC Batch
Calculated Parameters											
Dissolved Hardness (CaCO3)	mg/L				836	0.50	160	0.50	133	0.50	6390047
Inorganics											
pH	pH				7.00	N/A	8.10	N/A	7.51	N/A	6380957
Salinity	N/A				<2.0	2.0	<2.0	2.0	<2.0	2.0	6379715
Total Suspended Solids	mg/L	26	2.0	6380057	54	10	6.8	2.0	32	5.0	6377768
Metals											
Dissolved Aluminum (Al)	ug/L				60	10	22	10	55	10	6394571
Dissolved Antimony (Sb)	ug/L				1.44	0.50	0.63	0.50	<0.50	0.50	6394571
Dissolved Arsenic (As)	ug/L				354	0.50	3.79	0.50	1.31	0.50	6394571
Dissolved Barium (Ba)	ug/L				55.9	1.0	10.9	1.0	21.2	1.0	6394571
Dissolved Beryllium (Be)	ug/L				<1.0	1.0	<1.0	1.0	<1.0	1.0	6394571
Dissolved Bismuth (Bi)	ug/L				<1.0	1.0	<1.0	1.0	<1.0	1.0	6394571
Dissolved Boron (B)	ug/L				1160	50	391	50	389	50	6394571
Dissolved Cadmium (Cd)	ug/L				3790	0.050	0.362	0.050	0.167	0.050	6394571
Dissolved Chromium (Cr)	ug/L				2.58	0.50	<0.50	0.50	2.45	0.50	6394571
Dissolved Cobalt (Co)	ug/L				55.3	0.10	<0.10	0.10	<0.10	0.10	6394571
Dissolved Copper (Cu)	ug/L				3.95	0.50	<0.50	0.50	0.57	0.50	6394571
Dissolved Iron (Fe)	ug/L				11800	2.0	369	2.0	617	2.0	6394571
Dissolved Lead (Pb)	ug/L				6.35	0.10	1.27	0.10	3.04	0.10	6394571
Dissolved Lithium (Li)	ug/L				54	20	<20	20	<20	20	6394571
Dissolved Manganese (Mn)	ug/L				8550	0.50	79.3	0.50	229	0.50	6394571
Dissolved Molybdenum (Mo)	ug/L				4.9	1.0	7.6	1.0	2.4	1.0	6394571
Dissolved Nickel (Ni)	ug/L				29.7	0.20	1.28	0.20	2.49	0.20	6394571
Dissolved Phosphorus (P)	ug/L				<50	50	<50	50	<50	50	6394571
Dissolved Selenium (Se)	ug/L				1.06	0.50	0.83	0.50	<0.50	0.50	6394571
Dissolved Silicon (Si)	ug/L				7710	1000	<1000	1000	<1000	1000	6394571
Dissolved Silver (Ag)	ug/L				0.070	0.050	<0.050	0.050	<0.050	0.050	6394571
Dissolved Strontium (Sr)	ug/L				1440	10	1370	10	257	10	6394571
Dissolved Thallium (Tl)	ug/L				3140	0.10	0.14	0.10	0.54	0.10	6394571
Dissolved Tin (Sn)	ug/L				<1.0	1.0	<1.0	1.0	<1.0	1.0	6394571
Dissolved Titanium (Ti)	ug/L				<10	10	<10	10	<10	10	6394571
Dissolved Uranium (U)	ug/L				1.14	0.050	4.14	0.050	<0.050	0.050	6394571
Dissolved Vanadium (V)	ug/L				<10	10	<10	10	<10	10	6394571

RDL = Reportable Detection Limit
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Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

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BV Labs Job #: B9S2147
Report Date: 2019/10/21

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186

RESULTS OF ANALYSES OF WATER

BV Labs ID		KZF816			KZF817		KZF818		KZF819		
Sampling Date		2019/10/03			2019/10/02		2019/10/02		2019/10/02		
COC Number		112031			112031		112031		112031		
	UNITS	GW27 Lab-Dup	RDL	QC Batch	GW30A	RDL	GW30B	RDL	GW30C	RDL	QC Batch
Dissolved Zinc (Zn)	ug/L				18200	1.0	7.0	1.0	8.2	1.0	6394571
Dissolved Calcium (Ca)	mg/L				269	1.0	43.0	1.0	24.5	1.0	6394569
Dissolved Magnesium (Mg)	mg/L				39.9	1.0	12.9	1.0	17.3	1.0	6394569
Dissolved Potassium (K)	mg/L				48.9	1.0	2.6	1.0	14.8	1.0	6394569
Dissolved Sodium (Na)	mg/L				457	1.0	630	1.0	401	1.0	6394570
Dissolved Sulphur (S)	mg/L				335	20	224	20	146	20	6394569

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Report Date: 2019/10/21

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186

RESULTS OF ANALYSES OF WATER

BV Labs ID		KZF819			KZF820			KZF821		KZF822		
Sampling Date		2019/10/02			2019/10/01			2019/10/03		2019/10/02		
COC Number		112031			112031			112031		112031		
	UNITS	GW30C Lab-Dup	RDL	QC Batch	GW31A	RDL	QC Batch	GW31B	QC Batch	GW32	RDL	QC Batch
Calculated Parameters												
Dissolved Hardness (CaCO3)	mg/L				342	0.50	6390047	52.4	6390047	3800	0.50	6390047
Inorganics												
pH	pH				7.70	N/A	6380957	8.27	6386166	7.80	N/A	6380957
Salinity	N/A				<2.0	2.0	6379715	<2.0	6379715	16	2.0	6379715
Total Suspended Solids	mg/L	35	5.0	6377768	38	5.0	6375573	5.1	6380057	6.6	1.0	6377768
Metals												
Dissolved Aluminum (Al)	ug/L				63	10	6394571	54	6394571	59	10	6394571
Dissolved Antimony (Sb)	ug/L				<0.50	0.50	6394571	<0.50	6394571	6.15	0.50	6394571
Dissolved Arsenic (As)	ug/L				0.94	0.50	6394571	0.86	6394571	73.4	0.50	6394571
Dissolved Barium (Ba)	ug/L				248	1.0	6394571	62.1	6394571	40.7	1.0	6394571
Dissolved Beryllium (Be)	ug/L				<1.0	1.0	6394571	<1.0	6394571	<1.0	1.0	6394571
Dissolved Bismuth (Bi)	ug/L				<1.0	1.0	6394571	<1.0	6394571	<1.0	1.0	6394571
Dissolved Boron (B)	ug/L				83	50	6394571	<50	6394571	2460	50	6394571
Dissolved Cadmium (Cd)	ug/L				0.818	0.050	6394571	0.182	6394571	59.4	0.050	6394571
Dissolved Chromium (Cr)	ug/L				2.03	0.50	6394571	3.39	6394571	2.79	0.50	6394571
Dissolved Cobalt (Co)	ug/L				<0.10	0.10	6394571	<0.10	6394571	<0.10	0.10	6394571
Dissolved Copper (Cu)	ug/L				1.34	0.50	6394571	<0.50	6394571	6.54	0.50	6394571
Dissolved Iron (Fe)	ug/L				233	2.0	6394571	264	6394571	10.2	2.0	6394571
Dissolved Lead (Pb)	ug/L				5.25	0.10	6394571	2.86	6394571	49.7	0.10	6394571
Dissolved Lithium (Li)	ug/L				<20	20	6394571	<20	6394571	106	20	6394571
Dissolved Manganese (Mn)	ug/L				554	0.50	6394571	69.6	6394571	3.36	0.50	6394571
Dissolved Molybdenum (Mo)	ug/L				<1.0	1.0	6394571	<1.0	6394571	6.8	1.0	6394571
Dissolved Nickel (Ni)	ug/L				1.23	0.20	6394571	0.97	6394571	1.63	0.20	6394571
Dissolved Phosphorus (P)	ug/L				<50	50	6394571	<50	6394571	63	50	6394571
Dissolved Selenium (Se)	ug/L				<0.50	0.50	6394571	<0.50	6394571	2.32	0.50	6394571
Dissolved Silicon (Si)	ug/L				2570	1000	6394571	<1000	6394571	1520	1000	6394571
Dissolved Silver (Ag)	ug/L				<0.050	0.050	6394571	<0.050	6394571	1.10	0.050	6394571
Dissolved Strontium (Sr)	ug/L				340	10	6394571	237	6394571	5530	10	6394571
Dissolved Thallium (Tl)	ug/L				0.58	0.10	6394571	0.22	6394571	12.2	0.10	6394571
Dissolved Tin (Sn)	ug/L				<1.0	1.0	6394571	<1.0	6394571	<1.0	1.0	6394571
Dissolved Titanium (Ti)	ug/L				<10	10	6394571	<10	6394571	<10	10	6394571
Dissolved Uranium (U)	ug/L				0.321	0.050	6394571	0.547	6394571	1.72	0.050	6394571
Dissolved Vanadium (V)	ug/L				<10	10	6394571	<10	6394571	<10	10	6394571

RDL = Reportable Detection Limit
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Lab-Dup = Laboratory Initiated Duplicate
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BV Labs Job #: B9S2147
Report Date: 2019/10/21

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186

RESULTS OF ANALYSES OF WATER

BV Labs ID		KZF819			KZF820			KZF821		KZF822		
Sampling Date		2019/10/02			2019/10/01			2019/10/03		2019/10/02		
COC Number		112031			112031			112031		112031		
	UNITS	GW30C Lab-Dup	RDL	QC Batch	GW31A	RDL	QC Batch	GW31B	QC Batch	GW32	RDL	QC Batch
Dissolved Zinc (Zn)	ug/L				11.4	1.0	6394571	8.5	6394571	313	1.0	6394571
Dissolved Calcium (Ca)	mg/L				129	1.0	6394569	18.4	6394569	278	1.0	6394569
Dissolved Magnesium (Mg)	mg/L				4.7	1.0	6394569	1.6	6394569	755	1.0	6394569
Dissolved Potassium (K)	mg/L				1.4	1.0	6394569	1.1	6394569	231	1.0	6394569
Dissolved Sodium (Na)	mg/L				22.8	1.0	6394570	62.8	6394570	6170	1.0	6394570
Dissolved Sulphur (S)	mg/L				54	20	6394569	<20	6394569	586	20	6394569

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RESULTS OF ANALYSES OF WATER

BV Labs ID		KZF823			KZF823			KZF824		
Sampling Date		2019/10/02			2019/10/02			2019/10/02		
COC Number		112031			112031			112031		
	UNITS	GW34	RDL	QC Batch	GW34 Lab-Dup	RDL	QC Batch	GW42	RDL	QC Batch
Calculated Parameters										
Dissolved Hardness (CaCO3)	mg/L	930	0.50	6390047				697	0.50	6390047
Inorganics										
pH	pH	7.25	N/A	6380957				7.21	N/A	6386166
Salinity	N/A	2.9	2.0	6380124	2.9	2.0	6380124	<2.0	2.0	6380124
Total Suspended Solids	mg/L	36	5.0	6377768				480	17	6377768
Metals										
Dissolved Aluminum (Al)	ug/L	58	10	6394571				58	10	6394571
Dissolved Antimony (Sb)	ug/L	11.8	0.50	6394571				<0.50	0.50	6394571
Dissolved Arsenic (As)	ug/L	581	0.50	6394571				8.95	0.50	6394571
Dissolved Barium (Ba)	ug/L	87.2	1.0	6394571				29.3	1.0	6394571
Dissolved Beryllium (Be)	ug/L	<1.0	1.0	6394571				<1.0	1.0	6394571
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	6394571				<1.0	1.0	6394571
Dissolved Boron (B)	ug/L	1620	50	6394571				303	50	6394571
Dissolved Cadmium (Cd)	ug/L	2300	0.050	6394571				184	0.050	6394571
Dissolved Chromium (Cr)	ug/L	2.31	0.50	6394571				3.45	0.50	6394571
Dissolved Cobalt (Co)	ug/L	25.3	0.10	6394571				27.3	0.10	6394571
Dissolved Copper (Cu)	ug/L	3.30	0.50	6394571				0.79	0.50	6394571
Dissolved Iron (Fe)	ug/L	2680	2.0	6394571				12000	2.0	6394571
Dissolved Lead (Pb)	ug/L	12.9	0.10	6394571				8.98	0.10	6394571
Dissolved Lithium (Li)	ug/L	26	20	6394571				<20	20	6394571
Dissolved Manganese (Mn)	ug/L	6350	0.50	6394571				3870	0.50	6394571
Dissolved Molybdenum (Mo)	ug/L	7.2	1.0	6394571				<1.0	1.0	6394571
Dissolved Nickel (Ni)	ug/L	11.5	0.20	6394571				12.9	0.20	6394571
Dissolved Phosphorus (P)	ug/L	<50	50	6394571				<50	50	6394571
Dissolved Selenium (Se)	ug/L	3.01	0.50	6394571				0.51	0.50	6394571
Dissolved Silicon (Si)	ug/L	7830	1000	6394571				5990	1000	6394571
Dissolved Silver (Ag)	ug/L	0.056	0.050	6394571				<0.050	0.050	6394571
Dissolved Strontium (Sr)	ug/L	951	10	6394571				512	10	6394571
Dissolved Thallium (Tl)	ug/L	796	0.10	6394571				1.08	0.10	6394571
Dissolved Tin (Sn)	ug/L	<1.0	1.0	6394571				<1.0	1.0	6394571
Dissolved Titanium (Ti)	ug/L	<10	10	6394571				<10	10	6394571
Dissolved Uranium (U)	ug/L	<0.050	0.050	6394571				0.210	0.050	6394571
Dissolved Vanadium (V)	ug/L	<10	10	6394571				<10	10	6394571

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BV Labs Job #: B9S2147
Report Date: 2019/10/21

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186

RESULTS OF ANALYSES OF WATER

BV Labs ID		KZF823			KZF823			KZF824		
Sampling Date		2019/10/02			2019/10/02			2019/10/02		
COC Number		112031			112031			112031		
	UNITS	GW34	RDL	QC Batch	GW34 Lab-Dup	RDL	QC Batch	GW42	RDL	QC Batch
Dissolved Zinc (Zn)	ug/L	12900	1.0	6394571				7030	1.0	6394571
Dissolved Calcium (Ca)	mg/L	258	1.0	6394569				254	1.0	6394569
Dissolved Magnesium (Mg)	mg/L	69.5	1.0	6394569				15.3	1.0	6394569
Dissolved Potassium (K)	mg/L	90.8	1.0	6394569				7.6	1.0	6394569
Dissolved Sodium (Na)	mg/L	946	1.0	6394570				107	1.0	6394570
Dissolved Sulphur (S)	mg/L	455	20	6394569				207	20	6394569

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RESULTS OF ANALYSES OF WATER

BV Labs ID		KZF825			KZF825		KZF826		KZF827		
Sampling Date		2019/10/02			2019/10/02		2019/10/02		2019/10/02		
COC Number		112031			112031		112031		112031		
	UNITS	GW43	RDL	QC Batch	GW43 Lab-Dup	QC Batch	GW44	QC Batch	05GW49	RDL	QC Batch
Calculated Parameters											
Dissolved Hardness (CaCO3)	mg/L	266	0.50	6390047			1870	6390047	1590	0.50	6390047
Inorganics											
pH	pH	7.82	N/A	6380957	7.90	6380957	6.72	6380964	7.08	N/A	6386166
Salinity	N/A	<2.0	2.0	6380124			<2.0	6380124	<2.0	2.0	6380124
Total Suspended Solids	mg/L	48	5.0	6377768			100	6377768	510	17	6377768
Metals											
Dissolved Aluminum (Al)	ug/L	57	10	6394571			59	6394571	56	10	6394571
Dissolved Antimony (Sb)	ug/L	<0.50	0.50	6394571			5.09	6394571	<0.50	0.50	6394571
Dissolved Arsenic (As)	ug/L	1.92	0.50	6394571			111	6394571	6.94	0.50	6394571
Dissolved Barium (Ba)	ug/L	124	1.0	6394571			29.5	6394571	15.0	1.0	6394571
Dissolved Beryllium (Be)	ug/L	<1.0	1.0	6394571			<1.0	6394571	<1.0	1.0	6394571
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	6394571			<1.0	6394571	<1.0	1.0	6394571
Dissolved Boron (B)	ug/L	64	50	6394571			102	6394571	152	50	6394571
Dissolved Cadmium (Cd)	ug/L	0.972	0.050	6394571			94.5	6394571	12.1	0.050	6394571
Dissolved Chromium (Cr)	ug/L	3.10	0.50	6394571			2.93	6394571	2.52	0.50	6394571
Dissolved Cobalt (Co)	ug/L	<0.10	0.10	6394571			220	6394571	60.5	0.10	6394571
Dissolved Copper (Cu)	ug/L	0.96	0.50	6394571			7.11	6394571	0.64	0.50	6394571
Dissolved Iron (Fe)	ug/L	13.3	2.0	6394571			50100	6394571	16800	2.0	6394571
Dissolved Lead (Pb)	ug/L	4.09	0.10	6394571			145	6394571	3.39	0.10	6394571
Dissolved Lithium (Li)	ug/L	<20	20	6394571			39	6394571	22	20	6394571
Dissolved Manganese (Mn)	ug/L	12.8	0.50	6394571			4840	6394571	3200	0.50	6394571
Dissolved Molybdenum (Mo)	ug/L	<1.0	1.0	6394571			<1.0	6394571	<1.0	1.0	6394571
Dissolved Nickel (Ni)	ug/L	1.50	0.20	6394571			28.3	6394571	32.4	0.20	6394571
Dissolved Phosphorus (P)	ug/L	<50	50	6394571			<50	6394571	<50	50	6394571
Dissolved Selenium (Se)	ug/L	<0.50	0.50	6394571			1.95	6394571	<0.50	0.50	6394571
Dissolved Silicon (Si)	ug/L	3150	1000	6394571			8120	6394571	5340	1000	6394571
Dissolved Silver (Ag)	ug/L	<0.050	0.050	6394571			0.054	6394571	<0.050	0.050	6394571
Dissolved Strontium (Sr)	ug/L	250	10	6394571			5390	6394571	500	10	6394571
Dissolved Thallium (Tl)	ug/L	20.2	0.10	6394571			19.7	6394571	1.00	0.10	6394571
Dissolved Tin (Sn)	ug/L	1.7	1.0	6394571			<1.0	6394571	<1.0	1.0	6394571
Dissolved Titanium (Ti)	ug/L	<10	10	6394571			<10	6394571	<10	10	6394571
Dissolved Uranium (U)	ug/L	0.438	0.050	6394571			5.36	6394571	2.25	0.050	6394571
Dissolved Vanadium (V)	ug/L	<10	10	6394571			<10	6394571	<10	10	6394571

RDL = Reportable Detection Limit
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Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

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BV Labs Job #: B9S2147
Report Date: 2019/10/21

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186

RESULTS OF ANALYSES OF WATER

BV Labs ID		KZF825			KZF825		KZF826		KZF827		
Sampling Date		2019/10/02			2019/10/02		2019/10/02		2019/10/02		
COC Number		112031			112031		112031		112031		
	UNITS	GW43	RDL	QC Batch	GW43 Lab-Dup	QC Batch	GW44	QC Batch	05GW49	RDL	QC Batch
Dissolved Zinc (Zn)	ug/L	68.9	1.0	6394571			33700	6394571	6410	1.0	6394571
Dissolved Calcium (Ca)	mg/L	96.0	1.0	6394569			623	6394569	604	1.0	6394569
Dissolved Magnesium (Mg)	mg/L	6.3	1.0	6394569			75.4	6394569	19.9	1.0	6394569
Dissolved Potassium (K)	mg/L	4.9	1.0	6394569			3.5	6394569	3.3	1.0	6394569
Dissolved Sodium (Na)	mg/L	61.8	1.0	6394570			55.8	6394570	47.9	1.0	6394570
Dissolved Sulphur (S)	mg/L	<20	20	6394569			552	6394569	492	20	6394569

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BV Labs Job #: B9S2147
Report Date: 2019/10/21

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186

RESULTS OF ANALYSES OF WATER

BV Labs ID		KZF828			KZF828			KZF829		
Sampling Date		2019/10/01			2019/10/01			2019/10/01		
COC Number		112031			112031			112031		
	UNITS	05GW52	RDL	QC Batch	05GW52 Lab-Dup	RDL	QC Batch	05GW53	RDL	QC Batch
Calculated Parameters										
Dissolved Hardness (CaCO3)	mg/L	297	0.50	6390047				363	0.50	6390047
Inorganics										
pH	pH	7.80	N/A	6386166				7.77	N/A	6380964
Salinity	N/A	<2.0	2.0	6380124				<2.0	2.0	6380124
Total Suspended Solids	mg/L	88	5.0	6375573				27	2.0	6375573
Metals										
Dissolved Aluminum (Al)	ug/L	57	10	6394572	58	10	6394572	55	10	6394572
Dissolved Antimony (Sb)	ug/L	0.83	0.50	6394572	0.69	0.50	6394572	6.15	0.50	6394572
Dissolved Arsenic (As)	ug/L	8.86	0.50	6394572	8.95	0.50	6394572	0.91	0.50	6394572
Dissolved Barium (Ba)	ug/L	153	1.0	6394572	154	1.0	6394572	54.9	1.0	6394572
Dissolved Beryllium (Be)	ug/L	<1.0	1.0	6394572	<1.0	1.0	6394572	<1.0	1.0	6394572
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	6394572	<1.0	1.0	6394572	<1.0	1.0	6394572
Dissolved Boron (B)	ug/L	<50	50	6394572	<50	50	6394572	58	50	6394572
Dissolved Cadmium (Cd)	ug/L	0.054	0.050	6394572	0.058	0.050	6394572	0.130	0.050	6394572
Dissolved Chromium (Cr)	ug/L	2.47	0.50	6394572	2.99	0.50	6394572	2.37	0.50	6394572
Dissolved Cobalt (Co)	ug/L	0.33	0.10	6394572	0.35	0.10	6394572	<0.10	0.10	6394572
Dissolved Copper (Cu)	ug/L	0.65	0.50	6394572	0.56	0.50	6394572	1.19	0.50	6394572
Dissolved Iron (Fe)	ug/L	136	2.0	6394572	140	2.0	6394572	9.3	2.0	6394572
Dissolved Lead (Pb)	ug/L	0.79	0.10	6394572	0.76	0.10	6394572	2.61	0.10	6394572
Dissolved Lithium (Li)	ug/L	<20	20	6394572	<20	20	6394572	<20	20	6394572
Dissolved Manganese (Mn)	ug/L	1700	0.50	6394572	1730	0.50	6394572	7.39	0.50	6394572
Dissolved Molybdenum (Mo)	ug/L	4.2	1.0	6394572	4.2	1.0	6394572	1.7	1.0	6394572
Dissolved Nickel (Ni)	ug/L	1.70	0.20	6394572	1.62	0.20	6394572	1.03	0.20	6394572
Dissolved Phosphorus (P)	ug/L	<50	50	6394572	<50	50	6394572	<50	50	6394572
Dissolved Selenium (Se)	ug/L	<0.50	0.50	6394572	<0.50	0.50	6394572	5.21	0.50	6394572
Dissolved Silicon (Si)	ug/L	4840	1000	6394572	4690	1000	6394572	4830	1000	6394572
Dissolved Silver (Ag)	ug/L	<0.050	0.050	6394572	<0.050	0.050	6394572	<0.050	0.050	6394572
Dissolved Strontium (Sr)	ug/L	872	10	6394572	867	10	6394572	727	10	6394572
Dissolved Thallium (Tl)	ug/L	0.10	0.10	6394572	0.11	0.10	6394572	0.24	0.10	6394572
Dissolved Tin (Sn)	ug/L	<1.0	1.0	6394572	<1.0	1.0	6394572	<1.0	1.0	6394572
Dissolved Titanium (Ti)	ug/L	<10	10	6394572	<10	10	6394572	<10	10	6394572
Dissolved Uranium (U)	ug/L	2.52	0.050	6394572	2.52	0.050	6394572	0.176	0.050	6394572
Dissolved Vanadium (V)	ug/L	<10	10	6394572	<10	10	6394572	<10	10	6394572

RDL = Reportable Detection Limit
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BV Labs Job #: B9S2147
Report Date: 2019/10/21

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186

RESULTS OF ANALYSES OF WATER

BV Labs ID		KZF828			KZF828			KZF829		
Sampling Date		2019/10/01			2019/10/01			2019/10/01		
COC Number		112031			112031			112031		
	UNITS	05GW52	RDL	QC Batch	05GW52 Lab-Dup	RDL	QC Batch	05GW53	RDL	QC Batch
Dissolved Zinc (Zn)	ug/L	8.4	1.0	6394572	7.5	1.0	6394572	8.4	1.0	6394572
Dissolved Calcium (Ca)	mg/L	106	1.0	6394569				134	1.0	6394569
Dissolved Magnesium (Mg)	mg/L	8.2	1.0	6394569				7.2	1.0	6394569
Dissolved Potassium (K)	mg/L	5.9	1.0	6394569				8.7	1.0	6394569
Dissolved Sodium (Na)	mg/L	19.6	1.0	6394570				10.3	1.0	6394573
Dissolved Sulphur (S)	mg/L	36	20	6394569				39	20	6394569

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RESULTS OF ANALYSES OF WATER

BV Labs ID		KZF829			KZF830			KZF831		
Sampling Date		2019/10/01			2019/10/02			2019/10/02		
COC Number		112031			112031			112031		
	UNITS	05GW53 Lab-Dup	RDL	QC Batch	05GW54	RDL	QC Batch	05GW59	RDL	QC Batch
Calculated Parameters										
Dissolved Hardness (CaCO3)	mg/L				257	0.50	6390047	3950	0.50	6390047
Inorganics										
pH	pH	7.86	N/A	6380964	7.42	N/A	6386166	7.67	N/A	6380964
Salinity	N/A				<2.0	2.0	6380124	21	2.0	6380124
Total Suspended Solids	mg/L				140	10	6377768	38	2.0	6377768
Metals										
Dissolved Aluminum (Al)	ug/L				59	10	6394572	57	10	6394572
Dissolved Antimony (Sb)	ug/L				0.71	0.50	6394572	5.10	0.50	6394572
Dissolved Arsenic (As)	ug/L				4.42	0.50	6394572	40.8	0.50	6394572
Dissolved Barium (Ba)	ug/L				40.9	1.0	6394572	56.7	1.0	6394572
Dissolved Beryllium (Be)	ug/L				<1.0	1.0	6394572	<1.0	1.0	6394572
Dissolved Bismuth (Bi)	ug/L				<1.0	1.0	6394572	<1.0	1.0	6394572
Dissolved Boron (B)	ug/L				216	50	6394572	2460	50	6394572
Dissolved Cadmium (Cd)	ug/L				39.3	0.050	6394572	50.4	0.050	6394572
Dissolved Chromium (Cr)	ug/L				3.31	0.50	6394572	3.21	0.50	6394572
Dissolved Cobalt (Co)	ug/L				0.47	0.10	6394572	<0.10	0.10	6394572
Dissolved Copper (Cu)	ug/L				8.33	0.50	6394572	2.71	0.50	6394572
Dissolved Iron (Fe)	ug/L				35.9	2.0	6394572	9.0	2.0	6394572
Dissolved Lead (Pb)	ug/L				28.9	0.10	6394572	1.78	0.10	6394572
Dissolved Lithium (Li)	ug/L				<20	20	6394572	102	20	6394572
Dissolved Manganese (Mn)	ug/L				605	0.50	6394572	<0.50	0.50	6394572
Dissolved Molybdenum (Mo)	ug/L				3.3	1.0	6394572	7.0	1.0	6394572
Dissolved Nickel (Ni)	ug/L				1.71	0.20	6394572	1.55	0.20	6394572
Dissolved Phosphorus (P)	ug/L				<50	50	6394572	<50	50	6394572
Dissolved Selenium (Se)	ug/L				<0.50	0.50	6394572	1.39	0.50	6394572
Dissolved Silicon (Si)	ug/L				8100	1000	6394572	1190	1000	6394572
Dissolved Silver (Ag)	ug/L				<0.050	0.050	6394572	0.903	0.050	6394572
Dissolved Strontium (Sr)	ug/L				231	10	6394572	5500	10	6394572
Dissolved Thallium (Tl)	ug/L				7.74	0.10	6394572	15.8	0.10	6394572
Dissolved Tin (Sn)	ug/L				<1.0	1.0	6394572	<1.0	1.0	6394572
Dissolved Titanium (Ti)	ug/L				<10	10	6394572	<10	10	6394572
Dissolved Uranium (U)	ug/L				0.263	0.050	6394572	2.04	0.050	6394572
Dissolved Vanadium (V)	ug/L				<10	10	6394572	<10	10	6394572

RDL = Reportable Detection Limit
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N/A = Not Applicable

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BV Labs Job #: B9S2147
Report Date: 2019/10/21

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186

RESULTS OF ANALYSES OF WATER

BV Labs ID		KZF829			KZF830			KZF831		
Sampling Date		2019/10/01			2019/10/02			2019/10/02		
COC Number		112031			112031			112031		
	UNITS	05GW53 Lab-Dup	RDL	QC Batch	05GW54	RDL	QC Batch	05GW59	RDL	QC Batch
Dissolved Zinc (Zn)	ug/L				875	1.0	6394572	192	1.0	6394572
Dissolved Calcium (Ca)	mg/L				81.7	1.0	6394569	284	1.0	6394569
Dissolved Magnesium (Mg)	mg/L				12.9	1.0	6394569	787	1.0	6394569
Dissolved Potassium (K)	mg/L				11.6	1.0	6394569	234	1.0	6394569
Dissolved Sodium (Na)	mg/L	10.1	1.0	6394573	63.6	1.0	6394573	6310	1.0	6394573
Dissolved Sulphur (S)	mg/L				59	20	6394569	598	20	6394569

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Report Date: 2019/10/21

GHD Limited
Client Project #: 11198639-04
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RESULTS OF ANALYSES OF WATER

BV Labs ID		KZF832			KZF833	KZF834			KZF835		
Sampling Date		2019/10/03			2019/10/02	2019/10/02			2019/10/02		
COC Number		112031			112031	112031			112031		
	UNITS	**05GW68**	**RDL**	**QC Batch**	**05GW70**	**05GW71**	**RDL**	**QC Batch**	**05GW72**	**RDL**	**QC Batch**
Calculated Parameters											
Dissolved Hardness (CaCO3)	mg/L	201	0.50	6390047	299	327	0.50	6390047	216	0.50	6390047
Inorganics											
pH	pH	7.73	N/A	6386166	7.69	7.45	N/A	6386166	7.75	N/A	6380957
Salinity	N/A	<2.0	2.0	6380124	<2.0	<2.0	2.0	6380124	<2.0	2.0	6380124
Total Suspended Solids	mg/L	270	10	6380057	350	680	17	6377768	11	1.0	6377768
Metals											
Dissolved Aluminum (Al)	ug/L	57	10	6394572	57	64	10	6394572	59	10	6394572
Dissolved Antimony (Sb)	ug/L	<0.50	0.50	6394572	2.90	0.68	0.50	6394572	<0.50	0.50	6394572
Dissolved Arsenic (As)	ug/L	1.60	0.50	6394572	577	148	0.50	6394572	88.2	0.50	6394572
Dissolved Barium (Ba)	ug/L	130	1.0	6394572	220	219	1.0	6394572	83.1	1.0	6394572
Dissolved Beryllium (Be)	ug/L	<1.0	1.0	6394572	<1.0	<1.0	1.0	6394572	<1.0	1.0	6394572
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	6394572	<1.0	<1.0	1.0	6394572	<1.0	1.0	6394572
Dissolved Boron (B)	ug/L	<50	50	6394572	600	2710	50	6394572	6230	50	6394572
Dissolved Cadmium (Cd)	ug/L	1.61	0.050	6394572	8.84	0.219	0.050	6394572	0.493	0.050	6394572
Dissolved Chromium (Cr)	ug/L	2.71	0.50	6394572	3.68	3.83	0.50	6394572	3.42	0.50	6394572
Dissolved Cobalt (Co)	ug/L	0.13	0.10	6394572	1.45	<0.10	0.10	6394572	<0.10	0.10	6394572
Dissolved Copper (Cu)	ug/L	2.86	0.50	6394572	2.60	0.62	0.50	6394572	<0.50	0.50	6394572
Dissolved Iron (Fe)	ug/L	13.2	2.0	6394572	3680	1160	2.0	6394572	344	2.0	6394572
Dissolved Lead (Pb)	ug/L	9.92	0.10	6394572	12.3	2.97	0.10	6394572	0.85	0.10	6394572
Dissolved Lithium (Li)	ug/L	<20	20	6394572	<20	<20	20	6394572	<20	20	6394572
Dissolved Manganese (Mn)	ug/L	17.6	0.50	6394572	5010	2360	0.50	6394572	726	0.50	6394572
Dissolved Molybdenum (Mo)	ug/L	<1.0	1.0	6394572	1.4	<1.0	1.0	6394572	<1.0	1.0	6394572
Dissolved Nickel (Ni)	ug/L	0.95	0.20	6394572	2.89	1.57	0.20	6394572	1.26	0.20	6394572
Dissolved Phosphorus (P)	ug/L	<50	50	6394572	<50	75	50	6394572	80	50	6394572
Dissolved Selenium (Se)	ug/L	<0.50	0.50	6394572	1.88	<0.50	0.50	6394572	0.53	0.50	6394572
Dissolved Silicon (Si)	ug/L	3390	1000	6394572	11200	8930	1000	6394572	5840	1000	6394572
Dissolved Silver (Ag)	ug/L	<0.050	0.050	6394572	<0.050	<0.050	0.050	6394572	<0.050	0.050	6394572
Dissolved Strontium (Sr)	ug/L	113	10	6394572	257	301	10	6394572	195	10	6394572
Dissolved Thallium (Tl)	ug/L	0.65	0.10	6394572	3.95	0.16	0.10	6394572	<0.10	0.10	6394572
Dissolved Tin (Sn)	ug/L	<1.0	1.0	6394572	<1.0	<1.0	1.0	6394572	<1.0	1.0	6394572
Dissolved Titanium (Ti)	ug/L	<10	10	6394572	<10	<10	10	6394572	<10	10	6394572
Dissolved Uranium (U)	ug/L	0.191	0.050	6394572	0.408	0.107	0.050	6394572	0.106	0.050	6394572
Dissolved Vanadium (V)	ug/L	<10	10	6394572	<10	<10	10	6394572	<10	10	6394572
Dissolved Zinc (Zn)	ug/L	19.4	1.0	6394572	189	9.2	1.0	6394572	13.6	1.0	6394572

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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BV Labs Job #: B9S2147
Report Date: 2019/10/21

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186

RESULTS OF ANALYSES OF WATER

BV Labs ID		KZF832			KZF833	KZF834			KZF835		
Sampling Date		2019/10/03			2019/10/02	2019/10/02			2019/10/02		
COC Number		112031			112031	112031			112031		
	UNITS	05GW68	RDL	QC Batch	05GW70	05GW71	RDL	QC Batch	05GW72	RDL	QC Batch
Dissolved Calcium (Ca)	mg/L	75.3	1.0	6394569	108	113	1.0	6394569	77.7	1.0	6394569
Dissolved Magnesium (Mg)	mg/L	3.1	1.0	6394569	7.3	10.6	1.0	6394569	5.4	1.0	6394569
Dissolved Potassium (K)	mg/L	4.6	1.0	6394569	6.5	23.0	1.0	6394569	36.8	1.0	6394569
Dissolved Sodium (Na)	mg/L	34.9	1.0	6394573	74.3	192	1.0	6394573	175	1.0	6394573
Dissolved Sulphur (S)	mg/L	<20	20	6394569	30	<20	20	6394569	74	20	6394569

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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BV Labs Job #: B9S2147
Report Date: 2019/10/21

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186

RESULTS OF ANALYSES OF WATER

BV Labs ID		KZF836			KZF837			KZF838		
Sampling Date		2019/10/02			2019/10/01			2019/10/02		
COC Number		112031			112031			112031		
	UNITS	05GW76	RDL	QC Batch	05GW77	RDL	QC Batch	09GW-109	RDL	QC Batch
Calculated Parameters										
Dissolved Hardness (CaCO3)	mg/L	325	0.50	6390047	180	0.50	6390047	176	0.50	6390047
Inorganics										
pH	pH	7.61	N/A	6380957	7.82	N/A	6380964	7.66	N/A	6380957
Salinity	N/A	<2.0	2.0	6380124	<2.0	2.0	6380124	<2.0	2.0	6380124
Total Suspended Solids	mg/L	220	10	6377768	3200	100	6375573	100	5.0	6377768
Metals										
Dissolved Aluminum (Al)	ug/L	86	10	6394572	54	10	6394572	60	10	6394572
Dissolved Antimony (Sb)	ug/L	2.65	0.50	6394572	<0.50	0.50	6394572	14.6	0.50	6394572
Dissolved Arsenic (As)	ug/L	7.49	0.50	6394572	1.03	0.50	6394572	7.48	0.50	6394572
Dissolved Barium (Ba)	ug/L	162	1.0	6394572	207	1.0	6394572	167	1.0	6394572
Dissolved Beryllium (Be)	ug/L	<1.0	1.0	6394572	<1.0	1.0	6394572	<1.0	1.0	6394572
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	6394572	<1.0	1.0	6394572	<1.0	1.0	6394572
Dissolved Boron (B)	ug/L	117	50	6394572	<50	50	6394572	<50	50	6394572
Dissolved Cadmium (Cd)	ug/L	0.539	0.050	6394572	1.11	0.050	6394572	25.1	0.050	6394572
Dissolved Chromium (Cr)	ug/L	2.24	0.50	6394572	3.20	0.50	6394572	1.92	0.50	6394572
Dissolved Cobalt (Co)	ug/L	0.29	0.10	6394572	0.10	0.10	6394572	0.88	0.10	6394572
Dissolved Copper (Cu)	ug/L	1.72	0.50	6394572	1.21	0.50	6394572	14.0	0.50	6394572
Dissolved Iron (Fe)	ug/L	399	2.0	6394572	21.4	2.0	6394572	8.2	2.0	6394572
Dissolved Lead (Pb)	ug/L	3.19	0.10	6394572	4.65	0.10	6394572	153	0.10	6394572
Dissolved Lithium (Li)	ug/L	<20	20	6394572	<20	20	6394572	<20	20	6394572
Dissolved Manganese (Mn)	ug/L	71.9	0.50	6394572	73.4	0.50	6394572	944	0.50	6394572
Dissolved Molybdenum (Mo)	ug/L	<1.0	1.0	6394572	<1.0	1.0	6394572	<1.0	1.0	6394572
Dissolved Nickel (Ni)	ug/L	1.69	0.20	6394572	0.83	0.20	6394572	1.84	0.20	6394572
Dissolved Phosphorus (P)	ug/L	<50	50	6394572	98	50	6394572	<50	50	6394572
Dissolved Selenium (Se)	ug/L	<0.50	0.50	6394572	<0.50	0.50	6394572	1.77	0.50	6394572
Dissolved Silicon (Si)	ug/L	1830	1000	6394572	2450	1000	6394572	3720	1000	6394572
Dissolved Silver (Ag)	ug/L	<0.050	0.050	6394572	<0.050	0.050	6394572	<0.050	0.050	6394572
Dissolved Strontium (Sr)	ug/L	180	10	6394572	97	10	6394572	111	10	6394572
Dissolved Thallium (Tl)	ug/L	0.48	0.10	6394572	0.29	0.10	6394572	10.5	0.10	6394572
Dissolved Tin (Sn)	ug/L	<1.0	1.0	6394572	<1.0	1.0	6394572	<1.0	1.0	6394572
Dissolved Titanium (Ti)	ug/L	<10	10	6394572	<10	10	6394572	<10	10	6394572
Dissolved Uranium (U)	ug/L	0.294	0.050	6394572	0.197	0.050	6394572	0.631	0.050	6394572
Dissolved Vanadium (V)	ug/L	<10	10	6394572	<10	10	6394572	<10	10	6394572
Dissolved Zinc (Zn)	ug/L	19.3	1.0	6394572	9.3	1.0	6394572	55.1	1.0	6394572

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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BV Labs Job #: B9S2147
Report Date: 2019/10/21

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186

RESULTS OF ANALYSES OF WATER

BV Labs ID		KZF836			KZF837			KZF838		
Sampling Date		2019/10/02			2019/10/01			2019/10/02		
COC Number		112031			112031			112031		
	UNITS	05GW76	RDL	QC Batch	05GW77	RDL	QC Batch	09GW-109	RDL	QC Batch
Dissolved Calcium (Ca)	mg/L	113	1.0	6394569	69.8	1.0	6394569	65.6	1.0	6394569
Dissolved Magnesium (Mg)	mg/L	10.6	1.0	6394569	1.5	1.0	6394569	2.8	1.0	6394569
Dissolved Potassium (K)	mg/L	<1.0	1.0	6394569	1.2	1.0	6394569	4.0	1.0	6394569
Dissolved Sodium (Na)	mg/L	19.4	1.0	6394573	35.3	1.0	6394573	125	1.0	6394573
Dissolved Sulphur (S)	mg/L	<20	20	6394569	<20	20	6394569	<20	20	6394569

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Report Date: 2019/10/21

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186

RESULTS OF ANALYSES OF WATER

BV Labs ID		KZF839			KZF839			KZF840		
Sampling Date		2019/10/02			2019/10/02			2019/10/01		
COC Number		112031			112031			112031		
	UNITS	09GW-110	RDL	QC Batch	09GW-110 Lab-Dup	RDL	QC Batch	09GW-111	RDL	QC Batch
Calculated Parameters										
Dissolved Hardness (CaCO3)	mg/L	185	0.50	6390047				127	0.50	6390047
Inorganics										
pH	pH	7.47	N/A	6386166				7.37	N/A	6386185
Salinity	N/A	<2.0	2.0	6382103	<2.0	2.0	6382103	<2.0	2.0	6382103
Total Suspended Solids	mg/L	150	5.0	6377768				190	5.0	6375573
Metals										
Dissolved Aluminum (Al)	ug/L	54	10	6394572				55	10	6394572
Dissolved Antimony (Sb)	ug/L	35.9	0.50	6394572				0.97	0.50	6394572
Dissolved Arsenic (As)	ug/L	22.8	0.50	6394572				0.64	0.50	6394572
Dissolved Barium (Ba)	ug/L	145	1.0	6394572				151	1.0	6394572
Dissolved Beryllium (Be)	ug/L	<1.0	1.0	6394572				<1.0	1.0	6394572
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	6394572				<1.0	1.0	6394572
Dissolved Boron (B)	ug/L	185	50	6394572				<50	50	6394572
Dissolved Cadmium (Cd)	ug/L	104	0.050	6394572				1.01	0.050	6394572
Dissolved Chromium (Cr)	ug/L	2.51	0.50	6394572				2.65	0.50	6394572
Dissolved Cobalt (Co)	ug/L	0.80	0.10	6394572				<0.10	0.10	6394572
Dissolved Copper (Cu)	ug/L	66.1	0.50	6394572				2.29	0.50	6394572
Dissolved Iron (Fe)	ug/L	64.6	2.0	6394572				9.6	2.0	6394572
Dissolved Lead (Pb)	ug/L	113	0.10	6394572				12.2	0.10	6394572
Dissolved Lithium (Li)	ug/L	<20	20	6394572				<20	20	6394572
Dissolved Manganese (Mn)	ug/L	280	0.50	6394572				1.68	0.50	6394572
Dissolved Molybdenum (Mo)	ug/L	1.8	1.0	6394572				<1.0	1.0	6394572
Dissolved Nickel (Ni)	ug/L	2.02	0.20	6394572				1.12	0.20	6394572
Dissolved Phosphorus (P)	ug/L	<50	50	6394572				<50	50	6394572
Dissolved Selenium (Se)	ug/L	8.39	0.50	6394572				0.65	0.50	6394572
Dissolved Silicon (Si)	ug/L	5690	1000	6394572				2970	1000	6394572
Dissolved Silver (Ag)	ug/L	<0.050	0.050	6394572				<0.050	0.050	6394572
Dissolved Strontium (Sr)	ug/L	106	10	6394572				95	10	6394572
Dissolved Thallium (Tl)	ug/L	15.2	0.10	6394572				0.23	0.10	6394572
Dissolved Tin (Sn)	ug/L	<1.0	1.0	6394572				<1.0	1.0	6394572
Dissolved Titanium (Ti)	ug/L	<10	10	6394572				<10	10	6394572
Dissolved Uranium (U)	ug/L	0.190	0.050	6394572				0.321	0.050	6394572
Dissolved Vanadium (V)	ug/L	<10	10	6394572				<10	10	6394572

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

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BV Labs Job #: B9S2147
Report Date: 2019/10/21

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186

RESULTS OF ANALYSES OF WATER

BV Labs ID		KZF839			KZF839			KZF840		
Sampling Date		2019/10/02			2019/10/02			2019/10/01		
COC Number		112031			112031			112031		
	UNITS	09GW-110	RDL	QC Batch	09GW-110 Lab-Dup	RDL	QC Batch	09GW-111	RDL	QC Batch
Dissolved Zinc (Zn)	ug/L	2560	1.0	6394572				31.6	1.0	6394572
Dissolved Calcium (Ca)	mg/L	69.7	1.0	6394569				47.1	1.0	6394569
Dissolved Magnesium (Mg)	mg/L	2.7	1.0	6394569				2.2	1.0	6394569
Dissolved Potassium (K)	mg/L	3.1	1.0	6394569				1.1	1.0	6394569
Dissolved Sodium (Na)	mg/L	84.9	1.0	6394573				17.2	1.0	6394573
Dissolved Sulphur (S)	mg/L	34	20	6394569				<20	20	6394569

RDL = Reportable Detection Limit
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BV Labs Job #: B9S2147
Report Date: 2019/10/21

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186

RESULTS OF ANALYSES OF WATER

BV Labs ID		KZF841			KZF841			KZF842		KZF843		
Sampling Date		2019/10/01			2019/10/01			2019/10/02		2019/10/02		
COC Number		112031			112031			112031		112031		
	UNITS	09GW-112	RDL	QC Batch	09GW-112 Lab-Dup	RDL	QC Batch	19GW-125	RDL	19GW-126	RDL	QC Batch
Calculated Parameters												
Dissolved Hardness (CaCO3)	mg/L	273	0.50	6390047				377	0.50	347	0.50	6390047
Inorganics												
pH	pH	6.99	N/A	6380957				7.66	N/A	7.55	N/A	6380957
Salinity	N/A	<2.0	2.0	6382103				<2.0	2.0	<2.0	2.0	6382103
Total Suspended Solids	mg/L	160	10	6375795	180	10	6375795	460	10	610	17	6377768
Metals												
Dissolved Aluminum (Al)	ug/L	55	10	6394572				53	10	57	10	6394572
Dissolved Antimony (Sb)	ug/L	0.71	0.50	6394572				20.9	0.50	0.96	0.50	6394572
Dissolved Arsenic (As)	ug/L	4.63	0.50	6394572				26.8	0.50	7.10	0.50	6394572
Dissolved Barium (Ba)	ug/L	171	1.0	6394572				113	1.0	83.4	1.0	6394572
Dissolved Beryllium (Be)	ug/L	<1.0	1.0	6394572				<1.0	1.0	<1.0	1.0	6394572
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	6394572				<1.0	1.0	<1.0	1.0	6394572
Dissolved Boron (B)	ug/L	60	50	6394572				703	50	295	50	6394572
Dissolved Cadmium (Cd)	ug/L	0.475	0.050	6394572				1550	0.050	0.160	0.050	6394572
Dissolved Chromium (Cr)	ug/L	2.74	0.50	6394572				2.17	0.50	3.18	0.50	6394572
Dissolved Cobalt (Co)	ug/L	0.17	0.10	6394572				22.3	0.10	0.53	0.10	6394572
Dissolved Copper (Cu)	ug/L	2.18	0.50	6394572				7.94	0.50	<0.50	0.50	6394572
Dissolved Iron (Fe)	ug/L	170	2.0	6394572				118	2.0	3090	2.0	6394572
Dissolved Lead (Pb)	ug/L	8.02	0.10	6394572				237	0.10	0.31	0.10	6394572
Dissolved Lithium (Li)	ug/L	<20	20	6394572				<20	20	<20	20	6394572
Dissolved Manganese (Mn)	ug/L	88.3	0.50	6394572				272	0.50	3040	0.50	6394572
Dissolved Molybdenum (Mo)	ug/L	<1.0	1.0	6394572				8.3	1.0	<1.0	1.0	6394572
Dissolved Nickel (Ni)	ug/L	1.08	0.20	6394572				58.0	0.20	1.14	0.20	6394572
Dissolved Phosphorus (P)	ug/L	<50	50	6394572				<50	50	<50	50	6394572
Dissolved Selenium (Se)	ug/L	<0.50	0.50	6394572				3.02	0.50	<0.50	0.50	6394572
Dissolved Silicon (Si)	ug/L	2880	1000	6394572				4290	1000	3140	1000	6394572
Dissolved Silver (Ag)	ug/L	<0.050	0.050	6394572				<0.050	0.050	<0.050	0.050	6394572
Dissolved Strontium (Sr)	ug/L	182	10	6394572				410	10	352	10	6394572
Dissolved Thallium (Tl)	ug/L	7.19	0.10	6394572				1130	0.10	1.81	0.10	6394572
Dissolved Tin (Sn)	ug/L	<1.0	1.0	6394572				<1.0	1.0	<1.0	1.0	6394572
Dissolved Titanium (Ti)	ug/L	<10	10	6394572				<10	10	<10	10	6394572
Dissolved Uranium (U)	ug/L	0.189	0.050	6394572				0.131	0.050	0.064	0.050	6394572
Dissolved Vanadium (V)	ug/L	<10	10	6394572				<10	10	<10	10	6394572

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

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BV Labs Job #: B9S2147
Report Date: 2019/10/21

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186

RESULTS OF ANALYSES OF WATER

BV Labs ID		KZF841			KZF841			KZF842		KZF843		
Sampling Date		2019/10/01			2019/10/01			2019/10/02		2019/10/02		
COC Number		112031			112031			112031		112031		
	UNITS	09GW-112	RDL	QC Batch	09GW-112 Lab-Dup	RDL	QC Batch	19GW-125	RDL	19GW-126	RDL	QC Batch
Dissolved Zinc (Zn)	ug/L	42.4	1.0	6394572				6420	1.0	24.2	1.0	6394572
Dissolved Calcium (Ca)	mg/L	103	1.0	6394569				94.9	1.0	89.0	1.0	6394569
Dissolved Magnesium (Mg)	mg/L	3.8	1.0	6394569				34.0	1.0	30.2	1.0	6394569
Dissolved Potassium (K)	mg/L	1.3	1.0	6394569				26.5	1.0	16.9	1.0	6394569
Dissolved Sodium (Na)	mg/L	8.8	1.0	6394573				284	1.0	134	1.0	6394573
Dissolved Sulphur (S)	mg/L	42	20	6394569				99	20	54	20	6394569

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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Report Date: 2019/10/21

GHD Limited
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Site Location: Glencore
Your P.O. #: 73517186

RESULTS OF ANALYSES OF WATER

BV Labs ID		KZF844			KZF845			KZF846		
Sampling Date		2019/10/02			2019/10/02			2019/10/02		
COC Number		112031			112031			112031		
	UNITS	19GW-127	RDL	QC Batch	19GW-128	RDL	QC Batch	19GW-129	RDL	QC Batch
Calculated Parameters										
Dissolved Hardness (CaCO3)	mg/L	630	0.50	6390047	350	0.50	6390047	2750	0.50	6390047
Inorganics										
pH	pH	8.49	N/A	6380964	7.89	N/A	6386166	7.07	N/A	6380964
Salinity	N/A	2.3	2.0	6382103	<2.0	2.0	6382103	11	2.0	6382103
Total Suspended Solids	mg/L	2200	50	6377768	9.6	2.0	6378021	490	10	6378021
Metals										
Dissolved Aluminum (Al)	ug/L	73	10	6394572	75	10	6394572	57	10	6394572
Dissolved Antimony (Sb)	ug/L	950	0.50	6394572	34.2	0.50	6394572	4.46	0.50	6394572
Dissolved Arsenic (As)	ug/L	338	0.50	6394572	770	0.50	6394572	3940	0.50	6394572
Dissolved Barium (Ba)	ug/L	46.0	1.0	6394572	50.6	1.0	6394572	40.6	1.0	6394572
Dissolved Beryllium (Be)	ug/L	<1.0	1.0	6394572	<1.0	1.0	6394572	<1.0	1.0	6394572
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	6394572	<1.0	1.0	6394572	<1.0	1.0	6394572
Dissolved Boron (B)	ug/L	1860	50	6394572	861	50	6394572	2670	50	6394572
Dissolved Cadmium (Cd)	ug/L	29.0	0.050	6394572	60.2	0.050	6394572	560	0.050	6394572
Dissolved Chromium (Cr)	ug/L	3.29	0.50	6394572	3.05	0.50	6394572	3.04	0.50	6394572
Dissolved Cobalt (Co)	ug/L	0.34	0.10	6394572	0.34	0.10	6394572	17.7	0.10	6394572
Dissolved Copper (Cu)	ug/L	11.4	0.50	6394572	6.92	0.50	6394572	0.66	0.50	6394572
Dissolved Iron (Fe)	ug/L	10.1	2.0	6394572	15.5	2.0	6394572	19800	2.0	6394572
Dissolved Lead (Pb)	ug/L	78.0	0.10	6394572	129	0.10	6394572	29.6	0.10	6394572
Dissolved Lithium (Li)	ug/L	<20	20	6394572	<20	20	6394572	<20	20	6394572
Dissolved Manganese (Mn)	ug/L	327	0.50	6394572	596	0.50	6394572	11100	0.50	6394572
Dissolved Molybdenum (Mo)	ug/L	19.5	1.0	6394572	9.7	1.0	6394572	34.6	1.0	6394572
Dissolved Nickel (Ni)	ug/L	1.44	0.20	6394572	2.19	0.20	6394572	14.0	0.20	6394572
Dissolved Phosphorus (P)	ug/L	<50	50	6394572	<50	50	6394572	<50	50	6394572
Dissolved Selenium (Se)	ug/L	168	0.50	6394572	26.2	0.50	6394572	6.54	0.50	6394572
Dissolved Silicon (Si)	ug/L	2690	1000	6394572	2720	1000	6394572	5680	1000	6394572
Dissolved Silver (Ag)	ug/L	<0.050	0.050	6394572	<0.050	0.050	6394572	<0.050	0.050	6394572
Dissolved Strontium (Sr)	ug/L	770	10	6394572	436	10	6394572	2570	10	6394572
Dissolved Thallium (Tl)	ug/L	328	0.10	6394572	70.1	0.10	6394572	1540	0.10	6394572
Dissolved Tin (Sn)	ug/L	<1.0	1.0	6394572	2.8	1.0	6394572	<1.0	1.0	6394572
Dissolved Titanium (Ti)	ug/L	<10	10	6394572	<10	10	6394572	<10	10	6394572
Dissolved Uranium (U)	ug/L	0.255	0.050	6394572	0.118	0.050	6394572	1.75	0.050	6394572
Dissolved Vanadium (V)	ug/L	<10	10	6394572	<10	10	6394572	<10	10	6394572
Dissolved Zinc (Zn)	ug/L	34.0	1.0	6394572	63.1	1.0	6394572	2780	1.0	6394572

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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BV Labs Job #: B9S2147
Report Date: 2019/10/21

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186

RESULTS OF ANALYSES OF WATER

BV Labs ID		KZF844			KZF845			KZF846		
Sampling Date		2019/10/02			2019/10/02			2019/10/02		
COC Number		112031			112031			112031		
	UNITS	19GW-127	RDL	QC Batch	19GW-128	RDL	QC Batch	19GW-129	RDL	QC Batch
Dissolved Calcium (Ca)	mg/L	161	1.0	6394569	43.8	1.0	6394569	604	1.0	6394569
Dissolved Magnesium (Mg)	mg/L	55.1	1.0	6394569	58.4	1.0	6394569	303	1.0	6394569
Dissolved Potassium (K)	mg/L	110	1.0	6394569	31.0	1.0	6394569	160	1.0	6394569
Dissolved Sodium (Na)	mg/L	628	1.0	6394573	551	1.0	6394573	2710	1.0	6394573
Dissolved Sulphur (S)	mg/L	479	20	6394569	77	20	6394569	926	20	6394569

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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BV Labs Job #: B9S2147
Report Date: 2019/10/21

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186

RESULTS OF ANALYSES OF WATER

BV Labs ID		KZF847			KZF847			KZF848		
Sampling Date		2019/10/02			2019/10/02			2019/10/02		
COC Number		112031			112031			112031		
	UNITS	19GW-130	RDL	QC Batch	19GW-130 Lab-Dup	RDL	QC Batch	19GW-131	RDL	QC Batch
Calculated Parameters										
Dissolved Hardness (CaCO3)	mg/L	1440	0.50	6390047				921	0.50	6390047
Inorganics										
pH	pH	7.48	N/A	6386185	7.44	N/A	6386185	6.85	N/A	6386166
Salinity	N/A	5.7	2.0	6382103				2.4	2.0	6382103
Total Suspended Solids	mg/L	14	2.0	6378021				2300	50	6378021
Metals										
Dissolved Aluminum (Al)	ug/L	62	10	6394574	61	10	6394574	70	10	6394574
Dissolved Antimony (Sb)	ug/L	9.04	0.50	6394574	9.03	0.50	6394574	4.11	0.50	6394574
Dissolved Arsenic (As)	ug/L	1070	0.50	6394574	1070	0.50	6394574	6300	0.50	6394574
Dissolved Barium (Ba)	ug/L	79.6	1.0	6394574	79.2	1.0	6394574	42.8	1.0	6394574
Dissolved Beryllium (Be)	ug/L	<1.0	1.0	6394574	<1.0	1.0	6394574	<1.0	1.0	6394574
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	6394574	<1.0	1.0	6394574	<1.0	1.0	6394574
Dissolved Boron (B)	ug/L	1090	50	6394574	1100	50	6394574	1720	50	6394574
Dissolved Cadmium (Cd)	ug/L	54.3	0.050	6394574	54.9	0.050	6394574	4790	0.050	6394574
Dissolved Chromium (Cr)	ug/L	2.93	0.50	6394574	3.21	0.50	6394574	3.71	0.50	6394574
Dissolved Cobalt (Co)	ug/L	5.77	0.10	6394574	5.96	0.10	6394574	51.5	0.10	6394574
Dissolved Copper (Cu)	ug/L	1.16	0.50	6394574	1.07	0.50	6394574	6.37	0.50	6394574
Dissolved Iron (Fe)	ug/L	210	2.0	6394574	207	2.0	6394574	31800	2.0	6394574
Dissolved Lead (Pb)	ug/L	5.41	0.10	6394574	5.34	0.10	6394574	6.59	0.10	6394574
Dissolved Lithium (Li)	ug/L	<20	20	6394574	<20	20	6394574	70	20	6394574
Dissolved Manganese (Mn)	ug/L	5900	0.50	6394574	5930	0.50	6394574	9560	0.50	6394574
Dissolved Molybdenum (Mo)	ug/L	29.6	1.0	6394574	30.2	1.0	6394574	21.7	1.0	6394574
Dissolved Nickel (Ni)	ug/L	11.2	0.20	6394574	11.1	0.20	6394574	49.3	0.20	6394574
Dissolved Phosphorus (P)	ug/L	<50	50	6394574	<50	50	6394574	<50	50	6394574
Dissolved Selenium (Se)	ug/L	6.15	0.50	6394574	6.13	0.50	6394574	2.32	0.50	6394574
Dissolved Silicon (Si)	ug/L	3690	1000	6394574	3500	1000	6394574	11800	1000	6394574
Dissolved Silver (Ag)	ug/L	<0.050	0.050	6394574	<0.050	0.050	6394574	<0.050	0.050	6394574
Dissolved Strontium (Sr)	ug/L	2240	10	6394574	2240	10	6394574	803	10	6394574
Dissolved Thallium (Tl)	ug/L	97.6	0.10	6394574	97.9	0.10	6394574	3500	0.10	6394574
Dissolved Tin (Sn)	ug/L	2.8	1.0	6394574	2.5	1.0	6394574	<1.0	1.0	6394574
Dissolved Titanium (Ti)	ug/L	<10	10	6394574	<10	10	6394574	<10	10	6394574
Dissolved Uranium (U)	ug/L	3.76	0.050	6394574	3.85	0.050	6394574	0.226	0.050	6394574
Dissolved Vanadium (V)	ug/L	<10	10	6394574	<10	10	6394574	<10	10	6394574

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

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BV Labs Job #: B9S2147
Report Date: 2019/10/21

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186

RESULTS OF ANALYSES OF WATER

BV Labs ID		KZF847			KZF847			KZF848		
Sampling Date		2019/10/02			2019/10/02			2019/10/02		
COC Number		112031			112031			112031		
	UNITS	19GW-130	RDL	QC Batch	19GW-130 Lab-Dup	RDL	QC Batch	19GW-131	RDL	QC Batch
Dissolved Zinc (Zn)	ug/L	559	1.0	6394574	565	1.0	6394574	15200	1.0	6394574
Dissolved Calcium (Ca)	mg/L	331	1.0	6394569				227	1.0	6394569
Dissolved Magnesium (Mg)	mg/L	149	1.0	6394569				86.3	1.0	6394569
Dissolved Potassium (K)	mg/L	57.0	1.0	6394569				120	1.0	6394569
Dissolved Sodium (Na)	mg/L	1420	1.0	6394573				576	1.0	6394573
Dissolved Sulphur (S)	mg/L	447	20	6394569				429	20	6394569

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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BV Labs Job #: B9S2147
Report Date: 2019/10/21

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186

RESULTS OF ANALYSES OF WATER

BV Labs ID		KZF849			KZF849			KZF850		
Sampling Date		2019/10/02			2019/10/02			2019/10/02		
COC Number		112031			112031			112031		
	UNITS	19GW-132	RDL	QC Batch	19GW-132 Lab-Dup	RDL	QC Batch	19GW-133	RDL	QC Batch
Calculated Parameters										
Dissolved Hardness (CaCO3)	mg/L	997	0.50	6390047				915	0.50	6390047
Inorganics										
pH	pH	7.32	N/A	6380964				7.06	N/A	6380957
Salinity	N/A	3.5	2.0	6390702	3.5	2.0	6390702	2.0	2.0	6390702
Total Suspended Solids	mg/L	20	2.0	6378021				130	2.5	6378021
Metals										
Dissolved Aluminum (Al)	ug/L	59	10	6394574				112	10	6394574
Dissolved Antimony (Sb)	ug/L	7.91	0.50	6394574				25.7	0.50	6394574
Dissolved Arsenic (As)	ug/L	1530	0.50	6394574				176	0.50	6394574
Dissolved Barium (Ba)	ug/L	109	1.0	6394574				54.5	1.0	6394574
Dissolved Beryllium (Be)	ug/L	<1.0	1.0	6394574				<1.0	1.0	6394574
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	6394574				<1.0	1.0	6394574
Dissolved Boron (B)	ug/L	2040	50	6394574				1060	50	6394574
Dissolved Cadmium (Cd)	ug/L	2770	0.050	6394574				15000	0.050	6394574
Dissolved Chromium (Cr)	ug/L	2.52	0.50	6394574				4.81	0.50	6394574
Dissolved Cobalt (Co)	ug/L	34.7	0.10	6394574				1050	0.10	6394574
Dissolved Copper (Cu)	ug/L	3.51	0.50	6394574				2820	0.50	6394574
Dissolved Iron (Fe)	ug/L	266	2.0	6394574				31.1	2.0	6394574
Dissolved Lead (Pb)	ug/L	3.81	0.10	6394574				486	0.10	6394574
Dissolved Lithium (Li)	ug/L	70	20	6394574				<20	20	6394574
Dissolved Manganese (Mn)	ug/L	7260	0.50	6394574				17500	0.50	6394574
Dissolved Molybdenum (Mo)	ug/L	12.9	1.0	6394574				10.7	1.0	6394574
Dissolved Nickel (Ni)	ug/L	31.5	0.20	6394574				1070	0.20	6394574
Dissolved Phosphorus (P)	ug/L	<50	50	6394574				<50	50	6394574
Dissolved Selenium (Se)	ug/L	4.08	0.50	6394574				213	0.50	6394574
Dissolved Silicon (Si)	ug/L	7920	1000	6394574				9530	1000	6394574
Dissolved Silver (Ag)	ug/L	<0.050	0.050	6394574				0.104	0.050	6394574
Dissolved Strontium (Sr)	ug/L	1440	10	6394574				730	10	6394574
Dissolved Thallium (Tl)	ug/L	1500	0.10	6394574				6250 (1)	0.50	6394574
Dissolved Tin (Sn)	ug/L	<1.0	1.0	6394574				<1.0	1.0	6394574
Dissolved Titanium (Ti)	ug/L	<10	10	6394574				<10	10	6394574
Dissolved Uranium (U)	ug/L	1.03	0.050	6394574				0.374	0.050	6394574

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
(1) RDL raised due to concentration over linear range for Tl, sample dilution required.

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BV Labs Job #: B9S2147
Report Date: 2019/10/21

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186

RESULTS OF ANALYSES OF WATER

BV Labs ID		KZF849			KZF849			KZF850		
Sampling Date		2019/10/02			2019/10/02			2019/10/02		
COC Number		112031			112031			112031		
	UNITS	19GW-132	RDL	QC Batch	19GW-132 Lab-Dup	RDL	QC Batch	19GW-133	RDL	QC Batch
Dissolved Vanadium (V)	ug/L	<10	10	6394574				<10	10	6394574
Dissolved Zinc (Zn)	ug/L	10200	1.0	6394574				14900	1.0	6394574
Dissolved Calcium (Ca)	mg/L	208	1.0	6394569				311	1.0	6394569
Dissolved Magnesium (Mg)	mg/L	116	1.0	6394569				33.4	1.0	6394569
Dissolved Potassium (K)	mg/L	99.5	1.0	6394569				47.8	1.0	6394569
Dissolved Sodium (Na)	mg/L	922	1.0	6394575	900	1.0	6394575	389	1.0	6394575
Dissolved Sulphur (S)	mg/L	501	20	6394569				524	20	6394569

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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Report Date: 2019/10/21

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186

RESULTS OF ANALYSES OF WATER

BV Labs ID		KZF851			KZF852	KZF853			KZF854		
Sampling Date		2019/10/02			2019/10/02	2019/10/02			2019/10/03		
COC Number		112031			112031	112031			112031		
	UNITS	19GW-134	RDL	QC Batch	MW-1	MW-3	RDL	QC Batch	QA/QC-5	RDL	QC Batch
Calculated Parameters											
Dissolved Hardness (CaCO3)	mg/L	1040	0.50	6390047	196	197	0.50	6390047	345	0.50	6390047
Inorganics											
pH	pH	7.21	N/A	6380964	7.66	7.47	N/A	6386166	7.54	N/A	6386166
Salinity	N/A	2.6	2.0	6390702	<2.0	<2.0	2.0	6390702	<2.0	2.0	6390702
Total Suspended Solids	mg/L	37	5.0	6378021	310	190	5.0	6378021	430	10	6380057
Metals											
Dissolved Aluminum (Al)	ug/L	108	10	6394574	27	65	10	6394574	63	10	6394574
Dissolved Antimony (Sb)	ug/L	9.78	0.50	6394574	<0.50	<0.50	0.50	6394574	0.95	0.50	6394574
Dissolved Arsenic (As)	ug/L	99.2	0.50	6394574	406	280	0.50	6394574	8.40	0.50	6394574
Dissolved Barium (Ba)	ug/L	52.7	1.0	6394574	120	88.1	1.0	6394574	84.7	1.0	6394574
Dissolved Beryllium (Be)	ug/L	<1.0	1.0	6394574	<1.0	<1.0	1.0	6394574	<1.0	1.0	6394574
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	6394574	<1.0	<1.0	1.0	6394574	<1.0	1.0	6394574
Dissolved Boron (B)	ug/L	4030	50	6394574	3170	5370	50	6394574	359	50	6394574
Dissolved Cadmium (Cd)	ug/L	6050	0.050	6394574	0.085	0.872	0.050	6394574	0.218	0.050	6394574
Dissolved Chromium (Cr)	ug/L	2.88	0.50	6394574	1.44	3.32	0.50	6394574	2.85	0.50	6394574
Dissolved Cobalt (Co)	ug/L	53.0	0.10	6394574	<0.10	0.14	0.10	6394574	0.59	0.10	6394574
Dissolved Copper (Cu)	ug/L	114	0.50	6394574	<0.50	3.19	0.50	6394574	0.53	0.50	6394574
Dissolved Iron (Fe)	ug/L	685	2.0	6394574	226	1590	2.0	6394574	3090	2.0	6394574
Dissolved Lead (Pb)	ug/L	51.1	0.10	6394574	3.46	8.12	0.10	6394574	1.45	0.10	6394574
Dissolved Lithium (Li)	ug/L	72	20	6394574	<20	<20	20	6394574	<20	20	6394574
Dissolved Manganese (Mn)	ug/L	10300	0.50	6394574	1610	820	0.50	6394574	3070	0.50	6394574
Dissolved Molybdenum (Mo)	ug/L	15.1	1.0	6394574	<1.0	1.1	1.0	6394574	<1.0	1.0	6394574
Dissolved Nickel (Ni)	ug/L	89.7	0.20	6394574	<0.20	1.55	0.20	6394574	1.49	0.20	6394574
Dissolved Phosphorus (P)	ug/L	89	50	6394574	68	<50	50	6394574	<50	50	6394574
Dissolved Selenium (Se)	ug/L	17.9	0.50	6394574	<0.50	<0.50	0.50	6394574	<0.50	0.50	6394574
Dissolved Silicon (Si)	ug/L	5930	1000	6394574	4650	6520	1000	6394574	3180	1000	6394574
Dissolved Silver (Ag)	ug/L	0.154	0.050	6394574	<0.050	<0.050	0.050	6394574	<0.050	0.050	6394574
Dissolved Strontium (Sr)	ug/L	1130	10	6394574	214	183	10	6394574	360	10	6394574
Dissolved Thallium (Tl)	ug/L	14100 (1)	0.50	6394574	0.16	0.61	0.10	6394574	1.48	0.10	6394574
Dissolved Tin (Sn)	ug/L	<1.0	1.0	6394574	<1.0	<1.0	1.0	6394574	<1.0	1.0	6394574
Dissolved Titanium (Ti)	ug/L	<10	10	6394574	<10	<10	10	6394574	<10	10	6394574
Dissolved Uranium (U)	ug/L	0.251	0.050	6394574	<0.050	0.292	0.050	6394574	0.068	0.050	6394574
Dissolved Vanadium (V)	ug/L	<10	10	6394574	<10	<10	10	6394574	<10	10	6394574

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) RDL raised due to concentration over linear range for Tl, sample dilution required.

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BV Labs Job #: B9S2147
Report Date: 2019/10/21

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186

RESULTS OF ANALYSES OF WATER

BV Labs ID		KZF851			KZF852	KZF853			KZF854		
Sampling Date		2019/10/02			2019/10/02	2019/10/02			2019/10/03		
COC Number		112031			112031	112031			112031		
	UNITS	19GW-134	RDL	QC Batch	MW-1	MW-3	RDL	QC Batch	QA/QC-5	RDL	QC Batch
Dissolved Zinc (Zn)	ug/L	7610	1.0	6394574	6.8	12.3	1.0	6394574	26.1	1.0	6394574
Dissolved Calcium (Ca)	mg/L	281	1.0	6394569	67.4	69.3	1.0	6394569	88.6	1.0	6394569
Dissolved Magnesium (Mg)	mg/L	82.0	1.0	6394569	6.8	5.8	1.0	6394569	30.0	1.0	6394569
Dissolved Potassium (K)	mg/L	110	1.0	6394569	51.6	41.7	1.0	6394569	17.0	1.0	6394569
Dissolved Sodium (Na)	mg/L	806	1.0	6394575	161	188	1.0	6394575	133	1.0	6394575
Dissolved Sulphur (S)	mg/L	585	20	6394569	69	64	20	6394569	53	20	6394569

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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BV Labs Job #: B9S2147
Report Date: 2019/10/21

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186

RESULTS OF ANALYSES OF WATER

BV Labs ID		KZF855		KZF856		KZF857			KZF858		
Sampling Date		2019/10/03		2019/10/03		2019/10/03			2019/10/03		
COC Number		112031		112031		112031			112031		
	UNITS	QA/QC-6	RDL	QA/QC-7	RDL	QA/QC-8	RDL	QC Batch	QA/QC-9	RDL	QC Batch
Calculated Parameters											
Dissolved Hardness (CaCO3)	mg/L	988	0.50	1440	0.50	346	0.50	6390047	1030	0.50	6390047
Inorganics											
pH	pH	7.31	N/A	7.50	N/A	7.80	N/A	6380964			
Salinity	N/A	3.4	2.0	6.2	2.0	2.0	2.0	6390702			
Total Suspended Solids	mg/L	26	2.5	7.6	2.0	28	1.1	6380057			
Metals											
Dissolved Aluminum (Al)	ug/L	57	10	59	10	84	10	6394574	118	10	6394574
Dissolved Antimony (Sb)	ug/L	7.49	0.50	9.13	0.50	34.9	0.50	6394574	9.38	0.50	6394574
Dissolved Arsenic (As)	ug/L	1530	0.50	1080	0.50	771	0.50	6394574	96.7	0.50	6394574
Dissolved Barium (Ba)	ug/L	110	1.0	79.0	1.0	50.6	1.0	6394574	52.1	1.0	6394574
Dissolved Beryllium (Be)	ug/L	<1.0	1.0	<1.0	1.0	<1.0	1.0	6394574	<1.0	1.0	6394574
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	<1.0	1.0	<1.0	1.0	6394574	<1.0	1.0	6394574
Dissolved Boron (B)	ug/L	1990	50	1090	50	865	50	6394574	4050	50	6394574
Dissolved Cadmium (Cd)	ug/L	2770	0.050	54.5	0.050	60.1	0.050	6394574	6020	0.050	6394574
Dissolved Chromium (Cr)	ug/L	2.33	0.50	2.05	0.50	3.76	0.50	6394574	3.83	0.50	6394574
Dissolved Cobalt (Co)	ug/L	35.9	0.10	6.05	0.10	0.45	0.10	6394574	53.5	0.10	6394574
Dissolved Copper (Cu)	ug/L	3.27	0.50	1.26	0.50	8.24	0.50	6394574	115	0.50	6394574
Dissolved Iron (Fe)	ug/L	276	2.0	210	2.0	20.1	2.0	6394574	664	2.0	6394574
Dissolved Lead (Pb)	ug/L	2.42	0.10	6.63	0.10	134	0.10	6394574	50.9	0.10	6394574
Dissolved Lithium (Li)	ug/L	67	20	<20	20	<20	20	6394574	73	20	6394574
Dissolved Manganese (Mn)	ug/L	7370	0.50	6030	0.50	584	0.50	6394574	10400	0.50	6394574
Dissolved Molybdenum (Mo)	ug/L	12.9	1.0	30.1	1.0	9.9	1.0	6394574	15.8	1.0	6394574
Dissolved Nickel (Ni)	ug/L	30.4	0.20	10.8	0.20	2.36	0.20	6394574	81.2	0.20	6394574
Dissolved Phosphorus (P)	ug/L	<50	50	<50	50	<50	50	6394574	334	50	6394574
Dissolved Selenium (Se)	ug/L	4.04	0.50	6.21	0.50	25.9	0.50	6394574	16.4	0.50	6394574
Dissolved Silicon (Si)	ug/L	8040	1000	3690	1000	2710	1000	6394574	6070	1000	6394574
Dissolved Silver (Ag)	ug/L	<0.050	0.050	<0.050	0.050	<0.050	0.050	6394574	0.096	0.050	6394574
Dissolved Strontium (Sr)	ug/L	1450	10	2240	10	441	10	6394574	1130	10	6394574
Dissolved Thallium (Tl)	ug/L	1490	0.10	97.4	0.10	70.1	0.10	6394574	13800 (1)	0.50	6394574
Dissolved Tin (Sn)	ug/L	<1.0	1.0	2.6	1.0	3.1	1.0	6394574	<1.0	1.0	6394574
Dissolved Titanium (Ti)	ug/L	<10	10	<10	10	<10	10	6394574	<10	10	6394574
Dissolved Uranium (U)	ug/L	0.981	0.050	3.84	0.050	0.121	0.050	6394574	0.171	0.050	6394574
Dissolved Vanadium (V)	ug/L	<10	10	<10	10	<10	10	6394574	<10	10	6394574

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) RDL raised due to concentration over linear range for Tl, sample dilution required.

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BV Labs Job #: B9S2147
Report Date: 2019/10/21

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186

RESULTS OF ANALYSES OF WATER

BV Labs ID		KZF855		KZF856		KZF857			KZF858		
Sampling Date		2019/10/03		2019/10/03		2019/10/03			2019/10/03		
COC Number		112031		112031		112031			112031		
	UNITS	QA/QC-6	RDL	QA/QC-7	RDL	QA/QC-8	RDL	QC Batch	QA/QC-9	RDL	QC Batch
Dissolved Zinc (Zn)	ug/L	10300	1.0	570	1.0	64.3	1.0	6394574	7610	1.0	6394574
Dissolved Calcium (Ca)	mg/L	206	1.0	327	1.0	44.5	1.0	6394569	276	1.0	6394569
Dissolved Magnesium (Mg)	mg/L	115	1.0	151	1.0	57.1	1.0	6394569	82.9	1.0	6394569
Dissolved Potassium (K)	mg/L	101	1.0	56.7	1.0	31.1	1.0	6394569	111	1.0	6394569
Dissolved Sodium (Na)	mg/L	902	1.0	1410	1.0	538	1.0	6394575	829	1.0	6394575
Dissolved Sulphur (S)	mg/L	497	20	448	20	72	20	6394569	598	20	6394569

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Report Date: 2019/10/21

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186

MERCURY BY COLD VAPOUR AA (WATER)

BV Labs ID		KZF809		KZF810	KZF810	KZF811	KZF812	KZF813		
Sampling Date		2019/10/03		2019/10/03	2019/10/03	2019/10/02	2019/10/02	2019/10/02		
COC Number		112031		112031	112031	112031	112031	112031		
	UNITS	GW-1	QC Batch	GW3B	GW3B Lab-Dup	GW8A	GW8B	GW8C	RDL	QC Batch
Metals										
Dissolved Mercury (Hg)	ug/L	<0.013	6382339	<0.013	<0.013	0.28	<0.013	<0.013	0.013	6388931

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

BV Labs ID		KZF814	KZF815	KZF816	KZF817	KZF818	KZF819	KZF820		
Sampling Date		2019/10/02	2019/10/03	2019/10/03	2019/10/02	2019/10/02	2019/10/02	2019/10/01		
COC Number		112031	112031	112031	112031	112031	112031	112031		
	UNITS	GW10	GW24	GW27	GW30A	GW30B	GW30C	GW31A	RDL	QC Batch
Metals										
Dissolved Mercury (Hg)	ug/L	0.11	0.14	1.4	<0.013	<0.013	<0.013	<0.013	0.013	6388931

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

BV Labs ID		KZF821	KZF822	KZF823	KZF824	KZF825	KZF826	KZF827		
Sampling Date		2019/10/03	2019/10/02	2019/10/02	2019/10/02	2019/10/02	2019/10/02	2019/10/02		
COC Number		112031	112031	112031	112031	112031	112031	112031		
	UNITS	GW31B	GW32	GW34	GW42	GW43	GW44	05GW49	RDL	QC Batch
Metals										
Dissolved Mercury (Hg)	ug/L	<0.013	0.020	<0.013	<0.013	<0.013	0.028	<0.013	0.013	6388931

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

BV Labs ID		KZF828	KZF829		KZF830	KZF830	KZF831	KZF832		
Sampling Date		2019/10/01	2019/10/01		2019/10/02	2019/10/02	2019/10/02	2019/10/03		
COC Number		112031	112031		112031	112031	112031	112031		
	UNITS	05GW52	05GW53	QC Batch	05GW54	05GW54 Lab-Dup	05GW59	05GW68	RDL	QC Batch
Metals										
Dissolved Mercury (Hg)	ug/L	<0.013	<0.013	6388931	0.017	0.017	0.027	<0.013	0.013	6388969

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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Report Date: 2019/10/21

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186

MERCURY BY COLD VAPOUR AA (WATER)

BV Labs ID		KZF833	KZF834	KZF835	KZF836	KZF837	KZF838	KZF839		
Sampling Date		2019/10/02	2019/10/02	2019/10/02	2019/10/02	2019/10/01	2019/10/02	2019/10/02		
COC Number		112031	112031	112031	112031	112031	112031	112031		
	UNITS	05GW70	05GW71	05GW72	05GW76	05GW77	09GW-109	09GW-110	RDL	QC Batch
Metals										
Dissolved Mercury (Hg)	ug/L	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	0.013	6388969

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

BV Labs ID		KZF840	KZF841	KZF842	KZF843	KZF844	KZF845	KZF846		
Sampling Date		2019/10/01	2019/10/01	2019/10/02	2019/10/02	2019/10/02	2019/10/02	2019/10/02		
COC Number		112031	112031	112031	112031	112031	112031	112031		
	UNITS	09GW-111	09GW-112	19GW-125	19GW-126	19GW-127	19GW-128	19GW-129	RDL	QC Batch
Metals										
Dissolved Mercury (Hg)	ug/L	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	0.032	0.013	6388969

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

BV Labs ID		KZF847	KZF848	KZF849		KZF850	KZF850	KZF851		
Sampling Date		2019/10/02	2019/10/02	2019/10/02		2019/10/02	2019/10/02	2019/10/02		
COC Number		112031	112031	112031		112031	112031	112031		
	UNITS	19GW-130	19GW-131	19GW-132	QC Batch	19GW-133	19GW-133 Lab-Dup	19GW-134	RDL	QC Batch
Metals										
Dissolved Mercury (Hg)	ug/L	<0.013	<0.013	<0.013	6388969	0.027	0.028	0.48	0.013	6388998

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

BV Labs ID		KZF852	KZF853	KZF854	KZF855	KZF856	KZF857	KZF858		
Sampling Date		2019/10/02	2019/10/02	2019/10/03	2019/10/03	2019/10/03	2019/10/03	2019/10/03		
COC Number		112031	112031	112031	112031	112031	112031	112031		
	UNITS	MW-1	MW-3	QA/QC-5	QA/QC-6	QA/QC-7	QA/QC-8	QA/QC-9	RDL	QC Batch
Metals										
Dissolved Mercury (Hg)	ug/L	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	0.37	0.013	6388998

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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ATLANTIC RBCA HYDROCARBONS (WATER)

BV Labs ID		KZF815	KZF816	KZF834	KZF835	KZF852		
Sampling Date		2019/10/03	2019/10/03	2019/10/02	2019/10/02	2019/10/02		
COC Number		112031	112031	112031	112031	112031		
	UNITS	GW24	GW27	05GW71	05GW72	MW-1	RDL	QC Batch
Petroleum Hydrocarbons								
Benzene	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	6379762
Toluene	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	6379762
Ethylbenzene	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	0.0010	6379762
Total Xylenes	mg/L	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0020	6379762
C6 - C10 (less BTEX)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	6379762
>C10-C16 Hydrocarbons	mg/L	0.36	<0.050	0.90	0.62	0.57	0.050	6379868
>C16-C21 Hydrocarbons	mg/L	0.10	<0.050	0.89	0.38	0.49	0.050	6379868
>C21-<C32 Hydrocarbons	mg/L	<0.10	<0.10	0.36	0.17	0.22	0.10	6379868
Modified TPH (Tier1)	mg/L	0.46	<0.10	2.2	1.2	1.3	0.10	6375173
Reached Baseline at C32	mg/L	Yes	NA	Yes	Yes	Yes	N/A	6379868
Hydrocarbon Resemblance	mg/L	COMMENT (1)	NA	COMMENT (2)	COMMENT (1)	COMMENT (1)	N/A	6379868
Surrogate Recovery (%)								
Isobutylbenzene - Extractable	%	100	103	99	107	103		6379868
n-Dotriacontane - Extractable	%	88	93	92	96	92		6379868
Isobutylbenzene - Volatile	%	109 (3)	107	112	110	110		6379762

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) One product in fuel oil range.
(2) Weathered fuel oil fraction.
(3) VPH sample contained sediment.

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ATLANTIC RBCA HYDROCARBONS (WATER)

BV Labs ID		KZF853		
Sampling Date		2019/10/02		
COC Number		112031		
	UNITS	MW-3	RDL	QC Batch
Petroleum Hydrocarbons				
Benzene	mg/L	<0.0010	0.0010	6379762
Toluene	mg/L	<0.0010	0.0010	6379762
Ethylbenzene	mg/L	<0.0010	0.0010	6379762
Total Xylenes	mg/L	<0.0020	0.0020	6379762
C6 - C10 (less BTEX)	mg/L	<0.10	0.10	6379762
>C10-C16 Hydrocarbons	mg/L	0.60	0.050	6379868
>C16-C21 Hydrocarbons	mg/L	0.70	0.050	6379868
>C21-<C32 Hydrocarbons	mg/L	0.36	0.10	6379868
Modified TPH (Tier1)	mg/L	1.7	0.10	6375173
Reached Baseline at C32	mg/L	Yes	N/A	6379868
Hydrocarbon Resemblance	mg/L	COMMENT (1)	N/A	6379868
Surrogate Recovery (%)				
Isobutylbenzene - Extractable	%	105		6379868
n-Dotriacontane - Extractable	%	95		6379868
Isobutylbenzene - Volatile	%	108		6379762

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Weathered fuel oil fraction.

POLYCHLORINATED BIPHENYLS BY GC-ECD (WATER)

BV Labs ID		KZF817	KZF822		
Sampling Date		2019/10/02	2019/10/02		
COC Number		112031	112031		
	UNITS	GW30A	GW32	RDL	QC Batch
PCBs					
Aroclor 1016	ug/L	<0.050	<0.050	0.050	6382271
Aroclor 1221	ug/L	<0.050	<0.050	0.050	6382271
Aroclor 1232	ug/L	<0.050	<0.050	0.050	6382271
Aroclor 1248	ug/L	<0.050	<0.050	0.050	6382271
Aroclor 1242	ug/L	<0.050	<0.050	0.050	6382271
Aroclor 1254	ug/L	<0.050	<0.050	0.050	6382271
Aroclor 1260	ug/L	<0.050	<0.050	0.050	6382271
Calculated Total PCB	ug/L	<0.050	<0.050	0.050	6375691
Surrogate Recovery (%)					
Decachlorobiphenyl	%	98	102		6382271

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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GENERAL COMMENTS

RESULTS OF ANALYSES OF WATER

Sample KZF809 [GW-1] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KZF810 [GW3B] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KZF811 [GW8A] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KZF812 [GW8B] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KZF813 [GW8C] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KZF814 [GW10] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KZF815 [GW24] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KZF816 [GW27] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KZF817 [GW30A] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KZF818 [GW30B] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KZF819 [GW30C] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KZF820 [GW31A] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KZF821 [GW31B] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KZF822 [GW32] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KZF823 [GW34] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KZF824 [GW42] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KZF825 [GW43] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KZF826 [GW44] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KZF827 [05GW49] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KZF828 [05GW52] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KZF829 [05GW53] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KZF830 [05GW54] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KZF831 [05GW59] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KZF832 [05GW68] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KZF833 [05GW70] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KZF834 [05GW71] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KZF835 [05GW72] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KZF836 [05GW76] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KZF837 [05GW77] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KZF838 [09GW-109] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KZF839 [09GW-110] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KZF840 [09GW-111] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KZF841 [09GW-112] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KZF842 [19GW-125] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KZF843 [19GW-126] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KZF844 [19GW-127] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KZF845 [19GW-128] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KZF846 [19GW-129] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KZF847 [19GW-130] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KZF848 [19GW-131] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KZF849 [19GW-132] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KZF850 [19GW-133] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KZF851 [19GW-134] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KZF852 [MW-1] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KZF853 [MW-3] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KZF854 [QA/QC-5] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KZF855 [QA/QC-6] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KZF856 [QA/QC-7] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KZF857 [QA/QC-8] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KZF858 [QA/QC-9] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
6379762	Isobutylbenzene - Volatile	2019/10/11	107	70 - 130	108	70 - 130	111	%				
6379868	Isobutylbenzene - Extractable	2019/10/10	95	70 - 130	101	70 - 130	101	%				
6379868	n-Dotriacontane - Extractable	2019/10/10	97	70 - 130	98	70 - 130	96	%				
6382271	Decachlorobiphenyl	2019/10/15	69	30 - 130	89	30 - 130	100	%				
6375573	Total Suspended Solids	2019/10/11					<1.0	mg/L	13 (1)	20	97	80 - 120
6375795	Total Suspended Solids	2019/10/10					<1.0	mg/L	7.1 (2)	20	98	80 - 120
6377421	Total Suspended Solids	2019/10/10					<1.0	mg/L	14 (3)	20	98	80 - 120
6377768	Total Suspended Solids	2019/10/18					<1.0	mg/L	9.0 (4)	20	98	80 - 120
6378021	Total Suspended Solids	2019/10/15					<1.0	mg/L	20 (1)	20	95	80 - 120
6379715	Salinity	2019/10/10					<2.0	N/A	0 (1)	25	101	80 - 120
6379762	Benzene	2019/10/11	99	70 - 130	120	70 - 130	<0.0010	mg/L	NC (1)	40		
6379762	C6 - C10 (less BTEX)	2019/10/11					<0.10	mg/L	NC (1)	40		
6379762	Ethylbenzene	2019/10/11	100	70 - 130	116	70 - 130	<0.0010	mg/L	NC (1)	40		
6379762	Toluene	2019/10/11	102	70 - 130	116	70 - 130	<0.0010	mg/L	NC (1)	40		
6379762	Total Xylenes	2019/10/11	102	70 - 130	116	70 - 130	<0.0020	mg/L	NC (1)	40		
6379868	>C10-C16 Hydrocarbons	2019/10/10	92	70 - 130	92	70 - 130	<0.050	mg/L	NC (1)	40		
6379868	>C16-C21 Hydrocarbons	2019/10/10	83	70 - 130	81	70 - 130	<0.050	mg/L	NC (1)	40		
6379868	>C21-<C32 Hydrocarbons	2019/10/10	89	70 - 130	89	70 - 130	<0.10	mg/L	NC (1)	40		
6380057	Total Suspended Solids	2019/10/16					<1.0	mg/L	15 (5)	20	100	80 - 120
6380124	Salinity	2019/10/10					<2.0	N/A	0 (6)	25	100	80 - 120
6380957	pH	2019/10/10							1.0 (7)	N/A	100	97 - 103
6380964	pH	2019/10/10							1.2 (8)	N/A	101	97 - 103
6382103	Salinity	2019/10/11					<2.0	N/A	NC (9)	25	101	80 - 120
6382271	Aroclor 1016	2019/10/15					<0.050	ug/L	NC (1)	40		
6382271	Aroclor 1221	2019/10/15					<0.050	ug/L	NC (1)	40		
6382271	Aroclor 1232	2019/10/15					<0.050	ug/L	NC (1)	40		
6382271	Aroclor 1242	2019/10/15					<0.050	ug/L	NC (1)	40		
6382271	Aroclor 1248	2019/10/15					<0.050	ug/L	NC (1)	40		
6382271	Aroclor 1254	2019/10/15	96	70 - 130	99	70 - 130	<0.050	ug/L	NC (1)	40		
6382271	Aroclor 1260	2019/10/15					<0.050	ug/L	NC (1)	40		
6382339	Dissolved Mercury (Hg)	2019/10/15	100	80 - 120	103	80 - 120	<0.013	ug/L	NC (1)	20		
6386166	pH	2019/10/15							0.62 (1)	N/A	100	97 - 103

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
6386185	pH	2019/10/15							0.49 (10)	N/A	100	97 - 103
6388931	Dissolved Mercury (Hg)	2019/10/17	100 (11)	80 - 120	104	80 - 120	<0.013	ug/L	NC (12)	20		
6388969	Dissolved Mercury (Hg)	2019/10/17	102 (13)	80 - 120	103	80 - 120	<0.013	ug/L	0 (14)	20		
6388998	Dissolved Mercury (Hg)	2019/10/17	105 (15)	80 - 120	103	80 - 120	<0.013	ug/L	6.0 (16)	20		
6390702	Salinity	2019/10/17					<2.0	N/A	0 (17)	25	103	80 - 120
6394570	Dissolved Sodium (Na)	2019/10/15	NC (18)	80 - 120	105	80 - 120	<0.10	mg/L	0.055 (19)	20		
6394571	Dissolved Aluminum (Al)	2019/10/17	115 (18)	80 - 135	116	80 - 120	14, RDL=10 (20)	ug/L	4.0 (19)	25		
6394571	Dissolved Antimony (Sb)	2019/10/17	101 (18)	80 - 120	96	80 - 120	<0.50	ug/L	11 (19)	25		
6394571	Dissolved Arsenic (As)	2019/10/17	105 (18)	80 - 120	104	80 - 120	<0.50	ug/L	NC (19)	25		
6394571	Dissolved Barium (Ba)	2019/10/17	NC (18)	80 - 120	104	80 - 120	<1.0	ug/L	0.42 (19)	25		
6394571	Dissolved Beryllium (Be)	2019/10/17	108 (18)	80 - 120	99	80 - 120	<1.0	ug/L	NC (19)	25		
6394571	Dissolved Bismuth (Bi)	2019/10/17	104 (18)	80 - 120	96	80 - 120	<1.0	ug/L	NC (19)	25		
6394571	Dissolved Boron (B)	2019/10/17	108 (18)	80 - 120	100	80 - 120	<50	ug/L	3.2 (19)	25		
6394571	Dissolved Cadmium (Cd)	2019/10/17	102 (18)	80 - 120	97	80 - 120	<0.050	ug/L	1.4 (19)	25		
6394571	Dissolved Chromium (Cr)	2019/10/17	101 (18)	80 - 120	100	80 - 120	<0.50	ug/L	17 (19)	25		
6394571	Dissolved Cobalt (Co)	2019/10/17	99 (18)	80 - 120	93	80 - 120	<0.10	ug/L	NC (19)	25		
6394571	Dissolved Copper (Cu)	2019/10/17	98 (18)	80 - 120	90	80 - 120	<0.50	ug/L	5.8 (19)	25		
6394571	Dissolved Iron (Fe)	2019/10/17	102 (18)	80 - 135	95	80 - 120	<10	ug/L	NC (19)	25		
6394571	Dissolved Lead (Pb)	2019/10/17	106 (18)	80 - 120	100	80 - 120	<0.10	ug/L	0.15 (19)	25		
6394571	Dissolved Lithium (Li)	2019/10/17	117 (18)	80 - 120	107	80 - 120	<20	ug/L	NC (19)	25		
6394571	Dissolved Manganese (Mn)	2019/10/17	102 (18)	80 - 120	97	80 - 120	<0.50	ug/L	0.89 (19)	25		
6394571	Dissolved Molybdenum (Mo)	2019/10/17	105 (18)	80 - 120	102	80 - 120	<1.0	ug/L	1.8 (19)	25		
6394571	Dissolved Nickel (Ni)	2019/10/17	99 (18)	80 - 120	93	80 - 120	0.35, RDL=0.20 (21)	ug/L	9.8 (19)	25		
6394571	Dissolved Phosphorus (P)	2019/10/17					<50	ug/L	NC (19)	25		
6394571	Dissolved Selenium (Se)	2019/10/17	107 (18)	80 - 120	105	80 - 120	<0.50	ug/L	NC (19)	25		
6394571	Dissolved Silicon (Si)	2019/10/17					<1000	ug/L	4.4 (19)	25		
6394571	Dissolved Silver (Ag)	2019/10/17	96 (18)	80 - 120	94	80 - 120	<0.050	ug/L	NC (19)	25		
6394571	Dissolved Strontium (Sr)	2019/10/17	NC (18)	80 - 120	117	80 - 120	<10	ug/L	0.093 (19)	25		
6394571	Dissolved Thallium (Tl)	2019/10/17	104 (18)	80 - 120	97	80 - 120	<0.10	ug/L	5.0 (19)	25		
6394571	Dissolved Tin (Sn)	2019/10/17	96 (18)	80 - 120	89	80 - 120	<1.0	ug/L	NC (19)	25		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
6394571	Dissolved Titanium (Ti)	2019/10/17	106 (18)	80 - 120	112	80 - 120	<10	ug/L	NC (19)	25		
6394571	Dissolved Uranium (U)	2019/10/17	107 (18)	80 - 120	105	80 - 120	<0.050	ug/L	4.6 (19)	25		
6394571	Dissolved Vanadium (V)	2019/10/17	103 (18)	80 - 120	97	80 - 120	<10	ug/L	NC (19)	25		
6394571	Dissolved Zinc (Zn)	2019/10/17	104 (18)	80 - 120	100	80 - 120	<5.0	ug/L	16 (19)	25		
6394572	Dissolved Aluminum (Al)	2019/10/17	109 (22)	80 - 135	114	80 - 120	13, RDL=10 (20)	ug/L	2.7 (23)	25		
6394572	Dissolved Antimony (Sb)	2019/10/17	101 (22)	80 - 120	94	80 - 120	<0.50	ug/L	18 (23)	25		
6394572	Dissolved Arsenic (As)	2019/10/17	104 (22)	80 - 120	103	80 - 120	<0.50	ug/L	1.0 (23)	25		
6394572	Dissolved Barium (Ba)	2019/10/17	NC (22)	80 - 120	104	80 - 120	<1.0	ug/L	0.15 (23)	25		
6394572	Dissolved Beryllium (Be)	2019/10/17	102 (22)	80 - 120	93	80 - 120	<1.0	ug/L	NC (23)	25		
6394572	Dissolved Bismuth (Bi)	2019/10/17	104 (22)	80 - 120	97	80 - 120	<1.0	ug/L	NC (23)	25		
6394572	Dissolved Boron (B)	2019/10/17	99 (22)	80 - 120	93	80 - 120	<50	ug/L	NC (23)	25		
6394572	Dissolved Cadmium (Cd)	2019/10/17	103 (22)	80 - 120	98	80 - 120	<0.050	ug/L	7.2 (23)	25		
6394572	Dissolved Chromium (Cr)	2019/10/17	104 (22)	80 - 120	98	80 - 120	<0.50	ug/L	19 (23)	25		
6394572	Dissolved Cobalt (Co)	2019/10/17	100 (22)	80 - 120	93	80 - 120	<0.10	ug/L	3.9 (23)	25		
6394572	Dissolved Copper (Cu)	2019/10/17	100 (22)	80 - 120	91	80 - 120	<0.50	ug/L	15 (23)	25		
6394572	Dissolved Iron (Fe)	2019/10/17	101 (22)	80 - 135	95	80 - 120	<10	ug/L	2.5 (23)	25		
6394572	Dissolved Lead (Pb)	2019/10/17	106 (22)	80 - 120	100	80 - 120	<0.10	ug/L	3.9 (23)	25		
6394572	Dissolved Lithium (Li)	2019/10/17	108 (22)	80 - 120	99	80 - 120	<20	ug/L	NC (23)	25		
6394572	Dissolved Manganese (Mn)	2019/10/17	NC (22)	80 - 120	97	80 - 120	<0.50	ug/L	1.7 (23)	25		
6394572	Dissolved Molybdenum (Mo)	2019/10/17	101 (22)	80 - 120	105	80 - 120	<1.0	ug/L	0.24 (23)	25		
6394572	Dissolved Nickel (Ni)	2019/10/17	101 (22)	80 - 120	93	80 - 120	<0.20	ug/L	5.1 (23)	25		
6394572	Dissolved Phosphorus (P)	2019/10/17					<50	ug/L	NC (23)	25		
6394572	Dissolved Selenium (Se)	2019/10/17	106 (22)	80 - 120	104	80 - 120	<0.50	ug/L	NC (23)	25		
6394572	Dissolved Silicon (Si)	2019/10/17					<1000	ug/L	3.2 (23)	25		
6394572	Dissolved Silver (Ag)	2019/10/17	98 (22)	80 - 120	93	80 - 120	<0.050	ug/L	NC (23)	25		
6394572	Dissolved Strontium (Sr)	2019/10/17	NC (22)	80 - 120	115	80 - 120	<10	ug/L	0.50 (23)	25		
6394572	Dissolved Thallium (Tl)	2019/10/17	102 (22)	80 - 120	98	80 - 120	<0.10	ug/L	4.6 (23)	25		
6394572	Dissolved Tin (Sn)	2019/10/17	98 (22)	80 - 120	91	80 - 120	<1.0	ug/L	NC (23)	25		
6394572	Dissolved Titanium (Ti)	2019/10/17	104 (22)	80 - 120	105	80 - 120	<10	ug/L	NC (23)	25		
6394572	Dissolved Uranium (U)	2019/10/17	106 (22)	80 - 120	105	80 - 120	<0.050	ug/L	0.10 (23)	25		
6394572	Dissolved Vanadium (V)	2019/10/17	104 (22)	80 - 120	97	80 - 120	<10	ug/L	NC (23)	25		

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
6394572	Dissolved Zinc (Zn)	2019/10/17	103 (22)	80 - 120	97	80 - 120	<5.0	ug/L	11 (23)	25		
6394573	Dissolved Sodium (Na)	2019/10/15	NC (24)	80 - 120	103	80 - 120	<0.10	mg/L	1.1 (25)	20		
6394574	Dissolved Aluminum (Al)	2019/10/17	113 (26)	80 - 135	115	80 - 120	14, RDL=10 (20)	ug/L	1.1 (28)	25		
6394574	Dissolved Antimony (Sb)	2019/10/17	100 (26)	80 - 120	96	80 - 120	<0.50	ug/L	0.056 (28)	25		
6394574	Dissolved Arsenic (As)	2019/10/17	NC (26)	80 - 120	105	80 - 120	<0.50	ug/L	0.17 (28)	25		
6394574	Dissolved Barium (Ba)	2019/10/17	103 (26)	80 - 120	106	80 - 120	<1.0	ug/L	0.52 (28)	25		
6394574	Dissolved Beryllium (Be)	2019/10/17	105 (26)	80 - 120	99	80 - 120	<1.0	ug/L	NC (28)	25		
6394574	Dissolved Bismuth (Bi)	2019/10/17	100 (26)	80 - 120	97	80 - 120	<1.0	ug/L	NC (28)	25		
6394574	Dissolved Boron (B)	2019/10/17	NC (26)	80 - 120	96	80 - 120	<50	ug/L	1.2 (28)	25		
6394574	Dissolved Cadmium (Cd)	2019/10/17	100 (26)	80 - 120	99	80 - 120	<0.050	ug/L	1.2 (28)	25		
6394574	Dissolved Chromium (Cr)	2019/10/17	100 (26)	80 - 120	100	80 - 120	0.53, RDL=0.50 (27)	ug/L	8.9 (28)	25		
6394574	Dissolved Cobalt (Co)	2019/10/17	96 (26)	80 - 120	95	80 - 120	<0.10	ug/L	3.1 (28)	25		
6394574	Dissolved Copper (Cu)	2019/10/17	95 (26)	80 - 120	92	80 - 120	<0.50	ug/L	8.1 (28)	25		
6394574	Dissolved Iron (Fe)	2019/10/17	98 (26)	80 - 135	97	80 - 120	<10	ug/L	1.0 (28)	25		
6394574	Dissolved Lead (Pb)	2019/10/17	102 (26)	80 - 120	100	80 - 120	<0.10	ug/L	1.3 (28)	25		
6394574	Dissolved Lithium (Li)	2019/10/17	116 (26)	80 - 120	105	80 - 120	<20	ug/L	NC (28)	25		
6394574	Dissolved Manganese (Mn)	2019/10/17	NC (26)	80 - 120	100	80 - 120	<0.50	ug/L	0.46 (28)	25		
6394574	Dissolved Molybdenum (Mo)	2019/10/17	NC (26)	80 - 120	106	80 - 120	<1.0	ug/L	1.9 (28)	25		
6394574	Dissolved Nickel (Ni)	2019/10/17	95 (26)	80 - 120	94	80 - 120	<0.20	ug/L	0.88 (28)	25		
6394574	Dissolved Phosphorus (P)	2019/10/17					<50	ug/L	NC (28)	25		
6394574	Dissolved Selenium (Se)	2019/10/17	105 (26)	80 - 120	103	80 - 120	<0.50	ug/L	0.34 (28)	25		
6394574	Dissolved Silicon (Si)	2019/10/17					<1000	ug/L	5.3 (28)	25		
6394574	Dissolved Silver (Ag)	2019/10/17	97 (26)	80 - 120	92	80 - 120	<0.050	ug/L	NC (28)	25		
6394574	Dissolved Strontium (Sr)	2019/10/17	NC (26)	80 - 120	120	80 - 120	<10	ug/L	0.062 (28)	25		
6394574	Dissolved Thallium (Tl)	2019/10/17	NC (26)	80 - 120	99	80 - 120	<0.10	ug/L	0.31 (28)	25		
6394574	Dissolved Tin (Sn)	2019/10/17	93 (26)	80 - 120	93	80 - 120	<1.0	ug/L	9.5 (28)	25		
6394574	Dissolved Titanium (Ti)	2019/10/17	99 (26)	80 - 120	113	80 - 120	<10	ug/L	NC (28)	25		
6394574	Dissolved Uranium (U)	2019/10/17	106 (26)	80 - 120	106	80 - 120	<0.050	ug/L	2.5 (28)	25		
6394574	Dissolved Vanadium (V)	2019/10/17	103 (26)	80 - 120	99	80 - 120	<10	ug/L	NC (28)	25		
6394574	Dissolved Zinc (Zn)	2019/10/17	NC (26)	80 - 120	103	80 - 120	<5.0	ug/L	1.1 (28)	25		

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
6394575	Dissolved Sodium (Na)	2019/10/15	NC (29)	80 - 120	101	80 - 120	<0.10	mg/L	2.5 (30)	20		

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Duplicate Parent ID

(2) Duplicate Parent ID [KZF841-01]

(3) Duplicate Parent ID [KZF813-01]

(4) Duplicate Parent ID [KZF819-01]

(5) Duplicate Parent ID [KZF816-01]

(6) Duplicate Parent ID [KZF823-02]

(7) Duplicate Parent ID [KZF825-02]

(8) Duplicate Parent ID [KZF829-02]

(9) Duplicate Parent ID [KZF839-02]

(10) Duplicate Parent ID [KZF847-02]

(11) Matrix Spike Parent ID [KZF811-04]

(12) Duplicate Parent ID [KZF810-04]

(13) Matrix Spike Parent ID [KZF831-04]

(14) Duplicate Parent ID [KZF830-04]

(15) Matrix Spike Parent ID [KZF851-04]

(16) Duplicate Parent ID [KZF850-04]

(17) Duplicate Parent ID [KZF849-02]

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits

(18) Matrix Spike Parent ID [KZF809-03]

(19) Duplicate Parent ID [KZF809-03]

(20) Method Blank exceeds acceptance limits for Al - 2X RDL acceptable for seawater metals determination.

(21) Method Blank exceeds acceptance limits for Ni - 2X RDL acceptable for seawater metals determination.

(22) Matrix Spike Parent ID [KZF828-03]

(23) Duplicate Parent ID [KZF828-03]

(24) Matrix Spike Parent ID [KZF829-03]

(25) Duplicate Parent ID [KZF829-03]

(26) Matrix Spike Parent ID [KZF847-03]

(27) Method Blank exceeds acceptance limits for Cr - 2X RDL acceptable for seawater metals determination.

(28) Duplicate Parent ID [KZF847-03]

(29) Matrix Spike Parent ID [KZF849-03]

(30) Duplicate Parent ID [KZF849-03]

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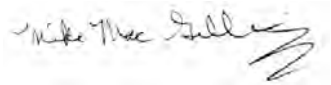
BV Labs Job #: B9S2147
Report Date: 2019/10/21

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186

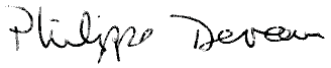
VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

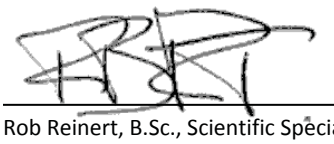
Eric Dearman, Scientific Specialist



Mike MacGillivray, Scientific Specialist (Inorganics)



Phil Deveau, Scientific Specialist (Organics)



Rob Reinert, B.Sc., Scientific Specialist

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Custody Tracking Form

T112031

Please use this form for custody tracking when submitting the work instructions via eTR (electronic Test Requisition). Please ensure your form has a barcode or a BV Labs eTR confirmation number in the top right hand side. This number links your electronic submission to your samples.

First Sample: GW-1
Last Sample: QA/QC-9
Sample Count: 50

Relinquished By				Received By			
MIKE GRAVES	Mike Graves	Date	2019/10/07			Date	
		Time (24 HR)	14:00			Time (24 HR)	
		Date				Date	
		Time (24 HR)				Time (24 HR)	
		Date				Date	
		Time (24 HR)				Time (24 HR)	

Submission Triage Information

Sampled By: MIKE GRAVES

# of Coolers/Pkgs: 5

Rush ☐ Immediate Test ☐ Food Residue ☐

Micro ☐ Food Chemistry ☐

***** LAB USE ONLY *****

Received At

Labeled By

Verified By

Comments: B952147

Custody Seal		Cooling	Temperature °C		
Present (Y/N)	Intact (Y/N)	Media	1	2	3

COR FCD-00265 / 4
Page ___ of ___

Maxxam
A Bureau Veritas Group Company

ADDITIONAL COOLER TEMPERATURE RECORD

CHAIN-OF-CUSTODY RECORD CP Rail / Wood

CHAIN OF CUSTODY #	
Page ___ of ___	
Page ___ of ___	
Page ___ of ___	
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COOLER OBSERVATIONS:

CUSTODY SEAL	YES	NO	COOLER ID	TEMP 1	TEMP 2	TEMP 3
PRESENT / INTACT / ICE PRESENT				4	6	2
PRESENT / INTACT / ICE PRESENT				2	1	3
PRESENT / INTACT / ICE PRESENT				-1	-3	-1
PRESENT / INTACT / ICE PRESENT				2	2	4
PRESENT / INTACT / ICE PRESENT				1	Ø	-1
PRESENT / INTACT / ICE PRESENT				Ø	2	2
PRESENT / INTACT / ICE PRESENT				4	Ø	4
PRESENT / INTACT / ICE PRESENT				4	1	6
PRESENT / INTACT / ICE PRESENT						
PRESENT / INTACT / ICE PRESENT						

MAXXAM JOB#:

CUSTODY SEAL	YES	NO	COOLER ID	TEMP 1	TEMP 2	TEMP 3
PRESENT / INTACT / ICE PRESENT						
PRESENT / INTACT / ICE PRESENT						
PRESENT / INTACT / ICE PRESENT						
PRESENT / INTACT / ICE PRESENT						
PRESENT / INTACT / ICE PRESENT						
PRESENT / INTACT / ICE PRESENT						
PRESENT / INTACT / ICE PRESENT						
PRESENT / INTACT / ICE PRESENT						
PRESENT / INTACT / ICE PRESENT						
PRESENT / INTACT / ICE PRESENT						

RECEIVED BY (SIGN & PRINT)		DATE (YYYY/MM/DD)	TIME (HH:MM)
[signature]			2019 OCT 8 9:39

Your P.O. #: 73517186
Your Project #: 11198639-04
Site Location: GLENCORE
Your C.O.C. #: D34724, D34726, D34725, D34723

Attention: Rob Turner

GHD Limited
466 Hodgson Rd
Fredericton , NB
CANADA E3C 2G5

Report Date: 2019/11/14
Report #: R5965145
Version: 4 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9R7082
Received: 2019/10/01, 10:40

Sample Matrix: Soil
Samples Received: 33

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Benzo(b/j)fluoranthene Sum (soil)	1	N/A	2019/10/08	N/A	Auto Calc.
Metals Leach TCLP/CGSB extraction	5	2019/10/22	2019/10/23	ATL SOP 00058	EPA 6020B R2 m
Metals Solids Acid Extr. ICPMS	4	2019/10/04	2019/10/07	ATL SOP 00058	EPA 6020B R2 m
Metals Solids Acid Extr. ICPMS	20	2019/10/04	2019/10/08	ATL SOP 00058	EPA 6020B R2 m
Metals Solids Acid Extr. ICPMS	1	2019/10/07	2019/10/07	ATL SOP 00058	EPA 6020B R2 m
Metals Solids Acid Extr. ICPMS	2	2019/10/09	2019/10/10	ATL SOP 00058	EPA 6020B R2 m
Moisture	2	N/A	2019/10/03	ATL SOP 00001	OMOE Handbook 1983 m
Moisture	1	N/A	2019/10/08	ATL SOP 00001	OMOE Handbook 1983 m
PAH Compounds by GCMS (SIM) (1)	1	2019/10/04	2019/10/07	ATL SOP 00102	EPA 8270E R6 m
PCBs in soil by GC/ECD (1)	1	2019/10/04	2019/10/07	ATL SOP 00106	EPA 8082A 2007 m
PCBs in soil by GC/ECD (1)	1	2019/10/10	2019/10/11	ATL SOP 00106	EPA 8082A 2007 m
PCB Aroclor sum (soil)	1	N/A	2019/10/07	N/A	Auto Calc.
PCB Aroclor sum (soil)	1	N/A	2019/10/11	N/A	Auto Calc.
Particle size in solids (pipette&sieve) (2)	3	N/A	2019/11/14	ATL SOP 00012	MSAMS'78/WREP-125R3m
TCLP Inorganic extraction - pH	5	N/A	2019/10/22	ATL SOP 00035	EPA 1311 m
TCLP Inorganic extraction - Weight	5	N/A	2019/10/22	ATL SOP 00035	EPA 1311 m

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by BV Labs, unless otherwise agreed in writing. BV Labs is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope

Your P.O. #: 73517186
Your Project #: 11198639-04
Site Location: GLENCORE
Your C.O.C. #: D34724, D34726, D34725, D34723

Attention: Rob Turner

GHD Limited
466 Hodgson Rd
Fredericton , NB
CANADA E3C 2G5

Report Date: 2019/11/14
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Version: 4 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9R7082
Received: 2019/10/01, 10:40

dilution methods.
Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) Soils are reported on a dry weight basis unless otherwise specified.
(2) Note: Graphical representation of larger fractions (PHI-4, PHI -3 and PHI -2) not applicable unless these optional parameters are specifically requested.

Encryption Key

AUTHORIZED REPORT
RAPPORT AUTORISÉ

Bureau Veritas Laboratories
14 Nov 2019 16:33:56

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Heather Macumber, Senior Project Manager
Email: Heather.MACUMBER@bvlabs.com
Phone# (902)420-0203 Ext:226
==========
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BV Labs Job #: B9R7082
Report Date: 2019/11/14

GHD Limited
Client Project #: 11198639-04
Site Location: GLENCORE
Your P.O. #: 73517186
Sampler Initials: MG

RESULTS OF ANALYSES OF SOIL

BV Labs ID		KYE103			KYE104	KYE105	
Sampling Date		2019/09/23			2019/09/23	2019/09/23	
COC Number		D34724			D34724	D34724	
	UNITS	19SP-13 (0.0-0.6M)	RDL	QC Batch	19GW-129 (0.0-0.15M)	19GW-129 (0.6-1.2M)	QC Batch
Inorganics							
Moisture	%	14	1.0	6375588			
Sample Weight (as received)	g				100	100	6396819
Initial pH	N/A				5.0	5.0	6396823
Final pH	N/A				5.4	5.9	6396823

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

BV Labs ID		KYE106			KYE107	KYE108	
Sampling Date		2019/09/23			2019/09/23	2019/09/23	
COC Number		D34724			D34724	D34724	
	UNITS	19GW-129 (3.0-3.6M)	RDL	QC Batch	19GW-131 (0.0-0.15M)	19GW-131 (0.6-1.2M)	QC Batch
Inorganics							
Sample Weight (as received)	g				100	55	6396819
Initial pH	N/A				5.0	5.0	6396823
Final pH	N/A				5.7	5.4	6396823
< -1 Phi (2 mm)	%	60	0.10	6401297			
< 0 Phi (1 mm)	%	48	0.10	6401297			
< +1 Phi (0.5 mm)	%	38	0.10	6401297			
< +2 Phi (0.25 mm)	%	29	0.10	6401297			
< +3 Phi (0.12 mm)	%	22	0.10	6401297			
< +4 Phi (0.062 mm)	%	16	0.10	6401297			
< +5 Phi (0.031 mm)	%	13	0.10	6401297			
< +6 Phi (0.016 mm)	%	9.3	0.10	6401297			
< +7 Phi (0.0078 mm)	%	1.6	0.10	6401297			
< +8 Phi (0.0039 mm)	%	0.99	0.10	6401297			
< +9 Phi (0.0020 mm)	%	0.80	0.10	6401297			
Gravel	%	40	0.10	6401297			
Sand	%	44	0.10	6401297			
Silt	%	15	0.10	6401297			
Clay	%	0.99	0.10	6401297			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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BV Labs Job #: B9R7082
Report Date: 2019/11/14

GHD Limited
Client Project #: 11198639-04
Site Location: GLENCORE
Your P.O. #: 73517186
Sampler Initials: MG

RESULTS OF ANALYSES OF SOIL

BV Labs ID		KYE109			KYE112	KYE112		
Sampling Date		2019/09/23			2019/09/24	2019/09/24		
COC Number		D34724			D34724	D34724		
	UNITS	19GW-131 (1.2-1.5M)	RDL	QC Batch	19SP-19 (1.8-2.4M)	19SP-19 (1.8-2.4M) Lab-Dup	RDL	QC Batch
Inorganics								
Moisture	%				13	14	1.0	6366984
< -1 Phi (2 mm)	%	66	0.10	6401297				
< 0 Phi (1 mm)	%	52	0.10	6401297				
< +1 Phi (0.5 mm)	%	42	0.10	6401297				
< +2 Phi (0.25 mm)	%	34	0.10	6401297				
< +3 Phi (0.12 mm)	%	28	0.10	6401297				
< +4 Phi (0.062 mm)	%	22	0.10	6401297				
< +5 Phi (0.031 mm)	%	19	0.10	6401297				
< +6 Phi (0.016 mm)	%	14	0.10	6401297				
< +7 Phi (0.0078 mm)	%	8.9	0.10	6401297				
< +8 Phi (0.0039 mm)	%	7.6	0.10	6401297				
< +9 Phi (0.0020 mm)	%	5.2	0.10	6401297				
Gravel	%	34	0.10	6401297				
Sand	%	43	0.10	6401297				
Silt	%	15	0.10	6401297				
Clay	%	7.6	0.10	6401297				

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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BV Labs Job #: B9R7082
Report Date: 2019/11/14

GHD Limited
Client Project #: 11198639-04
Site Location: GLENCORE
Your P.O. #: 73517186
Sampler Initials: MG

RESULTS OF ANALYSES OF SOIL

BV Labs ID		KYE122			KYE124			KYE141	
Sampling Date		2019/09/24			2019/09/24			2019/09/25	
COC Number		D34726			D34726			D34725	
	UNITS	19GW-125 (1.2-1.8M)	RDL	QC Batch	19SP-18 (0.3-0.9M)	RDL	QC Batch	19SP-27 (1.8-2.4M)	QC Batch
Inorganics									
Moisture	%				12	1.0	6366984		
Sample Weight (as received)	g							100	6396819
Initial pH	N/A							5.0	6396823
Final pH	N/A							6.2	6396823
< -1 Phi (2 mm)	%	56	0.10	6401297					
< 0 Phi (1 mm)	%	48	0.10	6401297					
< +1 Phi (0.5 mm)	%	38	0.10	6401297					
< +2 Phi (0.25 mm)	%	27	0.10	6401297					
< +3 Phi (0.12 mm)	%	21	0.10	6401297					
< +4 Phi (0.062 mm)	%	17	0.10	6401297					
< +5 Phi (0.031 mm)	%	15	0.10	6401297					
< +6 Phi (0.016 mm)	%	12	0.10	6401297					
< +7 Phi (0.0078 mm)	%	3.2	0.10	6401297					
< +8 Phi (0.0039 mm)	%	1.8	0.10	6401297					
< +9 Phi (0.0020 mm)	%	1.2	0.10	6401297					
Gravel	%	44	0.10	6401297					
Sand	%	39	0.10	6401297					
Silt	%	15	0.10	6401297					
Clay	%	1.8	0.10	6401297					

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

BV Labs ID		KYE141	
Sampling Date		2019/09/25	
COC Number		D34725	
	UNITS	19SP-27 (1.8-2.4M) Lab-Dup	QC Batch
Inorganics			
Sample Weight (as received)	g	100	6396819
Initial pH	N/A	5.0	6396823
Final pH	N/A	6.2	6396823

QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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BV Labs Job #: B9R7082
Report Date: 2019/11/14

GHD Limited
Client Project #: 11198639-04
Site Location: GLENCORE
Your P.O. #: 73517186
Sampler Initials: MG

ELEMENTS BY ICP/MS (SOIL)

BV Labs ID		KYE104		KYE105		KYE107		
Sampling Date		2019/09/23		2019/09/23		2019/09/23		
COC Number		D34724		D34724		D34724		
	UNITS	19GW-129 (0.0-0.15M)	RDL	19GW-129 (0.6-1.2M)	RDL	19GW-131 (0.0-0.15M)	RDL	QC Batch
Metals								
Leachable Aluminum (Al)	ug/L	570	100	260	100	<100	100	6398775
Leachable Antimony (Sb)	ug/L	3400	200	67	20	560	20	6398775
Leachable Arsenic (As)	ug/L	7700	200	33	20	2200	20	6398775
Leachable Barium (Ba)	ug/L	220	50	220	50	140	50	6398775
Leachable Beryllium (Be)	ug/L	<20	20	<20	20	<20	20	6398775
Leachable Boron (B)	ug/L	<500	500	<500	500	<500	500	6398775
Leachable Cadmium (Cd)	ug/L	4800	3.0	130	3.0	39000	30	6398775
Leachable Calcium (Ca)	ug/L	250000	1000	680000	1000	88000	1000	6398775
Leachable Chromium (Cr)	ug/L	<20	20	<20	20	<20	20	6398775
Leachable Cobalt (Co)	ug/L	35	10	28	10	200	10	6398775
Leachable Copper (Cu)	ug/L	18000	20	<20	20	210000	200	6398775
Leachable Iron (Fe)	ug/L	<500	500	<500	500	<500	500	6398775
Leachable Lead (Pb)	ug/L	380000	50	22000	5.0	980000	500	6398775
Leachable Lithium (Li)	ug/L	<20	20	<20	20	<20	20	6398775
Leachable Magnesium (Mg)	ug/L	7700	1000	5300	1000	6300	1000	6398775
Leachable Manganese (Mn)	ug/L	3700	20	3300	20	5500	20	6398775
Leachable Molybdenum (Mo)	ug/L	<20	20	<20	20	<20	20	6398775
Leachable Nickel (Ni)	ug/L	40	20	<20	20	400	20	6398775
Leachable Potassium (K)	ug/L	4600	1000	4600	1000	4300	1000	6398775
Leachable Selenium (Se)	ug/L	<10	10	<10	10	<10	10	6398775
Leachable Silver (Ag)	ug/L	<5.0	5.0	<5.0	5.0	<5.0	5.0	6398775
Leachable Strontium (Sr)	ug/L	410	50	380	50	190	50	6398775
Leachable Thallium (Tl)	ug/L	140	1.0	4.0	1.0	430	1.0	6398775
Leachable Tin (Sn)	ug/L	<20	20	<20	20	<20	20	6398775
Leachable Uranium (U)	ug/L	1.2	1.0	1.1	1.0	<1.0	1.0	6398775
Leachable Vanadium (V)	ug/L	<20	20	<20	20	<20	20	6398775
Leachable Zinc (Zn)	ug/L	36000	50	35000	50	240000	50	6398775

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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BV Labs Job #: B9R7082
Report Date: 2019/11/14

GHD Limited
Client Project #: 11198639-04
Site Location: GLENCORE
Your P.O. #: 73517186
Sampler Initials: MG

ELEMENTS BY ICP/MS (SOIL)

BV Labs ID		KYE108		KYE141	KYE141		
Sampling Date		2019/09/23		2019/09/25	2019/09/25		
COC Number		D34724		D34725	D34725		
	UNITS	19GW-131 (0.6-1.2M)	RDL	19SP-27 (1.8-2.4M)	19SP-27 (1.8-2.4M) Lab-Dup	RDL	QC Batch
Metals							
Leachable Aluminum (Al)	ug/L	630	100	<100	<100	100	6398775
Leachable Antimony (Sb)	ug/L	130	20	63	70	20	6398775
Leachable Arsenic (As)	ug/L	110	20	260	250	20	6398775
Leachable Barium (Ba)	ug/L	830	50	5700	5600	50	6398775
Leachable Beryllium (Be)	ug/L	<20	20	<20	<20	20	6398775
Leachable Boron (B)	ug/L	<500	500	900	890	500	6398775
Leachable Cadmium (Cd)	ug/L	1400	3.0	490	500	3.0	6398775
Leachable Calcium (Ca)	ug/L	350000	1000	360000	360000	1000	6398775
Leachable Chromium (Cr)	ug/L	<20	20	<20	<20	20	6398775
Leachable Cobalt (Co)	ug/L	<10	10	360	360	10	6398775
Leachable Copper (Cu)	ug/L	600	20	25	29	20	6398775
Leachable Iron (Fe)	ug/L	750	500	29000	23000	500	6398775
Leachable Lead (Pb)	ug/L	16000	5.0	100000	100000	50	6398775
Leachable Lithium (Li)	ug/L	<20	20	45	43	20	6398775
Leachable Magnesium (Mg)	ug/L	11000	1000	18000	18000	1000	6398775
Leachable Manganese (Mn)	ug/L	2800	20	8700	8700	20	6398775
Leachable Molybdenum (Mo)	ug/L	<20	20	<20	<20	20	6398775
Leachable Nickel (Ni)	ug/L	<20	20	41	42	20	6398775
Leachable Potassium (K)	ug/L	13000	1000	14000	13000	1000	6398775
Leachable Selenium (Se)	ug/L	<10	10	<10	<10	10	6398775
Leachable Silver (Ag)	ug/L	<5.0	5.0	<5.0	<5.0	5.0	6398775
Leachable Strontium (Sr)	ug/L	390	50	1600	1600	50	6398775
Leachable Thallium (Tl)	ug/L	75	1.0	20	20	1.0	6398775
Leachable Tin (Sn)	ug/L	<20	20	<20	<20	20	6398775
Leachable Uranium (U)	ug/L	<1.0	1.0	<1.0	<1.0	1.0	6398775
Leachable Vanadium (V)	ug/L	<20	20	<20	<20	20	6398775
Leachable Zinc (Zn)	ug/L	1900	50	200000	200000	50	6398775

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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BV Labs Job #: B9R7082
Report Date: 2019/11/14

GHD Limited
Client Project #: 11198639-04
Site Location: GLENCORE
Your P.O. #: 73517186
Sampler Initials: MG

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

BV Labs ID		KYE104		KYE105		KYE107		
Sampling Date		2019/09/23		2019/09/23		2019/09/23		
COC Number		D34724		D34724		D34724		
	UNITS	19GW-129 (0.0-0.15M)	RDL	19GW-129 (0.6-1.2M)	RDL	19GW-131 (0.0-0.15M)	RDL	QC Batch
Metals								
Acid Extractable Aluminum (Al)	mg/kg	18000	10	15000	10	18000	10	6369358
Acid Extractable Antimony (Sb)	mg/kg	1700	20	89	2.0	740	20	6369358
Acid Extractable Arsenic (As)	mg/kg	2800	20	250	2.0	1400	20	6369358
Acid Extractable Barium (Ba)	mg/kg	150	5.0	99	5.0	89	5.0	6369358
Acid Extractable Beryllium (Be)	mg/kg	<2.0	2.0	<2.0	2.0	<2.0	2.0	6369358
Acid Extractable Bismuth (Bi)	mg/kg	180	2.0	24	2.0	110	2.0	6369358
Acid Extractable Boron (B)	mg/kg	<50	50	<50	50	<50	50	6369358
Acid Extractable Cadmium (Cd)	mg/kg	540	3.0	53	0.30	540	3.0	6369358
Acid Extractable Chromium (Cr)	mg/kg	66	2.0	41	2.0	49	2.0	6369358
Acid Extractable Cobalt (Co)	mg/kg	34	1.0	17	1.0	31	1.0	6369358
Acid Extractable Copper (Cu)	mg/kg	3500	2.0	830	2.0	9400	20	6369358
Acid Extractable Iron (Fe)	mg/kg	54000	50	34000	50	39000	50	6369358
Acid Extractable Lead (Pb)	mg/kg	32000	5.0	8700	0.50	29000	5.0	6369358
Acid Extractable Lithium (Li)	mg/kg	24	2.0	21	2.0	25	2.0	6369358
Acid Extractable Manganese (Mn)	mg/kg	1200	2.0	630	2.0	770	2.0	6369358
Acid Extractable Mercury (Hg)	mg/kg	9.7	0.10	44	0.10	<1.0	1.0	6369358
Acid Extractable Molybdenum (Mo)	mg/kg	6.8	2.0	<2.0	2.0	<2.0	2.0	6369358
Acid Extractable Nickel (Ni)	mg/kg	56	2.0	35	2.0	56	2.0	6369358
Acid Extractable Rubidium (Rb)	mg/kg	7.7	2.0	7.9	2.0	5.8	2.0	6369358
Acid Extractable Selenium (Se)	mg/kg	52	1.0	4.3	1.0	5.0	1.0	6369358
Acid Extractable Silver (Ag)	mg/kg	110	5.0	22	0.50	100	5.0	6369358
Acid Extractable Strontium (Sr)	mg/kg	59	5.0	42	5.0	39	5.0	6369358
Acid Extractable Thallium (Tl)	mg/kg	90	0.10	5.5	0.10	14	0.10	6369358
Acid Extractable Tin (Sn)	mg/kg	350	1.0	25	1.0	200	1.0	6369358
Acid Extractable Uranium (U)	mg/kg	0.91	0.10	0.74	0.10	0.49	0.10	6369358
Acid Extractable Vanadium (V)	mg/kg	120	2.0	52	2.0	65	2.0	6369358
Acid Extractable Zinc (Zn)	mg/kg	8900	5.0	12000	5.0	8900	5.0	6369358

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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BV Labs Job #: B9R7082
Report Date: 2019/11/14

GHD Limited
Client Project #: 11198639-04
Site Location: GLENCORE
Your P.O. #: 73517186
Sampler Initials: MG

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

BV Labs ID		KYE108			KYE110		KYE111		
Sampling Date		2019/09/23			2019/09/24		2019/09/24		
COC Number		D34724			D34724		D34724		
	UNITS	19GW-131 (0.6-1.2M)	RDL	QC Batch	19SP-19 (0.0-0.15M)	RDL	19SP-19 (0.6-1.2M)	RDL	QC Batch
Metals									
Acid Extractable Aluminum (Al)	mg/kg	24000	10	6369358	19000	100	17000	10	6369646
Acid Extractable Antimony (Sb)	mg/kg	29	2.0	6369358	210	20	37	2.0	6369646
Acid Extractable Arsenic (As)	mg/kg	230	2.0	6369358	2100	20	210	2.0	6369646
Acid Extractable Barium (Ba)	mg/kg	83	5.0	6369358	180	50	450	5.0	6369646
Acid Extractable Beryllium (Be)	mg/kg	<2.0	2.0	6369358	<20	20	<2.0	2.0	6369646
Acid Extractable Bismuth (Bi)	mg/kg	13	2.0	6369358	<20	20	4.5	2.0	6369646
Acid Extractable Boron (B)	mg/kg	<50	50	6369358	1100	500	73	50	6369646
Acid Extractable Cadmium (Cd)	mg/kg	93	0.30	6369358	47	3.0	43	0.30	6369646
Acid Extractable Chromium (Cr)	mg/kg	53	2.0	6369358	240	20	86	2.0	6369646
Acid Extractable Cobalt (Co)	mg/kg	18	1.0	6369358	130	10	32	1.0	6369646
Acid Extractable Copper (Cu)	mg/kg	390	2.0	6369358	1500	20	250	2.0	6369646
Acid Extractable Iron (Fe)	mg/kg	38000	50	6369358	220000	500	65000	50	6369646
Acid Extractable Lead (Pb)	mg/kg	2800	0.50	6369358	9700	5.0	1800	0.50	6369646
Acid Extractable Lithium (Li)	mg/kg	27	2.0	6369358	<20	20	24	2.0	6369646
Acid Extractable Manganese (Mn)	mg/kg	500	2.0	6369358	1700	20	1300	2.0	6369646
Acid Extractable Mercury (Hg)	mg/kg	3.1	0.10	6369358	<1.0	1.0	0.26	0.10	6369646
Acid Extractable Molybdenum (Mo)	mg/kg	<2.0	2.0	6369358	52	20	14	2.0	6369646
Acid Extractable Nickel (Ni)	mg/kg	53	2.0	6369358	39	20	48	2.0	6369646
Acid Extractable Rubidium (Rb)	mg/kg	6.0	2.0	6369358	<20	20	7.9	2.0	6369646
Acid Extractable Selenium (Se)	mg/kg	2.5	1.0	6369358	61	10	5.8	1.0	6369646
Acid Extractable Silver (Ag)	mg/kg	7.9	0.50	6369358	25	5.0	3.3	0.50	6369646
Acid Extractable Strontium (Sr)	mg/kg	23	5.0	6369358	3200	50	290	5.0	6369646
Acid Extractable Thallium (Tl)	mg/kg	16	0.10	6369358	8.4	1.0	8.6	0.10	6369646
Acid Extractable Tin (Sn)	mg/kg	14	1.0	6369358	1200	10	120	1.0	6369646
Acid Extractable Uranium (U)	mg/kg	0.48	0.10	6369358	2.1	1.0	0.93	0.10	6369646
Acid Extractable Vanadium (V)	mg/kg	66	2.0	6369358	52	20	46	2.0	6369646
Acid Extractable Zinc (Zn)	mg/kg	680	5.0	6369358	60000	50	6600	5.0	6369646

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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GHD Limited
Client Project #: 11198639-04
Site Location: GLENCORE
Your P.O. #: 73517186
Sampler Initials: MG

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

BV Labs ID		KYE119		KYE120		
Sampling Date		2019/09/24		2019/09/24		
COC Number		D34726		D34726		
	UNITS	19GW-126 (0.0-0.6M)	RDL	19GW-126 (1.2-1.8M)	RDL	QC Batch
Metals						
Acid Extractable Aluminum (Al)	mg/kg	21000	10	16000	10	6377371
Acid Extractable Antimony (Sb)	mg/kg	1100	20	210	2.0	6377371
Acid Extractable Arsenic (As)	mg/kg	1700	20	710	20	6377371
Acid Extractable Barium (Ba)	mg/kg	190	5.0	130	5.0	6377371
Acid Extractable Beryllium (Be)	mg/kg	<2.0	2.0	<2.0	2.0	6377371
Acid Extractable Bismuth (Bi)	mg/kg	130	2.0	56	2.0	6377371
Acid Extractable Boron (B)	mg/kg	<50	50	<50	50	6377371
Acid Extractable Cadmium (Cd)	mg/kg	260	0.30	140	0.30	6377371
Acid Extractable Chromium (Cr)	mg/kg	98	2.0	50	2.0	6377371
Acid Extractable Cobalt (Co)	mg/kg	45	1.0	53	1.0	6377371
Acid Extractable Copper (Cu)	mg/kg	2500	2.0	1500	2.0	6377371
Acid Extractable Iron (Fe)	mg/kg	55000	50	56000	50	6377371
Acid Extractable Lead (Pb)	mg/kg	19000	5.0	13000	5.0	6377371
Acid Extractable Lithium (Li)	mg/kg	30	2.0	23	2.0	6377371
Acid Extractable Manganese (Mn)	mg/kg	1900	2.0	990	2.0	6377371
Acid Extractable Mercury (Hg)	mg/kg	1.8	0.10	0.70	0.10	6377371
Acid Extractable Molybdenum (Mo)	mg/kg	7.0	2.0	8.0	2.0	6377371
Acid Extractable Nickel (Ni)	mg/kg	79	2.0	38	2.0	6377371
Acid Extractable Rubidium (Rb)	mg/kg	9.9	2.0	9.3	2.0	6377371
Acid Extractable Selenium (Se)	mg/kg	56	1.0	12	1.0	6377371
Acid Extractable Silver (Ag)	mg/kg	110	5.0	33	0.50	6377371
Acid Extractable Strontium (Sr)	mg/kg	65	5.0	47	5.0	6377371
Acid Extractable Thallium (Tl)	mg/kg	75	0.10	66	0.10	6377371
Acid Extractable Tin (Sn)	mg/kg	270	1.0	140	1.0	6377371
Acid Extractable Uranium (U)	mg/kg	0.86	0.10	0.81	0.10	6377371
Acid Extractable Vanadium (V)	mg/kg	63	2.0	44	2.0	6377371
Acid Extractable Zinc (Zn)	mg/kg	6500	5.0	19000	5.0	6377371

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

BV Labs Job #: B9R7082
Report Date: 2019/11/14

GHD Limited
Client Project #: 11198639-04
Site Location: GLENCORE
Your P.O. #: 73517186
Sampler Initials: MG

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

BV Labs ID		KYE121		KYE123		KYE125		
Sampling Date		2019/09/24		2019/09/24		2019/09/24		
COC Number		D34726		D34726		D34726		
	UNITS	19GW-125 (0.0-0.15M)	RDL	19GW-125 (1.8-2.4M)	RDL	19SP-20 (0.0-0.15M)	RDL	QC Batch
Metals								
Acid Extractable Aluminum (Al)	mg/kg	15000	100	13000	10	15000	100	6369646
Acid Extractable Antimony (Sb)	mg/kg	140	20	63	2.0	1700	20	6369646
Acid Extractable Arsenic (As)	mg/kg	1300	20	220	2.0	3400	20	6369646
Acid Extractable Barium (Ba)	mg/kg	520	50	46	5.0	240	50	6369646
Acid Extractable Beryllium (Be)	mg/kg	<20	20	<2.0	2.0	<20	20	6369646
Acid Extractable Bismuth (Bi)	mg/kg	52	20	38	2.0	430	20	6369646
Acid Extractable Boron (B)	mg/kg	<500	500	<50	50	<500	500	6369646
Acid Extractable Cadmium (Cd)	mg/kg	51	3.0	130	0.30	1400	3.0	6369646
Acid Extractable Chromium (Cr)	mg/kg	100	20	42	2.0	110	20	6369646
Acid Extractable Cobalt (Co)	mg/kg	290	10	26	1.0	81	10	6369646
Acid Extractable Copper (Cu)	mg/kg	3900	20	410	2.0	6600	20	6369646
Acid Extractable Iron (Fe)	mg/kg	290000	500	37000	50	100000	500	6369646
Acid Extractable Lead (Pb)	mg/kg	37000	5.0	7900	0.50	48000	5.0	6369646
Acid Extractable Lithium (Li)	mg/kg	<20	20	21	2.0	<20	20	6369646
Acid Extractable Manganese (Mn)	mg/kg	900	20	410	2.0	3400	20	6369646
Acid Extractable Mercury (Hg)	mg/kg	<1.0	1.0	0.38	0.10	8.1	1.0	6369646
Acid Extractable Molybdenum (Mo)	mg/kg	56	20	3.2	2.0	31	20	6369646
Acid Extractable Nickel (Ni)	mg/kg	<20	20	33	2.0	59	20	6369646
Acid Extractable Rubidium (Rb)	mg/kg	<20	20	8.7	2.0	<20	20	6369646
Acid Extractable Selenium (Se)	mg/kg	16	10	1.9	1.0	140	10	6369646
Acid Extractable Silver (Ag)	mg/kg	56	5.0	10	0.50	76	5.0	6369646
Acid Extractable Strontium (Sr)	mg/kg	150	50	18	5.0	400	50	6369646
Acid Extractable Thallium (Tl)	mg/kg	12	1.0	89	0.10	170	1.0	6369646
Acid Extractable Tin (Sn)	mg/kg	730	10	44	1.0	740	10	6369646
Acid Extractable Uranium (U)	mg/kg	2.4	1.0	1.1	0.10	1.6	1.0	6369646
Acid Extractable Vanadium (V)	mg/kg	39	20	46	2.0	55	20	6369646
Acid Extractable Zinc (Zn)	mg/kg	130000	50	8100	5.0	33000	50	6369646

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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BV Labs Job #: B9R7082
Report Date: 2019/11/14

GHD Limited
Client Project #: 11198639-04
Site Location: GLENCORE
Your P.O. #: 73517186
Sampler Initials: MG

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

BV Labs ID		KYE126		KYE127		KYE128		
Sampling Date		2019/09/24		2019/09/24		2019/09/24		
COC Number		D34726		D34726		D34726		
	UNITS	19SP-20 (0.6-1.2M)	RDL	19SP-24 (0.0-0.15M)	QC Batch	19SP-24 (1.2-1.8M)	RDL	QC Batch
Metals								
Acid Extractable Aluminum (Al)	mg/kg	1600	100	23000	6369646	21000	10	6369646
Acid Extractable Antimony (Sb)	mg/kg	470	20	3.4	6369646	3.3	2.0	6369646
Acid Extractable Arsenic (As)	mg/kg	1600	20	26	6369646	25	2.0	6369646
Acid Extractable Barium (Ba)	mg/kg	130	50	76	6369646	71	5.0	6369646
Acid Extractable Beryllium (Be)	mg/kg	<20	20	<2.0	6369646	<2.0	2.0	6369646
Acid Extractable Bismuth (Bi)	mg/kg	260	20	<2.0	6369646	<2.0	2.0	6369646
Acid Extractable Boron (B)	mg/kg	<500	500	<50	6369646	<50	50	6369646
Acid Extractable Cadmium (Cd)	mg/kg	70	3.0	2.8	6369646	2.3	0.30	6369646
Acid Extractable Chromium (Cr)	mg/kg	28	20	42	6369646	31	2.0	6369646
Acid Extractable Cobalt (Co)	mg/kg	18	10	14	6369646	13	1.0	6369646
Acid Extractable Copper (Cu)	mg/kg	2600	20	42	6369646	41	2.0	6377333
Acid Extractable Iron (Fe)	mg/kg	70000	500	33000	6369646	25000	50	6369646
Acid Extractable Lead (Pb)	mg/kg	68000	5.0	290	6369646	400	0.50	6369646
Acid Extractable Lithium (Li)	mg/kg	<20	20	26	6369646	31	2.0	6369646
Acid Extractable Manganese (Mn)	mg/kg	180	20	770	6369646	860	2.0	6369646
Acid Extractable Mercury (Hg)	mg/kg	3.8	1.0	<0.10	6369646	<0.10	0.10	6369646
Acid Extractable Molybdenum (Mo)	mg/kg	<20	20	<2.0	6369646	<2.0	2.0	6369646
Acid Extractable Nickel (Ni)	mg/kg	<20	20	38	6369646	30	2.0	6369646
Acid Extractable Rubidium (Rb)	mg/kg	<20	20	10	6369646	8.0	2.0	6369646
Acid Extractable Selenium (Se)	mg/kg	25	10	<1.0	6369646	<1.0	1.0	6369646
Acid Extractable Silver (Ag)	mg/kg	73	5.0	0.77	6369646	0.64	0.50	6377333
Acid Extractable Strontium (Sr)	mg/kg	<50	50	9.4	6369646	11	5.0	6369646
Acid Extractable Thallium (Tl)	mg/kg	110	1.0	0.98	6369646	0.73	0.10	6369646
Acid Extractable Tin (Sn)	mg/kg	230	10	2.2	6369646	1.8	1.0	6369646
Acid Extractable Uranium (U)	mg/kg	<1.0	1.0	0.58	6369646	0.67	0.10	6369646
Acid Extractable Vanadium (V)	mg/kg	<20	20	66	6369646	39	2.0	6369646
Acid Extractable Zinc (Zn)	mg/kg	13000	50	130	6369646	160	5.0	6369646

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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BV Labs Job #: B9R7082
Report Date: 2019/11/14

GHD Limited
Client Project #: 11198639-04
Site Location: GLENCORE
Your P.O. #: 73517186
Sampler Initials: MG

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

BV Labs ID		KYE128			KYE138	KYE139		
Sampling Date		2019/09/24			2019/09/24	2019/09/24		
COC Number		D34726			D34725	D34725		
	UNITS	19SP-24 (1.2-1.8M) Lab-Dup	RDL	QC Batch	19SP-25 (0.0-0.15M)	19SP-25 (0.6-1.2M)	RDL	QC Batch
Metals								
Acid Extractable Aluminum (Al)	mg/kg	24000	10	6369646	23000	15000	10	6369646
Acid Extractable Antimony (Sb)	mg/kg	3.4	2.0	6369646	5.9	12	2.0	6369646
Acid Extractable Arsenic (As)	mg/kg	25	2.0	6369646	41	75	2.0	6369646
Acid Extractable Barium (Ba)	mg/kg	74	5.0	6369646	86	120	5.0	6369646
Acid Extractable Beryllium (Be)	mg/kg	<2.0	2.0	6369646	<2.0	<2.0	2.0	6369646
Acid Extractable Bismuth (Bi)	mg/kg	<2.0	2.0	6369646	2.7	3.9	2.0	6369646
Acid Extractable Boron (B)	mg/kg	<50	50	6369646	<50	<50	50	6369646
Acid Extractable Cadmium (Cd)	mg/kg	2.1	0.30	6369646	4.2	8.0	0.30	6369646
Acid Extractable Chromium (Cr)	mg/kg	32	2.0	6369646	39	30	2.0	6369646
Acid Extractable Cobalt (Co)	mg/kg	14	1.0	6369646	16	14	1.0	6369646
Acid Extractable Copper (Cu)	mg/kg				63	310	2.0	6369646
Acid Extractable Iron (Fe)	mg/kg	27000	50	6369646	39000	30000	50	6369646
Acid Extractable Lead (Pb)	mg/kg	380	0.50	6369646	950	1200	0.50	6369646
Acid Extractable Lithium (Li)	mg/kg	34	2.0	6369646	30	27	2.0	6369646
Acid Extractable Manganese (Mn)	mg/kg	860	2.0	6369646	720	780	2.0	6369646
Acid Extractable Mercury (Hg)	mg/kg	<0.10	0.10	6369646	0.10	0.12	0.10	6369646
Acid Extractable Molybdenum (Mo)	mg/kg	<2.0	2.0	6369646	<2.0	<2.0	2.0	6369646
Acid Extractable Nickel (Ni)	mg/kg	32	2.0	6369646	41	38	2.0	6369646
Acid Extractable Rubidium (Rb)	mg/kg	10	2.0	6369646	12	8.1	2.0	6369646
Acid Extractable Selenium (Se)	mg/kg	<1.0	1.0	6369646	<1.0	<1.0	1.0	6369646
Acid Extractable Silver (Ag)	mg/kg				1.8	2.7	0.50	6369646
Acid Extractable Strontium (Sr)	mg/kg	11	5.0	6369646	11	14	5.0	6369646
Acid Extractable Thallium (Tl)	mg/kg	0.73	0.10	6369646	1.5	2.4	0.10	6369646
Acid Extractable Tin (Sn)	mg/kg	2.2	1.0	6369646	4.1	6.9	1.0	6369646
Acid Extractable Uranium (U)	mg/kg	0.81	0.10	6369646	0.61	0.87	0.10	6369646
Acid Extractable Vanadium (V)	mg/kg	43	2.0	6369646	72	51	2.0	6369646
Acid Extractable Zinc (Zn)	mg/kg	160	5.0	6369646	260	400	5.0	6369646

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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BV Labs Job #: B9R7082
Report Date: 2019/11/14

GHD Limited
Client Project #: 11198639-04
Site Location: GLENCORE
Your P.O. #: 73517186
Sampler Initials: MG

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

BV Labs ID		KYE140	KYE141	KYE142		KYE143		
Sampling Date		2019/09/25	2019/09/25	2019/09/25		2019/09/25		
COC Number		D34725	D34725	D34725		D34725		
	UNITS	19SP-26 (0.6-1.2M)	19SP-27 (1.8-2.4M)	19SP-28 (0.0-0.6M)	RDL	19SP-21 (0.0-0.15M)	RDL	QC Batch
Metals								
Acid Extractable Aluminum (Al)	mg/kg	12000	18000	21000	100	12000	10	6369646
Acid Extractable Antimony (Sb)	mg/kg	130	620	440	20	21	2.0	6369646
Acid Extractable Arsenic (As)	mg/kg	1600	2700	1400	20	75	2.0	6369646
Acid Extractable Barium (Ba)	mg/kg	520	600	210	50	120	5.0	6369646
Acid Extractable Beryllium (Be)	mg/kg	<20	<20	<20	20	<2.0	2.0	6369646
Acid Extractable Bismuth (Bi)	mg/kg	29	39	20	20	2.4	2.0	6369646
Acid Extractable Boron (B)	mg/kg	<500	<500	640	500	<50	50	6369646
Acid Extractable Cadmium (Cd)	mg/kg	69	190	28	3.0	10	0.30	6369646
Acid Extractable Chromium (Cr)	mg/kg	90	280	170	20	32	2.0	6369646
Acid Extractable Cobalt (Co)	mg/kg	230	340	51	10	18	1.0	6369646
Acid Extractable Copper (Cu)	mg/kg	3600	3600	4200	20	170	2.0	6369646
Acid Extractable Iron (Fe)	mg/kg	270000	250000	240000	500	33000	50	6369646
Acid Extractable Lead (Pb)	mg/kg	30000	33000	15000	5.0	1400	0.50	6369646
Acid Extractable Lithium (Li)	mg/kg	<20	<20	24	20	18	2.0	6369646
Acid Extractable Manganese (Mn)	mg/kg	4300	3600	15000	20	870	2.0	6369646
Acid Extractable Mercury (Hg)	mg/kg	<1.0	<1.0	<1.0	1.0	0.11	0.10	6369646
Acid Extractable Molybdenum (Mo)	mg/kg	46	100	220	20	3.3	2.0	6369646
Acid Extractable Nickel (Ni)	mg/kg	<20	<20	<20	20	28	2.0	6369646
Acid Extractable Rubidium (Rb)	mg/kg	<20	<20	28	20	6.1	2.0	6369646
Acid Extractable Selenium (Se)	mg/kg	26	22	150	10	2.2	1.0	6369646
Acid Extractable Silver (Ag)	mg/kg	28	78	63	5.0	3.2	0.50	6369646
Acid Extractable Strontium (Sr)	mg/kg	470	480	2400	50	46	5.0	6369646
Acid Extractable Thallium (Tl)	mg/kg	2.0	2.0	1.5	1.0	1.4	0.10	6369646
Acid Extractable Tin (Sn)	mg/kg	790	1100	490	10	35	1.0	6369646
Acid Extractable Uranium (U)	mg/kg	2.2	4.0	6.5	1.0	0.65	0.10	6369646
Acid Extractable Vanadium (V)	mg/kg	32	37	93	20	46	2.0	6369646
Acid Extractable Zinc (Zn)	mg/kg	110000	110000	110000	50	3900	5.0	6369646

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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BV Labs Job #: B9R7082
Report Date: 2019/11/14

GHD Limited
Client Project #: 11198639-04
Site Location: GLENCORE
Your P.O. #: 73517186
Sampler Initials: MG

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

BV Labs ID		KYE144	KYE145	KYE146	KYE147		
Sampling Date		2019/09/25	2019/09/25	2019/09/25	2019/09/25		
COC Number		D34725	D34725	D34725	D34725		
	UNITS	19SP-21 (0.3-0.6M)	19SP-22 (0.0-0.15M)	19SP-22 (1.2-1.8M)	19SP-23 (0.0-0.15M)	RDL	QC Batch
Metals							
Acid Extractable Aluminum (Al)	mg/kg	12000	15000	12000	20000	10	6369646
Acid Extractable Antimony (Sb)	mg/kg	2.4	14	<2.0	6.1	2.0	6369646
Acid Extractable Arsenic (As)	mg/kg	12	59	10	37	2.0	6369646
Acid Extractable Barium (Ba)	mg/kg	62	89	39	85	5.0	6369646
Acid Extractable Beryllium (Be)	mg/kg	<2.0	<2.0	<2.0	<2.0	2.0	6369646
Acid Extractable Bismuth (Bi)	mg/kg	<2.0	2.8	<2.0	2.5	2.0	6369646
Acid Extractable Boron (B)	mg/kg	<50	<50	<50	<50	50	6369646
Acid Extractable Cadmium (Cd)	mg/kg	1.2	5.7	<0.30	4.8	0.30	6369646
Acid Extractable Chromium (Cr)	mg/kg	28	45	33	47	2.0	6369646
Acid Extractable Cobalt (Co)	mg/kg	9.0	17	12	17	1.0	6369646
Acid Extractable Copper (Cu)	mg/kg	24	92	13	98	2.0	6369646
Acid Extractable Iron (Fe)	mg/kg	21000	38000	29000	41000	50	6369646
Acid Extractable Lead (Pb)	mg/kg	140	810	20	690	0.50	6369646
Acid Extractable Lithium (Li)	mg/kg	18	21	16	26	2.0	6369646
Acid Extractable Manganese (Mn)	mg/kg	480	790	570	880	2.0	6369646
Acid Extractable Mercury (Hg)	mg/kg	<0.10	<0.10	<0.10	0.11	0.10	6369646
Acid Extractable Molybdenum (Mo)	mg/kg	<2.0	<2.0	<2.0	<2.0	2.0	6369646
Acid Extractable Nickel (Ni)	mg/kg	21	41	31	42	2.0	6369646
Acid Extractable Rubidium (Rb)	mg/kg	4.8	6.6	4.8	11	2.0	6369646
Acid Extractable Selenium (Se)	mg/kg	<1.0	1.0	<1.0	<1.0	1.0	6369646
Acid Extractable Silver (Ag)	mg/kg	<0.50	2.1	<0.50	1.4	0.50	6369646
Acid Extractable Strontium (Sr)	mg/kg	19	32	43	12	5.0	6369646
Acid Extractable Thallium (Tl)	mg/kg	0.30	0.91	<0.10	1.6	0.10	6369646
Acid Extractable Tin (Sn)	mg/kg	2.4	23	<1.0	5.9	1.0	6369646
Acid Extractable Uranium (U)	mg/kg	1.3	0.51	0.37	0.77	0.10	6369646
Acid Extractable Vanadium (V)	mg/kg	41	68	57	78	2.0	6369646
Acid Extractable Zinc (Zn)	mg/kg	180	1900	54	620	5.0	6369646

RDL = Reportable Detection Limit
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BV Labs Job #: B9R7082
Report Date: 2019/11/14

GHD Limited
Client Project #: 11198639-04
Site Location: GLENCORE
Your P.O. #: 73517186
Sampler Initials: MG

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

BV Labs ID		KYE156	KYE157			KYE158	KYE158		
Sampling Date		2019/09/25	2019/09/25			2019/09/25	2019/09/25		
COC Number		D34723	D34723			D34723	D34723		
	UNITS	19SP-23 (0.6-1.2M)	SOIL-QA/QC-4	RDL	QC Batch	SOIL-QA/QC-5	SOIL-QA/QC-5 Lab-Dup	RDL	QC Batch
Metals									
Acid Extractable Aluminum (Al)	mg/kg	13000	12000	10	6369646	20000	20000	10	6372709
Acid Extractable Antimony (Sb)	mg/kg	<2.0	<2.0	2.0	6369646	330	310	20	6372709
Acid Extractable Arsenic (As)	mg/kg	15	8.9	2.0	6369646	1500	1500	20	6372709
Acid Extractable Barium (Ba)	mg/kg	76	41	5.0	6369646	350	310	5.0	6372709
Acid Extractable Beryllium (Be)	mg/kg	<2.0	<2.0	2.0	6369646	<2.0	<2.0	2.0	6372709
Acid Extractable Bismuth (Bi)	mg/kg	<2.0	<2.0	2.0	6369646	18	14	2.0	6372709
Acid Extractable Boron (B)	mg/kg	<50	<50	50	6369646	1100	1100	50	6372709
Acid Extractable Cadmium (Cd)	mg/kg	0.32	<0.30	0.30	6369646	23	21	0.30	6372709
Acid Extractable Chromium (Cr)	mg/kg	31	31	2.0	6369646	170	150	2.0	6372709
Acid Extractable Cobalt (Co)	mg/kg	13	11	1.0	6369646	42	41	1.0	6372709
Acid Extractable Copper (Cu)	mg/kg	14	15	2.0	6369646	3900	3700	2.0	6372709
Acid Extractable Iron (Fe)	mg/kg	31000	25000	50	6369646	240000	240000	500	6372709
Acid Extractable Lead (Pb)	mg/kg	30	21	0.50	6369646	16000	14000	5.0	6372709
Acid Extractable Lithium (Li)	mg/kg	19	18	2.0	6369646	27	26	2.0	6372709
Acid Extractable Manganese (Mn)	mg/kg	960	540	2.0	6369646	13000	12000	2.0	6372709
Acid Extractable Mercury (Hg)	mg/kg	<0.10	<0.10	0.10	6369646	<0.10	<0.10	0.10	6372709
Acid Extractable Molybdenum (Mo)	mg/kg	<2.0	<2.0	2.0	6369646	200	200	2.0	6372709
Acid Extractable Nickel (Ni)	mg/kg	35	33	2.0	6369646	6.0	5.4	2.0	6372709
Acid Extractable Rubidium (Rb)	mg/kg	5.8	4.7	2.0	6369646	28	29	2.0	6372709
Acid Extractable Selenium (Se)	mg/kg	<1.0	<1.0	1.0	6369646	140	140	1.0	6372709
Acid Extractable Silver (Ag)	mg/kg	<0.50	<0.50	0.50	6369646	74	58	5.0	6372709
Acid Extractable Strontium (Sr)	mg/kg	10	43	5.0	6369646	2400	2300	5.0	6372709
Acid Extractable Thallium (Tl)	mg/kg	0.14	<0.10	0.10	6369646	1.3	1.0	0.10	6372709
Acid Extractable Tin (Sn)	mg/kg	<1.0	<1.0	1.0	6369646	450	460	10	6372709
Acid Extractable Uranium (U)	mg/kg	0.46	0.35	0.10	6369646	6.2	6.1	0.10	6372709
Acid Extractable Vanadium (V)	mg/kg	56	46	2.0	6369646	92	89	2.0	6372709
Acid Extractable Zinc (Zn)	mg/kg	51	57	5.0	6369646	120000	120000	50	6372709

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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GHD Limited
Client Project #: 11198639-04
Site Location: GLENCORE
Your P.O. #: 73517186
Sampler Initials: MG

SEMI-VOLATILE ORGANICS BY GC-MS (SOIL)

BV Labs ID		KYE112			KYE112		
Sampling Date		2019/09/24			2019/09/24		
COC Number		D34724			D34724		
	UNITS	19SP-19 (1.8-2.4M)	RDL	QC Batch	19SP-19 (1.8-2.4M) Lab-Dup	RDL	QC Batch
Polyaromatic Hydrocarbons							
1-Methylnaphthalene	mg/kg	<0.010	0.010	6370106	<0.010	0.010	6370106
2-Methylnaphthalene	mg/kg	<0.010	0.010	6370106	<0.010	0.010	6370106
Acenaphthene	mg/kg	<0.010	0.010	6370106	<0.010	0.010	6370106
Acenaphthylene	mg/kg	<0.010	0.010	6370106	<0.010	0.010	6370106
Anthracene	mg/kg	<0.010	0.010	6370106	<0.010	0.010	6370106
Benzo(a)anthracene	mg/kg	<0.010	0.010	6370106	<0.010	0.010	6370106
Benzo(a)pyrene	mg/kg	<0.010	0.010	6370106	<0.010	0.010	6370106
Benzo(b)fluoranthene	mg/kg	<0.010	0.010	6370106	<0.010	0.010	6370106
Benzo(b/j)fluoranthene	mg/kg	<0.020	0.020	6366923			
Benzo(g,h,i)perylene	mg/kg	<0.010	0.010	6370106	<0.010	0.010	6370106
Benzo(j)fluoranthene	mg/kg	<0.010	0.010	6370106	<0.010	0.010	6370106
Benzo(k)fluoranthene	mg/kg	<0.010	0.010	6370106	<0.010	0.010	6370106
Chrysene	mg/kg	<0.010	0.010	6370106	<0.010	0.010	6370106
Dibenz(a,h)anthracene	mg/kg	<0.010	0.010	6370106	<0.010	0.010	6370106
Fluoranthene	mg/kg	<0.010	0.010	6370106	<0.010	0.010	6370106
Fluorene	mg/kg	<0.010	0.010	6370106	<0.010	0.010	6370106
Indeno(1,2,3-cd)pyrene	mg/kg	<0.010	0.010	6370106	<0.010	0.010	6370106
Naphthalene	mg/kg	<0.010	0.010	6370106	<0.010	0.010	6370106
Perylene	mg/kg	<0.010	0.010	6370106	<0.010	0.010	6370106
Phenanthrene	mg/kg	<0.010	0.010	6370106	<0.010	0.010	6370106
Pyrene	mg/kg	<0.010	0.010	6370106	<0.010	0.010	6370106
Surrogate Recovery (%)							
D10-Anthracene	%	92		6370106	88		6370106
D14-Terphenyl (FS)	%	92		6370106	88		6370106
D8-Acenaphthylene	%	91		6370106	88		6370106

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

BV Labs Job #: B9R7082
Report Date: 2019/11/14

GHD Limited
Client Project #: 11198639-04
Site Location: GLENCORE
Your P.O. #: 73517186
Sampler Initials: MG

POLYCHLORINATED BIPHENYLS BY GC-ECD (SOIL)

BV Labs ID		KYE103			KYE103			KYE124		
Sampling Date		2019/09/23			2019/09/23			2019/09/24		
COC Number		D34724			D34724			D34726		
	UNITS	19SP-13 (0.0-0.6M)	RDL	QC Batch	19SP-13 (0.0-0.6M) Lab-Dup	RDL	QC Batch	19SP-18 (0.3-0.9M)	RDL	QC Batch
PCBs										
Aroclor 1016	ug/g	<0.050	0.050	6380491	<0.050	0.050	6380491	<0.050	0.050	6367103
Aroclor 1221	ug/g	<0.050	0.050	6380491	<0.050	0.050	6380491	<0.050	0.050	6367103
Aroclor 1232	ug/g	<0.050	0.050	6380491	<0.050	0.050	6380491	<0.050	0.050	6367103
Aroclor 1248	ug/g	<0.050	0.050	6380491	<0.050	0.050	6380491	<0.050	0.050	6367103
Aroclor 1242	ug/g	<0.050	0.050	6380491	<0.050	0.050	6380491	<0.050	0.050	6367103
Aroclor 1254	ug/g	0.060	0.050	6380491	0.062	0.050	6380491	<0.050	0.050	6367103
Aroclor 1260	ug/g	<0.050	0.050	6380491	<0.050	0.050	6380491	<0.050	0.050	6367103
Calculated Total PCB	ug/g	0.060	0.050	6375615				<0.050	0.050	6366925
Surrogate Recovery (%)										
Decachlorobiphenyl	%	93		6380491	94		6380491	105		6367103

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

BV Labs ID		KYE124		
Sampling Date		2019/09/24		
COC Number		D34726		
	UNITS	19SP-18 (0.3-0.9M) Lab-Dup	RDL	QC Batch
PCBs				
Aroclor 1016	ug/g	<0.050	0.050	6367103
Aroclor 1221	ug/g	<0.050	0.050	6367103
Aroclor 1232	ug/g	<0.050	0.050	6367103
Aroclor 1248	ug/g	<0.050	0.050	6367103
Aroclor 1242	ug/g	<0.050	0.050	6367103
Aroclor 1254	ug/g	<0.050	0.050	6367103
Aroclor 1260	ug/g	<0.050	0.050	6367103
Surrogate Recovery (%)				
Decachlorobiphenyl	%	104		6367103

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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BV Labs Job #: B9R7082
Report Date: 2019/11/14

GHD Limited
Client Project #: 11198639-04
Site Location: GLENCORE
Your P.O. #: 73517186
Sampler Initials: MG

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	3.7°C
Package 2	6.3°C

Sample KYE108 [19GW-131 (0.6-1.2M)] : The minimum weight of 100g for the standard TCLP extraction, as per Reference Method EPA 1311 R1992, could not be achieved due to insufficient sample. Client consent has been received to proceed using the modified TCLP method. The uncertainty of the analysis may be increased, and the reported results may not be suitable for compliance purposes.

Sample KYE110 [19SP-19 (0.0-0.15M)] : Elevated reporting limits for trace metals due to sample matrix.

Sample KYE121 [19GW-125 (0.0-0.15M)] : Elevated reporting limits for trace metals due to sample matrix.

Sample KYE125 [19SP-20 (0.0-0.15M)] : Elevated reporting limits for trace metals due to sample matrix.

Sample KYE126 [19SP-20 (0.6-1.2M)] : Elevated reporting limits for trace metals due to sample matrix.

Sample KYE140 [19SP-26 (0.6-1.2M)] : Elevated reporting limits for trace metals due to sample matrix.

Sample KYE141 [19SP-27 (1.8-2.4M)] : Elevated reporting limits for trace metals due to sample matrix.

Sample KYE142 [19SP-28 (0.0-0.6M)] : Elevated reporting limits for trace metals due to sample matrix.

Sample KYE128, Metals Solids Acid Extr. ICPMS: Test repeated.

Results relate only to the items tested.

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Report Date: 2019/11/14

QUALITY ASSURANCE REPORT

GHD Limited
Client Project #: 11198639-04
Site Location: GLENCORE
Your P.O. #: 73517186
Sampler Initials: MG

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
6367103	Decachlorobiphenyl	2019/10/07	101 (2)	70 - 130	103	70 - 130	100	%		
6370106	D10-Anthracene	2019/10/07	90 (7)	50 - 130	92	50 - 130	94	%		
6370106	D14-Terphenyl (FS)	2019/10/07	92 (7)	50 - 130	93	50 - 130	93	%		
6370106	D8-Acenaphthylene	2019/10/07	92 (7)	50 - 130	92	50 - 130	95	%		
6380491	Decachlorobiphenyl	2019/10/11	90 (11)	70 - 130	93	70 - 130	94	%		
6366984	Moisture	2019/10/03							8.2 (1)	25
6367103	Aroclor 1016	2019/10/07					<0.050	ug/g	NC (3)	50
6367103	Aroclor 1221	2019/10/07					<0.050	ug/g	NC (3)	50
6367103	Aroclor 1232	2019/10/07					<0.050	ug/g	NC (3)	50
6367103	Aroclor 1242	2019/10/07					<0.050	ug/g	NC (3)	50
6367103	Aroclor 1248	2019/10/07					<0.050	ug/g	NC (3)	50
6367103	Aroclor 1254	2019/10/07	105 (2)	70 - 130	103	70 - 130	<0.050	ug/g	NC (3)	50
6367103	Aroclor 1260	2019/10/07					<0.050	ug/g	NC (3)	50
6369358	Acid Extractable Aluminum (Al)	2019/10/04					<10	mg/kg	5.8 (4)	35
6369358	Acid Extractable Antimony (Sb)	2019/10/04	100	75 - 125	104	75 - 125	<2.0	mg/kg	NC (4)	35
6369358	Acid Extractable Arsenic (As)	2019/10/04	103	75 - 125	104	75 - 125	<2.0	mg/kg	3.3 (4)	35
6369358	Acid Extractable Barium (Ba)	2019/10/04	102	75 - 125	98	75 - 125	<5.0	mg/kg	8.4 (4)	35
6369358	Acid Extractable Beryllium (Be)	2019/10/04	106	75 - 125	103	75 - 125	<2.0	mg/kg	NC (4)	35
6369358	Acid Extractable Bismuth (Bi)	2019/10/04	104	75 - 125	102	75 - 125	<2.0	mg/kg	NC (4)	35
6369358	Acid Extractable Boron (B)	2019/10/04	105	75 - 125	101	75 - 125	<50	mg/kg	NC (4)	35
6369358	Acid Extractable Cadmium (Cd)	2019/10/04	103	75 - 125	102	75 - 125	<0.30	mg/kg	NC (4)	35
6369358	Acid Extractable Chromium (Cr)	2019/10/04	101	75 - 125	100	75 - 125	<2.0	mg/kg	4.1 (4)	35
6369358	Acid Extractable Cobalt (Co)	2019/10/04	104	75 - 125	101	75 - 125	<1.0	mg/kg	6.3 (4)	35
6369358	Acid Extractable Copper (Cu)	2019/10/04	105	75 - 125	100	75 - 125	<2.0	mg/kg	3.8 (4)	35
6369358	Acid Extractable Iron (Fe)	2019/10/04					<50	mg/kg	7.3 (4)	35
6369358	Acid Extractable Lead (Pb)	2019/10/04	103	75 - 125	103	75 - 125	<0.50	mg/kg	3.5 (4)	35
6369358	Acid Extractable Lithium (Li)	2019/10/04	109	75 - 125	108	75 - 125	<2.0	mg/kg	4.3 (4)	35
6369358	Acid Extractable Manganese (Mn)	2019/10/04	NC	75 - 125	104	75 - 125	<2.0	mg/kg	0.91 (4)	35
6369358	Acid Extractable Mercury (Hg)	2019/10/04	99	75 - 125	108	75 - 125	<0.10	mg/kg	NC (4)	35
6369358	Acid Extractable Molybdenum (Mo)	2019/10/04	104	75 - 125	103	75 - 125	<2.0	mg/kg	NC (4)	35
6369358	Acid Extractable Nickel (Ni)	2019/10/04	103	75 - 125	101	75 - 125	<2.0	mg/kg	0.46 (4)	35

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
6369358	Acid Extractable Rubidium (Rb)	2019/10/04	103	75 - 125	101	75 - 125	<2.0	mg/kg	5.0 (4)	35
6369358	Acid Extractable Selenium (Se)	2019/10/04	104	75 - 125	106	75 - 125	<1.0	mg/kg	NC (4)	35
6369358	Acid Extractable Silver (Ag)	2019/10/04	100	75 - 125	98	75 - 125	<0.50	mg/kg	NC (4)	35
6369358	Acid Extractable Strontium (Sr)	2019/10/04	110	75 - 125	105	75 - 125	<5.0	mg/kg	11 (4)	35
6369358	Acid Extractable Thallium (Tl)	2019/10/04	104	75 - 125	104	75 - 125	<0.10	mg/kg	NC (4)	35
6369358	Acid Extractable Tin (Sn)	2019/10/04	105	75 - 125	102	75 - 125	<1.0	mg/kg	NC (4)	35
6369358	Acid Extractable Uranium (U)	2019/10/04	109	75 - 125	110	75 - 125	<0.10	mg/kg	1.0 (4)	35
6369358	Acid Extractable Vanadium (V)	2019/10/04	99	75 - 125	97	75 - 125	<2.0	mg/kg	10 (4)	35
6369358	Acid Extractable Zinc (Zn)	2019/10/04	99	75 - 125	102	75 - 125	<5.0	mg/kg	8.8 (4)	35
6369646	Acid Extractable Aluminum (Al)	2019/10/08					<10	mg/kg	15 (6)	35
6369646	Acid Extractable Antimony (Sb)	2019/10/08	120 (5)	75 - 125	102	75 - 125	<2.0	mg/kg	1.4 (6)	35
6369646	Acid Extractable Arsenic (As)	2019/10/08	106 (5)	75 - 125	104	75 - 125	<2.0	mg/kg	1.2 (6)	35
6369646	Acid Extractable Barium (Ba)	2019/10/08	NC (5)	75 - 125	106	75 - 125	<5.0	mg/kg	4.5 (6)	35
6369646	Acid Extractable Beryllium (Be)	2019/10/08	108 (5)	75 - 125	106	75 - 125	<2.0	mg/kg	NC (6)	35
6369646	Acid Extractable Bismuth (Bi)	2019/10/08	109 (5)	75 - 125	106	75 - 125	<2.0	mg/kg	NC (6)	35
6369646	Acid Extractable Boron (B)	2019/10/08	91 (5)	75 - 125	105	75 - 125	<50	mg/kg	NC (6)	35
6369646	Acid Extractable Cadmium (Cd)	2019/10/08	101 (5)	75 - 125	102	75 - 125	<0.30	mg/kg	9.2 (6)	35
6369646	Acid Extractable Chromium (Cr)	2019/10/08	106 (5)	75 - 125	103	75 - 125	<2.0	mg/kg	3.7 (6)	35
6369646	Acid Extractable Cobalt (Co)	2019/10/08	105 (5)	75 - 125	106	75 - 125	<1.0	mg/kg	8.6 (6)	35
6369646	Acid Extractable Copper (Cu)	2019/10/08	NC (5)	75 - 125	101	75 - 125	<2.0	mg/kg		
6369646	Acid Extractable Iron (Fe)	2019/10/08					<50	mg/kg	8.2 (6)	35
6369646	Acid Extractable Lead (Pb)	2019/10/08	NC (5)	75 - 125	105	75 - 125	<0.50	mg/kg	6.6 (6)	35
6369646	Acid Extractable Lithium (Li)	2019/10/08	121 (5)	75 - 125	107	75 - 125	<2.0	mg/kg	10 (6)	35
6369646	Acid Extractable Manganese (Mn)	2019/10/08	NC (5)	75 - 125	104	75 - 125	<2.0	mg/kg	0.21 (6)	35
6369646	Acid Extractable Mercury (Hg)	2019/10/08	102 (5)	75 - 125	109	75 - 125	<0.10	mg/kg	NC (6)	35
6369646	Acid Extractable Molybdenum (Mo)	2019/10/08	109 (5)	75 - 125	109	75 - 125	<2.0	mg/kg	NC (6)	35
6369646	Acid Extractable Nickel (Ni)	2019/10/08	105 (5)	75 - 125	103	75 - 125	<2.0	mg/kg	8.2 (6)	35
6369646	Acid Extractable Rubidium (Rb)	2019/10/08	98 (5)	75 - 125	104	75 - 125	<2.0	mg/kg	26 (6)	35
6369646	Acid Extractable Selenium (Se)	2019/10/08	101 (5)	75 - 125	106	75 - 125	<1.0	mg/kg	NC (6)	35
6369646	Acid Extractable Silver (Ag)	2019/10/08	112 (5)	75 - 125	102	75 - 125	<0.50	mg/kg		
6369646	Acid Extractable Strontium (Sr)	2019/10/08	104 (5)	75 - 125	107	75 - 125	<5.0	mg/kg	4.7 (6)	35

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
6369646	Acid Extractable Thallium (Tl)	2019/10/08	108 (5)	75 - 125	104	75 - 125	<0.10	mg/kg	0.73 (6)	35
6369646	Acid Extractable Tin (Sn)	2019/10/08	106 (5)	75 - 125	110	75 - 125	<1.0	mg/kg	18 (6)	35
6369646	Acid Extractable Uranium (U)	2019/10/08	114 (5)	75 - 125	103	75 - 125	<0.10	mg/kg	19 (6)	35
6369646	Acid Extractable Vanadium (V)	2019/10/08	107 (5)	75 - 125	105	75 - 125	<2.0	mg/kg	10 (6)	35
6369646	Acid Extractable Zinc (Zn)	2019/10/08	NC (5)	75 - 125	105	75 - 125	<5.0	mg/kg	0.30 (6)	35
6370106	1-Methylnaphthalene	2019/10/07	113 (7)	50 - 130	114	50 - 130	<0.010	mg/kg	NC (1)	50
6370106	2-Methylnaphthalene	2019/10/07	110 (7)	50 - 130	109	50 - 130	<0.010	mg/kg	NC (1)	50
6370106	Acenaphthene	2019/10/07	111 (7)	50 - 130	111	50 - 130	<0.010	mg/kg	NC (1)	50
6370106	Acenaphthylene	2019/10/07	110 (7)	50 - 130	111	50 - 130	<0.010	mg/kg	NC (1)	50
6370106	Anthracene	2019/10/07	107 (7)	50 - 130	110	50 - 130	<0.010	mg/kg	NC (1)	50
6370106	Benzo(a)anthracene	2019/10/07	119 (7)	50 - 130	118	50 - 130	<0.010	mg/kg	NC (1)	50
6370106	Benzo(a)pyrene	2019/10/07	102 (7)	50 - 130	105	50 - 130	<0.010	mg/kg	NC (1)	50
6370106	Benzo(b)fluoranthene	2019/10/07	109 (7)	50 - 130	111	50 - 130	<0.010	mg/kg	NC (1)	50
6370106	Benzo(g,h,i)perylene	2019/10/07	99 (7)	50 - 130	103	50 - 130	<0.010	mg/kg	NC (1)	50
6370106	Benzo(j)fluoranthene	2019/10/07	105 (7)	50 - 130	109	50 - 130	<0.010	mg/kg	NC (1)	50
6370106	Benzo(k)fluoranthene	2019/10/07	106 (7)	50 - 130	110	50 - 130	<0.010	mg/kg	NC (1)	50
6370106	Chrysene	2019/10/07	118 (7)	50 - 130	119	50 - 130	<0.010	mg/kg	NC (1)	50
6370106	Dibenz(a,h)anthracene	2019/10/07	110 (7)	50 - 130	114	50 - 130	<0.010	mg/kg	NC (1)	50
6370106	Fluoranthene	2019/10/07	113 (7)	50 - 130	114	50 - 130	<0.010	mg/kg	NC (1)	50
6370106	Fluorene	2019/10/07	111 (7)	50 - 130	113	50 - 130	<0.010	mg/kg	NC (1)	50
6370106	Indeno(1,2,3-cd)pyrene	2019/10/07	105 (7)	50 - 130	110	50 - 130	<0.010	mg/kg	NC (1)	50
6370106	Naphthalene	2019/10/07	110 (7)	50 - 130	110	50 - 130	<0.010	mg/kg	NC (1)	50
6370106	Perylene	2019/10/07	104 (7)	50 - 130	108	50 - 130	<0.010	mg/kg	NC (1)	50
6370106	Phenanthrene	2019/10/07	109 (7)	50 - 130	111	50 - 130	<0.010	mg/kg	NC (1)	50
6370106	Pyrene	2019/10/07	110 (7)	50 - 130	115	50 - 130	<0.010	mg/kg	NC (1)	50
6372709	Acid Extractable Aluminum (Al)	2019/10/07					<10	mg/kg	3.0 (9)	35
6372709	Acid Extractable Antimony (Sb)	2019/10/07	NC (8)	75 - 125	100	75 - 125	<2.0	mg/kg	8.0 (9)	35
6372709	Acid Extractable Arsenic (As)	2019/10/07	NC (8)	75 - 125	105	75 - 125	<2.0	mg/kg	4.2 (9)	35
6372709	Acid Extractable Barium (Ba)	2019/10/07	NC (8)	75 - 125	103	75 - 125	<5.0	mg/kg	14 (9)	35
6372709	Acid Extractable Beryllium (Be)	2019/10/07	103 (8)	75 - 125	104	75 - 125	<2.0	mg/kg	NC (9)	35
6372709	Acid Extractable Bismuth (Bi)	2019/10/07	NC (8)	75 - 125	103	75 - 125	<2.0	mg/kg	31 (9)	35

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
6372709	Acid Extractable Boron (B)	2019/10/07	NC (8)	75 - 125	108	75 - 125	<50	mg/kg	2.8 (9)	35
6372709	Acid Extractable Cadmium (Cd)	2019/10/07	98 (8)	75 - 125	98	75 - 125	<0.30	mg/kg	9.5 (9)	35
6372709	Acid Extractable Chromium (Cr)	2019/10/07	NC (8)	75 - 125	105	75 - 125	<2.0	mg/kg	10 (9)	35
6372709	Acid Extractable Cobalt (Co)	2019/10/07	99 (8)	75 - 125	106	75 - 125	<1.0	mg/kg	2.0 (9)	35
6372709	Acid Extractable Copper (Cu)	2019/10/07	NC (8)	75 - 125	104	75 - 125	<2.0	mg/kg	5.2 (9)	35
6372709	Acid Extractable Iron (Fe)	2019/10/07					<50	mg/kg	1.8 (9)	35
6372709	Acid Extractable Lead (Pb)	2019/10/07	NC (8)	75 - 125	104	75 - 125	<0.50	mg/kg	9.3 (9)	35
6372709	Acid Extractable Lithium (Li)	2019/10/07	108 (8)	75 - 125	105	75 - 125	<2.0	mg/kg	3.8 (9)	35
6372709	Acid Extractable Manganese (Mn)	2019/10/07	NC (8)	75 - 125	107	75 - 125	<2.0	mg/kg	1.6 (9)	35
6372709	Acid Extractable Mercury (Hg)	2019/10/07	97 (8)	75 - 125	105	75 - 125	<0.10	mg/kg	NC (9)	35
6372709	Acid Extractable Molybdenum (Mo)	2019/10/07	NC (8)	75 - 125	104	75 - 125	<2.0	mg/kg	0.71 (9)	35
6372709	Acid Extractable Nickel (Ni)	2019/10/07	100 (8)	75 - 125	106	75 - 125	<2.0	mg/kg	12 (9)	35
6372709	Acid Extractable Rubidium (Rb)	2019/10/07	98 (8)	75 - 125	103	75 - 125	<2.0	mg/kg	2.7 (9)	35
6372709	Acid Extractable Selenium (Se)	2019/10/07	NC (8)	75 - 125	105	75 - 125	<1.0	mg/kg	1.2 (9)	35
6372709	Acid Extractable Silver (Ag)	2019/10/07	NC (8)	75 - 125	101	75 - 125	<0.50	mg/kg	24 (9)	35
6372709	Acid Extractable Strontium (Sr)	2019/10/07	NC (8)	75 - 125	105	75 - 125	<5.0	mg/kg	7.1 (9)	35
6372709	Acid Extractable Thallium (Tl)	2019/10/07	102 (8)	75 - 125	105	75 - 125	<0.10	mg/kg	24 (9)	35
6372709	Acid Extractable Tin (Sn)	2019/10/07	NC (8)	75 - 125	100	75 - 125	<1.0	mg/kg	2.0 (9)	35
6372709	Acid Extractable Uranium (U)	2019/10/07	109 (8)	75 - 125	103	75 - 125	<0.10	mg/kg	2.0 (9)	35
6372709	Acid Extractable Vanadium (V)	2019/10/07	NC (8)	75 - 125	106	75 - 125	<2.0	mg/kg	3.4 (9)	35
6372709	Acid Extractable Zinc (Zn)	2019/10/07	NC (8)	75 - 125	99	75 - 125	<5.0	mg/kg	1.6 (9)	35
6375588	Moisture	2019/10/08							1.7 (4)	25
6377333	Acid Extractable Copper (Cu)	2019/10/09	113	75 - 125	101	75 - 125	<2.0	mg/kg	17 (4)	35
6377333	Acid Extractable Silver (Ag)	2019/10/09	110	75 - 125	100	75 - 125	<0.50	mg/kg	NC (4)	35
6377371	Acid Extractable Aluminum (Al)	2019/10/09					<10	mg/kg	4.1 (4)	35
6377371	Acid Extractable Antimony (Sb)	2019/10/09	103	75 - 125	106	75 - 125	<2.0	mg/kg	NC (4)	35
6377371	Acid Extractable Arsenic (As)	2019/10/09	91	75 - 125	105	75 - 125	<2.0	mg/kg	4.7 (4)	35
6377371	Acid Extractable Barium (Ba)	2019/10/09	105	75 - 125	104	75 - 125	<5.0	mg/kg	1.3 (4)	35
6377371	Acid Extractable Beryllium (Be)	2019/10/09	106	75 - 125	108	75 - 125	<2.0	mg/kg	NC (4)	35
6377371	Acid Extractable Bismuth (Bi)	2019/10/09	104	75 - 125	104	75 - 125	<2.0	mg/kg	NC (4)	35
6377371	Acid Extractable Boron (B)	2019/10/09	99	75 - 125	107	75 - 125	<50	mg/kg	NC (4)	35

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
6377371	Acid Extractable Cadmium (Cd)	2019/10/09	99	75 - 125	102	75 - 125	<0.30	mg/kg	NC (4)	35
6377371	Acid Extractable Chromium (Cr)	2019/10/09	103	75 - 125	106	75 - 125	<2.0	mg/kg	5.0 (4)	35
6377371	Acid Extractable Cobalt (Co)	2019/10/09	103	75 - 125	106	75 - 125	<1.0	mg/kg	15 (4)	35
6377371	Acid Extractable Copper (Cu)	2019/10/09	101	75 - 125	103	75 - 125	<2.0	mg/kg	5.2 (4)	35
6377371	Acid Extractable Iron (Fe)	2019/10/09					<50	mg/kg	7.2 (4)	35
6377371	Acid Extractable Lead (Pb)	2019/10/09	105	75 - 125	106	75 - 125	<0.50	mg/kg	5.7 (4)	35
6377371	Acid Extractable Lithium (Li)	2019/10/09	112	75 - 125	113	75 - 125	<2.0	mg/kg	6.1 (4)	35
6377371	Acid Extractable Manganese (Mn)	2019/10/09	NC	75 - 125	105	75 - 125	<2.0	mg/kg	9.2 (4)	35
6377371	Acid Extractable Mercury (Hg)	2019/10/09	98	75 - 125	105	75 - 125	<0.10	mg/kg	NC (4)	35
6377371	Acid Extractable Molybdenum (Mo)	2019/10/09	103	75 - 125	106	75 - 125	<2.0	mg/kg	NC (4)	35
6377371	Acid Extractable Nickel (Ni)	2019/10/09	102	75 - 125	107	75 - 125	<2.0	mg/kg	12 (4)	35
6377371	Acid Extractable Rubidium (Rb)	2019/10/09	99	75 - 125	104	75 - 125	<2.0	mg/kg	8.4 (4)	35
6377371	Acid Extractable Selenium (Se)	2019/10/09	94	75 - 125	109	75 - 125	<1.0	mg/kg	NC (4)	35
6377371	Acid Extractable Silver (Ag)	2019/10/09	102	75 - 125	103	75 - 125	<0.50	mg/kg	NC (4)	35
6377371	Acid Extractable Strontium (Sr)	2019/10/09	131 (10)	75 - 125	105	75 - 125	<5.0	mg/kg	9.2 (4)	35
6377371	Acid Extractable Thallium (Tl)	2019/10/09	103	75 - 125	107	75 - 125	<0.10	mg/kg	NC (4)	35
6377371	Acid Extractable Tin (Sn)	2019/10/09	102	75 - 125	110	75 - 125	<1.0	mg/kg	NC (4)	35
6377371	Acid Extractable Uranium (U)	2019/10/09	106	75 - 125	112	75 - 125	<0.10	mg/kg	4.3 (4)	35
6377371	Acid Extractable Vanadium (V)	2019/10/09	104	75 - 125	105	75 - 125	<2.0	mg/kg	2.9 (4)	35
6377371	Acid Extractable Zinc (Zn)	2019/10/09	104	75 - 125	105	75 - 125	<5.0	mg/kg	4.6 (4)	35
6380491	Aroclor 1016	2019/10/11					<0.050	ug/g	NC (12)	50
6380491	Aroclor 1221	2019/10/11					<0.050	ug/g	NC (12)	50
6380491	Aroclor 1232	2019/10/11					<0.050	ug/g	NC (12)	50
6380491	Aroclor 1242	2019/10/11					<0.050	ug/g	NC (12)	50
6380491	Aroclor 1248	2019/10/11					<0.050	ug/g	NC (12)	50
6380491	Aroclor 1254	2019/10/11	101 (11)	70 - 130	101	70 - 130	<0.050	ug/g	4.1 (12)	50
6380491	Aroclor 1260	2019/10/11					<0.050	ug/g	NC (12)	50
6396819	Sample Weight (as received)	2019/10/22					NA	g	0.020 (13)	N/A
6398775	Leachable Aluminum (Al)	2019/10/23					<100	ug/L	NC (13)	35
6398775	Leachable Antimony (Sb)	2019/10/23	105	75 - 125	106	75 - 125	<20	ug/L	10 (13)	35
6398775	Leachable Arsenic (As)	2019/10/23	101	75 - 125	103	75 - 125	<20	ug/L	2.9 (13)	35

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
6398775	Leachable Barium (Ba)	2019/10/23	101	75 - 125	104	75 - 125	<50	ug/L	1.4 (13)	35
6398775	Leachable Beryllium (Be)	2019/10/23	105	75 - 125	105	75 - 125	<20	ug/L	NC (13)	35
6398775	Leachable Boron (B)	2019/10/23	99	75 - 125	101	75 - 125	<500	ug/L	1.7 (13)	35
6398775	Leachable Cadmium (Cd)	2019/10/23	97	75 - 125	96	75 - 125	<3.0	ug/L	2.3 (13)	35
6398775	Leachable Calcium (Ca)	2019/10/23					<1000	ug/L	0.47 (13)	35
6398775	Leachable Chromium (Cr)	2019/10/23	97	75 - 125	98	75 - 125	<20	ug/L	NC (13)	35
6398775	Leachable Cobalt (Co)	2019/10/23	NC	75 - 125	100	75 - 125	<10	ug/L	1.9 (13)	35
6398775	Leachable Copper (Cu)	2019/10/23	93	75 - 125	95	75 - 125	<20	ug/L	17 (13)	35
6398775	Leachable Iron (Fe)	2019/10/23					<500	ug/L	24 (13)	35
6398775	Leachable Lead (Pb)	2019/10/23	NC	75 - 125	103	75 - 125	<5.0	ug/L	0.57 (13)	35
6398775	Leachable Lithium (Li)	2019/10/23	107	75 - 125	107	75 - 125	<20	ug/L	6.1 (13)	35
6398775	Leachable Magnesium (Mg)	2019/10/23					<1000	ug/L	1.7 (13)	35
6398775	Leachable Manganese (Mn)	2019/10/23	101	75 - 125	104	75 - 125	<20	ug/L	0.54 (13)	35
6398775	Leachable Molybdenum (Mo)	2019/10/23	105	75 - 125	105	75 - 125	<20	ug/L	NC (13)	35
6398775	Leachable Nickel (Ni)	2019/10/23	97	75 - 125	100	75 - 125	<20	ug/L	3.0 (13)	35
6398775	Leachable Potassium (K)	2019/10/23					<1000	ug/L	6.0 (13)	35
6398775	Leachable Selenium (Se)	2019/10/23	98	75 - 125	98	75 - 125	<10	ug/L	NC (13)	35
6398775	Leachable Silver (Ag)	2019/10/23	97	75 - 125	97	75 - 125	<5.0	ug/L	NC (13)	35
6398775	Leachable Strontium (Sr)	2019/10/23	106	75 - 125	108	75 - 125	<50	ug/L	0.36 (13)	35
6398775	Leachable Thallium (Tl)	2019/10/23	102	75 - 125	102	75 - 125	<1.0	ug/L	3.5 (13)	35
6398775	Leachable Tin (Sn)	2019/10/23	107	75 - 125	105	75 - 125	<20	ug/L	NC (13)	35
6398775	Leachable Uranium (U)	2019/10/23	109	75 - 125	109	75 - 125	<1.0	ug/L	NC (13)	35
6398775	Leachable Vanadium (V)	2019/10/23	99	75 - 125	100	75 - 125	<20	ug/L	NC (13)	35
6398775	Leachable Zinc (Zn)	2019/10/23	NC	75 - 125	101	75 - 125	<50	ug/L	1.6 (13)	35
6401297	Clay	2019/11/12							2.7 (4)	35
6401297	Gravel	2019/11/12							55 (14,4)	35
6401297	Sand	2019/11/12							5.2 (4)	35

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
6401297	Silt	2019/11/12							2.3 (4)	35

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Duplicate Parent ID [KYE112-01]

(2) Matrix Spike Parent ID [KYE124-01]

(3) Duplicate Parent ID [KYE124-01]

(4) Duplicate Parent ID

(5) Matrix Spike Parent ID [KYE128-01]

(6) Duplicate Parent ID [KYE128-01]

(7) Matrix Spike Parent ID [KYE112-01]

(8) Matrix Spike Parent ID [KYE158-01]

(9) Duplicate Parent ID [KYE158-01]

(10) Recovery is within QC acceptance limits. < 10 % of compounds in multi-component analysis in violation.

(11) Matrix Spike Parent ID [KYE103-01]

(12) Duplicate Parent ID [KYE103-01]

(13) Duplicate Parent ID [KYE141-02]

(14) Duplicate %RPD violation not applicable. Absolute % Difference within 10%.

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BV Labs Job #: B9R7082
Report Date: 2019/11/14

GHD Limited
Client Project #: 11198639-04
Site Location: GLENCORE
Your P.O. #: 73517186
Sampler Initials: MG

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Colleen Acker, Scientific Service Specialist

Eric Dearman, Scientific Specialist

Mike MacGillivray, Scientific Specialist (Inorganics)

Rosemarie MacDonald, Scientific Specialist (Organics)

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports.
For Service Group specific validation please refer to the Validation Signature Page.

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CHAIN OF CUSTODY RECORD

COC #: D34724 Page 1 of 4

Invoice Information	Report Information (if differs from invoice)	Project Information (where applicable)	Turnaround Time (TAT) Required
Company Name: GHD LIMITED	Company Name:	Quotation #:	☐ Regular TAT (5 business days) Most analyses
Contact Name: ROB TURNER	Contact Name:	P.O. #: 7357186	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 466 HODGSON ROAD	Address: SAME	Project #: 11198639-04	IF RUSH please specify date (Surcharges will be applied)
FREDERICTON, NB Postal Code: E3C 2G5	Postal Code:	Site Location: GLENCORE	DATE REQUIRED:
Phone: 506-458-1248 Fax: 506-462-7046	Phone: Fax:	Site #:	
Email: rob.turner@ghd.com	Email:	Sampled By: MIKE GRAVES	

Laboratory Use Only

CUSTODY SEAL Present	CUSTODY SEAL Intact	COOLER TEMPERATURES	COOLER TEMPERATURES
		14, 15, 16 °C	
		3, 6, 2	
		5, 6, 8	

COOLING MEDIA PRESENT Y / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED & PRESERVED	LAB FILTRATION REQUIRED	RCAP-MS (Total Metals) Well / Surface water	RCAP-MS (Dissolved Metals) Ground waters	Metals (Water): Total Digest (Default Method) for well water & surface water	Metals (Water): Dissolved for ground water	Metals (Water): Mercury (CIRCLE) TOTAL / DISSOLVED	Metals (Soil): Metals & Mercury Default: Acid Extractable (Available) Digest	Metals (Soil): Metals Total Digest -for Ocean Sediments (HNO3/HF/HClO4)	Metals (Soil): Mercury Low level by Cold Vapour AA	Metals (Soil): Hot Water Soluble Boron (required for CCME Agricultural/ Landfill)	RBCA Hydrocarbons (BTEX, C6-C32)	Hydrocarbons Soil (Potable), NS Fuel Oil Spill Policy Low Level BTEX ,C6-C32	CCME Hydrocarbons (CWS-PHC F1/BTEX, F2-F4)	NB Potable Water BTEX, VPH, Low level T.E.H	PAHs (Default for water/soil)	PAHs (FWAL /CCME Sediment)	PCBs	VOCs	Total Coliform/E.coli (Presence/Absence)	Total Coliform/E.Coli (Count)	GRAIN SIZE	HOLD- DO NOT ANALYZE	Regulatory Requirements (Specify)	COMMENTS
1	19SP-13 (0.6-1.2m)	2019/09/23	-	Soil	1																		✓							
2	19GW-129 (0.0-0.15m)	2019/09/23	-		1								✓																	
3	19GW-129 (0.6-1.2m)	2019/09/23	-		1								✓																	HOLD FOR POSSIBLE LEACHATE LIMITED SAMPLE
4	19GW-129 ~~(0.6~~ (3.0-3.6m)	2019/09/23	-		1																						✓			
5	19GW-130 (0.0-0.15m)	2019/09/23	-		1								✓																	
6	19GW-131 (0.6-1.2m)	2019/09/23	-		1								✓																	2019 OCT 1 13:40
7	19GW-131 (1.2-1.5m)	2019/09/23	-		1																						✓			
8	19SP-19 (0.0-0.15m)	2019/09/24	-		1								✓																	Shipped from FREDTON
9	19SP-19 (0.6-1.2m)	2019/09/24	-		1								✓																	
10	19SP-19 (1.8-2.4m)	2019/09/24	-	↓	1																	✓								

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY:(Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
Mike Graves / MIKE GRAVES	2019/09/30	10:00				B9R7082

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CHAIN OF CUSTODY RECORD

COC #: D34726 Page 2 of 4

Invoice Information	Report Information (if differs from invoice)	Project Information (where applicable)	Turnaround Time (TAT) Required
Company Name: GHD LIMITED	Company Name:	Quotation #:	✓ Regular TAT (5 business days) Most analyses
Contact Name: ROB TURNER	Contact Name:	P.O. #: 7351718 6	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 466 HODGSON ROAD	Address: SAME	Project #: 11198639-04	IF RUSH please specify date (Surcharges will be applied)
FREDERICTON, NB Postal Code: E3C 2G6	Postal Code:	Site Location: GLEN CORE	DATE REQUIRED:
Phone: 506-458-1248 Fax: 506-462-7646	Phone: Fax:	Site #:	
Email: rob.turner@ghd.com	Email:	Sampled By: MIKE GRAVES	

Laboratory Use Only

CUSTODY SEAL Present	CUSTODY SEAL Intact	COOLER TEMPERATURES	COOLER TEMPERATURES
		11, 15, 11.0 SB	
		3, 0, 2	
		5, 6, 8	

COOLING MEDIA PRESENT Y / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED &PRESERVED	LAB FILTRATION REQUIRED	RCAP-MS (Total Metals) Well / Surface water	RCAP-MS (Dissolved Metals) Ground waters	Metals (Water): Total Digest (Default Method) for well water & surface water	Metals (Water): Dissolved for ground water	Metals (Water): Mercury (CIRCLE) TOTAL / DISSOLVED	Metals (Soil): Metals & Mercury Default Acid Extractable (Available) Digest	Metals (Soil): Metals Total Digest - for Ocean sediments (HNO3/HF/HClO4)	Metals (Soil): Mercury Low level by Cold Vapour AA	Metals (Soil): Hot Water Soluble Boron (required for CCME Agricultural/ Landfill)	RBCA Hydrocarbons (BTEX, C6-C32)	Hydrocarbons Soil (Potable), NS Fuel Oil Spill Policy Low Level BTEX, C6-C32	CCME Hydrocarbons (CWS: PHC F1/BTEX, F2-F4)	NB Potable Water BTEX, VPH, Low level T.E.H.	PAHs (Default for water/soil)	PAHs (FWAL /CCME Sediment)	PCBs	VOCs	Total Coliform/E.coli (Presence/Absence)	Total Coliform/E.coli (Count)	GRAIN SIZE	HOLD- DO NOT ANALYZE	Regulatory Requirements (Specify)	COMMENTS
1	19GW-126 (0.0-0.15m)	2019/07/24	—	SOIL	1								✓																	
2	19GW-126 (0.6-1.2m)	2019/07/24	—		1								✓																	Shipped from FREDTON
3	19GW-125 (0.0-0.15m)	2019/07/24	—		1								✓																	
4	19GW-125 (1.2-1.8m)	2019/07/24	—		1																						✓			
5	19GW-125 (1.8-2.4m)	2019/07/24	—		1								✓																	
6	19SP-18 (0.3-0.9m)	2019/07/24	—		1																			✓						
7	19SP-20 (0.0-0.15m)	2019/07/24	—		1								✓																	2019 OCT 1 10:40
8	19SP-20 (0.6-1.2m)	2019/07/24	—		1								✓																	
9	19SP-24 (0.0-0.15m)	2019/07/24	—		1								✓																	
10	19SP-24 (1.2-1.8m)	2019/07/24	—	↓	1								✓																	

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY:(Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
Mike Graves / MIKE GRAVES	2019/07/30	10:00				B9R7082

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CHAIN OF CUSTODY RECORD

COC #: D34725 Page 3 of 4

Invoice Information	Report Information (if differs from invoice)	Project Information (where applicable)	Turnaround Time (TAT) Required
Company Name: GHD LIMITED	Company Name: SAME	Quotation #:	Regular TAT (5 business days) Most analyses
Contact Name: ROB TURNER	Contact Name:	P.O. #: 73517186	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 446 HODGSON ROAD FREDERICTON, NB Postal Code: E3C 2G5	Address:	Project #: 11198639-04	IF RUSH please specify date (Surcharges will be applied)
Phone: 506-458-1248 Fax: 506-462-7046	Postal Code:	Site Location: GLENCORE	DATE REQUIRED:
Email: rob.turner@ghd.com	Phone: Fax:	Site #:	
	Email:	Sampled By: MIKE GRAVES	

Laboratory Use Only

CUSTODY SEAL Present	CUSTODY SEAL Intact	COOLER TEMPERATURES	COOLER TEMPERATURES
		14, 15, 16 RB	
		3, 6, 2	
		5, 6, 8	

COOLING MEDIA PRESENT Y / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED &PRESERVED	LAB FILTRATION REQUIRED	RCAP-MS (Total Metals) Well / Surface water	RCAP-MS (Dissolved Metals) Ground waters	Metals (Water): Total Digest (Default Method) for well water & surface water	Metals (Water): Dissolved for ground water	Metals (Water): Mercury (CIRCLE) TOTAL / DISSOLVED	Metals (Soil): Metals & Mercury Default Acid Extractable (Available) Digest	Metals (Soil): Metals Total Digest -for Ocean sediments (HNO3/HF/HClO4)	Metals (Soil): Mercury Low level by Cold Vapour AA	Metals (Soil): Hot Water Soluble Boron (required for CCME Agricultural/Landfill)	RBCA Hydrocarbons (BTEX, C6-C32)	Hydrocarbons Soil (Potable); NS Fuel Oil Spill Policy Low Level BTEX ,C6-C32	CCME Hydrocarbons (CWS-PHC F1/BTEX, F2-F4)	NB Potable Water BTEX, VPH, Low level T.E.H	PAHs (Default: for water/soil)	PAHs (FWAL /CCME Sediment)	PCBs	VOCs	Total Coliform/E.coli (Presence/Absence)	Total Coliform/E.Coli (Count)	GRAIN SIZE	HOLD- DO NOT ANALYZE	Regulatory Requirements (Specify)	COMMENTS
1	19SP-25 (0.0-0.15m)	2019/09/24	-	SOIL	1	N	N						✓																Shipped from FREDTON
2	19SP-25 (0.6-1.2m)	2019/09/24	-	SOIL	1	N	N						✓																
3	19SP-26 (0.6-1.2m)	2019/09/23	-	SOIL	1	N	N						✓																
4	19SP-27 (1.8-2.4m)	2019/09/25	-	SOIL	2	N	N						✓																HOLD 1 JAR FOR POSSIBLE LEACHATE
5	19SP-28 (0.0-0.6m)	2019/09/25	-	SOIL	1	N	N						✓																
6	19SP-21 (0.0-0.15m)	2019/09/25	-	SOIL	1	N	N						✓																
7	19SP-21 (0.3-0.6m)	2019/09/25	-	SOIL	1	N	N						✓																2019 OCT 1 10:40
8	19SP-22 (0.0-0.15m)	2019/09/25	-	SOIL	1	N	N						✓																
9	19SP-22 (0.6-1.2m) ~~(0.0-0.15m) DUP~~	2019/09/25	-	SOIL	1	N	N						✓																
10	19SP-23 (0.0-0.15m)	2019/09/25	-	SOIL	1	N	N						✓																

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY:(Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
Mike Graves / MIKE GRAVES	2019/09/30	10:00				B9R7082

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CHAIN OF CUSTODY RECORD

COC #: D34723 Page 4 of 4

Invoice Information	Report Information (if differs from invoice)	Project Information (where applicable)	Turnaround Time (TAT) Required
Company Name: GHD LIMITED	Company Name:	Quotation #:	☑ Regular TAT (5 business days) Most analyses
Contact Name: ROB TURNER	Contact Name:	P.O. #: 735171/86	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 466 HODGSON ROAD	Address: SAME	Project #: 11198639-04	IF RUSH please specify date (Surcharges will be applied)
FREDERICTON NB Postal Code: E3C 2G5	Postal Code:	Site Location: GLENCORE	DATE REQUIRED:
Phone: 506-455-1248 Fax: 506-462-7646	Phone: Fax:	Site #:	
Email: rob.turner@ghd.com	Email:	Sampled By: MIKE GRAVES	

Laboratory Use Only

CUSTODY SEAL Present	CUSTODY SEAL Intact	COOLER TEMPERATURES	COOLER TEMPERATURES
		11, 15, 16 EB	
		3, 6, 8	
		5, 6, 8	

COOLING MEDIA PRESENT Y / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED & PRESERVED	LAB FILTRATION REQUIRED	RCAP-MS (Total Metals) Well / Surface water	RCAP-MS (Dissolved Metals) Ground waters	Metals (Water): Total Digest (Default Method) for well water & surface water	Metals (Water): Dissolved for ground water	Metals (Water): Mercury (CIRCLE) TOTAL / DISSOLVED	Metals (Soil): Metals & Mercury Default Aqua Extractable (Available) Digest	Metals (Soil): Metals Total Digest -for Ocean sediments (HNO3/HF/HClO4)	Metals (Soil): Mercury Low level by Cold Vapour AA	Metals (Soil): Hot Water Soluble Boron (required for CCME Agriculture/ Landfill)	RBCA Hydrocarbons (BTEX, C6-C32)	Hydrocarbons Soil (Potable), NS Fuel Oil Spill Policy Low Level BTEX, C6-C32	CCME Hydrocarbons (CWS-PHC F1/BTEX, F2-F4)	NB Potable Water BTEX, VPH, Low level T.E.H	PAHs (Default: for water/soil)	PAHs: (FWAL /CCME Sediment)	PCBs	VOCs	Total Coliform/E.coli (Presence/Absence)	Total Coliform/E.Coli (Count)	GRAIN SIZE	HOLD- DO NOT ANALYZE	Regulatory Requirements (Specify) / COMMENTS
1	19SP-23(0.6-1.2m)	2019/09/25	–	SOIL	1	N	N						✓																
2	SOIL-QA/QC-4	2019/09/25	–	SOIL	1	N	N						✓																Shipped from FREDTON
3	SOIL-QA/QC-5	2019/09/25	–	SOIL	1	N	N						✓																
4																													
5																													
6																													
7																													
8																													2019 OCT 1 10:40
9																													
10																													

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY:(Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
Mike Graves / MIKE GRAVES	2019/09/30	10:00				B9R7082

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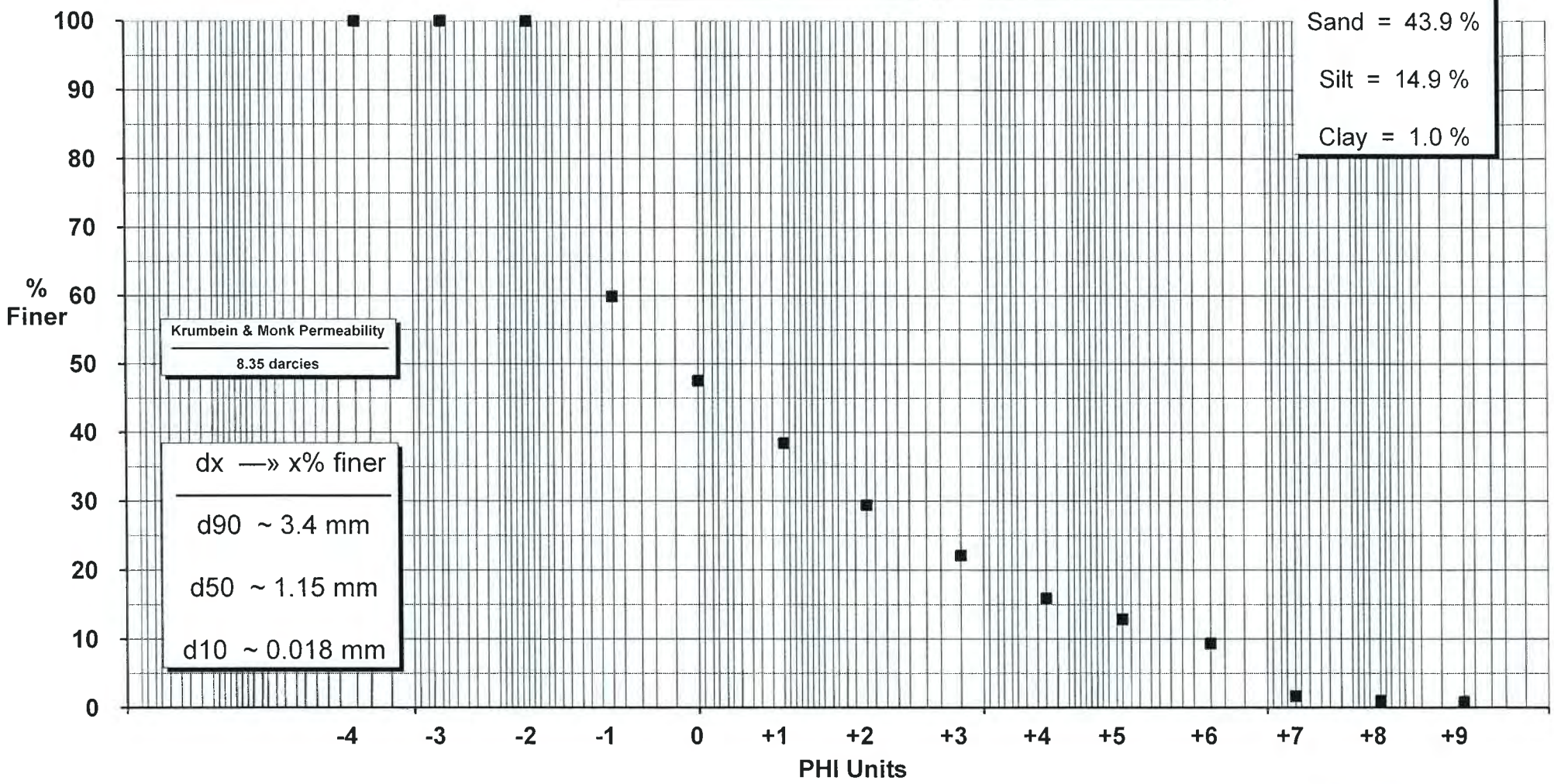
BV Labs ID: KYE106-01

19GW-129 (3.0-3.6M)



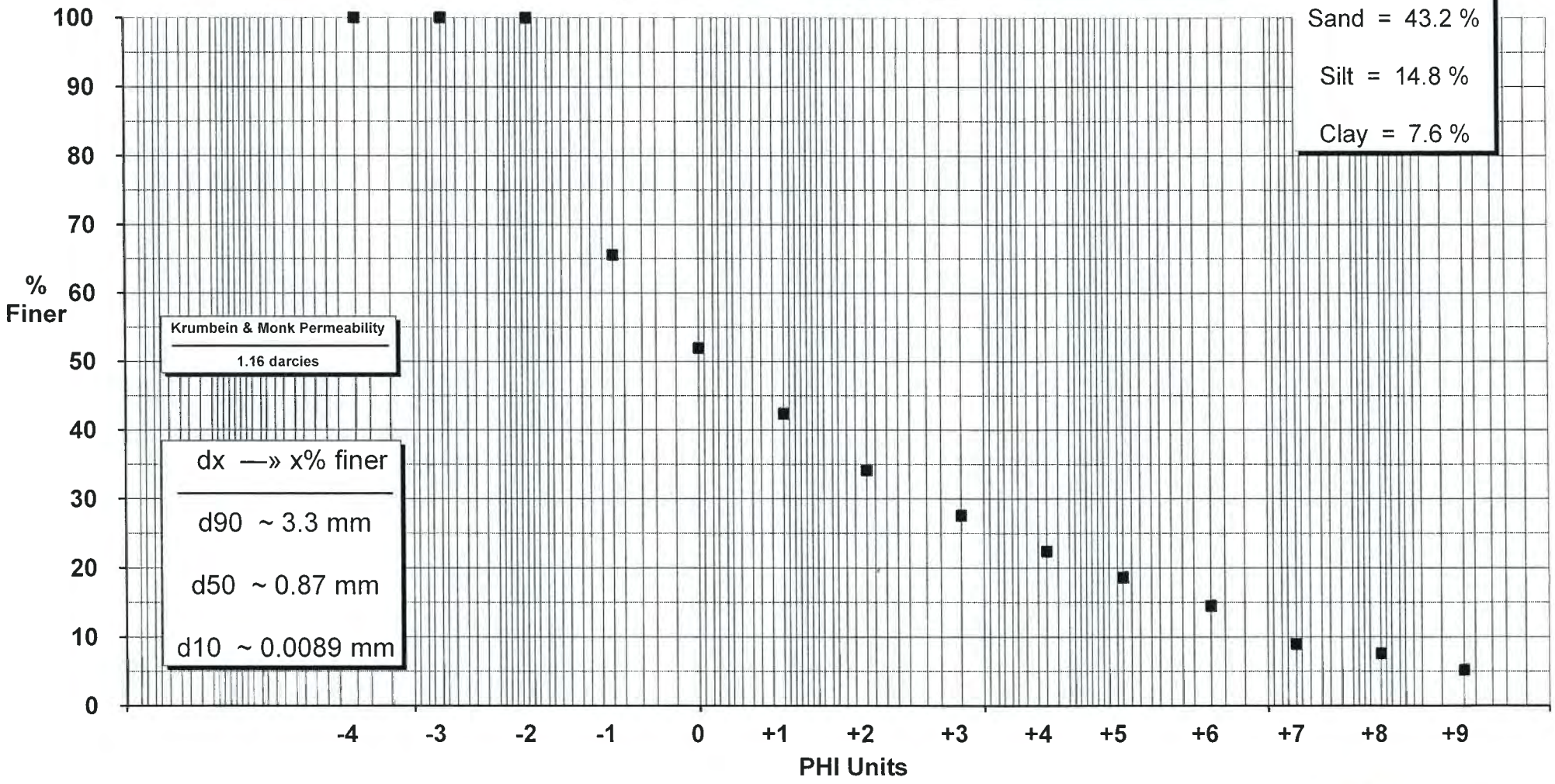
Approved

BV Labs ID: KYE109-01

19GW-131 (1.2-1.5M)

Percent Coarser than 75 µm (PHI = 3.737)	Percent Coarser than 50 µm (PHI = 4.322)
76.3 %	78.8 %

Wentworth	
Gravel	34.4 %
Sand	43.2 %
Silt	14.8 %
Clay	7.6 %



Krumbein & Monk Permeability
1.16 darcies

dx —» x% finer
d90 ~ 3.3 mm
d50 ~ 0.87 mm
d10 ~ 0.0089 mm

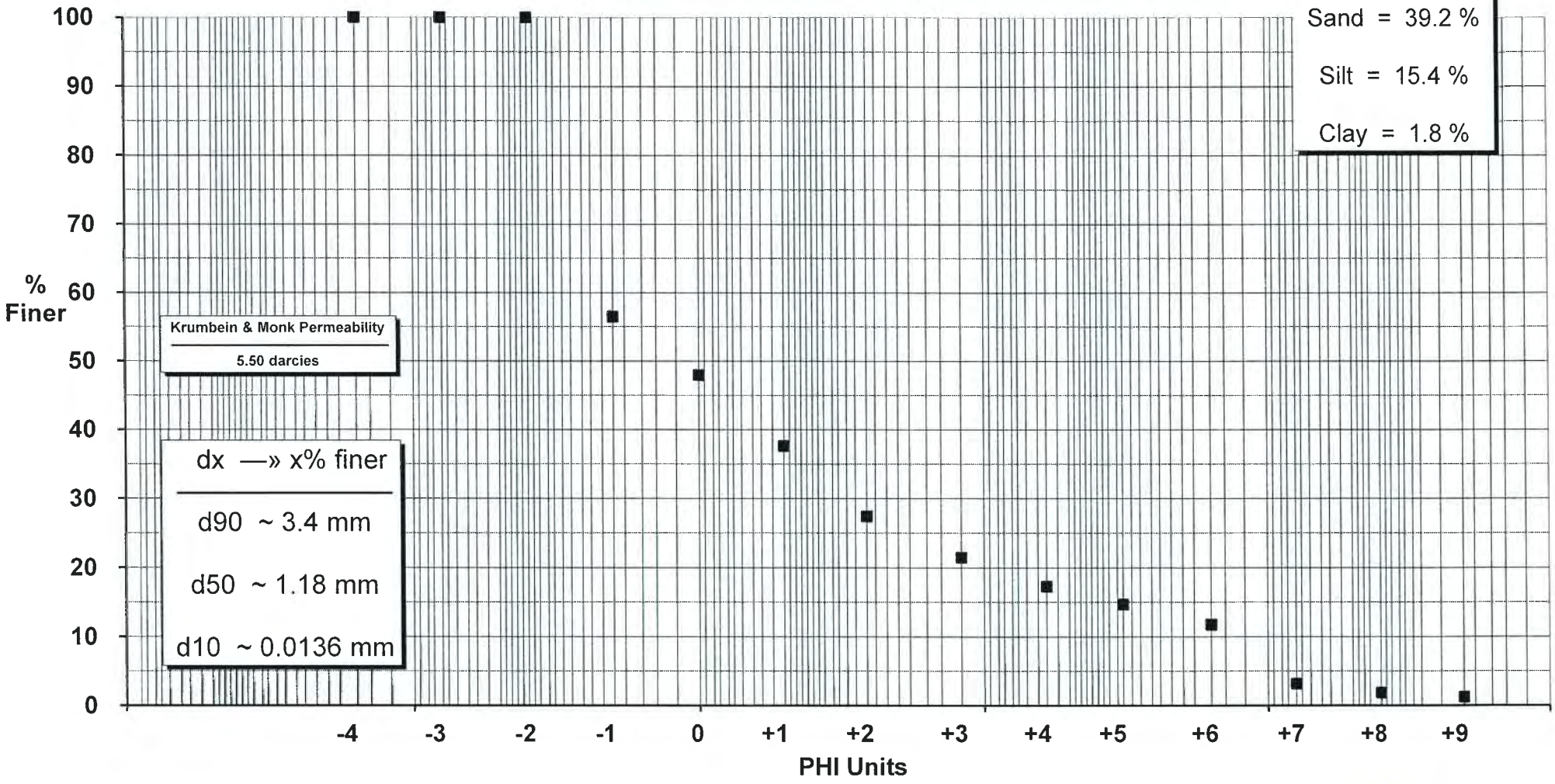
Approved

BV Labs ID: KYE122-01

19GW-125 (1.2-1.8M)

Percent Coarser than 75 µm (PHI = 3.737)	Percent Coarser than 50 µm (PHI = 4.322)
81.7 %	83.6 %

Wentworth	
Gravel	43.5 %
Sand	39.2 %
Silt	15.4 %
Clay	1.8 %



Krumbein & Monk Permeability

5.50 darcies

dx —» x% finer

d90 ~ 3.4 mm

d50 ~ 1.18 mm

d10 ~ 0.0136 mm

Approved

Your P.O. #: 73517186
Your Project #: 11198639-04
Site Location: BELLEDUNE SMELTER
Your C.O.C. #: D34710

Attention: Rob Turner

GHD Limited
466 Hodgson Rd
Fredericton , NB
CANADA E3C 2G5

Report Date: 2019/10/09
Report #: R5913948
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9R2553
Received: 2019/09/27, 09:25

Sample Matrix: Sea Water
Samples Received: 6

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Mercury - Dissolved (CVAA,LL)	6	2019/10/02	2019/10/03	ATL SOP 00026	EPA 245.1 R3 m
Mercury - Total (CVAA,LL)	6	2019/10/03	2019/10/04	ATL SOP 00026	EPA 245.1 R3 m
Hardness Total (calculated as CaCO3) (1, 2)	6	N/A	2019/10/03	BBY WI-00033	Auto Calc
Hardness (calculated as CaCO3) (1)	6	N/A	2019/10/03	BBY WI-00033	Auto Calc
ICP-OES Dissolved Metals in Water (1)	6	N/A	2019/10/04	BBY7SOP-00018	EPA 6010d m
ICP-OES Total Metals in Water (1)	6	2019/10/04	2019/10/04	BBY7SOP-00003 BBY7SOP-00018	EPA 6010d m
Na, K, Ca, Mg, S by CRC ICPMS (diss.) (1)	6	N/A	2019/10/03	BBY WI-00033	Auto Calc
Elements by ICPMS (dissolved) - Seawater (1)	6	N/A	2019/10/03	BBY7SOP-00002	BCMOE BCLM Nov 2015
Na, K, Ca, Mg, S by CRC ICPMS (total) (1)	6	N/A	2019/10/03	BBY WI-00033	Auto Calc
Elements by CRC ICPMS (total) - Seawater (1)	6	N/A	2019/10/03	BBY7SOP-00003 BBY7SOP-00002	EPA 6020b R2m
pH (3)	6	N/A	2019/10/01	ATL SOP 00003	SM 23 4500-H+ B m
Salinity (4)	6	N/A	2019/10/03		SM 22 2520B
Total Suspended Solids	6	2019/10/03	2019/10/07	ATL SOP 00007	SM 23 2540D m

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by BV Labs, unless otherwise agreed in writing. BV Labs is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.

Your P.O. #: 73517186
Your Project #: 11198639-04
Site Location: BELLEDUNE SMELTER
Your C.O.C. #: D34710

Attention: Rob Turner

GHD Limited
466 Hodgson Rd
Fredericton , NB
CANADA E3C 2G5

Report Date: 2019/10/09
Report #: R5913948
Version: 1 - Final

CERTIFICATE OF ANALYSIS

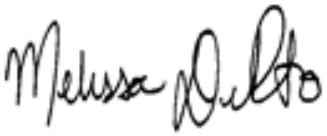
BV LABS JOB #: B9R2553
Received: 2019/09/27, 09:25

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) This test was performed by Bedford to Burnaby - Offsite
(2) "Total Hardness" was calculated from Total Ca and Mg concentrations and may be biased high (Hardness, or Dissolved Hardness, calculated from Dissolved Ca and Mg, should be used for compliance if available).
(3) The APHA Standard Method require pH to be analyzed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the APHA Standard Method holding time.
(4) Non-accredited test method

Encryption Key



Melissa DiPinto
Project Manager
09 Oct 2019 12:25:23

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Heather Macumber, Senior Project Manager
Email: Heather.MACUMBER@bvlabs.com
Phone# (902)420-0203 Ext:226

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BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

BV Labs Job #: B9R2553
Report Date: 2019/10/09

GHD Limited
Client Project #: 11198639-04
Site Location: BELLEDUNE SMELTER
Your P.O. #: 73517186
Sampler Initials: MT

RESULTS OF ANALYSES OF SEA WATER

BV Labs ID		KXE030		KXE031		KXE032		KXE033		
Sampling Date		2019/09/26		2019/09/26		2019/09/26		2019/09/26		
COC Number		D34710		D34710		D34710		D34710		
	UNITS	19SW-1	QC Batch	19SW-2	QC Batch	19SW-3	QC Batch	19SW-4	RDL	QC Batch
Calculated Parameters										
Dissolved Hardness (CaCO3)	mg/L	3970	6377068	3890	6377068	3710	6377068	3560	0.50	6377068
Inorganics										
pH	pH	7.78	6363133	7.86	6363133	7.97	6363133	7.89	N/A	6363133
Salinity	N/A	22	6367020	21	6367020	20	6367020	20	2.0	6367020
Total Suspended Solids	mg/L	5.6	6367233	4.6	6367233	10	6367233	5.6	1.0	6367233
Metals										
Dissolved Aluminum (Al)	ug/L	<10	6371611	<10	6371611	<10	6371611	<10	10	6371611
Total Aluminum (Al)	ug/L	15	6377065	121	6377065	13	6377065	37	10	6377065
Dissolved Antimony (Sb)	ug/L	3.93	6371611	4.07	6371611	5.76	6371611	5.94	0.50	6371611
Total Antimony (Sb)	ug/L	4.12	6377065	5.95	6377065	5.76	6377065	6.37	0.50	6377065
Dissolved Arsenic (As)	ug/L	14.2	6371611	14.3	6371611	16.0	6371611	16.5	0.50	6371611
Total Arsenic (As)	ug/L	16.7	6377065	29.6	6377065	19.8	6377065	26.3	0.50	6377065
Dissolved Barium (Ba)	ug/L	35.2	6371611	35.0	6371611	55.2	6371611	60.0	1.0	6371611
Total Barium (Ba)	ug/L	35.3	6377065	43.8	6377065	53.2	6377065	61.9	1.0	6377065
Dissolved Beryllium (Be)	ug/L	<1.0	6371611	<1.0	6371611	<1.0	6371611	<1.0	1.0	6371611
Total Beryllium (Be)	ug/L	<1.0	6377065	<1.0	6377065	<1.0	6377065	<1.0	1.0	6377065
Dissolved Bismuth (Bi)	ug/L	<1.0	6371611	<1.0	6371611	<1.0	6371611	<1.0	1.0	6371611
Total Bismuth (Bi)	ug/L	<1.0	6377065	1.1	6377065	<1.0	6377065	<1.0	1.0	6377065
Dissolved Boron (B)	ug/L	2850	6371611	2790	6371611	2690	6371611	2660	50	6371611
Total Boron (B)	ug/L	3070	6377065	2950	6377065	2830	6377065	2740	50	6377065
Dissolved Cadmium (Cd)	ug/L	34.2	6371611	35.4	6371611	127	6371611	200	0.050	6371611
Total Cadmium (Cd)	ug/L	36.7	6377065	39.9	6377065	115	6377065	208	0.050	6377065
Dissolved Chromium (Cr)	ug/L	0.82	6371611	0.53	6371611	<0.50	6371611	0.98	0.50	6371611
Total Chromium (Cr)	ug/L	0.74	6377065	1.16	6377065	0.90	6377065	0.67	0.50	6377065
Dissolved Cobalt (Co)	ug/L	<0.10	6371611	<0.10	6371611	0.83	6371611	1.43	0.10	6371611
Total Cobalt (Co)	ug/L	<0.10	6377065	0.28	6377065	0.83	6377065	1.62	0.10	6377065
Dissolved Copper (Cu)	ug/L	3.11	6371611	3.54	6371611	8.17	6371611	6.25	0.50	6371611
Total Copper (Cu)	ug/L	5.55	6377065	19.5	6377065	10.7	6377065	12.1	0.50	6377065
Dissolved Iron (Fe)	ug/L	18.9	6371611	4.0	6371611	34.0	6371611	45.9	2.0	6371611
Total Iron (Fe)	ug/L	50.7	6377065	443	6377065	112	6377065	272	2.0	6377065
Dissolved Lead (Pb)	ug/L	18.2	6371611	25.1	6371611	53.7	6371611	34.4	0.10	6371611
Total Lead (Pb)	ug/L	35.5	6377065	243	6377065	94.3	6377065	99.8	0.10	6377065
Dissolved Lithium (Li)	ug/L	114	6371611	110	6371611	108	6371611	105	20	6371611

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

Bureau Veritas Laboratories 200 Bluewater Rd, Suite 105, Bedford, Nova Scotia Canada B4B 1G9 Tel: 902-420-0203 Toll-free: 800-565-7227 Fax: 902-420-8612 www.bvlabs.com

BV Labs Job #: B9R2553
Report Date: 2019/10/09

GHD Limited
Client Project #: 11198639-04
Site Location: BELLEDUNE SMELTER
Your P.O. #: 73517186
Sampler Initials: MT

RESULTS OF ANALYSES OF SEA WATER

BV Labs ID		KXE030		KXE031		KXE032		KXE033		
Sampling Date		2019/09/26		2019/09/26		2019/09/26		2019/09/26		
COC Number		D34710		D34710		D34710		D34710		
	UNITS	19SW-1	QC Batch	19SW-2	QC Batch	19SW-3	QC Batch	19SW-4	RDL	QC Batch
Total Lithium (Li)	ug/L	126	6377065	121	6377065	116	6377065	113	20	6377065
Dissolved Manganese (Mn)	ug/L	8.42	6377066	13.1	6371611	127	6371611	322	0.50	6371611
Total Manganese (Mn)	ug/L	8.90	6377065	17.9	6377065	109	6377065	334	0.50	6377065
Dissolved Molybdenum (Mo)	ug/L	7.4	6371611	6.9	6371611	9.2	6371611	9.3	1.0	6371611
Total Molybdenum (Mo)	ug/L	7.4	6377065	7.1	6377065	9.2	6377065	9.4	1.0	6377065
Dissolved Nickel (Ni)	ug/L	0.82	6371611	0.57	6371611	1.12	6377066	1.11	0.20	6371611
Total Nickel (Ni)	ug/L	0.93	6377065	1.21	6377065	0.86	6377065	2.04	0.20	6377065
Dissolved Phosphorus (P)	ug/L	76	6371611	69	6371611	<50	6371611	<50	50	6371611
Total Phosphorus (P)	ug/L	79	6377065	153	6377065	<50	6377065	<50	50	6377065
Dissolved Selenium (Se)	ug/L	0.62	6371611	0.77	6371611	1.06	6371611	0.98	0.50	6371611
Total Selenium (Se)	ug/L	0.73	6377065	0.90	6377065	1.07	6377065	1.02	0.50	6377065
Dissolved Silicon (Si)	ug/L	<1000	6371611	1040	6371611	1210	6371611	1330	1000	6371611
Total Silicon (Si)	ug/L	1080	6377065	1200	6377065	1190	6377065	1380	1000	6377065
Dissolved Silver (Ag)	ug/L	0.119	6371611	0.126	6371611	0.307	6371611	0.232	0.050	6371611
Total Silver (Ag)	ug/L	0.264	6377065	1.03	6377065	0.583	6377065	0.617	0.050	6377065
Dissolved Strontium (Sr)	ug/L	4950	6371611	4790	6371611	4410	6371611	4380	10	6371611
Total Strontium (Sr)	ug/L	5010	6377065	4770	6377065	4570	6377065	4420	10	6377065
Dissolved Thallium (Tl)	ug/L	5.59	6371611	6.78	6371611	78.8	6371611	129	0.10	6371611
Total Thallium (Tl)	ug/L	6.04	6377065	6.61	6377065	69.8	6377065	135	0.10	6377065
Dissolved Tin (Sn)	ug/L	<1.0	6371611	<1.0	6371611	<1.0	6371611	<1.0	1.0	6371611
Total Tin (Sn)	ug/L	<1.0	6377065	1.4	6377065	<1.0	6377065	4.9	1.0	6377065
Dissolved Titanium (Ti)	ug/L	<10	6371611	<10	6371611	<10	6371611	<10	10	6371611
Total Titanium (Ti)	ug/L	<10	6377065	<10	6377065	<10	6377065	<10	10	6377065
Dissolved Uranium (U)	ug/L	1.89	6371611	1.87	6371611	1.68	6371611	1.61	0.050	6371611
Total Uranium (U)	ug/L	2.00	6377065	1.88	6377065	1.72	6377065	1.66	0.050	6377065
Dissolved Vanadium (V)	ug/L	<10	6371611	<10	6371611	<10	6371611	<10	10	6371611
Total Vanadium (V)	ug/L	<10	6377065	<10	6377065	<10	6377065	<10	10	6377065
Dissolved Zinc (Zn)	ug/L	205	6371611	187	6371611	520	6371611	700	1.0	6371611
Total Zinc (Zn)	ug/L	210	6377065	286	6377065	498	6377065	771	1.0	6377065
Dissolved Calcium (Ca)	mg/L	274	6377067	269	6377067	269	6377067	264	1.0	6377067
Total Calcium (Ca)	mg/L	285	6377064	271	6377064	275	6377064	274	1.0	6377064
Dissolved Magnesium (Mg)	mg/L	797	6377067	781	6377067	739	6377067	705	1.0	6377067
Total Magnesium (Mg)	mg/L	827	6377064	788	6377064	775	6377064	735	1.0	6377064
Dissolved Potassium (K)	mg/L	243	6377067	239	6377067	225	6377067	218	1.0	6377067
Total Potassium (K)	mg/L	251	6377064	238	6377064	233	6377064	226	1.0	6377064

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Bureau Veritas Laboratories 200 Bluewater Rd, Suite 105, Bedford, Nova Scotia Canada B4B 1G9 Tel: 902-420-0203 Toll-free: 800-565-7227 Fax: 902-420-8612 www.bvlabs.com

BV Labs Job #: B9R2553
Report Date: 2019/10/09

GHD Limited
Client Project #: 11198639-04
Site Location: BELLEDUNE SMELTER
Your P.O. #: 73517186
Sampler Initials: MT

RESULTS OF ANALYSES OF SEA WATER

BV Labs ID		KXE030		KXE031		KXE032		KXE033		
Sampling Date		2019/09/26		2019/09/26		2019/09/26		2019/09/26		
COC Number		D34710		D34710		D34710		D34710		
	UNITS	19SW-1	QC Batch	19SW-2	QC Batch	19SW-3	QC Batch	19SW-4	RDL	QC Batch
Dissolved Sodium (Na)	mg/L	7470	6371609	7460	6371609	6740	6371609	6540	5.0	6371609
Total Sodium (Na)	mg/L	7630	6377063	7240	6377063	6920	6377063	6760	5.0	6377063
Dissolved Sulphur (S)	mg/L	579	6377067	565	6377067	539	6377067	530	20	6377067
Total Sulphur (S)	mg/L	609	6377064	576	6377064	567	6377064	552	20	6377064

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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BV Labs Job #: B9R2553
Report Date: 2019/10/09

GHD Limited
Client Project #: 11198639-04
Site Location: BELLEDUNE SMELTER
Your P.O. #: 73517186
Sampler Initials: MT

RESULTS OF ANALYSES OF SEA WATER

BV Labs ID		KXE034	KXE035			KXE035		
Sampling Date		2019/09/26	2019/09/26			2019/09/26		
COC Number		D34710	D34710			D34710		
	UNITS	19SW-5	19SW-QA/QC	RDL	QC Batch	19SW-QA/QC Lab-Dup	RDL	QC Batch
Calculated Parameters								
Dissolved Hardness (CaCO3)	mg/L	3680	3860	0.50	6377068			
Inorganics								
pH	pH	7.99	7.89	N/A	6363133			
Salinity	N/A	20	22	2.0	6367020			
Total Suspended Solids	mg/L	16	5.4	1.0	6367233			
Metals								
Dissolved Aluminum (Al)	ug/L	<10	<10	10	6371611			
Total Aluminum (Al)	ug/L	15	33	10	6377065	29	10	6377065
Dissolved Antimony (Sb)	ug/L	5.92	3.98	0.50	6371611			
Total Antimony (Sb)	ug/L	6.33	4.36	0.50	6377065	4.40	0.50	6377065
Dissolved Arsenic (As)	ug/L	14.8	14.8	0.50	6371611			
Total Arsenic (As)	ug/L	22.8	18.3	0.50	6377065	18.7	0.50	6377065
Dissolved Barium (Ba)	ug/L	58.5	35.0	1.0	6371611			
Total Barium (Ba)	ug/L	59.4	37.3	1.0	6377065	36.9	1.0	6377065
Dissolved Beryllium (Be)	ug/L	<1.0	<1.0	1.0	6371611			
Total Beryllium (Be)	ug/L	<1.0	<1.0	1.0	6377065	<1.0	1.0	6377065
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	1.0	6371611			
Total Bismuth (Bi)	ug/L	<1.0	<1.0	1.0	6377065	<1.0	1.0	6377065
Dissolved Boron (B)	ug/L	2670	2850	50	6371611			
Total Boron (B)	ug/L	2750	2780	50	6377065	2830	50	6377065
Dissolved Cadmium (Cd)	ug/L	170	35.9	0.050	6371611			
Total Cadmium (Cd)	ug/L	169	36.8	0.050	6377065	37.3	0.050	6377065
Dissolved Chromium (Cr)	ug/L	1.06	<0.50	0.50	6371611			
Total Chromium (Cr)	ug/L	1.25	0.80	0.50	6377065	0.65	0.50	6377065
Dissolved Cobalt (Co)	ug/L	1.14	<0.10	0.10	6371611			
Total Cobalt (Co)	ug/L	1.16	0.15	0.10	6377065	0.12	0.10	6377065
Dissolved Copper (Cu)	ug/L	4.42	3.77	0.50	6371611			
Total Copper (Cu)	ug/L	10.8	8.32	0.50	6377065	8.24	0.50	6377065
Dissolved Iron (Fe)	ug/L	19.8	8.1	2.0	6371611			
Total Iron (Fe)	ug/L	188	118	2.0	6377065	111	2.0	6377065
Dissolved Lead (Pb)	ug/L	34.5	53.1	0.10	6371611			
Total Lead (Pb)	ug/L	92.7	72.8	0.10	6377065	71.3	0.10	6377065

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

Bureau Veritas Laboratories 200 Bluewater Rd, Suite 105, Bedford, Nova Scotia Canada B4B 1G9 Tel: 902-420-0203 Toll-free: 800-565-7227 Fax: 902-420-8612 www.bvlabs.com

BV Labs Job #: B9R2553
Report Date: 2019/10/09

GHD Limited
Client Project #: 11198639-04
Site Location: BELLEDUNE SMELTER
Your P.O. #: 73517186
Sampler Initials: MT

RESULTS OF ANALYSES OF SEA WATER

BV Labs ID		KXE034	KXE035			KXE035		
Sampling Date		2019/09/26	2019/09/26			2019/09/26		
COC Number		D34710	D34710			D34710		
	UNITS	19SW-5	19SW-QA/QC	RDL	QC Batch	19SW-QA/QC Lab-Dup	RDL	QC Batch
Dissolved Lithium (Li)	ug/L	108	113	20	6371611			
Total Lithium (Li)	ug/L	113	110	20	6377065	112	20	6377065
Dissolved Manganese (Mn)	ug/L	189	12.0	0.50	6371611			
Total Manganese (Mn)	ug/L	177	12.1	0.50	6377065	11.4	0.50	6377065
Dissolved Molybdenum (Mo)	ug/L	9.2	6.9	1.0	6371611			
Total Molybdenum (Mo)	ug/L	9.4	7.2	1.0	6377065	6.9	1.0	6377065
Dissolved Nickel (Ni)	ug/L	0.73	0.36	0.20	6371611			
Total Nickel (Ni)	ug/L	1.02	1.95 (1)	0.20	6377065	1.13 (2)	0.20	6377065
Dissolved Phosphorus (P)	ug/L	<50	66	50	6371611			
Total Phosphorus (P)	ug/L	<50	92	50	6377065	89	50	6377065
Dissolved Selenium (Se)	ug/L	1.00	0.63	0.50	6371611			
Total Selenium (Se)	ug/L	1.08	0.75	0.50	6377065	0.82	0.50	6377065
Dissolved Silicon (Si)	ug/L	1280	1160	1000	6371611			
Total Silicon (Si)	ug/L	1720	1060	1000	6377065	1040	1000	6377065
Dissolved Silver (Ag)	ug/L	0.115	0.145	0.050	6371611			
Total Silver (Ag)	ug/L	0.543	0.393	0.050	6377065	0.435	0.050	6377065
Dissolved Strontium (Sr)	ug/L	4500	4660	10	6371611			
Total Strontium (Sr)	ug/L	4480	4780	10	6377065	4750	10	6377065
Dissolved Thallium (Tl)	ug/L	100	6.96	0.10	6371611			
Total Thallium (Tl)	ug/L	98.5	6.44	0.10	6377065	6.46	0.10	6377065
Dissolved Tin (Sn)	ug/L	<1.0	<1.0	1.0	6371611			
Total Tin (Sn)	ug/L	<1.0	2.0 (3)	1.0	6377065	<1.0	1.0	6377065
Dissolved Titanium (Ti)	ug/L	<10	<10	10	6371611			
Total Titanium (Ti)	ug/L	<10	<10	10	6377065	<10	10	6377065
Dissolved Uranium (U)	ug/L	1.62	1.82	0.050	6371611			
Total Uranium (U)	ug/L	1.60	1.97	0.050	6377065	1.99	0.050	6377065
Dissolved Vanadium (V)	ug/L	<10	<10	10	6371611			
Total Vanadium (V)	ug/L	<10	<10	10	6377065	<10	10	6377065
Dissolved Zinc (Zn)	ug/L	614	188	1.0	6371611			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
(1) Duplicate RPD for Ni above control limit - Non-homogenous sample. Re-analysis yields similar results.

(2) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.
(3) Matrix Spike for Sn outside acceptance criteria (10% of analytes failure allowed).

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BV Labs Job #: B9R2553
Report Date: 2019/10/09

GHD Limited
Client Project #: 11198639-04
Site Location: BELLEDUNE SMELTER
Your P.O. #: 73517186
Sampler Initials: MT

RESULTS OF ANALYSES OF SEA WATER

BV Labs ID		KXE034	KXE035			KXE035		
Sampling Date		2019/09/26	2019/09/26			2019/09/26		
COC Number		D34710	D34710			D34710		
	UNITS	19SW-5	19SW-QA/QC	RDL	QC Batch	19SW-QA/QC Lab-Dup	RDL	QC Batch
Total Zinc (Zn)	ug/L	629	217	1.0	6377065	209	1.0	6377065
Dissolved Calcium (Ca)	mg/L	265	259	1.0	6377067			
Total Calcium (Ca)	mg/L	270	268	1.0	6377064			
Dissolved Magnesium (Mg)	mg/L	733	781	1.0	6377067			
Total Magnesium (Mg)	mg/L	734	787	1.0	6377064			
Dissolved Potassium (K)	mg/L	222	236	1.0	6377067			
Total Potassium (K)	mg/L	224	239	1.0	6377064			
Dissolved Sodium (Na)	mg/L	6860	7360	5.0	6371609			
Total Sodium (Na)	mg/L	6830	6990	5.0	6377063	7280	5.0	6377063
Dissolved Sulphur (S)	mg/L	540	567	20	6377067			
Total Sulphur (S)	mg/L	545	561	20	6377064			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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BV Labs Job #: B9R2553
Report Date: 2019/10/09

GHD Limited
Client Project #: 11198639-04
Site Location: BELLEDUNE SMELTER
Your P.O. #: 73517186
Sampler Initials: MT

MERCURY BY COLD VAPOUR AA (SEA WATER)

BV Labs ID		KXE030			KXE030			KXE031	KXE032		
Sampling Date		2019/09/26			2019/09/26			2019/09/26	2019/09/26		
COC Number		D34710			D34710			D34710	D34710		
	UNITS	19SW-1	RDL	QC Batch	19SW-1 Lab-Dup	RDL	QC Batch	19SW-2	19SW-3	RDL	QC Batch
Metals											
Dissolved Mercury (Hg)	ug/L	0.015	0.013	6364481				<0.013	0.018	0.013	6364481
Total Mercury (Hg)	ug/L	0.025	0.013	6367191	0.022	0.013	6367191	0.047	0.020	0.013	6367191

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

BV Labs ID		KXE033	KXE034	KXE035		
Sampling Date		2019/09/26	2019/09/26	2019/09/26		
COC Number		D34710	D34710	D34710		
	UNITS	19SW-4	19SW-5	19SW-QA/QC	RDL	QC Batch
Metals						
Dissolved Mercury (Hg)	ug/L	<0.013	<0.013	0.013	0.013	6364481
Total Mercury (Hg)	ug/L	0.022	0.020	0.030	0.013	6367191

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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BV Labs Job #: B9R2553
Report Date: 2019/10/09

GHD Limited
Client Project #: 11198639-04
Site Location: BELLEDUNE SMELTER
Your P.O. #: 73517186
Sampler Initials: MT

ELEMENTS BY ATOMIC SPECTROSCOPY (SEA WATER)

BV Labs ID		KXE030	KXE031	KXE032	KXE033	KXE034	KXE035		
Sampling Date		2019/09/26	2019/09/26	2019/09/26	2019/09/26	2019/09/26	2019/09/26		
COC Number		D34710	D34710	D34710	D34710	D34710	D34710		
	UNITS	**19SW-1**	**19SW-2**	**19SW-3**	**19SW-4**	**19SW-5**	**19SW-QA/QC**	**RDL**	**QC Batch**
Calculated Parameters									
Total Hardness (CaCO3)	mg/L	4110	3920	3880	3710	3690	3910	0.50	6374557

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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GHD Limited
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Your P.O. #: 73517186
Sampler Initials: MT

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	4.0°C

RESULTS OF ANALYSES OF SEA WATER

Sample KXE030 [19SW-1] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KXE031 [19SW-2] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KXE032 [19SW-3] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KXE033 [19SW-4] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KXE034 [19SW-5] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KXE035 [19SW-QA/QC] ICP-OES Dissolved Metals in Water: Detection limits raised due to sample matrix.
Sample KXE030, Elements by ICPMS (dissolved) - Seawater: Test repeated.
Sample KXE032, Elements by ICPMS (dissolved) - Seawater: Test repeated.

Results relate only to the items tested.

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BV Labs Job #: B9R2553
Report Date: 2019/10/09

QUALITY ASSURANCE REPORT

GHD Limited
Client Project #: 11198639-04
Site Location: BELLEDUNE SMELTER
Your P.O. #: 73517186
Sampler Initials: MT

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
6363133	pH	2019/10/01							1.2 (1)	N/A	100	97 - 103
6364481	Dissolved Mercury (Hg)	2019/10/03	100	80 - 120	100	80 - 120	<0.013	ug/L	NC (1)	20		
6367020	Salinity	2019/10/03					<2.0	N/A	0 (1)	25	101	80 - 120
6367191	Total Mercury (Hg)	2019/10/04	98 (2)	80 - 120	100	80 - 120	<0.013	ug/L	14 (3)	20		
6367233	Total Suspended Solids	2019/10/07					<1.0	mg/L	3.2 (1)	20	99	80 - 120
6371609	Dissolved Sodium (Na)	2019/10/04	NC	80 - 120	109	80 - 120	<0.10	mg/L				
6371611	Dissolved Aluminum (Al)	2019/10/03	100	80 - 135	95	80 - 120	<10	ug/L	NC (1)	25		
6371611	Dissolved Antimony (Sb)	2019/10/03	NC	80 - 120	98	80 - 120	<0.50	ug/L	1.7 (1)	25		
6371611	Dissolved Arsenic (As)	2019/10/03	92	80 - 120	93	80 - 120	<0.50	ug/L	6.9 (1)	25		
6371611	Dissolved Barium (Ba)	2019/10/03	98	80 - 120	96	80 - 120	<1.0	ug/L	1.1 (1)	25		
6371611	Dissolved Beryllium (Be)	2019/10/03	100	80 - 120	93	80 - 120	<1.0	ug/L	NC (1)	25		
6371611	Dissolved Bismuth (Bi)	2019/10/03	105	80 - 120	96	80 - 120	<1.0	ug/L	NC (1)	25		
6371611	Dissolved Boron (B)	2019/10/03	99	80 - 120	93	80 - 120	<50	ug/L	NC (1)	25		
6371611	Dissolved Cadmium (Cd)	2019/10/03	98	80 - 120	94	80 - 120	<0.050	ug/L	2.4 (1)	25		
6371611	Dissolved Chromium (Cr)	2019/10/03	100	80 - 120	95	80 - 120	<0.50	ug/L	NC (1)	25		
6371611	Dissolved Cobalt (Co)	2019/10/03	101	80 - 120	94	80 - 120	<0.10	ug/L	24 (1)	25		
6371611	Dissolved Copper (Cu)	2019/10/03	107	80 - 120	99	80 - 120	<0.50	ug/L	0.073 (1)	25		
6371611	Dissolved Iron (Fe)	2019/10/03	99	80 - 135	96	80 - 120	<10	ug/L	NC (1)	25		
6371611	Dissolved Lead (Pb)	2019/10/03	98	80 - 120	95	80 - 120	<0.10	ug/L	7.4 (1)	25		
6371611	Dissolved Lithium (Li)	2019/10/03	97	80 - 120	91	80 - 120	<20	ug/L	NC (1)	25		
6371611	Dissolved Manganese (Mn)	2019/10/03	NC	80 - 120	94	80 - 120	<0.50	ug/L	2.8 (1)	25		
6371611	Dissolved Molybdenum (Mo)	2019/10/03	87	80 - 120	92	80 - 120	<1.0	ug/L	NC (1)	25		
6371611	Dissolved Nickel (Ni)	2019/10/03	107	80 - 120	96	80 - 120	<0.20	ug/L	3.1 (1)	25		
6371611	Dissolved Phosphorus (P)	2019/10/03					<50	ug/L	9.6 (1)	25		
6371611	Dissolved Selenium (Se)	2019/10/03	95	80 - 120	97	80 - 120	<0.50	ug/L	3.7 (1)	25		
6371611	Dissolved Silicon (Si)	2019/10/03					<1000	ug/L	1.8 (1)	25		
6371611	Dissolved Silver (Ag)	2019/10/03	100	80 - 120	92	80 - 120	<0.050	ug/L	NC (1)	25		
6371611	Dissolved Strontium (Sr)	2019/10/03	NC	80 - 120	84	80 - 120	<10	ug/L	0.20 (1)	25		
6371611	Dissolved Thallium (Tl)	2019/10/03	99	80 - 120	94	80 - 120	<0.10	ug/L	3.1 (1)	25		
6371611	Dissolved Tin (Sn)	2019/10/03	96	80 - 120	94	80 - 120	<1.0	ug/L	NC (1)	25		
6371611	Dissolved Titanium (Ti)	2019/10/03	94	80 - 120	97	80 - 120	<10	ug/L	NC (1)	25		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
6371611	Dissolved Uranium (U)	2019/10/03	95	80 - 120	94	80 - 120	<0.050	ug/L	6.0 (1)	25		
6371611	Dissolved Vanadium (V)	2019/10/03	95	80 - 120	93	80 - 120	<10	ug/L	NC (1)	25		
6371611	Dissolved Zinc (Zn)	2019/10/03	NC	80 - 120	100	80 - 120	<5.0	ug/L	1.4 (1)	25		
6377063	Total Sodium (Na)	2019/10/04	NC	80 - 120	111	80 - 120	<0.10	mg/L	4.1 (4)	20		
6377065	Total Aluminum (Al)	2019/10/03	104 (5)	80 - 135	103	80 - 120	<10	ug/L	15 (4)	25		
6377065	Total Antimony (Sb)	2019/10/03	99 (5)	80 - 120	100	80 - 120	<0.50	ug/L	0.99 (4)	25		
6377065	Total Arsenic (As)	2019/10/03	99 (5)	80 - 120	98	80 - 120	<0.50	ug/L	2.0 (4)	25		
6377065	Total Barium (Ba)	2019/10/03	101 (5)	80 - 120	101	80 - 120	<1.0	ug/L	0.91 (4)	25		
6377065	Total Beryllium (Be)	2019/10/03	102 (5)	80 - 120	100	80 - 120	<1.0	ug/L	NC (4)	25		
6377065	Total Bismuth (Bi)	2019/10/03	98 (5)	80 - 120	102	80 - 120	<1.0	ug/L	NC (4)	25		
6377065	Total Boron (B)	2019/10/03	NC (5)	80 - 120	101	80 - 120	<50	ug/L	1.6 (4)	25		
6377065	Total Cadmium (Cd)	2019/10/03	98 (5)	80 - 120	101	80 - 120	<0.050	ug/L	1.3 (4)	25		
6377065	Total Chromium (Cr)	2019/10/03	97 (5)	80 - 120	99	80 - 120	<0.50	ug/L	20 (4)	25		
6377065	Total Cobalt (Co)	2019/10/03	98 (5)	80 - 120	99	80 - 120	<0.10	ug/L	21 (4)	25		
6377065	Total Copper (Cu)	2019/10/03	97 (5)	80 - 120	101	80 - 120	<0.50	ug/L	0.94 (4)	25		
6377065	Total Iron (Fe)	2019/10/03	99 (5)	80 - 135	101	80 - 120	<10	ug/L	5.8 (4)	25		
6377065	Total Lead (Pb)	2019/10/03	99 (5)	80 - 120	100	80 - 120	<0.10	ug/L	2.2 (4)	25		
6377065	Total Lithium (Li)	2019/10/03	NC (5)	80 - 120	105	80 - 120	<20	ug/L	1.8 (4)	25		
6377065	Total Manganese (Mn)	2019/10/03	99 (5)	80 - 120	99	80 - 120	<0.50	ug/L	6.4 (4)	25		
6377065	Total Molybdenum (Mo)	2019/10/03	97 (5)	80 - 120	98	80 - 120	<1.0	ug/L	3.5 (4)	25		
6377065	Total Nickel (Ni)	2019/10/03	98 (5)	80 - 120	102	80 - 120	<0.20	ug/L	53 (6,4)	25		
6377065	Total Phosphorus (P)	2019/10/03					<50	ug/L	3.5 (4)	25		
6377065	Total Selenium (Se)	2019/10/03	102 (5)	80 - 120	100	80 - 120	<0.50	ug/L	9.2 (4)	25		
6377065	Total Silicon (Si)	2019/10/03					<1000	ug/L	1.2 (4)	25		
6377065	Total Silver (Ag)	2019/10/03	98 (5)	80 - 120	98	80 - 120	<0.050	ug/L	10 (4)	25		
6377065	Total Strontium (Sr)	2019/10/03	NC (5)	80 - 120	89	80 - 120	<10	ug/L	0.53 (4)	25		
6377065	Total Thallium (Tl)	2019/10/03	100 (5)	80 - 120	98	80 - 120	<0.10	ug/L	0.34 (4)	25		
6377065	Total Tin (Sn)	2019/10/03	78 (6,5)	80 - 120	99	80 - 120	<1.0	ug/L	NC (4)	25		
6377065	Total Titanium (Ti)	2019/10/03	91 (5)	80 - 120	98	80 - 120	<10	ug/L	NC (4)	25		
6377065	Total Uranium (U)	2019/10/03	101 (5)	80 - 120	102	80 - 120	<0.050	ug/L	0.81 (4)	25		
6377065	Total Vanadium (V)	2019/10/03	98 (5)	80 - 120	99	80 - 120	<10	ug/L	NC (4)	25		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
6377065	Total Zinc (Zn)	2019/10/03	NC (5)	80 - 120	105	80 - 120	<5.0	ug/L	4.1 (4)	25		
6377066	Dissolved Manganese (Mn)	2019/10/08			92	80 - 120	<0.50	ug/L				
6377066	Dissolved Nickel (Ni)	2019/10/08			99	80 - 120	<0.20	ug/L				

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Duplicate Parent ID

(2) Matrix Spike Parent ID [KXE031-05]

(3) Duplicate Parent ID [KXE030-05]

(4) Duplicate Parent ID [KXE035-03]

(5) Matrix Spike Parent ID [KXE035-03]

(6) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

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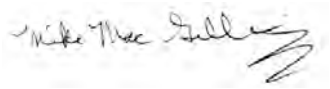
BV Labs Job #: B9R2553
Report Date: 2019/10/09

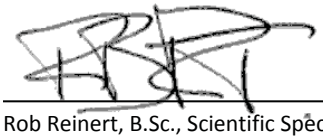
GHD Limited
Client Project #: 11198639-04
Site Location: BELLEDUNE SMELTER
Your P.O. #: 73517186
Sampler Initials: MT

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Mike MacGillivray, Scientific Specialist (Inorganics)



Rob Reinert, B.Sc., Scientific Specialist

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports.
For Service Group specific validation please refer to the Validation Signature Page.

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CHAIN OF CUSTODY RECORD

COC #: D34710 Page 1 of 1

Invoice Information	Report Information (if differs from invoice)	Project Information (where applicable)	Turnaround Time (TAT) Required
Company Name: GHD	Company Name:	Quotation #:	X Regular TAT (5 business days) Most analyses
Contact Name: Rob Turner	Contact Name:	P.O. #: 73517186	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 466 Hodgson Rd Fredericton Postal Code: E3C 2G5	Address: Postal Code:	Project #: 11188639-04	IF RUSH please specify date (Surcharges will be applied)
Phone: Fax:	Phone: Fax:	Site Location: Belledune Smelter	DATE REQUIRED:
Email: rob.turner@ghd.com	Email:	Site #:	
		Sampled By: Mario Theriault	

Laboratory Use Only

CUSTODY SEAL Present	CUSTODY SEAL Intact	COOLER TEMPERATURES	COOLER TEMPERATURES
		8, -2, 6	

COOLING MEDIA PRESENT Y / N

SAMPLES MUST BE KEPT COOL (<10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED &PRESERVED	LAB FILTRATION REQUIRED	RCAP-MS [Total Metals] Well / Surface water	RCAP-MS [Dissolved Metals] Ground waters	Metals (Water): Total Digest (Default Method) for well water & surface water	Metals (Water): Dissolved for ground water	Metals (Water): Mercury (CIRCLE) (TOTAL / DISSOLVED)	Metals (Soil): Metals & Mercury Default: Aqua Regia Extractable (Available) Digest	Metals (Soil): Metals Total Digest for Ocean Sediments (HNO3/HF/HClO4)	Metals (Soil): Mercury Low level by Cold Vapour AA	Metals (Soil): Hot Water Soluble Boron (required for CCME Agricultural / Landfill)	RBCA Hydrocarbons (BTEX, CG-C32)	Hydrocarbons Soil (Potable), NS Fuel Oil Spill Policy Low Level (BTEX, CG-C52)	CCME Hydrocarbons (CWS-PHC F1/BTEX, F2-F4)	NB Potable Water BTEX, VPH, Low level T.E.H	PAHs (Default for water/soil)	PAHs (FWAL /CCME Sediment)	PCBs	VOCs	Total Coliform/E.coli (Presence/Absence)	Total Coliform/E.Coli (Count)	HOLD- DO NOT ANALYZE	Regulatory Requirements (Specify)
1	195W-1	2019/09/26	—	SW	6	Y	N			X	X	X															
2	195W-2	2019/09/26	—	SW	6	Y	N			X	X	X															
3	195W-3	2019/09/26	—	SW	6	Y	N			X	X	X															
4	195W-4	2019/09/26	—	SW	6	Y	N			X	X	X															
5	195W-5	2019/09/26	—	SW	6	Y	N			X	X	X															
6	195W-QA/QC	2019/09/26		SW	6	Y	N			X	X	X															
7																											
8																									*		
9																											
10																											

HOLD: PH, TSS, Salinity
PH, TSS, Salinity
PH, TSS, SALinity
PH, TSS, SALinity
PH, TSS, SALinity
PH, TSS, SALinity

COMMENTS: 2019 SEP 27 8:25

* Please Send Samples to Bacvalby for Low Detection

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY:(Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
Mario Theriault	2019/09/26	13:30	E Bourque			B9R2553

White: Maxxam Pink: Client

Your P.O. #: 73517186
Your Project #: 11198639-04
Site Location: BELLEDUNE SMELTER
Your C.O.C. #: D34716

Attention: Rob Turner

GHD Limited
466 Hodgson Rd
Fredericton , NB
CANADA E3C 2G5

Report Date: 2019/10/07
Report #: R5910453
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9R2548
Received: 2019/09/27, 09:25

Sample Matrix: Sediment
Samples Received: 10

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Metals Solids Acid Extr. ICPMS	1	2019/10/02	2019/10/03	ATL SOP 00058	EPA 6020B R2 m
Metals Solids Acid Extr. ICPMS	9	2019/10/02	2019/10/04	ATL SOP 00058	EPA 6020B R2 m

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by BV Labs, unless otherwise agreed in writing. BV Labs is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Your P.O. #: 73517186
Your Project #: 11198639-04
Site Location: BELLEDUNE SMELTER
Your C.O.C. #: D34716

Attention: Rob Turner

GHD Limited
466 Hodgson Rd
Fredericton , NB
CANADA E3C 2G5

Report Date: 2019/10/07
Report #: R5910453
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9R2548
Received: 2019/09/27, 09:25

Encryption Key

Bureau Veritas Laboratories
07 Oct 2019 09:07:48

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Heather Macumber, Senior Project Manager
Email: Heather.MACUMBER@bvlabs.com
Phone# (902)420-0203 Ext:226
==========
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BV Labs Job #: B9R2548
Report Date: 2019/10/07

GHD Limited
Client Project #: 11198639-04
Site Location: BELLEDUNE SMELTER
Your P.O. #: 73517186
Sampler Initials: MT

ELEMENTS BY ATOMIC SPECTROSCOPY (SEDIMENT)

BV Labs ID		KXE012	KXE013		KXE014		KXE015		KXE016		
Sampling Date		2019/09/26	2019/09/26		2019/09/26		2019/09/26		2019/09/26		
COC Number		D34716	D34716		D34716		D34716		D34716		
	UNITS	19SED-1	19SED-2	RDL	19SED-3	RDL	19SED-4	RDL	19SED-5	RDL	QC Batch
Metals											
Acid Extractable Aluminum (Al)	mg/kg	14000	15000	10	15000	10	18000	10	10000	10	6364239
Acid Extractable Antimony (Sb)	mg/kg	54	64	2.0	70	2.0	100	2.0	83	2.0	6364239
Acid Extractable Arsenic (As)	mg/kg	210	350	2.0	510	20	640	20	1200	20	6364239
Acid Extractable Barium (Ba)	mg/kg	49	83	5.0	210	5.0	180	5.0	260	5.0	6364239
Acid Extractable Beryllium (Be)	mg/kg	<2.0	<2.0	2.0	<2.0	2.0	<2.0	2.0	<2.0	2.0	6364239
Acid Extractable Bismuth (Bi)	mg/kg	29	22	2.0	25	2.0	35	2.0	29	2.0	6364239
Acid Extractable Boron (B)	mg/kg	<50	57	50	52	50	72	50	63	50	6364239
Acid Extractable Cadmium (Cd)	mg/kg	230	270	0.30	240	0.30	750	3.0	130	0.30	6364239
Acid Extractable Chromium (Cr)	mg/kg	52	59	2.0	120	2.0	80	2.0	56	2.0	6364239
Acid Extractable Cobalt (Co)	mg/kg	34	50	1.0	110	1.0	100	1.0	180	1.0	6364239
Acid Extractable Copper (Cu)	mg/kg	590	1200	2.0	2200	2.0	2300	2.0	2900	2.0	6364239
Acid Extractable Iron (Fe)	mg/kg	47000	76000	50	170000	500	150000	500	210000	500	6364239
Acid Extractable Lead (Pb)	mg/kg	6600	8500	0.50	12000	5.0	17000	5.0	19000	5.0	6364239
Acid Extractable Lithium (Li)	mg/kg	22	23	2.0	19	2.0	22	2.0	9.1	2.0	6364239
Acid Extractable Manganese (Mn)	mg/kg	540	480	2.0	820	2.0	800	2.0	1500	2.0	6364239
Acid Extractable Mercury (Hg)	mg/kg	0.73	0.96	0.10	0.77	0.10	1.2	0.10	0.59	0.10	6364239
Acid Extractable Molybdenum (Mo)	mg/kg	7.8	11	2.0	10	2.0	12	2.0	23	2.0	6364239
Acid Extractable Nickel (Ni)	mg/kg	40	44	2.0	29	2.0	37	2.0	9.7	2.0	6364239
Acid Extractable Rubidium (Rb)	mg/kg	6.3	8.3	2.0	7.7	2.0	8.7	2.0	6.5	2.0	6364239
Acid Extractable Selenium (Se)	mg/kg	4.7	5.7	1.0	4.6	1.0	9.1	1.0	9.2	1.0	6364239
Acid Extractable Silver (Ag)	mg/kg	15	18	0.50	21	0.50	30	0.50	28	0.50	6364239
Acid Extractable Strontium (Sr)	mg/kg	58	88	5.0	160	5.0	130	5.0	100	5.0	6364239
Acid Extractable Thallium (Tl)	mg/kg	270	290	1.0	110	0.10	620	1.0	140	0.10	6364239
Acid Extractable Tin (Sn)	mg/kg	66	100	1.0	180	1.0	220	1.0	520	10	6364239
Acid Extractable Uranium (U)	mg/kg	1.1	1.6	0.10	1.7	0.10	2.2	0.10	2.2	0.10	6364239
Acid Extractable Vanadium (V)	mg/kg	54	58	2.0	51	2.0	62	2.0	30	2.0	6364239
Acid Extractable Zinc (Zn)	mg/kg	10000	19000	5.0	56000	50	50000	50	92000	50	6364239

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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BV Labs Job #: B9R2548
Report Date: 2019/10/07

GHD Limited
Client Project #: 11198639-04
Site Location: BELLEDUNE SMELTER
Your P.O. #: 73517186
Sampler Initials: MT

ELEMENTS BY ATOMIC SPECTROSCOPY (SEDIMENT)

BV Labs ID		KXE017		KXE018		KXE019	KXE020		
Sampling Date		2019/09/26		2019/09/26		2019/09/26	2019/09/26		
COC Number		D34716		D34716		D34716	D34716		
	UNITS	**19SED-6**	**RDL**	**19SED-7**	**QC Batch**	**19SED-8**	**19SED-9**	**RDL**	**QC Batch**
Metals									
Acid Extractable Aluminum (Al)	mg/kg	16000	10	14000	6364239	13000	12000	10	6364599
Acid Extractable Antimony (Sb)	mg/kg	79	2.0	130	6364239	150	130	2.0	6364599
Acid Extractable Arsenic (As)	mg/kg	700	20	1200	6364239	2000	2400	20	6364599
Acid Extractable Barium (Ba)	mg/kg	220	5.0	190	6364239	240	550	5.0	6364599
Acid Extractable Beryllium (Be)	mg/kg	<2.0	2.0	<2.0	6364239	<2.0	<2.0	2.0	6364599
Acid Extractable Bismuth (Bi)	mg/kg	39	2.0	28	6364239	49	56	2.0	6364599
Acid Extractable Boron (B)	mg/kg	52	50	100	6364239	140	130	50	6364599
Acid Extractable Cadmium (Cd)	mg/kg	150	0.30	280	6364239	300	430	0.30	6364599
Acid Extractable Chromium (Cr)	mg/kg	80	2.0	63	6364239	71	95	2.0	6364599
Acid Extractable Cobalt (Co)	mg/kg	100	1.0	140	6364239	180	260	1.0	6364599
Acid Extractable Copper (Cu)	mg/kg	2000	2.0	2500	6364239	3600	4100	2.0	6364599
Acid Extractable Iron (Fe)	mg/kg	170000	500	160000	6364239	200000	240000	500	6364599
Acid Extractable Lead (Pb)	mg/kg	12000	5.0	24000	6364239	41000	41000	5.0	6364599
Acid Extractable Lithium (Li)	mg/kg	20	2.0	16	6364239	11	11	2.0	6364599
Acid Extractable Manganese (Mn)	mg/kg	1000	2.0	1100	6364239	1200	1100	2.0	6364599
Acid Extractable Mercury (Hg)	mg/kg	0.62	0.10	1.3	6364239	2.5	3.6	0.10	6364599
Acid Extractable Molybdenum (Mo)	mg/kg	11	2.0	13	6364239	12	24	2.0	6364599
Acid Extractable Nickel (Ni)	mg/kg	30	2.0	26	6364239	20	17	2.0	6364599
Acid Extractable Rubidium (Rb)	mg/kg	7.9	2.0	6.6	6364239	4.7	5.4	2.0	6364599
Acid Extractable Selenium (Se)	mg/kg	5.1	1.0	14	6364239	17	36	1.0	6364599
Acid Extractable Silver (Ag)	mg/kg	17	0.50	22	6364239	39	34	0.50	6364599
Acid Extractable Strontium (Sr)	mg/kg	120	5.0	150	6364239	140	190	5.0	6364599
Acid Extractable Thallium (Tl)	mg/kg	82	0.10	98	6364239	110	19	0.10	6364599
Acid Extractable Tin (Sn)	mg/kg	210	1.0	480	6364239	670	900	10	6364599
Acid Extractable Uranium (U)	mg/kg	1.8	0.10	3.5	6364239	4.6	4.1	0.10	6364599
Acid Extractable Vanadium (V)	mg/kg	55	2.0	49	6364239	44	40	2.0	6364599
Acid Extractable Zinc (Zn)	mg/kg	50000	50	67000	6364239	99000	98000	50	6364599

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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BV Labs Job #: B9R2548
Report Date: 2019/10/07

GHD Limited
Client Project #: 11198639-04
Site Location: BELLEDUNE SMELTER
Your P.O. #: 73517186
Sampler Initials: MT

ELEMENTS BY ATOMIC SPECTROSCOPY (SEDIMENT)

BV Labs ID		KXE021		
Sampling Date		2019/09/26		
COC Number		D34716		
	UNITS	19SED-QA/QC	RDL	QC Batch
Metals				
Acid Extractable Aluminum (Al)	mg/kg	14000	10	6364599
Acid Extractable Antimony (Sb)	mg/kg	56	2.0	6364599
Acid Extractable Arsenic (As)	mg/kg	210	2.0	6364599
Acid Extractable Barium (Ba)	mg/kg	52	5.0	6364599
Acid Extractable Beryllium (Be)	mg/kg	<2.0	2.0	6364599
Acid Extractable Bismuth (Bi)	mg/kg	26	2.0	6364599
Acid Extractable Boron (B)	mg/kg	<50	50	6364599
Acid Extractable Cadmium (Cd)	mg/kg	130	0.30	6364599
Acid Extractable Chromium (Cr)	mg/kg	53	2.0	6364599
Acid Extractable Cobalt (Co)	mg/kg	37	1.0	6364599
Acid Extractable Copper (Cu)	mg/kg	610	2.0	6364599
Acid Extractable Iron (Fe)	mg/kg	50000	50	6364599
Acid Extractable Lead (Pb)	mg/kg	7200	0.50	6364599
Acid Extractable Lithium (Li)	mg/kg	21	2.0	6364599
Acid Extractable Manganese (Mn)	mg/kg	600	2.0	6364599
Acid Extractable Mercury (Hg)	mg/kg	0.57	0.10	6364599
Acid Extractable Molybdenum (Mo)	mg/kg	6.3	2.0	6364599
Acid Extractable Nickel (Ni)	mg/kg	43	2.0	6364599
Acid Extractable Rubidium (Rb)	mg/kg	6.2	2.0	6364599
Acid Extractable Selenium (Se)	mg/kg	4.0	1.0	6364599
Acid Extractable Silver (Ag)	mg/kg	13	0.50	6364599
Acid Extractable Strontium (Sr)	mg/kg	54	5.0	6364599
Acid Extractable Thallium (Tl)	mg/kg	170	0.10	6364599
Acid Extractable Tin (Sn)	mg/kg	67	1.0	6364599
Acid Extractable Uranium (U)	mg/kg	0.86	0.10	6364599
Acid Extractable Vanadium (V)	mg/kg	53	2.0	6364599
Acid Extractable Zinc (Zn)	mg/kg	11000	5.0	6364599

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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BV Labs Job #: B9R2548
Report Date: 2019/10/07

GHD Limited
Client Project #: 11198639-04
Site Location: BELLEDUNE SMELTER
Your P.O. #: 73517186
Sampler Initials: MT

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	4.0°C

Results relate only to the items tested.

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BV Labs Job #: B9R2548
Report Date: 2019/10/07

QUALITY ASSURANCE REPORT

GHD Limited
Client Project #: 11198639-04
Site Location: BELLEDUNE SMELTER
Your P.O. #: 73517186
Sampler Initials: MT

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
6364239	Acid Extractable Aluminum (Al)	2019/10/03					<10	mg/kg	9.1 (1)	35
6364239	Acid Extractable Antimony (Sb)	2019/10/03	NC	75 - 125	110	75 - 125	<2.0	mg/kg	27 (1)	35
6364239	Acid Extractable Arsenic (As)	2019/10/03	NC	75 - 125	102	75 - 125	<2.0	mg/kg	3.4 (1)	35
6364239	Acid Extractable Barium (Ba)	2019/10/03	NC	75 - 125	115	75 - 125	<5.0	mg/kg	6.2 (1)	35
6364239	Acid Extractable Beryllium (Be)	2019/10/03	98	75 - 125	100	75 - 125	<2.0	mg/kg	NC (1)	35
6364239	Acid Extractable Bismuth (Bi)	2019/10/03	105	75 - 125	109	75 - 125	<2.0	mg/kg	NC (1)	35
6364239	Acid Extractable Boron (B)	2019/10/03	93	75 - 125	98	75 - 125	<50	mg/kg	NC (1)	35
6364239	Acid Extractable Cadmium (Cd)	2019/10/03	93	75 - 125	96	75 - 125	<0.30	mg/kg	5.0 (1)	35
6364239	Acid Extractable Chromium (Cr)	2019/10/03	94	75 - 125	99	75 - 125	<2.0	mg/kg	11 (1)	35
6364239	Acid Extractable Cobalt (Co)	2019/10/03	97	75 - 125	102	75 - 125	<1.0	mg/kg	3.0 (1)	35
6364239	Acid Extractable Copper (Cu)	2019/10/03	NC	75 - 125	98	75 - 125	<2.0	mg/kg	43 (2,1)	35
6364239	Acid Extractable Iron (Fe)	2019/10/03					<50	mg/kg	9.3 (1)	35
6364239	Acid Extractable Lead (Pb)	2019/10/03	NC	75 - 125	107	75 - 125	<0.50	mg/kg	23 (1)	35
6364239	Acid Extractable Lithium (Li)	2019/10/03	106	75 - 125	105	75 - 125	<2.0	mg/kg	8.1 (1)	35
6364239	Acid Extractable Manganese (Mn)	2019/10/03	NC	75 - 125	101	75 - 125	<2.0	mg/kg	5.7 (1)	35
6364239	Acid Extractable Mercury (Hg)	2019/10/03	100	75 - 125	106	75 - 125	<0.10	mg/kg	2.8 (1)	35
6364239	Acid Extractable Molybdenum (Mo)	2019/10/03	NC	75 - 125	110	75 - 125	<2.0	mg/kg	12 (1)	35
6364239	Acid Extractable Nickel (Ni)	2019/10/03	93	75 - 125	101	75 - 125	<2.0	mg/kg	4.2 (1)	35
6364239	Acid Extractable Rubidium (Rb)	2019/10/03	100	75 - 125	103	75 - 125	<2.0	mg/kg	7.6 (1)	35
6364239	Acid Extractable Selenium (Se)	2019/10/03	85	75 - 125	94	75 - 125	<1.0	mg/kg	1.5 (1)	35
6364239	Acid Extractable Silver (Ag)	2019/10/03	95	75 - 125	100	75 - 125	<0.50	mg/kg	0.66 (1)	35
6364239	Acid Extractable Strontium (Sr)	2019/10/03	NC	75 - 125	105	75 - 125	<5.0	mg/kg	0.98 (1)	35
6364239	Acid Extractable Thallium (Tl)	2019/10/03	98	75 - 125	106	75 - 125	<0.10	mg/kg	2.6 (1)	35
6364239	Acid Extractable Tin (Sn)	2019/10/03	NC	75 - 125	105	75 - 125	<1.0	mg/kg	17 (1)	35
6364239	Acid Extractable Uranium (U)	2019/10/03	106	75 - 125	107	75 - 125	<0.10	mg/kg	7.4 (1)	35
6364239	Acid Extractable Vanadium (V)	2019/10/03	95	75 - 125	102	75 - 125	<2.0	mg/kg	5.3 (1)	35
6364239	Acid Extractable Zinc (Zn)	2019/10/03	NC	75 - 125	99	75 - 125	<5.0	mg/kg	13 (1)	35
6364599	Acid Extractable Aluminum (Al)	2019/10/04					<10	mg/kg	6.3 (1)	35
6364599	Acid Extractable Antimony (Sb)	2019/10/04	116	75 - 125	105	75 - 125	<2.0	mg/kg	11 (1)	35
6364599	Acid Extractable Arsenic (As)	2019/10/04	116	75 - 125	108	75 - 125	<2.0	mg/kg	2.5 (1)	35
6364599	Acid Extractable Barium (Ba)	2019/10/04	NC	75 - 125	106	75 - 125	<5.0	mg/kg	5.4 (1)	35

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
6364599	Acid Extractable Beryllium (Be)	2019/10/04	112	75 - 125	105	75 - 125	<2.0	mg/kg	NC (1)	35
6364599	Acid Extractable Bismuth (Bi)	2019/10/04	111	75 - 125	106	75 - 125	<2.0	mg/kg	NC (1)	35
6364599	Acid Extractable Boron (B)	2019/10/04	108	75 - 125	109	75 - 125	<50	mg/kg	NC (1)	35
6364599	Acid Extractable Cadmium (Cd)	2019/10/04	110	75 - 125	102	75 - 125	<0.30	mg/kg	2.4 (1)	35
6364599	Acid Extractable Chromium (Cr)	2019/10/04	120	75 - 125	106	75 - 125	<2.0	mg/kg	2.4 (1)	35
6364599	Acid Extractable Cobalt (Co)	2019/10/04	115	75 - 125	106	75 - 125	<1.0	mg/kg	5.9 (1)	35
6364599	Acid Extractable Copper (Cu)	2019/10/04	NC	75 - 125	105	75 - 125	<2.0	mg/kg	1.9 (1)	35
6364599	Acid Extractable Iron (Fe)	2019/10/04					<50	mg/kg	7.5 (1)	35
6364599	Acid Extractable Lead (Pb)	2019/10/04	NC	75 - 125	104	75 - 125	<0.50	mg/kg	11 (1)	35
6364599	Acid Extractable Lithium (Li)	2019/10/04	125	75 - 125	107	75 - 125	<2.0	mg/kg	8.2 (1)	35
6364599	Acid Extractable Manganese (Mn)	2019/10/04	NC	75 - 125	107	75 - 125	<2.0	mg/kg	4.9 (1)	35
6364599	Acid Extractable Mercury (Hg)	2019/10/04	109	75 - 125	105	75 - 125	<0.10	mg/kg	12 (1)	35
6364599	Acid Extractable Molybdenum (Mo)	2019/10/04	NC	75 - 125	108	75 - 125	<2.0	mg/kg	12 (1)	35
6364599	Acid Extractable Nickel (Ni)	2019/10/04	116	75 - 125	108	75 - 125	<2.0	mg/kg	0.51 (1)	35
6364599	Acid Extractable Rubidium (Rb)	2019/10/04	113	75 - 125	104	75 - 125	<2.0	mg/kg	1.0 (1)	35
6364599	Acid Extractable Selenium (Se)	2019/10/04	116	75 - 125	109	75 - 125	<1.0	mg/kg	0.030 (1)	35
6364599	Acid Extractable Silver (Ag)	2019/10/04	110	75 - 125	100	75 - 125	<0.50	mg/kg	NC (1)	35
6364599	Acid Extractable Strontium (Sr)	2019/10/04	116	75 - 125	106	75 - 125	<5.0	mg/kg	3.3 (1)	35
6364599	Acid Extractable Thallium (Tl)	2019/10/04	109	75 - 125	106	75 - 125	<0.10	mg/kg	7.8 (1)	35
6364599	Acid Extractable Tin (Sn)	2019/10/04	NC	75 - 125	111	75 - 125	<1.0	mg/kg	0.44 (1)	35
6364599	Acid Extractable Uranium (U)	2019/10/04	117	75 - 125	111	75 - 125	<0.10	mg/kg	5.5 (1)	35
6364599	Acid Extractable Vanadium (V)	2019/10/04	121	75 - 125	108	75 - 125	<2.0	mg/kg	2.7 (1)	35

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
6364599	Acid Extractable Zinc (Zn)	2019/10/04	NC	75 - 125	107	75 - 125	<5.0	mg/kg	3.0 (1)	35

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Duplicate Parent ID

(2) Poor RPD due to sample inhomogeneity verified by repeat digestion and analysis.

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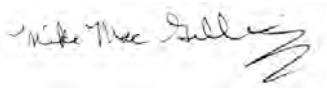
BV Labs Job #: B9R2548
Report Date: 2019/10/07

GHD Limited
Client Project #: 11198639-04
Site Location: BELLEDUNE SMELTER
Your P.O. #: 73517186
Sampler Initials: MT

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Mike MacGillivray, Scientific Specialist (Inorganics)

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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465 George Street,Unit G,Sydney, NS B1P 1K5 Tel: 902-567-1255 Fax: 902-539-6504 Toll Free: 1-866-535-7770
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ATL FCD 00149 / 22

CHAIN OF CUSTODY RECORD

COC #: D34716 Page 1 of 1

Invoice Information	Report Information (if differs from invoice)	Project Information (where applicable)	Turnaround Time (TAT) Required
Company Name: GHD	Company Name:	Quotation #:	☐ Regular TAT (5 business days) Most analyses
Contact Name: Rob Turner	Contact Name:	P.O. #: 7357186	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 446 Hodgson Rd Fredericton Postal Code: E3C 2G5	Address: Postal Code:	Project #: 11198639-04	IF RUSH please specify date (Surcharges will be applied)
Phone: Fax:	Phone: Fax:	Site Location: Belledune Smelter	DATE REQUIRED:
Email: rob.turner@ghd.com	Email:	Site #:	
		Sampled By: Mario Theriault	

Laboratory Use Only

CUSTODY SEAL Present	CUSTODY SEAL Intact	COOLER TEMPERATURES	COOLER TEMPERATURES
		8, -2, 6	

COOLING MEDIA PRESENT Y / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED &PRESERVED	LAB FILTRATION REQUIRED	RCAP-MS [Total Metals] Well / Surface water	RCAP-MS [Dissolved Metals] Ground waters	Metals (Water): Total Digest (Default Method) for well water & surface water	Metals (Water): Dissolved for ground water	Metals (Water): Mercury (CIRCLE) TOTAL / DISSOLVED	Metals (Soil): Metals & Mercury Default Acid Extractable (Available) Digest	Metals (Soil): Metals Total Digest - for Ocean sediments (HNO3/HF/HClO4)	Metals (Soil): Mercury Low level by Cold Vapour AA	Metals (Soil): Hot Water Soluble Boron (required for CCME Agricultural/ Landfill)	RBCA Hydrocarbons (BTEX, C6-C32)	Hydrocarbons Soil (Possible), NS Fuel Oil Spill Policy Low Level BTEX, C6-C32	CCME Hydrocarbons (CWS-PHC F1/BTEX, F2-F4)	NB Potable Water BTEX, VPH, Low level T.E.H.	PAHs (Default for water/soil)	PAHs (FWAL /CCME Sediment)	PCBs	VOCs	Total Coliform/E.coli (Presence/Absence)	Total Coliform/E.Coli (Count)		HOLD- DO NOT ANALYZE	Regulatory Requirements (Specify) / COMMENTS
1	19SED-1	2019/09/26		Sediment	1	N	N						X															
2	19SED-2	2019/09/26			1	N	N						X															
3	19SED-3	2019/09/26			1	N	N						X															
4	19SED-4	2019/09/26			1	N	N						X															
5	19SED-5	2019/09/26			1	N	N						X															
6	19SED-6	2019/09/26			1	N	N						X															
7	19SED-7	2019/09/26			1	N	N						X															
8	19SED-8	2019/09/26			1	N	N						X															
9	19SED-9	2019/09/26			1	N	N						X															
10	19SED-QA/QC	2019/09/26			1	N	N						X															

2019 SEP 27 9:25

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY:(Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
	2019/09/26	13:38				B9R2548
Mario Theriault						

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White: Maxxam Pink: Client

Your P.O. #: 73517186
Your Project #: 11198639-04
Site Location: Glencore
Your C.O.C. #: 112702

Attention: Rob Turner

GHD Limited
120 Western Parkway
Bedford, NS
CANADA B4B 0V2

Report Date: 2019/10/18
Report #: R5925870
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9S5685
Received: 2019/10/10, 09:31

Sample Matrix: Soil
Samples Received: 34

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Metals Solids Acid Extr. ICPMS	15	2019/10/15	2019/10/15	ATL SOP 00058	EPA 6020B R2 m
Metals Solids Acid Extr. ICPMS	13	2019/10/15	2019/10/16	ATL SOP 00058	EPA 6020B R2 m
Metals Solids Acid Extr. ICPMS	1	2019/10/15	2019/10/17	ATL SOP 00058	EPA 6020B R2 m
Moisture	5	N/A	2019/10/15	ATL SOP 00001	OMOE Handbook 1983 m
PCBs in soil by GC/ECD (1)	5	2019/10/16	2019/10/17	ATL SOP 00106	EPA 8082A 2007 m
PCB Aroclor sum (soil)	5	N/A	2019/10/17	N/A	Auto Calc.

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by BV Labs, unless otherwise agreed in writing. BV Labs is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) Soils are reported on a dry weight basis unless otherwise specified.

Your P.O. #: 73517186
Your Project #: 11198639-04
Site Location: Glencore
Your C.O.C. #: 112702

Attention: Rob Turner

GHD Limited
120 Western Parkway
Bedford, NS
CANADA B4B 0V2

Report Date: 2019/10/18
Report #: R5925870
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9S5685
Received: 2019/10/10, 09:31

Encryption Key

AUTHORIZED REPORT
RAPPORT AUTORISÉ

Bureau Veritas Laboratories
18 Oct 2019 09:00:15

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Heather Macumber, Senior Project Manager
Email: Heather.MACUMBER@bvlabs.com
Phone# (902)420-0203 Ext:226

==========

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BV Labs Job #: B9S5685
Report Date: 2019/10/18

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186
Sampler Initials: MG

RESULTS OF ANALYSES OF SOIL

BV Labs ID		KZZ131	KZZ131	KZZ132	KZZ133		
Sampling Date		2019/10/02	2019/10/02	2019/10/02	2019/10/02		
COC Number		112702	112702	112702	112702		
	UNITS	19SP-7 (0.0-0.15m)	19SP-7 (0.0-0.15m) Lab-Dup	19SP-7 (0.15-0.3m)	19SP-8 (0.0-0.15m)	RDL	QC Batch
Inorganics							
Moisture	%	11	12	8.9	15	1.0	6382196

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

BV Labs ID		KZZ134	KZZ161		
Sampling Date		2019/10/02	2019/10/02		
COC Number		112702	112702		
	UNITS	19SP-8 (0.15-0.3m)	SOIL-QA/QC-6	RDL	QC Batch
Inorganics					
Moisture	%	13	12	1.0	6382196

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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BV Labs Job #: B9S5685
Report Date: 2019/10/18

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186
Sampler Initials: MG

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

BV Labs ID		KZZ135		KZZ136		KZZ137		
Sampling Date		2019/09/27		2019/09/27		2019/09/27		
COC Number		112702		112702		112702		
	UNITS	19SS-1 (0-0.05m)	RDL	19SS-1 (0.05-0.3m)	RDL	19SS-2 (0-0.05m)	RDL	QC Batch
Metals								
Acid Extractable Aluminum (Al)	mg/kg	18000	10	15000	10	21000	10	6386086
Acid Extractable Antimony (Sb)	mg/kg	140	2.0	120	2.0	50	2.0	6386086
Acid Extractable Arsenic (As)	mg/kg	640	20	760	20	360	2.0	6386086
Acid Extractable Barium (Ba)	mg/kg	280	5.0	360	5.0	60	5.0	6386086
Acid Extractable Beryllium (Be)	mg/kg	<2.0	2.0	<2.0	2.0	<2.0	2.0	6386086
Acid Extractable Bismuth (Bi)	mg/kg	25	2.0	25	2.0	37	2.0	6386086
Acid Extractable Boron (B)	mg/kg	<50	50	<50	50	<50	50	6386086
Acid Extractable Cadmium (Cd)	mg/kg	29	0.30	19	0.30	22	0.30	6386086
Acid Extractable Chromium (Cr)	mg/kg	66	2.0	80	2.0	75	2.0	6386086
Acid Extractable Cobalt (Co)	mg/kg	110	1.0	150	1.0	27	1.0	6386086
Acid Extractable Copper (Cu)	mg/kg	2100	2.0	2900	2.0	520	2.0	6386086
Acid Extractable Iron (Fe)	mg/kg	150000	500	200000	500	42000	50	6386086
Acid Extractable Lead (Pb)	mg/kg	19000	5.0	21000	5.0	9700	5.0	6386086
Acid Extractable Lithium (Li)	mg/kg	21	2.0	15	2.0	30	2.0	6386086
Acid Extractable Manganese (Mn)	mg/kg	780	2.0	960	2.0	880	2.0	6386086
Acid Extractable Mercury (Hg)	mg/kg	0.23	0.10	<0.10	0.10	5.8	0.10	6386086
Acid Extractable Molybdenum (Mo)	mg/kg	12	2.0	19	2.0	<2.0	2.0	6386086
Acid Extractable Nickel (Ni)	mg/kg	27	2.0	16	2.0	49	2.0	6386086
Acid Extractable Rubidium (Rb)	mg/kg	9.9	2.0	9.1	2.0	12	2.0	6386086
Acid Extractable Selenium (Se)	mg/kg	5.1	1.0	4.8	1.0	16	1.0	6386086
Acid Extractable Silver (Ag)	mg/kg	23	0.50	24	0.50	12	0.50	6386086
Acid Extractable Strontium (Sr)	mg/kg	110	5.0	140	5.0	87	5.0	6386086
Acid Extractable Thallium (Tl)	mg/kg	3.6	0.10	2.8	0.10	14	0.10	6386086
Acid Extractable Tin (Sn)	mg/kg	250	1.0	320	1.0	53	1.0	6386086
Acid Extractable Uranium (U)	mg/kg	1.3	0.10	1.7	0.10	9.6	0.10	6386086
Acid Extractable Vanadium (V)	mg/kg	59	2.0	48	2.0	110	2.0	6386086
Acid Extractable Zinc (Zn)	mg/kg	45000	5.0	70000	50	3500	5.0	6386086

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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BV Labs Job #: B9S5685
Report Date: 2019/10/18

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186
Sampler Initials: MG

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

BV Labs ID		KZZ138	KZZ138			KZZ139		
Sampling Date		2019/09/27	2019/09/27			2019/09/27		
COC Number		112702	112702			112702		
	UNITS	19SS-2 (0.05-0.3m)	19SS-2 (0.05-0.3m) Lab-Dup	RDL	QC Batch	19SS-3 (0-0.05m)	RDL	QC Batch
Metals								
Acid Extractable Aluminum (Al)	mg/kg	19000	19000	10	6386107	7700	10	6386086
Acid Extractable Antimony (Sb)	mg/kg	8.1	7.4	2.0	6386107	89	2.0	6386086
Acid Extractable Arsenic (As)	mg/kg	93	91	2.0	6386107	1300	20	6386086
Acid Extractable Barium (Ba)	mg/kg	54	54	5.0	6386107	480	5.0	6386086
Acid Extractable Beryllium (Be)	mg/kg	<2.0	<2.0	2.0	6386107	<2.0	2.0	6386086
Acid Extractable Bismuth (Bi)	mg/kg	3.2	3.0	2.0	6386107	19	2.0	6386086
Acid Extractable Boron (B)	mg/kg	<50	<50	50	6386107	<50	50	6386086
Acid Extractable Cadmium (Cd)	mg/kg	11	11	0.30	6386107	38	0.30	6386086
Acid Extractable Chromium (Cr)	mg/kg	65	59	2.0	6386107	49	2.0	6386086
Acid Extractable Cobalt (Co)	mg/kg	19	19	1.0	6386107	180	1.0	6386086
Acid Extractable Copper (Cu)	mg/kg	100	98	2.0	6386107	1700	2.0	6386086
Acid Extractable Iron (Fe)	mg/kg	38000	36000	50	6386107	210000	500	6386086
Acid Extractable Lead (Pb)	mg/kg	1200	1000	0.50	6386107	24000	5.0	6386086
Acid Extractable Lithium (Li)	mg/kg	29	29	2.0	6386107	7.0	2.0	6386086
Acid Extractable Manganese (Mn)	mg/kg	750	780	2.0	6386107	650	2.0	6386086
Acid Extractable Mercury (Hg)	mg/kg	2.0	2.0	0.10	6386107	<0.10	0.10	6386086
Acid Extractable Molybdenum (Mo)	mg/kg	<2.0	<2.0	2.0	6386107	26	2.0	6386086
Acid Extractable Nickel (Ni)	mg/kg	45	46	2.0	6386107	6.6	2.0	6386086
Acid Extractable Rubidium (Rb)	mg/kg	8.4	8.0	2.0	6386107	5.4	2.0	6386086
Acid Extractable Selenium (Se)	mg/kg	4.3	4.1	1.0	6386107	11	1.0	6386086
Acid Extractable Silver (Ag)	mg/kg	2.4	2.4	0.50	6386107	11	0.50	6386086
Acid Extractable Strontium (Sr)	mg/kg	52	51	5.0	6386107	85	5.0	6386086
Acid Extractable Thallium (Tl)	mg/kg	5.6	5.5	0.10	6386107	1.2	0.10	6386086
Acid Extractable Tin (Sn)	mg/kg	6.0	5.4	1.0	6386107	650	1.0	6386086
Acid Extractable Uranium (U)	mg/kg	2.7	2.5	0.10	6386107	1.6	0.10	6386086
Acid Extractable Vanadium (V)	mg/kg	88	90	2.0	6386107	25	2.0	6386086
Acid Extractable Zinc (Zn)	mg/kg	1600	1500	5.0	6386107	86000	50	6386086

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

Bureau Veritas Laboratories 200 Bluewater Rd, Suite 105, Bedford, Nova Scotia Canada B4B 1G9 Tel: 902-420-0203 Toll-free: 800-565-7227 Fax: 902-420-8612 www.bvlabs.com

BV Labs Job #: B9S5685
Report Date: 2019/10/18

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186
Sampler Initials: MG

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

BV Labs ID		KZZ140			KZZ141	KZZ142		
Sampling Date		2019/09/27			2019/09/27	2019/09/27		
COC Number		112702			112702	112702		
	UNITS	19SS-3 (0.05-0.3m)	RDL	QC Batch	19SS-4 (0-0.05m)	19SS-4 (0.05-0.3m)	RDL	QC Batch
Metals								
Acid Extractable Aluminum (Al)	mg/kg	9100	10	6386086	16000	24000	10	6386107
Acid Extractable Antimony (Sb)	mg/kg	120	2.0	6386086	35	6.3	2.0	6386107
Acid Extractable Arsenic (As)	mg/kg	1100	20	6386086	160	63	2.0	6386107
Acid Extractable Barium (Ba)	mg/kg	440	5.0	6386086	50	48	5.0	6386107
Acid Extractable Beryllium (Be)	mg/kg	<2.0	2.0	6386086	<2.0	<2.0	2.0	6386107
Acid Extractable Bismuth (Bi)	mg/kg	16	2.0	6386086	26	2.7	2.0	6386107
Acid Extractable Boron (B)	mg/kg	<50	50	6386086	<50	<50	50	6386107
Acid Extractable Cadmium (Cd)	mg/kg	35	0.30	6386086	13	2.3	0.30	6386107
Acid Extractable Chromium (Cr)	mg/kg	54	2.0	6386086	45	54	2.0	6386107
Acid Extractable Cobalt (Co)	mg/kg	160	1.0	6386086	23	25	1.0	6386107
Acid Extractable Copper (Cu)	mg/kg	1600	2.0	6386086	390	81	2.0	6386107
Acid Extractable Iron (Fe)	mg/kg	190000	500	6386086	46000	52000	50	6386107
Acid Extractable Lead (Pb)	mg/kg	24000	5.0	6386086	6600	740	0.50	6386107
Acid Extractable Lithium (Li)	mg/kg	11	2.0	6386086	23	37	2.0	6386107
Acid Extractable Manganese (Mn)	mg/kg	820	2.0	6386086	940	1600	2.0	6386107
Acid Extractable Mercury (Hg)	mg/kg	<0.10	0.10	6386086	0.79	0.11	0.10	6386107
Acid Extractable Molybdenum (Mo)	mg/kg	24	2.0	6386086	2.4	<2.0	2.0	6386107
Acid Extractable Nickel (Ni)	mg/kg	13	2.0	6386086	41	60	2.0	6386107
Acid Extractable Rubidium (Rb)	mg/kg	5.6	2.0	6386086	9.3	7.4	2.0	6386107
Acid Extractable Selenium (Se)	mg/kg	9.7	1.0	6386086	2.3	<1.0	1.0	6386107
Acid Extractable Silver (Ag)	mg/kg	10	0.50	6386086	11	1.2	0.50	6386107
Acid Extractable Strontium (Sr)	mg/kg	80	5.0	6386086	50	15	5.0	6386107
Acid Extractable Thallium (Tl)	mg/kg	1.7	0.10	6386086	6.5	1.7	0.10	6386107
Acid Extractable Tin (Sn)	mg/kg	560	1.0	6386086	53	5.4	1.0	6386107
Acid Extractable Uranium (U)	mg/kg	1.6	0.10	6386086	4.7	1.3	0.10	6386107
Acid Extractable Vanadium (V)	mg/kg	32	2.0	6386086	73	81	2.0	6386107
Acid Extractable Zinc (Zn)	mg/kg	77000	50	6386086	3600	580	5.0	6386107

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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BV Labs Job #: B9S5685
Report Date: 2019/10/18

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186
Sampler Initials: MG

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

BV Labs ID		KZZ143		KZZ144		KZZ145		
Sampling Date		2019/09/27		2019/09/27		2019/09/27		
COC Number		112702		112702		112702		
	UNITS	19SS-5 (0-0.05m)	RDL	19SS-5 (0.05-0.3m)	RDL	19SS-6 (0-0.05m)	RDL	QC Batch
Metals								
Acid Extractable Aluminum (Al)	mg/kg	7800	10	15000	10	3800	10	6386107
Acid Extractable Antimony (Sb)	mg/kg	93	2.0	7.2	2.0	140	2.0	6386107
Acid Extractable Arsenic (As)	mg/kg	360	2.0	60	2.0	190	2.0	6386107
Acid Extractable Barium (Ba)	mg/kg	84	5.0	44	5.0	86	5.0	6386107
Acid Extractable Beryllium (Be)	mg/kg	<2.0	2.0	<2.0	2.0	<2.0	2.0	6386107
Acid Extractable Bismuth (Bi)	mg/kg	79	2.0	3.8	2.0	61	2.0	6386107
Acid Extractable Boron (B)	mg/kg	<50	50	<50	50	<50	50	6386107
Acid Extractable Cadmium (Cd)	mg/kg	51	0.30	4.9	0.30	58	0.30	6386107
Acid Extractable Chromium (Cr)	mg/kg	37	2.0	46	2.0	22	2.0	6386107
Acid Extractable Cobalt (Co)	mg/kg	16	1.0	20	1.0	8.0	1.0	6386107
Acid Extractable Copper (Cu)	mg/kg	840	2.0	88	2.0	1000	2.0	6386107
Acid Extractable Iron (Fe)	mg/kg	37000	50	36000	50	16000	50	6386107
Acid Extractable Lead (Pb)	mg/kg	19000	5.0	800	0.50	15000	5.0	6386107
Acid Extractable Lithium (Li)	mg/kg	6.3	2.0	25	2.0	3.3	2.0	6386107
Acid Extractable Manganese (Mn)	mg/kg	340	2.0	1200	2.0	720	2.0	6386107
Acid Extractable Mercury (Hg)	mg/kg	2.3	0.10	0.15	0.10	2.3	0.10	6386107
Acid Extractable Molybdenum (Mo)	mg/kg	3.6	2.0	<2.0	2.0	2.8	2.0	6386107
Acid Extractable Nickel (Ni)	mg/kg	24	2.0	34	2.0	17	2.0	6386107
Acid Extractable Rubidium (Rb)	mg/kg	5.0	2.0	8.8	2.0	2.2	2.0	6386107
Acid Extractable Selenium (Se)	mg/kg	7.1	1.0	<1.0	1.0	9.7	1.0	6386107
Acid Extractable Silver (Ag)	mg/kg	34	0.50	1.9	0.50	73	5.0	6386107
Acid Extractable Strontium (Sr)	mg/kg	110	5.0	24	5.0	58	5.0	6386107
Acid Extractable Thallium (Tl)	mg/kg	14	0.10	2.0	0.10	10	0.10	6386107
Acid Extractable Tin (Sn)	mg/kg	110	1.0	5.3	1.0	77	1.0	6386107
Acid Extractable Uranium (U)	mg/kg	14	0.10	1.5	0.10	2.2	0.10	6386107
Acid Extractable Vanadium (V)	mg/kg	80	2.0	87	2.0	22	2.0	6386107
Acid Extractable Zinc (Zn)	mg/kg	4200	5.0	510	5.0	4900	5.0	6386107

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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BV Labs Job #: B9S5685
Report Date: 2019/10/18

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186
Sampler Initials: MG

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

BV Labs ID		KZZ146		KZZ147	KZZ148	KZZ149		
Sampling Date		2019/09/27		2019/09/27	2019/09/27	2019/09/27		
COC Number		112702		112702	112702	112702		
	UNITS	19SS-6 (0.05-0.3m)	RDL	19SS-7 (0-0.05m)	19SS-7 (0.05-0.3m)	19SS-8 (0-0.05m)	RDL	QC Batch
Metals								
Acid Extractable Aluminum (Al)	mg/kg	14000	10	12000	12000	14000	10	6386107
Acid Extractable Antimony (Sb)	mg/kg	44	2.0	23	16	39	2.0	6386107
Acid Extractable Arsenic (As)	mg/kg	390	2.0	150	73	140	2.0	6386107
Acid Extractable Barium (Ba)	mg/kg	66	5.0	35	55	53	5.0	6386107
Acid Extractable Beryllium (Be)	mg/kg	<2.0	2.0	<2.0	<2.0	<2.0	2.0	6386107
Acid Extractable Bismuth (Bi)	mg/kg	44	2.0	16	7.4	31	2.0	6386107
Acid Extractable Boron (B)	mg/kg	<50	50	<50	<50	<50	50	6386107
Acid Extractable Cadmium (Cd)	mg/kg	39	0.30	30	24	32	0.30	6386107
Acid Extractable Chromium (Cr)	mg/kg	41	2.0	41	37	44	2.0	6386107
Acid Extractable Cobalt (Co)	mg/kg	15	1.0	18	12	16	1.0	6386107
Acid Extractable Copper (Cu)	mg/kg	510	2.0	180	130	340	2.0	6386107
Acid Extractable Iron (Fe)	mg/kg	34000	50	33000	28000	34000	50	6386107
Acid Extractable Lead (Pb)	mg/kg	9900	5.0	3300	1700	6000	0.50	6386107
Acid Extractable Lithium (Li)	mg/kg	15	2.0	17	17	20	2.0	6386107
Acid Extractable Manganese (Mn)	mg/kg	670	2.0	710	610	780	2.0	6386107
Acid Extractable Mercury (Hg)	mg/kg	1.6	0.10	1.5	0.75	0.72	0.10	6386107
Acid Extractable Molybdenum (Mo)	mg/kg	2.4	2.0	<2.0	<2.0	<2.0	2.0	6386107
Acid Extractable Nickel (Ni)	mg/kg	30	2.0	34	30	42	2.0	6386107
Acid Extractable Rubidium (Rb)	mg/kg	9.3	2.0	6.5	7.0	8.9	2.0	6386107
Acid Extractable Selenium (Se)	mg/kg	5.2	1.0	4.6	2.3	2.3	1.0	6386107
Acid Extractable Silver (Ag)	mg/kg	13	0.50	4.0	5.3	11	0.50	6386107
Acid Extractable Strontium (Sr)	mg/kg	59	5.0	26	23	52	5.0	6386107
Acid Extractable Thallium (Tl)	mg/kg	9.7	0.10	7.3	3.6	12	0.10	6386107
Acid Extractable Tin (Sn)	mg/kg	47	1.0	20	9.9	25	1.0	6386107
Acid Extractable Uranium (U)	mg/kg	11	0.10	2.2	1.0	6.6	0.10	6386107
Acid Extractable Vanadium (V)	mg/kg	98	2.0	70	61	81	2.0	6386107
Acid Extractable Zinc (Zn)	mg/kg	1700	5.0	2400	1100	2100	5.0	6386107

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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BV Labs Job #: B9S5685
Report Date: 2019/10/18

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186
Sampler Initials: MG

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

BV Labs ID		KZZ150		KZZ151	KZZ152	KZZ153		
Sampling Date		2019/09/27		2019/09/27	2019/09/27	2019/09/27		
COC Number		112702		112702	112702	112702		
	UNITS	19SS-8 (0.05-0.3m)	QC Batch	19SS-9 (0-0.05m)	19SS-9 (0.05-0.3m)	19SS-10 (0-0.05m)	RDL	QC Batch
Metals								
Acid Extractable Aluminum (Al)	mg/kg	12000	6386107	7200	17000	10000	10	6386086
Acid Extractable Antimony (Sb)	mg/kg	20	6386107	20	7.4	49	2.0	6386086
Acid Extractable Arsenic (As)	mg/kg	72	6386107	46	51	110	2.0	6386086
Acid Extractable Barium (Ba)	mg/kg	50	6386107	92	100	59	5.0	6386086
Acid Extractable Beryllium (Be)	mg/kg	<2.0	6386107	<2.0	<2.0	<2.0	2.0	6386086
Acid Extractable Bismuth (Bi)	mg/kg	9.3	6386107	8.9	3.8	18	2.0	6386086
Acid Extractable Boron (B)	mg/kg	<50	6386107	<50	<50	<50	50	6386086
Acid Extractable Cadmium (Cd)	mg/kg	15	6386107	20	7.4	11	0.30	6386086
Acid Extractable Chromium (Cr)	mg/kg	36	6386107	24	43	40	2.0	6386086
Acid Extractable Cobalt (Co)	mg/kg	13	6386107	9.3	19	21	1.0	6386086
Acid Extractable Copper (Cu)	mg/kg	190	6386107	170	81	950	2.0	6386086
Acid Extractable Iron (Fe)	mg/kg	28000	6386107	27000	41000	46000	50	6386086
Acid Extractable Lead (Pb)	mg/kg	2200	6386107	2000	770	5400	0.50	6386086
Acid Extractable Lithium (Li)	mg/kg	16	6386107	10	24	15	2.0	6386086
Acid Extractable Manganese (Mn)	mg/kg	960	6386107	690	1300	1000	2.0	6386086
Acid Extractable Mercury (Hg)	mg/kg	0.27	6386107	0.35	0.25	0.45	0.10	6386086
Acid Extractable Molybdenum (Mo)	mg/kg	<2.0	6386107	<2.0	2.2	4.1	2.0	6386086
Acid Extractable Nickel (Ni)	mg/kg	33	6386107	25	48	38	2.0	6386086
Acid Extractable Rubidium (Rb)	mg/kg	8.5	6386107	4.5	8.1	4.8	2.0	6386086
Acid Extractable Selenium (Se)	mg/kg	1.2	6386107	1.3	<1.0	2.3	1.0	6386086
Acid Extractable Silver (Ag)	mg/kg	5.5	6386107	9.0	1.9	14	0.50	6386086
Acid Extractable Strontium (Sr)	mg/kg	45	6386107	21	14	84	5.0	6386086
Acid Extractable Thallium (Tl)	mg/kg	4.7	6386107	4.0	2.3	4.3	0.10	6386086
Acid Extractable Tin (Sn)	mg/kg	7.1	6386107	13	4.7	57	1.0	6386086
Acid Extractable Uranium (U)	mg/kg	2.7	6386107	1.5	1.3	2.5	0.10	6386086
Acid Extractable Vanadium (V)	mg/kg	65	6386107	27	50	39	2.0	6386086
Acid Extractable Zinc (Zn)	mg/kg	950	6386107	1100	490	3100	5.0	6386086

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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BV Labs Job #: B9S5685
Report Date: 2019/10/18

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186
Sampler Initials: MG

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

BV Labs ID		KZZ153	KZZ154	KZZ155	KZZ156		
Sampling Date		2019/09/27	2019/09/27	2019/10/01	2019/10/01		
COC Number		112702	112702	112702	112702		
	UNITS	19SS-10 (0-0.05m) Lab-Dup	19SS-10 (0.05-0.3m)	19SS-11 (0-0.15m)	19SS-11 (0.15-0.3m)	RDL	QC Batch
Metals							
Acid Extractable Aluminum (Al)	mg/kg	14000	23000	25000	25000	10	6386086
Acid Extractable Antimony (Sb)	mg/kg	52	16	8.9	3.9	2.0	6386086
Acid Extractable Arsenic (As)	mg/kg	130	77	41	22	2.0	6386086
Acid Extractable Barium (Ba)	mg/kg	65	54	97	83	5.0	6386086
Acid Extractable Beryllium (Be)	mg/kg	<2.0	<2.0	<2.0	<2.0	2.0	6386086
Acid Extractable Bismuth (Bi)	mg/kg	16	2.9	2.1	<2.0	2.0	6386086
Acid Extractable Boron (B)	mg/kg	<50	<50	<50	<50	50	6386086
Acid Extractable Cadmium (Cd)	mg/kg	9.5	1.9	5.9	2.9	0.30	6386086
Acid Extractable Chromium (Cr)	mg/kg	48	60	54	56	2.0	6386086
Acid Extractable Cobalt (Co)	mg/kg	27	27	17	17	1.0	6386086
Acid Extractable Copper (Cu)	mg/kg	930	300	59	33	2.0	6386086
Acid Extractable Iron (Fe)	mg/kg	64000	60000	46000	45000	50	6386086
Acid Extractable Lead (Pb)	mg/kg	5000	840	440	220	0.50	6386086
Acid Extractable Lithium (Li)	mg/kg	20	35	41	46	2.0	6386086
Acid Extractable Manganese (Mn)	mg/kg	1100	1400	1200	1100	2.0	6386086
Acid Extractable Mercury (Hg)	mg/kg	0.41	0.10	0.13	<0.10	0.10	6386086
Acid Extractable Molybdenum (Mo)	mg/kg	4.5	<2.0	<2.0	<2.0	2.0	6386086
Acid Extractable Nickel (Ni)	mg/kg	49	62	43	42	2.0	6386086
Acid Extractable Rubidium (Rb)	mg/kg	5.7	6.9	13	13	2.0	6386086
Acid Extractable Selenium (Se)	mg/kg	2.1	<1.0	<1.0	<1.0	1.0	6386086
Acid Extractable Silver (Ag)	mg/kg	13	2.3	2.0	0.84	0.50	6386086
Acid Extractable Strontium (Sr)	mg/kg	74	17	18	12	5.0	6386086
Acid Extractable Thallium (Tl)	mg/kg	4.0	2.3	1.6	0.55	0.10	6386086
Acid Extractable Tin (Sn)	mg/kg	73	35	2.1	1.2	1.0	6386086
Acid Extractable Uranium (U)	mg/kg	2.3	1.2	2.2	0.88	0.10	6386086
Acid Extractable Vanadium (V)	mg/kg	53	68	100	90	2.0	6386086
Acid Extractable Zinc (Zn)	mg/kg	4400	720	550	340	5.0	6386086

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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BV Labs Job #: B9S5685
Report Date: 2019/10/18

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186
Sampler Initials: MG

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

BV Labs ID		KZZ157	KZZ158	KZZ159	KZZ160		
Sampling Date		2019/10/01	2019/10/01	2019/10/01	2019/10/01		
COC Number		112702	112702	112702	112702		
	UNITS	19SS-12 (0-0.15m)	19SS-12 (0.15-0.3m)	19SS-13 (0-0.15m)	19SS-13 (0.15-0.3m)	RDL	QC Batch
Metals							
Acid Extractable Aluminum (Al)	mg/kg	25000	16000	22000	19000	10	6386086
Acid Extractable Antimony (Sb)	mg/kg	32	8.8	40	12	2.0	6386086
Acid Extractable Arsenic (As)	mg/kg	96	26	81	24	2.0	6386086
Acid Extractable Barium (Ba)	mg/kg	140	130	100	100	5.0	6386086
Acid Extractable Beryllium (Be)	mg/kg	<2.0	<2.0	<2.0	<2.0	2.0	6386086
Acid Extractable Bismuth (Bi)	mg/kg	14	<2.0	11	<2.0	2.0	6386086
Acid Extractable Boron (B)	mg/kg	<50	<50	<50	<50	50	6386086
Acid Extractable Cadmium (Cd)	mg/kg	35	5.4	49	24	0.30	6386086
Acid Extractable Chromium (Cr)	mg/kg	60	35	50	42	2.0	6386086
Acid Extractable Cobalt (Co)	mg/kg	17	12	15	14	1.0	6386086
Acid Extractable Copper (Cu)	mg/kg	240	57	170	59	2.0	6386086
Acid Extractable Iron (Fe)	mg/kg	41000	35000	36000	40000	50	6386086
Acid Extractable Lead (Pb)	mg/kg	3200	420	2500	320	0.50	6386086
Acid Extractable Lithium (Li)	mg/kg	27	19	25	26	2.0	6386086
Acid Extractable Manganese (Mn)	mg/kg	1400	1500	1100	1200	2.0	6386086
Acid Extractable Mercury (Hg)	mg/kg	0.36	0.10	0.37	<0.10	0.10	6386086
Acid Extractable Molybdenum (Mo)	mg/kg	2.9	<2.0	<2.0	<2.0	2.0	6386086
Acid Extractable Nickel (Ni)	mg/kg	49	30	43	33	2.0	6386086
Acid Extractable Rubidium (Rb)	mg/kg	26	15	17	15	2.0	6386086
Acid Extractable Selenium (Se)	mg/kg	2.0	<1.0	2.1	<1.0	1.0	6386086
Acid Extractable Silver (Ag)	mg/kg	11	2.2	12	1.8	0.50	6386086
Acid Extractable Strontium (Sr)	mg/kg	180	39	83	18	5.0	6386086
Acid Extractable Thallium (Tl)	mg/kg	10	1.3	10	1.7	0.10	6386086
Acid Extractable Tin (Sn)	mg/kg	12	2.3	10	2.2	1.0	6386086
Acid Extractable Uranium (U)	mg/kg	26	2.9	13	1.9	0.10	6386086
Acid Extractable Vanadium (V)	mg/kg	130	78	130	90	2.0	6386086
Acid Extractable Zinc (Zn)	mg/kg	2500	610	650	380	5.0	6386086

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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BV Labs Job #: B9S5685
Report Date: 2019/10/18

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186
Sampler Initials: MG

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

BV Labs ID		KZZ162		KZZ163		KZZ164		
Sampling Date		2019/09/27		2019/09/27		2019/09/27		
COC Number		112702		112702		112702		
	UNITS	SOIL-QA/QC-7	RDL	SOIL-QA/QC-8	RDL	SOIL-QA/QC-9	RDL	QC Batch
Metals								
Acid Extractable Aluminum (Al)	mg/kg	20000	10	14000	10	20000	10	6386086
Acid Extractable Antimony (Sb)	mg/kg	21	2.0	110	2.0	15	2.0	6386086
Acid Extractable Arsenic (As)	mg/kg	170	2.0	840	20	79	2.0	6386086
Acid Extractable Barium (Ba)	mg/kg	56	5.0	290	5.0	63	5.0	6386086
Acid Extractable Beryllium (Be)	mg/kg	<2.0	2.0	<2.0	2.0	<2.0	2.0	6386086
Acid Extractable Bismuth (Bi)	mg/kg	10	2.0	21	2.0	4.1	2.0	6386086
Acid Extractable Boron (B)	mg/kg	<50	50	<50	50	<50	50	6386086
Acid Extractable Cadmium (Cd)	mg/kg	12	0.30	17	0.30	2.8	0.30	6386086
Acid Extractable Chromium (Cr)	mg/kg	71	2.0	65	2.0	50	2.0	6386086
Acid Extractable Cobalt (Co)	mg/kg	24	1.0	120	1.0	23	1.0	6386086
Acid Extractable Copper (Cu)	mg/kg	260	2.0	2400	2.0	270	2.0	6386086
Acid Extractable Iron (Fe)	mg/kg	41000	50	170000	500	50000	50	6386086
Acid Extractable Lead (Pb)	mg/kg	3700	0.50	17000	5.0	1300	0.50	6386086
Acid Extractable Lithium (Li)	mg/kg	29	2.0	15	2.0	30	2.0	6386086
Acid Extractable Manganese (Mn)	mg/kg	900	2.0	800	2.0	1200	2.0	6386086
Acid Extractable Mercury (Hg)	mg/kg	3.2	0.10	0.13	0.10	0.18	0.10	6386086
Acid Extractable Molybdenum (Mo)	mg/kg	<2.0	2.0	14	2.0	2.1	2.0	6386086
Acid Extractable Nickel (Ni)	mg/kg	50	2.0	19	2.0	53	2.0	6386086
Acid Extractable Rubidium (Rb)	mg/kg	8.3	2.0	8.2	2.0	7.2	2.0	6386086
Acid Extractable Selenium (Se)	mg/kg	8.7	1.0	3.9	1.0	<1.0	1.0	6386086
Acid Extractable Silver (Ag)	mg/kg	4.5	0.50	19	0.50	3.0	0.50	6386086
Acid Extractable Strontium (Sr)	mg/kg	70	5.0	130	5.0	21	5.0	6386086
Acid Extractable Thallium (Tl)	mg/kg	9.7	0.10	2.9	0.10	2.5	0.10	6386086
Acid Extractable Tin (Sn)	mg/kg	18	1.0	250	1.0	18	1.0	6386086
Acid Extractable Uranium (U)	mg/kg	5.6	0.10	1.4	0.10	1.3	0.10	6386086
Acid Extractable Vanadium (V)	mg/kg	110	2.0	47	2.0	62	2.0	6386086
Acid Extractable Zinc (Zn)	mg/kg	3400	5.0	56000	50	1200	5.0	6386086

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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BV Labs Job #: B9S5685
Report Date: 2019/10/18

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186
Sampler Initials: MG

POLYCHLORINATED BIPHENYLS BY GC-ECD (SOIL)

BV Labs ID		KZZ131			KZZ131			KZZ132		
Sampling Date		2019/10/02			2019/10/02			2019/10/02		
COC Number		112702			112702			112702		
	UNITS	19SP-7 (0.0-0.15m)	RDL	QC Batch	19SP-7 (0.0-0.15m) Lab-Dup	RDL	QC Batch	19SP-7 (0.15-0.3m)	RDL	QC Batch
PCBs										
Aroclor 1016	ug/g	<0.050	0.050	6389114	<0.050	0.050	6389114	<0.050	0.050	6389114
Aroclor 1221	ug/g	<0.050	0.050	6389114	<0.050	0.050	6389114	<0.050	0.050	6389114
Aroclor 1232	ug/g	<0.050	0.050	6389114	<0.050	0.050	6389114	<0.050	0.050	6389114
Aroclor 1248	ug/g	<0.050	0.050	6389114	<0.050	0.050	6389114	<0.050	0.050	6389114
Aroclor 1242	ug/g	<0.050	0.050	6389114	<0.050	0.050	6389114	<0.050	0.050	6389114
Aroclor 1254	ug/g	<0.050	0.050	6389114	<0.050	0.050	6389114	<0.050	0.050	6389114
Aroclor 1260	ug/g	<0.050	0.050	6389114	<0.050	0.050	6389114	<0.050	0.050	6389114
Calculated Total PCB	ug/g	<0.050	0.050	6381183				<0.050	0.050	6381183
Surrogate Recovery (%)										
Decachlorobiphenyl	%	94		6389114	92		6389114	94		6389114

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

BV Labs ID		KZZ133	KZZ134	KZZ161		
Sampling Date		2019/10/02	2019/10/02	2019/10/02		
COC Number		112702	112702	112702		
	UNITS	19SP-8 (0.0-0.15m)	19SP-8 (0.15-0.3m)	SOIL-QA/QC-6	RDL	QC Batch
PCBs						
Aroclor 1016	ug/g	<0.050	<0.050	<0.050	0.050	6389114
Aroclor 1221	ug/g	<0.050	<0.050	<0.050	0.050	6389114
Aroclor 1232	ug/g	<0.050	<0.050	<0.050	0.050	6389114
Aroclor 1248	ug/g	<0.050	<0.050	<0.050	0.050	6389114
Aroclor 1242	ug/g	<0.050	<0.050	<0.050	0.050	6389114
Aroclor 1254	ug/g	<0.050	<0.050	<0.050	0.050	6389114
Aroclor 1260	ug/g	<0.050	<0.050	<0.050	0.050	6389114
Calculated Total PCB	ug/g	<0.050	<0.050	<0.050	0.050	6381183
Surrogate Recovery (%)						
Decachlorobiphenyl	%	93	92	95		6389114

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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BV Labs Job #: B9S5685
Report Date: 2019/10/18

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186
Sampler Initials: MG

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	1.0°C

Results relate only to the items tested.

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BV Labs Job #: B9S5685
Report Date: 2019/10/18

QUALITY ASSURANCE REPORT

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186
Sampler Initials: MG

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
6389114	Decachlorobiphenyl	2019/10/17	93 (6)	70 - 130	90	70 - 130	97	%		
6382196	Moisture	2019/10/15							10 (1)	25
6386086	Acid Extractable Aluminum (Al)	2019/10/15					<10	mg/kg	32 (3)	35
6386086	Acid Extractable Antimony (Sb)	2019/10/15	NC (2)	75 - 125	107	75 - 125	<2.0	mg/kg	5.3 (3)	35
6386086	Acid Extractable Arsenic (As)	2019/10/15	NC (2)	75 - 125	106	75 - 125	<2.0	mg/kg	22 (3)	35
6386086	Acid Extractable Barium (Ba)	2019/10/15	NC (2)	75 - 125	102	75 - 125	<5.0	mg/kg	9.8 (3)	35
6386086	Acid Extractable Beryllium (Be)	2019/10/15	105 (2)	75 - 125	105	75 - 125	<2.0	mg/kg	NC (3)	35
6386086	Acid Extractable Bismuth (Bi)	2019/10/15	NC (2)	75 - 125	105	75 - 125	<2.0	mg/kg	9.9 (3)	35
6386086	Acid Extractable Boron (B)	2019/10/15	94 (2)	75 - 125	107	75 - 125	<50	mg/kg	NC (3)	35
6386086	Acid Extractable Cadmium (Cd)	2019/10/15	95 (2)	75 - 125	99	75 - 125	<0.30	mg/kg	12 (3)	35
6386086	Acid Extractable Chromium (Cr)	2019/10/15	112 (2)	75 - 125	102	75 - 125	<2.0	mg/kg	20 (3)	35
6386086	Acid Extractable Cobalt (Co)	2019/10/15	116 (2)	75 - 125	105	75 - 125	<1.0	mg/kg	24 (3)	35
6386086	Acid Extractable Copper (Cu)	2019/10/15	NC (2)	75 - 125	102	75 - 125	<2.0	mg/kg	1.6 (3)	35
6386086	Acid Extractable Iron (Fe)	2019/10/15					<50	mg/kg	34 (3)	35
6386086	Acid Extractable Lead (Pb)	2019/10/15	NC (2)	75 - 125	105	75 - 125	<0.50	mg/kg	6.9 (3)	35
6386086	Acid Extractable Lithium (Li)	2019/10/15	116 (2)	75 - 125	109	75 - 125	<2.0	mg/kg	33 (3)	35
6386086	Acid Extractable Manganese (Mn)	2019/10/15	NC (2)	75 - 125	106	75 - 125	<2.0	mg/kg	6.5 (3)	35
6386086	Acid Extractable Mercury (Hg)	2019/10/15	98 (2)	75 - 125	105	75 - 125	<0.10	mg/kg	10 (3)	35
6386086	Acid Extractable Molybdenum (Mo)	2019/10/15	86 (2)	75 - 125	109	75 - 125	<2.0	mg/kg	7.9 (3)	35
6386086	Acid Extractable Nickel (Ni)	2019/10/15	110 (2)	75 - 125	104	75 - 125	<2.0	mg/kg	26 (3)	35
6386086	Acid Extractable Rubidium (Rb)	2019/10/15	101 (2)	75 - 125	103	75 - 125	<2.0	mg/kg	18 (3)	35
6386086	Acid Extractable Selenium (Se)	2019/10/15	100 (2)	75 - 125	106	75 - 125	<1.0	mg/kg	11 (3)	35
6386086	Acid Extractable Silver (Ag)	2019/10/15	NC (2)	75 - 125	103	75 - 125	<0.50	mg/kg	9.2 (3)	35
6386086	Acid Extractable Strontium (Sr)	2019/10/15	NC (2)	75 - 125	107	75 - 125	<5.0	mg/kg	14 (3)	35
6386086	Acid Extractable Thallium (Tl)	2019/10/15	93 (2)	75 - 125	105	75 - 125	<0.10	mg/kg	7.0 (3)	35
6386086	Acid Extractable Tin (Sn)	2019/10/15	NC (2)	75 - 125	102	75 - 125	<1.0	mg/kg	26 (3)	35
6386086	Acid Extractable Uranium (U)	2019/10/15	104 (2)	75 - 125	106	75 - 125	<0.10	mg/kg	6.9 (3)	35
6386086	Acid Extractable Vanadium (V)	2019/10/15	121 (2)	75 - 125	104	75 - 125	<2.0	mg/kg	30 (3)	35
6386086	Acid Extractable Zinc (Zn)	2019/10/15	NC (2)	75 - 125	103	75 - 125	<5.0	mg/kg	33 (3)	35
6386107	Acid Extractable Aluminum (Al)	2019/10/15					<10	mg/kg	0.91 (5)	35
6386107	Acid Extractable Antimony (Sb)	2019/10/15	NC (4)	75 - 125	108	75 - 125	<2.0	mg/kg	8.8 (5)	35

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
6386107	Acid Extractable Arsenic (As)	2019/10/15	NC (4)	75 - 125	107	75 - 125	<2.0	mg/kg	1.9 (5)	35
6386107	Acid Extractable Barium (Ba)	2019/10/15	NC (4)	75 - 125	105	75 - 125	<5.0	mg/kg	0.28 (5)	35
6386107	Acid Extractable Beryllium (Be)	2019/10/15	113 (4)	75 - 125	108	75 - 125	<2.0	mg/kg	NC (5)	35
6386107	Acid Extractable Bismuth (Bi)	2019/10/15	108 (4)	75 - 125	105	75 - 125	<2.0	mg/kg	7.7 (5)	35
6386107	Acid Extractable Boron (B)	2019/10/15	108 (4)	75 - 125	108	75 - 125	<50	mg/kg	NC (5)	35
6386107	Acid Extractable Cadmium (Cd)	2019/10/15	107 (4)	75 - 125	100	75 - 125	<0.30	mg/kg	2.3 (5)	35
6386107	Acid Extractable Chromium (Cr)	2019/10/15	NC (4)	75 - 125	103	75 - 125	<2.0	mg/kg	9.1 (5)	35
6386107	Acid Extractable Cobalt (Co)	2019/10/15	113 (4)	75 - 125	105	75 - 125	<1.0	mg/kg	1.2 (5)	35
6386107	Acid Extractable Copper (Cu)	2019/10/15	NC (4)	75 - 125	103	75 - 125	<2.0	mg/kg	5.8 (5)	35
6386107	Acid Extractable Iron (Fe)	2019/10/15					<50	mg/kg	4.4 (5)	35
6386107	Acid Extractable Lead (Pb)	2019/10/15	NC (4)	75 - 125	106	75 - 125	<0.50	mg/kg	9.9 (5)	35
6386107	Acid Extractable Lithium (Li)	2019/10/15	122 (4)	75 - 125	112	75 - 125	<2.0	mg/kg	2.8 (5)	35
6386107	Acid Extractable Manganese (Mn)	2019/10/15	NC (4)	75 - 125	107	75 - 125	<2.0	mg/kg	3.0 (5)	35
6386107	Acid Extractable Mercury (Hg)	2019/10/15	106 (4)	75 - 125	107	75 - 125	<0.10	mg/kg	0.88 (5)	35
6386107	Acid Extractable Molybdenum (Mo)	2019/10/15	105 (4)	75 - 125	109	75 - 125	<2.0	mg/kg	NC (5)	35
6386107	Acid Extractable Nickel (Ni)	2019/10/15	118 (4)	75 - 125	105	75 - 125	<2.0	mg/kg	2.9 (5)	35
6386107	Acid Extractable Rubidium (Rb)	2019/10/15	101 (4)	75 - 125	105	75 - 125	<2.0	mg/kg	4.8 (5)	35
6386107	Acid Extractable Selenium (Se)	2019/10/15	107 (4)	75 - 125	104	75 - 125	<1.0	mg/kg	4.0 (5)	35
6386107	Acid Extractable Silver (Ag)	2019/10/15	107 (4)	75 - 125	103	75 - 125	<0.50	mg/kg	0.031 (5)	35
6386107	Acid Extractable Strontium (Sr)	2019/10/15	NC (4)	75 - 125	105	75 - 125	<5.0	mg/kg	2.0 (5)	35
6386107	Acid Extractable Thallium (Tl)	2019/10/15	NC (4)	75 - 125	106	75 - 125	<0.10	mg/kg	2.0 (5)	35
6386107	Acid Extractable Tin (Sn)	2019/10/15	NC (4)	75 - 125	101	75 - 125	<1.0	mg/kg	9.7 (5)	35
6386107	Acid Extractable Uranium (U)	2019/10/15	118 (4)	75 - 125	107	75 - 125	<0.10	mg/kg	7.4 (5)	35
6386107	Acid Extractable Vanadium (V)	2019/10/15	NC (4)	75 - 125	105	75 - 125	<2.0	mg/kg	2.4 (5)	35
6386107	Acid Extractable Zinc (Zn)	2019/10/15	NC (4)	75 - 125	104	75 - 125	<5.0	mg/kg	5.1 (5)	35
6389114	Aroclor 1016	2019/10/17					<0.050	ug/g	NC (1)	50
6389114	Aroclor 1221	2019/10/17					<0.050	ug/g	NC (1)	50
6389114	Aroclor 1232	2019/10/17					<0.050	ug/g	NC (1)	50
6389114	Aroclor 1242	2019/10/17					<0.050	ug/g	NC (1)	50
6389114	Aroclor 1248	2019/10/17					<0.050	ug/g	NC (1)	50
6389114	Aroclor 1254	2019/10/17	114 (6)	70 - 130	107	70 - 130	<0.050	ug/g	NC (1)	50

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
6389114	Aroclor 1260	2019/10/17					<0.050	ug/g	NC (1)	50

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Duplicate Parent ID [KZZ131-01]

(2) Matrix Spike Parent ID [KZZ153-01]

(3) Duplicate Parent ID [KZZ153-01]

(4) Matrix Spike Parent ID [KZZ138-01]

(5) Duplicate Parent ID [KZZ138-01]

(6) Matrix Spike Parent ID [KZZ131-01]

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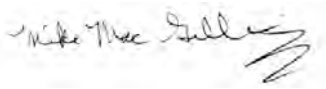
BV Labs Job #: B9S5685
Report Date: 2019/10/18

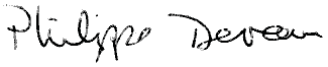
GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186
Sampler Initials: MG

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Mike MacGillivray, Scientific Specialist (Inorganics)



Phil Deveau, Scientific Specialist (Organics)

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For Service Group specific validation please refer to the Validation Signature Page.

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Custody Tracking Form

T112702

Please use this form for custody tracking when submitting the work instructions via eTR (electronic Test Requisition). Please ensure your form has a barcode or a BV Labs eTR confirmation number in the top right hand side. This number links your electronic submission to your samples.

First Sample: 19SP-7 (0.0-0.15m)
Last Sample: SOIL-QA/QC-9
Sample Count: 34

Relinquished By				Received By			
MIKE GRAVES		Date	2019/10/09			Date	
		Time (24 HR)	14:00			Time (24 HR)	2019 OCT 10 9:3
		Date				Date	
		Time (24 HR)				Time (24 HR)	
		Date				Date	
		Time (24 HR)				Time (24 HR)	

Submission Triage Information

Sampled By: MIKE GRAVES

# of Coolers/Pkgs: 1

Rush ☐ Immediate Test ☐ Food Residue ☐

Micro ☐ Food Chemistry ☐

*** LAB USE ONLY ***

Received At

Labeled By

Verified By

Comments: B955685

Shipped from FREDTON

Custody Seal		Cooling	Temperature °C		
Present (Y/N)	Intact (Y/N)	Media	1	2	3
			Ø	3	Ø

Your P.O. #: 73517254
Your Project #: 11198639-06
Site Location: BELLEDUNE SMELTER
Your C.O.C. #: D 34695

Attention: Troy Small

GHD Limited
466 Hodgson Rd
Fredericton , NB
CANADA E3C 2G5

Report Date: 2019/10/01
Report #: R5902950
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9Q9381
Received: 2019/09/25, 09:58

Sample Matrix: Rock
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
PCBs in Solid by GC/ECD (1)	2	2019/09/27	2019/10/01	ATL SOP 00105	EPA 8082A m
PCB Aroclor sum (solid)	2	N/A	2019/10/01	N/A	Auto Calc.

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by BV Labs, unless otherwise agreed in writing. BV Labs is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) Samples were analyzed for PCB using an accredited standard procedure modified for a non-standard matrix. Best laboratory practice and all routine QC procedures were employed. The accreditation does not extend to the matrix analyzed.

Your P.O. #: 73517254
Your Project #: 11198639-06
Site Location: BELLEDUNE SMELTER
Your C.O.C. #: D 34695

Attention: Troy Small

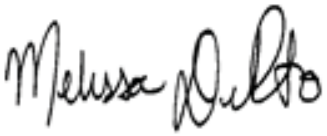
GHD Limited
466 Hodgson Rd
Fredericton , NB
CANADA E3C 2G5

Report Date: 2019/10/01
Report #: R5902950
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9Q9381
Received: 2019/09/25, 09:58

Encryption Key



Melissa DiPinto
Project Manager
01 Oct 2019 13:06:56

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Heather Macumber, Senior Project Manager
Email: Heather.MACUMBER@bvlabs.com
Phone# (902)420-0203 Ext:226

==========

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BV Labs Job #: B9Q9381
Report Date: 2019/10/01

GHD Limited
Client Project #: 11198639-06
Site Location: BELLEDUNE SMELTER
Your P.O. #: 73517254
Sampler Initials: JR

POLYCHLORINATED BIPHENYLS BY GC-ECD (ROCK)

BV Labs ID		KWN281	KWN282			KWN282		
Sampling Date		2019/09/18	2019/09/18			2019/09/18		
COC Number		D 34695	D 34695			D 34695		
	UNITS	19-CONCRETE-1	19-CONCRETE-2	RDL	QC Batch	19-CONCRETE-2 Lab-Dup	RDL	QC Batch
PCBs								
Aroclor 1016	mg/kg	<0.50	<0.50	0.50	6356857	<0.50	0.50	6356857
Aroclor 1221	mg/kg	<0.50	<0.50	0.50	6356857	<0.50	0.50	6356857
Aroclor 1232	mg/kg	<0.50	<0.50	0.50	6356857	<0.50	0.50	6356857
Aroclor 1248	mg/kg	<0.50	<0.50	0.50	6356857	<0.50	0.50	6356857
Aroclor 1242	mg/kg	<0.50	<0.50	0.50	6356857	<0.50	0.50	6356857
Aroclor 1254	mg/kg	<0.50	<0.50	0.50	6356857	<0.50	0.50	6356857
Aroclor 1260	mg/kg	<0.50	<0.50	0.50	6356857	<0.50	0.50	6356857
Calculated Total PCB	mg/kg	<0.50	<0.50	0.50	6353740			
Surrogate Recovery (%)								
Decachlorobiphenyl	%	94	94		6356857	92		6356857

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

Bureau Veritas Laboratories 200 Bluewater Rd, Suite 105, Bedford, Nova Scotia Canada B4B 1G9 Tel: 902-420-0203 Toll-free: 800-565-7227 Fax: 902-420-8612 www.bvlabs.com

BV Labs Job #: B9Q9381
Report Date: 2019/10/01

GHD Limited
Client Project #: 11198639-06
Site Location: BELLEDUNE SMELTER
Your P.O. #: 73517254
Sampler Initials: JR

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	15.0°C
Package 2	3.7°C
Package 3	16.0°C
Package 4	16.0°C
Package 5	15.7°C
Package 6	16.7°C

Results relate only to the items tested.

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BV Labs Job #: B9Q9381
Report Date: 2019/10/01

QUALITY ASSURANCE REPORT

GHD Limited
Client Project #: 11198639-06
Site Location: BELLEDUNE SMELTER
Your P.O. #: 73517254
Sampler Initials: JR

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
6356857	Decachlorobiphenyl	2019/10/01	92 (1)	30 - 130	94	30 - 130	91	%		
6356857	Aroclor 1016	2019/10/01					<0.50	mg/kg	NC (2)	50
6356857	Aroclor 1221	2019/10/01					<0.50	mg/kg	NC (2)	50
6356857	Aroclor 1232	2019/10/01					<0.50	mg/kg	NC (2)	50
6356857	Aroclor 1242	2019/10/01					<0.50	mg/kg	NC (2)	50
6356857	Aroclor 1248	2019/10/01					<0.50	mg/kg	NC (2)	50
6356857	Aroclor 1254	2019/10/01	101 (1)	30 - 130	98	30 - 130	<0.50	mg/kg	NC (2)	50
6356857	Aroclor 1260	2019/10/01					<0.50	mg/kg	NC (2)	50

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Matrix Spike Parent ID [KWN282-01]

(2) Duplicate Parent ID [KWN282-01]

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BV Labs Job #: B9Q9381
Report Date: 2019/10/01

GHD Limited
Client Project #: 11198639-06
Site Location: BELLEDUNE SMELTER
Your P.O. #: 73517254
Sampler Initials: JR

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Rosemarie MacDonald, Scientific Specialist (Organics)

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ATL FCD 00149 / 22

CHAIN OF CUSTODY RECORD

COC #: D34695 Page 1 of 1

Invoice Information	Report Information (if differs from invoice)	Project Information (where applicable)	Turnaround Time (TAT) Required
Company Name: GHD Limited	Company Name:	Quotation #:	X Regular TAT (5 business days) Most analyses
Contact Name: Troy Small / Claire Belairew	Contact Name:	P.O. #: 73517254	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 466 Hodgson Road Fredericton NB Postal Code: E3C-2G5	Address: Postal Code:	Project #: 11198639-06	IF RUSH please specify date (Surcharges will be applied)
Phone: Fax:	Phone: Fax:	Site Location: Belledune Smelter	DATE REQUIRED:
Email: Troy.small@ghd.com claire	Email: Belairew@ghd.com	Site #:	
		Sampled By: JR / Cody	

Laboratory Use Only

CUSTODY SEAL Present	CUSTODY SEAL Intact	COOLER TEMPERATURES	COOLER TEMPERATURES

COOLING MEDIA PRESENT Y / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED & PRESERVED	LAB FILTRATION REQUIRED	RCAP-MS (Total Metals) Well / Surface water	RCAP-MS (Dissolved Metals) Ground waters	Metals (Water): Total Digest (Default Method) (for well water & surface water)	Metals (Water): Dissolved for ground water	Metals (Water): Mercury (CVAFS) TOTAL / DISSOLVED	Metals (Soil): Metals & Mercury Default Aqua Regia Extractable (Available) Digest	Metals (Soil): Metals Total Digest - for Ocean Sediments (HNO3/HF/HClO4)	Metals (Soil): Mercury Low level by Cold Vapour AA	Metals (Soil): Hot Water Soluble Boron (required for CCME Agricultural/ Landfill)	RBCA Hydrocarbons (BTEX, C6-C32)	Hydrocarbons Soil (Petrofix), NS Fuel Oil Spill Policy Low Level BTEX, C6-C32	CCME Hydrocarbons (CWS-PHC-F1/BTEX, F2-F4)	NB Potable Water BTEX, VPH, Low level T.E.H	PAHs (Default for water/soil)	PAHs (FWAL/CCME Sediment)	PCBs	VOCs	Total Coliform/E.coli (Presence/Absence)	Total Coliform/E.Coli (Count)		HOLD- DO NOT ANALYZE	Regulatory Requirements (Specify)	COMMENTS
1	19-Concrete-1	19/09/18	~	Concrete	1																		X						Shipped from FREDTON
2	19-Concrete-2	19/09/18	~	Concrete	1																		X						
3																													
4																													
5																													
6																													
7																													
8																													
9																													
10																													

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY:(Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
Marco Theriault	19/09/21	10:42				B9Q9381

Unless otherwise agreed to in writing, work submitted on this Chain of Custody is subject to Maxxam's standard Terms and Conditions. Signing of this Chain of Custody document is acknowledgment and acceptance of our terms which are available for viewing at www.maxxam.ca/terms.

White: Maxxam Pink: Client

Your P.O. #: 73517186
Your Project #: 11198639-04
Site Location: Glencore
Your C.O.C. #: 118653

Attention: Rob Turner

GHD Limited
120 Western Parkway
Bedford, NS
CANADA B4B 0V2

Report Date: 2019/11/08
Report #: R5957598
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9V1834
Received: 2019/11/05, 09:49

Sample Matrix: Soil
Samples Received: 21

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Metals Solids Acid Extr. ICPMS	21	2019/11/07	2019/11/07	ATL SOP 00058	EPA 6020B R2 m

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by BV Labs, unless otherwise agreed in writing. BV Labs is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Encryption Key

AUTHORIZED REPORT
RAPPORT AUTORISÉ

Bureau Veritas Laboratories
08 Nov 2019 17:53:04

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Heather Macumber, Senior Project Manager
Email: Heather.MACUMBER@bvlabs.com
Phone# (902)420-0203 Ext:226

==========

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BV Labs Job #: B9V1834
Report Date: 2019/11/08

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186
Sampler Initials: MG

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

BV Labs ID		LFQ021	LFQ022	LFQ023	LFQ024		
Sampling Date		2019/10/31	2019/10/31	2019/10/31	2019/10/31		
COC Number		118653	118653	118653	118653		
	UNITS	19SS-14 (0-0.15m)	19SS-14 (0.15-0.3 m)	19SS-15 (0-0.15m)	19SS-15 (0.15-0.3 m)	RDL	QC Batch
Metals							
Acid Extractable Aluminum (Al)	mg/kg	11000	8800	18000	16000	10	6429731
Acid Extractable Antimony (Sb)	mg/kg	3.7	<2.0	12	4.1	2.0	6429731
Acid Extractable Arsenic (As)	mg/kg	17	8.5	54	22	2.0	6429731
Acid Extractable Barium (Ba)	mg/kg	60	53	72	61	5.0	6429731
Acid Extractable Beryllium (Be)	mg/kg	<2.0	<2.0	<2.0	<2.0	2.0	6429731
Acid Extractable Bismuth (Bi)	mg/kg	<2.0	<2.0	5.7	<2.0	2.0	6429731
Acid Extractable Boron (B)	mg/kg	<50	<50	<50	<50	50	6429731
Acid Extractable Cadmium (Cd)	mg/kg	4.2	0.45	13	3.2	0.30	6429731
Acid Extractable Chromium (Cr)	mg/kg	26	24	39	35	2.0	6429731
Acid Extractable Cobalt (Co)	mg/kg	7.8	7.3	14	11	1.0	6429731
Acid Extractable Copper (Cu)	mg/kg	27	8.2	100	37	2.0	6429731
Acid Extractable Iron (Fe)	mg/kg	29000	28000	34000	34000	50	6429731
Acid Extractable Lead (Pb)	mg/kg	170	22	1400	230	0.50	6429731
Acid Extractable Lithium (Li)	mg/kg	13	9.1	23	19	2.0	6429731
Acid Extractable Manganese (Mn)	mg/kg	580	550	810	640	2.0	6429731
Acid Extractable Mercury (Hg)	mg/kg	<0.10	<0.10	0.14	<0.10	0.10	6429731
Acid Extractable Molybdenum (Mo)	mg/kg	<2.0	<2.0	<2.0	<2.0	2.0	6429731
Acid Extractable Nickel (Ni)	mg/kg	17	14	36	28	2.0	6429731
Acid Extractable Rubidium (Rb)	mg/kg	11	12	13	13	2.0	6429731
Acid Extractable Selenium (Se)	mg/kg	<1.0	<1.0	<1.0	<1.0	1.0	6429731
Acid Extractable Silver (Ag)	mg/kg	0.51	<0.50	3.9	0.72	0.50	6429731
Acid Extractable Strontium (Sr)	mg/kg	13	10	48	19	5.0	6429731
Acid Extractable Thallium (Tl)	mg/kg	0.63	0.13	4.6	0.94	0.10	6429731
Acid Extractable Tin (Sn)	mg/kg	1.5	1.0	5.1	1.7	1.0	6429731
Acid Extractable Uranium (U)	mg/kg	1.1	0.41	7.7	2.2	0.10	6429731
Acid Extractable Vanadium (V)	mg/kg	68	67	74	75	2.0	6429731
Acid Extractable Zinc (Zn)	mg/kg	340	130	1100	340	5.0	6429731

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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BV Labs Job #: B9V1834
Report Date: 2019/11/08

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186
Sampler Initials: MG

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

BV Labs ID		LFQ025	LFQ026	LFQ027	LFQ028		
Sampling Date		2019/10/31	2019/10/31	2019/10/31	2019/10/31		
COC Number		118653	118653	118653	118653		
	UNITS	19SS-16 (0-0.15m)	19SS-16 (0.15-0.3 m)	19SS-17 (0-0.15m)	19SS-17 (0.15-0.3 m)	RDL	QC Batch
Metals							
Acid Extractable Aluminum (Al)	mg/kg	22000	19000	23000	24000	10	6429731
Acid Extractable Antimony (Sb)	mg/kg	15	6.0	14	3.3	2.0	6429731
Acid Extractable Arsenic (As)	mg/kg	74	35	45	21	2.0	6429731
Acid Extractable Barium (Ba)	mg/kg	80	92	88	90	5.0	6429731
Acid Extractable Beryllium (Be)	mg/kg	<2.0	<2.0	<2.0	<2.0	2.0	6429731
Acid Extractable Bismuth (Bi)	mg/kg	5.1	<2.0	6.1	<2.0	2.0	6429731
Acid Extractable Boron (B)	mg/kg	<50	<50	<50	<50	50	6429731
Acid Extractable Cadmium (Cd)	mg/kg	11	6.4	9.6	2.7	0.30	6429731
Acid Extractable Chromium (Cr)	mg/kg	47	44	51	52	2.0	6429731
Acid Extractable Cobalt (Co)	mg/kg	15	14	17	17	1.0	6429731
Acid Extractable Copper (Cu)	mg/kg	230	96	110	50	2.0	6429731
Acid Extractable Iron (Fe)	mg/kg	36000	39000	39000	43000	50	6429731
Acid Extractable Lead (Pb)	mg/kg	1100	160	1500	280	0.50	6429731
Acid Extractable Lithium (Li)	mg/kg	28	25	29	31	2.0	6429731
Acid Extractable Manganese (Mn)	mg/kg	1000	990	1100	1200	2.0	6429731
Acid Extractable Mercury (Hg)	mg/kg	0.10	<0.10	0.17	<0.10	0.10	6429731
Acid Extractable Molybdenum (Mo)	mg/kg	<2.0	<2.0	<2.0	<2.0	2.0	6429731
Acid Extractable Nickel (Ni)	mg/kg	40	33	44	44	2.0	6429731
Acid Extractable Rubidium (Rb)	mg/kg	12	14	15	15	2.0	6429731
Acid Extractable Selenium (Se)	mg/kg	1.4	<1.0	<1.0	<1.0	1.0	6429731
Acid Extractable Silver (Ag)	mg/kg	3.7	0.68	5.9	0.83	0.50	6429731
Acid Extractable Strontium (Sr)	mg/kg	28	16	52	26	5.0	6429731
Acid Extractable Thallium (Tl)	mg/kg	4.4	1.4	2.8	0.79	0.10	6429731
Acid Extractable Tin (Sn)	mg/kg	7.4	1.4	5.9	1.9	1.0	6429731
Acid Extractable Uranium (U)	mg/kg	3.9	1.6	7.0	3.1	0.10	6429731
Acid Extractable Vanadium (V)	mg/kg	76	89	94	100	2.0	6429731
Acid Extractable Zinc (Zn)	mg/kg	1000	640	810	330	5.0	6429731

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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BV Labs Job #: B9V1834
Report Date: 2019/11/08

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186
Sampler Initials: MG

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

BV Labs ID		LFQ029	LFQ030		LFQ031		
Sampling Date		2019/10/31	2019/10/31		2019/10/31		
COC Number		118653	118653		118653		
	UNITS	19SS-18 (0-0.15m)	19SS-18 (0.15-0.3 m)	QC Batch	19SS-19 (0-0.15m)	RDL	QC Batch
Metals							
Acid Extractable Aluminum (Al)	mg/kg	20000	15000	6429731	24000	10	6429753
Acid Extractable Antimony (Sb)	mg/kg	33	6.0	6429731	50	2.0	6429753
Acid Extractable Arsenic (As)	mg/kg	94	31	6429731	260	2.0	6429753
Acid Extractable Barium (Ba)	mg/kg	100	67	6429731	110	5.0	6429753
Acid Extractable Beryllium (Be)	mg/kg	<2.0	<2.0	6429731	<2.0	2.0	6429753
Acid Extractable Bismuth (Bi)	mg/kg	16	<2.0	6429731	27	2.0	6429753
Acid Extractable Boron (B)	mg/kg	<50	<50	6429731	<50	50	6429753
Acid Extractable Cadmium (Cd)	mg/kg	38	5.3	6429731	44	0.30	6429753
Acid Extractable Chromium (Cr)	mg/kg	57	35	6429731	55	2.0	6429753
Acid Extractable Cobalt (Co)	mg/kg	15	11	6429731	15	1.0	6429753
Acid Extractable Copper (Cu)	mg/kg	290	49	6429731	1100	2.0	6429753
Acid Extractable Iron (Fe)	mg/kg	33000	32000	6429731	37000	50	6429753
Acid Extractable Lead (Pb)	mg/kg	4300	220	6429731	6000	0.50	6429753
Acid Extractable Lithium (Li)	mg/kg	22	21	6429731	27	2.0	6429753
Acid Extractable Manganese (Mn)	mg/kg	800	800	6429731	730	2.0	6429753
Acid Extractable Mercury (Hg)	mg/kg	0.37	<0.10	6429731	0.58	0.10	6429753
Acid Extractable Molybdenum (Mo)	mg/kg	2.8	<2.0	6429731	2.2	2.0	6429753
Acid Extractable Nickel (Ni)	mg/kg	39	30	6429731	55	2.0	6429753
Acid Extractable Rubidium (Rb)	mg/kg	17	11	6429731	17	2.0	6429753
Acid Extractable Selenium (Se)	mg/kg	2.2	<1.0	6429731	7.6	1.0	6429753
Acid Extractable Silver (Ag)	mg/kg	11	1.0	6429731	14	0.50	6429753
Acid Extractable Strontium (Sr)	mg/kg	190	20	6429731	120	5.0	6429753
Acid Extractable Thallium (Tl)	mg/kg	12	1.2	6429731	20	0.10	6429753
Acid Extractable Tin (Sn)	mg/kg	16	1.7	6429731	45	1.0	6429753
Acid Extractable Uranium (U)	mg/kg	29	2.0	6429731	15	0.10	6429753
Acid Extractable Vanadium (V)	mg/kg	100	73	6429731	83	2.0	6429753
Acid Extractable Zinc (Zn)	mg/kg	2300	680	6429731	1300	5.0	6429753

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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BV Labs Job #: B9V1834
Report Date: 2019/11/08

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186
Sampler Initials: MG

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

BV Labs ID		LFQ032	LFQ033	LFQ034	LFQ034		
Sampling Date		2019/10/31	2019/10/31	2019/10/31	2019/10/31		
COC Number		118653	118653	118653	118653		
	UNITS	19SS-19 (0.15-0.3 m)	19SS-20 (0-0.15m)	19SS-20 (0.15-0.3 m)	19SS-20 (0.15-0.3 m) Lab-Dup	RDL	QC Batch
Metals							
Acid Extractable Aluminum (Al)	mg/kg	23000	21000	19000	19000	10	6429753
Acid Extractable Antimony (Sb)	mg/kg	20	23	4.5	4.4	2.0	6429753
Acid Extractable Arsenic (As)	mg/kg	83	62	23	22	2.0	6429753
Acid Extractable Barium (Ba)	mg/kg	91	81	69	65	5.0	6429753
Acid Extractable Beryllium (Be)	mg/kg	<2.0	<2.0	<2.0	<2.0	2.0	6429753
Acid Extractable Bismuth (Bi)	mg/kg	8.9	9.3	<2.0	<2.0	2.0	6429753
Acid Extractable Boron (B)	mg/kg	<50	<50	<50	<50	50	6429753
Acid Extractable Cadmium (Cd)	mg/kg	21	16	4.7	4.6	0.30	6429753
Acid Extractable Chromium (Cr)	mg/kg	44	47	39	38	2.0	6429753
Acid Extractable Cobalt (Co)	mg/kg	17	14	13	14	1.0	6429753
Acid Extractable Copper (Cu)	mg/kg	330	140	52	51	2.0	6429753
Acid Extractable Iron (Fe)	mg/kg	39000	33000	35000	35000	50	6429753
Acid Extractable Lead (Pb)	mg/kg	2000	2200	300	330	0.50	6429753
Acid Extractable Lithium (Li)	mg/kg	28	24	24	23	2.0	6429753
Acid Extractable Manganese (Mn)	mg/kg	1000	820	980	930	2.0	6429753
Acid Extractable Mercury (Hg)	mg/kg	0.20	0.21	<0.10	<0.10	0.10	6429753
Acid Extractable Molybdenum (Mo)	mg/kg	<2.0	<2.0	<2.0	<2.0	2.0	6429753
Acid Extractable Nickel (Ni)	mg/kg	39	37	37	37	2.0	6429753
Acid Extractable Rubidium (Rb)	mg/kg	17	16	12	11	2.0	6429753
Acid Extractable Selenium (Se)	mg/kg	1.8	1.2	<1.0	<1.0	1.0	6429753
Acid Extractable Silver (Ag)	mg/kg	3.9	8.5	1.2	1.4	0.50	6429753
Acid Extractable Strontium (Sr)	mg/kg	61	100	25	25	5.0	6429753
Acid Extractable Thallium (Tl)	mg/kg	8.5	4.8	0.96	0.91	0.10	6429753
Acid Extractable Tin (Sn)	mg/kg	10	8.4	2.1	1.9	1.0	6429753
Acid Extractable Uranium (U)	mg/kg	11	16	2.7	2.8	0.10	6429753
Acid Extractable Vanadium (V)	mg/kg	100	92	87	79	2.0	6429753
Acid Extractable Zinc (Zn)	mg/kg	440	930	600	570	5.0	6429753

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

Bureau Veritas Laboratories 200 Bluewater Rd, Suite 105, Bedford, Nova Scotia Canada B4B 1G9 Tel: 902-420-0203 Toll-free: 800-565-7227 Fax: 902-420-8612 www.bvlabs.com

BV Labs Job #: B9V1834
Report Date: 2019/11/08

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186
Sampler Initials: MG

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

BV Labs ID		LFQ035	LFQ036	LFQ037	LFQ038		
Sampling Date		2019/10/31	2019/10/31	2019/10/31	2019/10/31		
COC Number		118653	118653	118653	118653		
	UNITS	19SS-21 (0-0.15m)	19SS-21 (0.15-0.3 m)	19SS-22 (0-0.15m)	19SS-22 (0.15-0.3 m)	RDL	QC Batch
Metals							
Acid Extractable Aluminum (Al)	mg/kg	22000	19000	20000	14000	10	6429753
Acid Extractable Antimony (Sb)	mg/kg	20	6.2	100	7.3	2.0	6429753
Acid Extractable Arsenic (As)	mg/kg	50	21	150	16	2.0	6429753
Acid Extractable Barium (Ba)	mg/kg	86	73	110	89	5.0	6429753
Acid Extractable Beryllium (Be)	mg/kg	<2.0	<2.0	<2.0	<2.0	2.0	6429753
Acid Extractable Bismuth (Bi)	mg/kg	6.1	<2.0	26	<2.0	2.0	6429753
Acid Extractable Boron (B)	mg/kg	<50	<50	<50	<50	50	6429753
Acid Extractable Cadmium (Cd)	mg/kg	15	2.4	96	9.0	0.30	6429753
Acid Extractable Chromium (Cr)	mg/kg	50	39	51	30	2.0	6429753
Acid Extractable Cobalt (Co)	mg/kg	16	14	17	11	1.0	6429753
Acid Extractable Copper (Cu)	mg/kg	100	44	420	44	2.0	6429753
Acid Extractable Iron (Fe)	mg/kg	36000	37000	37000	32000	50	6429753
Acid Extractable Lead (Pb)	mg/kg	1400	76	6900	190	0.50	6429753
Acid Extractable Lithium (Li)	mg/kg	26	24	23	19	2.0	6429753
Acid Extractable Manganese (Mn)	mg/kg	1000	1100	1300	920	2.0	6429753
Acid Extractable Mercury (Hg)	mg/kg	0.19	<0.10	0.72	<0.10	0.10	6429753
Acid Extractable Molybdenum (Mo)	mg/kg	<2.0	<2.0	2.7	<2.0	2.0	6429753
Acid Extractable Nickel (Ni)	mg/kg	42	35	44	24	2.0	6429753
Acid Extractable Rubidium (Rb)	mg/kg	13	11	15	11	2.0	6429753
Acid Extractable Selenium (Se)	mg/kg	1.0	<1.0	5.5	<1.0	1.0	6429753
Acid Extractable Silver (Ag)	mg/kg	5.4	0.51	31	1.0	0.50	6429753
Acid Extractable Strontium (Sr)	mg/kg	88	12	110	13	5.0	6429753
Acid Extractable Thallium (Tl)	mg/kg	4.6	0.65	21	0.88	0.10	6429753
Acid Extractable Tin (Sn)	mg/kg	5.7	1.2	25	1.5	1.0	6429753
Acid Extractable Uranium (U)	mg/kg	13	1.1	16	1.2	0.10	6429753
Acid Extractable Vanadium (V)	mg/kg	100	77	110	65	2.0	6429753
Acid Extractable Zinc (Zn)	mg/kg	750	370	1600	290	5.0	6429753

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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BV Labs Job #: B9V1834
Report Date: 2019/11/08

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186
Sampler Initials: MG

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

BV Labs ID		LFQ039	LFQ040	LFQ041		
Sampling Date		2019/10/31	2019/10/31	2019/10/31		
COC Number		118653	118653	118653		
	UNITS	19SS-23 (0-0.15m)	19SS-23 (0.15-0.3 m)	SOIL-QA/QC-10	RDL	QC Batch
Metals						
Acid Extractable Aluminum (Al)	mg/kg	20000	19000	14000	10	6429753
Acid Extractable Antimony (Sb)	mg/kg	18	4.0	6.8	2.0	6429753
Acid Extractable Arsenic (As)	mg/kg	46	20	13	2.0	6429753
Acid Extractable Barium (Ba)	mg/kg	68	71	93	5.0	6429753
Acid Extractable Beryllium (Be)	mg/kg	<2.0	<2.0	<2.0	2.0	6429753
Acid Extractable Bismuth (Bi)	mg/kg	5.5	<2.0	<2.0	2.0	6429753
Acid Extractable Boron (B)	mg/kg	<50	<50	<50	50	6429753
Acid Extractable Cadmium (Cd)	mg/kg	11	2.7	7.0	0.30	6429753
Acid Extractable Chromium (Cr)	mg/kg	47	40	28	2.0	6429753
Acid Extractable Cobalt (Co)	mg/kg	15	14	12	1.0	6429753
Acid Extractable Copper (Cu)	mg/kg	95	51	39	2.0	6429753
Acid Extractable Iron (Fe)	mg/kg	36000	36000	33000	50	6429753
Acid Extractable Lead (Pb)	mg/kg	1300	240	100	0.50	6429753
Acid Extractable Lithium (Li)	mg/kg	25	26	18	2.0	6429753
Acid Extractable Manganese (Mn)	mg/kg	850	820	1000	2.0	6429753
Acid Extractable Mercury (Hg)	mg/kg	0.15	<0.10	<0.10	0.10	6429753
Acid Extractable Molybdenum (Mo)	mg/kg	<2.0	<2.0	<2.0	2.0	6429753
Acid Extractable Nickel (Ni)	mg/kg	44	37	22	2.0	6429753
Acid Extractable Rubidium (Rb)	mg/kg	10	11	12	2.0	6429753
Acid Extractable Selenium (Se)	mg/kg	<1.0	<1.0	<1.0	1.0	6429753
Acid Extractable Silver (Ag)	mg/kg	5.5	0.97	0.69	0.50	6429753
Acid Extractable Strontium (Sr)	mg/kg	39	16	9.1	5.0	6429753
Acid Extractable Thallium (Tl)	mg/kg	2.9	0.71	0.60	0.10	6429753
Acid Extractable Tin (Sn)	mg/kg	5.3	1.7	1.2	1.0	6429753
Acid Extractable Uranium (U)	mg/kg	6.2	1.8	0.68	0.10	6429753
Acid Extractable Vanadium (V)	mg/kg	100	88	69	2.0	6429753
Acid Extractable Zinc (Zn)	mg/kg	550	280	260	5.0	6429753

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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BV Labs Job #: B9V1834
Report Date: 2019/11/08

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186
Sampler Initials: MG

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	11.0°C

Results relate only to the items tested.

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BV Labs Job #: B9V1834
Report Date: 2019/11/08

QUALITY ASSURANCE REPORT

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186
Sampler Initials: MG

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
6429731	Acid Extractable Aluminum (Al)	2019/11/07					<10	mg/kg	8.4 (2)	35
6429731	Acid Extractable Antimony (Sb)	2019/11/07	102	75 - 125	108	75 - 125	<2.0	mg/kg	NC (2)	35
6429731	Acid Extractable Arsenic (As)	2019/11/07	103	75 - 125	101	75 - 125	<2.0	mg/kg	29 (2)	35
6429731	Acid Extractable Barium (Ba)	2019/11/07	NC	75 - 125	99	75 - 125	<5.0	mg/kg	0.83 (2)	35
6429731	Acid Extractable Beryllium (Be)	2019/11/07	106	75 - 125	105	75 - 125	<2.0	mg/kg	NC (2)	35
6429731	Acid Extractable Bismuth (Bi)	2019/11/07	107	75 - 125	105	75 - 125	<2.0	mg/kg	NC (2)	35
6429731	Acid Extractable Boron (B)	2019/11/07	101	75 - 125	104	75 - 125	<50	mg/kg	NC (2)	35
6429731	Acid Extractable Cadmium (Cd)	2019/11/07	100	75 - 125	99	75 - 125	<0.30	mg/kg	NC (2)	35
6429731	Acid Extractable Chromium (Cr)	2019/11/07	105	75 - 125	99	75 - 125	<2.0	mg/kg	15 (2)	35
6429731	Acid Extractable Cobalt (Co)	2019/11/07	105	75 - 125	102	75 - 125	<1.0	mg/kg	16 (2)	35
6429731	Acid Extractable Copper (Cu)	2019/11/07	100	75 - 125	99	75 - 125	<2.0	mg/kg	17 (2)	35
6429731	Acid Extractable Iron (Fe)	2019/11/07					<50	mg/kg	7.7 (2)	35
6429731	Acid Extractable Lead (Pb)	2019/11/07	106	75 - 125	103	75 - 125	<0.50	mg/kg	16 (2)	35
6429731	Acid Extractable Lithium (Li)	2019/11/07	120	75 - 125	107	75 - 125	<2.0	mg/kg	6.2 (2)	35
6429731	Acid Extractable Manganese (Mn)	2019/11/07	NC	75 - 125	102	75 - 125	<2.0	mg/kg	8.5 (2)	35
6429731	Acid Extractable Mercury (Hg)	2019/11/07	99	75 - 125	104	75 - 125	<0.10	mg/kg	NC (2)	35
6429731	Acid Extractable Molybdenum (Mo)	2019/11/07	109	75 - 125	101	75 - 125	<2.0	mg/kg	NC (2)	35
6429731	Acid Extractable Nickel (Ni)	2019/11/07	105	75 - 125	101	75 - 125	<2.0	mg/kg	2.5 (2)	35
6429731	Acid Extractable Rubidium (Rb)	2019/11/07	104	75 - 125	102	75 - 125	<2.0	mg/kg	7.4 (2)	35
6429731	Acid Extractable Selenium (Se)	2019/11/07	103	75 - 125	106	75 - 125	<1.0	mg/kg	NC (2)	35
6429731	Acid Extractable Silver (Ag)	2019/11/07	102	75 - 125	101	75 - 125	<0.50	mg/kg	NC (2)	35
6429731	Acid Extractable Strontium (Sr)	2019/11/07	113	75 - 125	103	75 - 125	<5.0	mg/kg	3.2 (2)	35
6429731	Acid Extractable Thallium (Tl)	2019/11/07	107	75 - 125	105	75 - 125	<0.10	mg/kg	9.9 (2)	35
6429731	Acid Extractable Tin (Sn)	2019/11/07	113	75 - 125	107	75 - 125	<1.0	mg/kg	NC (2)	35
6429731	Acid Extractable Uranium (U)	2019/11/07	108	75 - 125	104	75 - 125	<0.10	mg/kg	24 (2)	35
6429731	Acid Extractable Vanadium (V)	2019/11/07	107	75 - 125	101	75 - 125	<2.0	mg/kg	5.8 (2)	35
6429731	Acid Extractable Zinc (Zn)	2019/11/07	130 (1)	75 - 125	99	75 - 125	<5.0	mg/kg	27 (2)	35
6429753	Acid Extractable Aluminum (Al)	2019/11/07					<10	mg/kg	2.5 (4)	35
6429753	Acid Extractable Antimony (Sb)	2019/11/07	91 (3)	75 - 125	105	75 - 125	<2.0	mg/kg	4.2 (4)	35
6429753	Acid Extractable Arsenic (As)	2019/11/07	103 (3)	75 - 125	103	75 - 125	<2.0	mg/kg	4.2 (4)	35
6429753	Acid Extractable Barium (Ba)	2019/11/07	NC (3)	75 - 125	102	75 - 125	<5.0	mg/kg	7.0 (4)	35

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
6429753	Acid Extractable Beryllium (Be)	2019/11/07	109 (3)	75 - 125	103	75 - 125	<2.0	mg/kg	NC (4)	35
6429753	Acid Extractable Bismuth (Bi)	2019/11/07	105 (3)	75 - 125	105	75 - 125	<2.0	mg/kg	NC (4)	35
6429753	Acid Extractable Boron (B)	2019/11/07	87 (3)	75 - 125	101	75 - 125	<50	mg/kg	NC (4)	35
6429753	Acid Extractable Cadmium (Cd)	2019/11/07	101 (3)	75 - 125	98	75 - 125	<0.30	mg/kg	2.4 (4)	35
6429753	Acid Extractable Chromium (Cr)	2019/11/07	107 (3)	75 - 125	98	75 - 125	<2.0	mg/kg	3.3 (4)	35
6429753	Acid Extractable Cobalt (Co)	2019/11/07	105 (3)	75 - 125	101	75 - 125	<1.0	mg/kg	6.1 (4)	35
6429753	Acid Extractable Copper (Cu)	2019/11/07	NC (3)	75 - 125	97	75 - 125	<2.0	mg/kg	1.3 (4)	35
6429753	Acid Extractable Iron (Fe)	2019/11/07					<50	mg/kg	0.24 (4)	35
6429753	Acid Extractable Lead (Pb)	2019/11/07	NC (3)	75 - 125	103	75 - 125	<0.50	mg/kg	8.1 (4)	35
6429753	Acid Extractable Lithium (Li)	2019/11/07	114 (3)	75 - 125	105	75 - 125	<2.0	mg/kg	4.2 (4)	35
6429753	Acid Extractable Manganese (Mn)	2019/11/07	NC (3)	75 - 125	100	75 - 125	<2.0	mg/kg	5.4 (4)	35
6429753	Acid Extractable Mercury (Hg)	2019/11/07	98 (3)	75 - 125	106	75 - 125	<0.10	mg/kg	NC (4)	35
6429753	Acid Extractable Molybdenum (Mo)	2019/11/07	108 (3)	75 - 125	103	75 - 125	<2.0	mg/kg	NC (4)	35
6429753	Acid Extractable Nickel (Ni)	2019/11/07	112 (3)	75 - 125	101	75 - 125	<2.0	mg/kg	1.3 (4)	35
6429753	Acid Extractable Rubidium (Rb)	2019/11/07	98 (3)	75 - 125	101	75 - 125	<2.0	mg/kg	11 (4)	35
6429753	Acid Extractable Selenium (Se)	2019/11/07	99 (3)	75 - 125	103	75 - 125	<1.0	mg/kg	NC (4)	35
6429753	Acid Extractable Silver (Ag)	2019/11/07	100 (3)	75 - 125	96	75 - 125	<0.50	mg/kg	13 (4)	35
6429753	Acid Extractable Strontium (Sr)	2019/11/07	109 (3)	75 - 125	103	75 - 125	<5.0	mg/kg	1.1 (4)	35
6429753	Acid Extractable Thallium (Tl)	2019/11/07	103 (3)	75 - 125	106	75 - 125	<0.10	mg/kg	4.7 (4)	35
6429753	Acid Extractable Tin (Sn)	2019/11/07	93 (3)	75 - 125	107	75 - 125	<1.0	mg/kg	10 (4)	35
6429753	Acid Extractable Uranium (U)	2019/11/07	106 (3)	75 - 125	104	75 - 125	<0.10	mg/kg	3.6 (4)	35
6429753	Acid Extractable Vanadium (V)	2019/11/07	NC (3)	75 - 125	101	75 - 125	<2.0	mg/kg	9.6 (4)	35

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
6429753	Acid Extractable Zinc (Zn)	2019/11/07	NC (3)	75 - 125	100	75 - 125	<5.0	mg/kg	4.2 (4)	35

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Recovery is within QC acceptance limits. < 10 % of compounds in multi-component analysis in violation.

(2) Duplicate Parent ID

(3) Matrix Spike Parent ID [LFQ034-01]

(4) Duplicate Parent ID [LFQ034-01]

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BV Labs Job #: B9V1834
Report Date: 2019/11/08

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186
Sampler Initials: MG

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Eric Dearman, Scientific Specialist

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports.
For Service Group specific validation please refer to the Validation Signature Page.

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Custody Tracking Form

T118653

Please use this form for custody tracking when submitting the work instructions via eTR (electronic Test Requisition). Please ensure your form has a barcode or a BV Labs eTR confirmation number in the top right hand side. This number links your electronic submission to your samples.

First Sample: 19SS-14 (0-0.15m)
Last Sample: SOIL-QA/QC-10
Sample Count: 21

Relinquished By				Received By			
MIKE GRAVES		Date	2019/11/04			Date	
		Time (24 HR)	14:00			Time (24 HR)	
		Date				Date	
		Time (24 HR)				Time (24 HR)	
		Date				Date	2019 NOV 5 9:49
		Time (24 HR)				Time (24 HR)	

Submission Triage Information

Sampled By: MIKE GRAVES

# of Coolers/Pkgs: 1

Rush ☐ Immediate Test ☐ Food Residue ☐

Micro ☐ Food Chemistry ☐

***** LAB USE ONLY *****

Received At

Labeled By

Verified By

Comments: B9V1834

Custody Seal		Cooling Media	Temperature °C		
Present (Y/N)	Intact (Y/N)		1	2	3
			11	11	11

Shipped from FREDTON

Your P.O. #: 73517186
Your Project #: 11198639-04
Site Location: Glencore
Your C.O.C. #: 118653

Attention: Rob Turner

GHD Limited
120 Western Parkway
Bedford, NS
CANADA B4B 0V2

Report Date: 2019/11/08
Report #: R5957598
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9V1834
Received: 2019/11/05, 09:49

Sample Matrix: Soil
Samples Received: 21

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Metals Solids Acid Extr. ICPMS	21	2019/11/07	2019/11/07	ATL SOP 00058	EPA 6020B R2 m

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by BV Labs, unless otherwise agreed in writing. BV Labs is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Encryption Key

AUTHORIZED REPORT
RAPPORT AUTORISÉ

Bureau Veritas Laboratories
08 Nov 2019 17:53:04

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Heather Macumber, Senior Project Manager
Email: Heather.MACUMBER@bvlabs.com
Phone# (902)420-0203 Ext:226

==========

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BV Labs Job #: B9V1834
Report Date: 2019/11/08

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186
Sampler Initials: MG

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

BV Labs ID		LFQ021	LFQ022	LFQ023	LFQ024		
Sampling Date		2019/10/31	2019/10/31	2019/10/31	2019/10/31		
COC Number		118653	118653	118653	118653		
	UNITS	19SS-14 (0-0.15m)	19SS-14 (0.15-0.3 m)	19SS-15 (0-0.15m)	19SS-15 (0.15-0.3 m)	RDL	QC Batch
Metals							
Acid Extractable Aluminum (Al)	mg/kg	11000	8800	18000	16000	10	6429731
Acid Extractable Antimony (Sb)	mg/kg	3.7	<2.0	12	4.1	2.0	6429731
Acid Extractable Arsenic (As)	mg/kg	17	8.5	54	22	2.0	6429731
Acid Extractable Barium (Ba)	mg/kg	60	53	72	61	5.0	6429731
Acid Extractable Beryllium (Be)	mg/kg	<2.0	<2.0	<2.0	<2.0	2.0	6429731
Acid Extractable Bismuth (Bi)	mg/kg	<2.0	<2.0	5.7	<2.0	2.0	6429731
Acid Extractable Boron (B)	mg/kg	<50	<50	<50	<50	50	6429731
Acid Extractable Cadmium (Cd)	mg/kg	4.2	0.45	13	3.2	0.30	6429731
Acid Extractable Chromium (Cr)	mg/kg	26	24	39	35	2.0	6429731
Acid Extractable Cobalt (Co)	mg/kg	7.8	7.3	14	11	1.0	6429731
Acid Extractable Copper (Cu)	mg/kg	27	8.2	100	37	2.0	6429731
Acid Extractable Iron (Fe)	mg/kg	29000	28000	34000	34000	50	6429731
Acid Extractable Lead (Pb)	mg/kg	170	22	1400	230	0.50	6429731
Acid Extractable Lithium (Li)	mg/kg	13	9.1	23	19	2.0	6429731
Acid Extractable Manganese (Mn)	mg/kg	580	550	810	640	2.0	6429731
Acid Extractable Mercury (Hg)	mg/kg	<0.10	<0.10	0.14	<0.10	0.10	6429731
Acid Extractable Molybdenum (Mo)	mg/kg	<2.0	<2.0	<2.0	<2.0	2.0	6429731
Acid Extractable Nickel (Ni)	mg/kg	17	14	36	28	2.0	6429731
Acid Extractable Rubidium (Rb)	mg/kg	11	12	13	13	2.0	6429731
Acid Extractable Selenium (Se)	mg/kg	<1.0	<1.0	<1.0	<1.0	1.0	6429731
Acid Extractable Silver (Ag)	mg/kg	0.51	<0.50	3.9	0.72	0.50	6429731
Acid Extractable Strontium (Sr)	mg/kg	13	10	48	19	5.0	6429731
Acid Extractable Thallium (Tl)	mg/kg	0.63	0.13	4.6	0.94	0.10	6429731
Acid Extractable Tin (Sn)	mg/kg	1.5	1.0	5.1	1.7	1.0	6429731
Acid Extractable Uranium (U)	mg/kg	1.1	0.41	7.7	2.2	0.10	6429731
Acid Extractable Vanadium (V)	mg/kg	68	67	74	75	2.0	6429731
Acid Extractable Zinc (Zn)	mg/kg	340	130	1100	340	5.0	6429731

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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BV Labs Job #: B9V1834
Report Date: 2019/11/08

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186
Sampler Initials: MG

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

BV Labs ID		LFQ025	LFQ026	LFQ027	LFQ028		
Sampling Date		2019/10/31	2019/10/31	2019/10/31	2019/10/31		
COC Number		118653	118653	118653	118653		
	UNITS	19SS-16 (0-0.15m)	19SS-16 (0.15-0.3 m)	19SS-17 (0-0.15m)	19SS-17 (0.15-0.3 m)	RDL	QC Batch
Metals							
Acid Extractable Aluminum (Al)	mg/kg	22000	19000	23000	24000	10	6429731
Acid Extractable Antimony (Sb)	mg/kg	15	6.0	14	3.3	2.0	6429731
Acid Extractable Arsenic (As)	mg/kg	74	35	45	21	2.0	6429731
Acid Extractable Barium (Ba)	mg/kg	80	92	88	90	5.0	6429731
Acid Extractable Beryllium (Be)	mg/kg	<2.0	<2.0	<2.0	<2.0	2.0	6429731
Acid Extractable Bismuth (Bi)	mg/kg	5.1	<2.0	6.1	<2.0	2.0	6429731
Acid Extractable Boron (B)	mg/kg	<50	<50	<50	<50	50	6429731
Acid Extractable Cadmium (Cd)	mg/kg	11	6.4	9.6	2.7	0.30	6429731
Acid Extractable Chromium (Cr)	mg/kg	47	44	51	52	2.0	6429731
Acid Extractable Cobalt (Co)	mg/kg	15	14	17	17	1.0	6429731
Acid Extractable Copper (Cu)	mg/kg	230	96	110	50	2.0	6429731
Acid Extractable Iron (Fe)	mg/kg	36000	39000	39000	43000	50	6429731
Acid Extractable Lead (Pb)	mg/kg	1100	160	1500	280	0.50	6429731
Acid Extractable Lithium (Li)	mg/kg	28	25	29	31	2.0	6429731
Acid Extractable Manganese (Mn)	mg/kg	1000	990	1100	1200	2.0	6429731
Acid Extractable Mercury (Hg)	mg/kg	0.10	<0.10	0.17	<0.10	0.10	6429731
Acid Extractable Molybdenum (Mo)	mg/kg	<2.0	<2.0	<2.0	<2.0	2.0	6429731
Acid Extractable Nickel (Ni)	mg/kg	40	33	44	44	2.0	6429731
Acid Extractable Rubidium (Rb)	mg/kg	12	14	15	15	2.0	6429731
Acid Extractable Selenium (Se)	mg/kg	1.4	<1.0	<1.0	<1.0	1.0	6429731
Acid Extractable Silver (Ag)	mg/kg	3.7	0.68	5.9	0.83	0.50	6429731
Acid Extractable Strontium (Sr)	mg/kg	28	16	52	26	5.0	6429731
Acid Extractable Thallium (Tl)	mg/kg	4.4	1.4	2.8	0.79	0.10	6429731
Acid Extractable Tin (Sn)	mg/kg	7.4	1.4	5.9	1.9	1.0	6429731
Acid Extractable Uranium (U)	mg/kg	3.9	1.6	7.0	3.1	0.10	6429731
Acid Extractable Vanadium (V)	mg/kg	76	89	94	100	2.0	6429731
Acid Extractable Zinc (Zn)	mg/kg	1000	640	810	330	5.0	6429731

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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BV Labs Job #: B9V1834
Report Date: 2019/11/08

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186
Sampler Initials: MG

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

BV Labs ID		LFQ029	LFQ030		LFQ031		
Sampling Date		2019/10/31	2019/10/31		2019/10/31		
COC Number		118653	118653		118653		
	UNITS	19SS-18 (0-0.15m)	19SS-18 (0.15-0.3 m)	QC Batch	19SS-19 (0-0.15m)	RDL	QC Batch
Metals							
Acid Extractable Aluminum (Al)	mg/kg	20000	15000	6429731	24000	10	6429753
Acid Extractable Antimony (Sb)	mg/kg	33	6.0	6429731	50	2.0	6429753
Acid Extractable Arsenic (As)	mg/kg	94	31	6429731	260	2.0	6429753
Acid Extractable Barium (Ba)	mg/kg	100	67	6429731	110	5.0	6429753
Acid Extractable Beryllium (Be)	mg/kg	<2.0	<2.0	6429731	<2.0	2.0	6429753
Acid Extractable Bismuth (Bi)	mg/kg	16	<2.0	6429731	27	2.0	6429753
Acid Extractable Boron (B)	mg/kg	<50	<50	6429731	<50	50	6429753
Acid Extractable Cadmium (Cd)	mg/kg	38	5.3	6429731	44	0.30	6429753
Acid Extractable Chromium (Cr)	mg/kg	57	35	6429731	55	2.0	6429753
Acid Extractable Cobalt (Co)	mg/kg	15	11	6429731	15	1.0	6429753
Acid Extractable Copper (Cu)	mg/kg	290	49	6429731	1100	2.0	6429753
Acid Extractable Iron (Fe)	mg/kg	33000	32000	6429731	37000	50	6429753
Acid Extractable Lead (Pb)	mg/kg	4300	220	6429731	6000	0.50	6429753
Acid Extractable Lithium (Li)	mg/kg	22	21	6429731	27	2.0	6429753
Acid Extractable Manganese (Mn)	mg/kg	800	800	6429731	730	2.0	6429753
Acid Extractable Mercury (Hg)	mg/kg	0.37	<0.10	6429731	0.58	0.10	6429753
Acid Extractable Molybdenum (Mo)	mg/kg	2.8	<2.0	6429731	2.2	2.0	6429753
Acid Extractable Nickel (Ni)	mg/kg	39	30	6429731	55	2.0	6429753
Acid Extractable Rubidium (Rb)	mg/kg	17	11	6429731	17	2.0	6429753
Acid Extractable Selenium (Se)	mg/kg	2.2	<1.0	6429731	7.6	1.0	6429753
Acid Extractable Silver (Ag)	mg/kg	11	1.0	6429731	14	0.50	6429753
Acid Extractable Strontium (Sr)	mg/kg	190	20	6429731	120	5.0	6429753
Acid Extractable Thallium (Tl)	mg/kg	12	1.2	6429731	20	0.10	6429753
Acid Extractable Tin (Sn)	mg/kg	16	1.7	6429731	45	1.0	6429753
Acid Extractable Uranium (U)	mg/kg	29	2.0	6429731	15	0.10	6429753
Acid Extractable Vanadium (V)	mg/kg	100	73	6429731	83	2.0	6429753
Acid Extractable Zinc (Zn)	mg/kg	2300	680	6429731	1300	5.0	6429753

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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BV Labs Job #: B9V1834
Report Date: 2019/11/08

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186
Sampler Initials: MG

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

BV Labs ID		LFQ032	LFQ033	LFQ034	LFQ034		
Sampling Date		2019/10/31	2019/10/31	2019/10/31	2019/10/31		
COC Number		118653	118653	118653	118653		
	UNITS	19SS-19 (0.15-0.3 m)	19SS-20 (0-0.15m)	19SS-20 (0.15-0.3 m)	19SS-20 (0.15-0.3 m) Lab-Dup	RDL	QC Batch
Metals							
Acid Extractable Aluminum (Al)	mg/kg	23000	21000	19000	19000	10	6429753
Acid Extractable Antimony (Sb)	mg/kg	20	23	4.5	4.4	2.0	6429753
Acid Extractable Arsenic (As)	mg/kg	83	62	23	22	2.0	6429753
Acid Extractable Barium (Ba)	mg/kg	91	81	69	65	5.0	6429753
Acid Extractable Beryllium (Be)	mg/kg	<2.0	<2.0	<2.0	<2.0	2.0	6429753
Acid Extractable Bismuth (Bi)	mg/kg	8.9	9.3	<2.0	<2.0	2.0	6429753
Acid Extractable Boron (B)	mg/kg	<50	<50	<50	<50	50	6429753
Acid Extractable Cadmium (Cd)	mg/kg	21	16	4.7	4.6	0.30	6429753
Acid Extractable Chromium (Cr)	mg/kg	44	47	39	38	2.0	6429753
Acid Extractable Cobalt (Co)	mg/kg	17	14	13	14	1.0	6429753
Acid Extractable Copper (Cu)	mg/kg	330	140	52	51	2.0	6429753
Acid Extractable Iron (Fe)	mg/kg	39000	33000	35000	35000	50	6429753
Acid Extractable Lead (Pb)	mg/kg	2000	2200	300	330	0.50	6429753
Acid Extractable Lithium (Li)	mg/kg	28	24	24	23	2.0	6429753
Acid Extractable Manganese (Mn)	mg/kg	1000	820	980	930	2.0	6429753
Acid Extractable Mercury (Hg)	mg/kg	0.20	0.21	<0.10	<0.10	0.10	6429753
Acid Extractable Molybdenum (Mo)	mg/kg	<2.0	<2.0	<2.0	<2.0	2.0	6429753
Acid Extractable Nickel (Ni)	mg/kg	39	37	37	37	2.0	6429753
Acid Extractable Rubidium (Rb)	mg/kg	17	16	12	11	2.0	6429753
Acid Extractable Selenium (Se)	mg/kg	1.8	1.2	<1.0	<1.0	1.0	6429753
Acid Extractable Silver (Ag)	mg/kg	3.9	8.5	1.2	1.4	0.50	6429753
Acid Extractable Strontium (Sr)	mg/kg	61	100	25	25	5.0	6429753
Acid Extractable Thallium (Tl)	mg/kg	8.5	4.8	0.96	0.91	0.10	6429753
Acid Extractable Tin (Sn)	mg/kg	10	8.4	2.1	1.9	1.0	6429753
Acid Extractable Uranium (U)	mg/kg	11	16	2.7	2.8	0.10	6429753
Acid Extractable Vanadium (V)	mg/kg	100	92	87	79	2.0	6429753
Acid Extractable Zinc (Zn)	mg/kg	440	930	600	570	5.0	6429753

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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BV Labs Job #: B9V1834
Report Date: 2019/11/08

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186
Sampler Initials: MG

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

BV Labs ID		LFQ035	LFQ036	LFQ037	LFQ038		
Sampling Date		2019/10/31	2019/10/31	2019/10/31	2019/10/31		
COC Number		118653	118653	118653	118653		
	UNITS	19SS-21 (0-0.15m)	19SS-21 (0.15-0.3 m)	19SS-22 (0-0.15m)	19SS-22 (0.15-0.3 m)	RDL	QC Batch
Metals							
Acid Extractable Aluminum (Al)	mg/kg	22000	19000	20000	14000	10	6429753
Acid Extractable Antimony (Sb)	mg/kg	20	6.2	100	7.3	2.0	6429753
Acid Extractable Arsenic (As)	mg/kg	50	21	150	16	2.0	6429753
Acid Extractable Barium (Ba)	mg/kg	86	73	110	89	5.0	6429753
Acid Extractable Beryllium (Be)	mg/kg	<2.0	<2.0	<2.0	<2.0	2.0	6429753
Acid Extractable Bismuth (Bi)	mg/kg	6.1	<2.0	26	<2.0	2.0	6429753
Acid Extractable Boron (B)	mg/kg	<50	<50	<50	<50	50	6429753
Acid Extractable Cadmium (Cd)	mg/kg	15	2.4	96	9.0	0.30	6429753
Acid Extractable Chromium (Cr)	mg/kg	50	39	51	30	2.0	6429753
Acid Extractable Cobalt (Co)	mg/kg	16	14	17	11	1.0	6429753
Acid Extractable Copper (Cu)	mg/kg	100	44	420	44	2.0	6429753
Acid Extractable Iron (Fe)	mg/kg	36000	37000	37000	32000	50	6429753
Acid Extractable Lead (Pb)	mg/kg	1400	76	6900	190	0.50	6429753
Acid Extractable Lithium (Li)	mg/kg	26	24	23	19	2.0	6429753
Acid Extractable Manganese (Mn)	mg/kg	1000	1100	1300	920	2.0	6429753
Acid Extractable Mercury (Hg)	mg/kg	0.19	<0.10	0.72	<0.10	0.10	6429753
Acid Extractable Molybdenum (Mo)	mg/kg	<2.0	<2.0	2.7	<2.0	2.0	6429753
Acid Extractable Nickel (Ni)	mg/kg	42	35	44	24	2.0	6429753
Acid Extractable Rubidium (Rb)	mg/kg	13	11	15	11	2.0	6429753
Acid Extractable Selenium (Se)	mg/kg	1.0	<1.0	5.5	<1.0	1.0	6429753
Acid Extractable Silver (Ag)	mg/kg	5.4	0.51	31	1.0	0.50	6429753
Acid Extractable Strontium (Sr)	mg/kg	88	12	110	13	5.0	6429753
Acid Extractable Thallium (Tl)	mg/kg	4.6	0.65	21	0.88	0.10	6429753
Acid Extractable Tin (Sn)	mg/kg	5.7	1.2	25	1.5	1.0	6429753
Acid Extractable Uranium (U)	mg/kg	13	1.1	16	1.2	0.10	6429753
Acid Extractable Vanadium (V)	mg/kg	100	77	110	65	2.0	6429753
Acid Extractable Zinc (Zn)	mg/kg	750	370	1600	290	5.0	6429753

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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BV Labs Job #: B9V1834
Report Date: 2019/11/08

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186
Sampler Initials: MG

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

BV Labs ID		LFQ039	LFQ040	LFQ041		
Sampling Date		2019/10/31	2019/10/31	2019/10/31		
COC Number		118653	118653	118653		
	UNITS	19SS-23 (0-0.15m)	19SS-23 (0.15-0.3 m)	SOIL-QA/QC-10	RDL	QC Batch
Metals						
Acid Extractable Aluminum (Al)	mg/kg	20000	19000	14000	10	6429753
Acid Extractable Antimony (Sb)	mg/kg	18	4.0	6.8	2.0	6429753
Acid Extractable Arsenic (As)	mg/kg	46	20	13	2.0	6429753
Acid Extractable Barium (Ba)	mg/kg	68	71	93	5.0	6429753
Acid Extractable Beryllium (Be)	mg/kg	<2.0	<2.0	<2.0	2.0	6429753
Acid Extractable Bismuth (Bi)	mg/kg	5.5	<2.0	<2.0	2.0	6429753
Acid Extractable Boron (B)	mg/kg	<50	<50	<50	50	6429753
Acid Extractable Cadmium (Cd)	mg/kg	11	2.7	7.0	0.30	6429753
Acid Extractable Chromium (Cr)	mg/kg	47	40	28	2.0	6429753
Acid Extractable Cobalt (Co)	mg/kg	15	14	12	1.0	6429753
Acid Extractable Copper (Cu)	mg/kg	95	51	39	2.0	6429753
Acid Extractable Iron (Fe)	mg/kg	36000	36000	33000	50	6429753
Acid Extractable Lead (Pb)	mg/kg	1300	240	100	0.50	6429753
Acid Extractable Lithium (Li)	mg/kg	25	26	18	2.0	6429753
Acid Extractable Manganese (Mn)	mg/kg	850	820	1000	2.0	6429753
Acid Extractable Mercury (Hg)	mg/kg	0.15	<0.10	<0.10	0.10	6429753
Acid Extractable Molybdenum (Mo)	mg/kg	<2.0	<2.0	<2.0	2.0	6429753
Acid Extractable Nickel (Ni)	mg/kg	44	37	22	2.0	6429753
Acid Extractable Rubidium (Rb)	mg/kg	10	11	12	2.0	6429753
Acid Extractable Selenium (Se)	mg/kg	<1.0	<1.0	<1.0	1.0	6429753
Acid Extractable Silver (Ag)	mg/kg	5.5	0.97	0.69	0.50	6429753
Acid Extractable Strontium (Sr)	mg/kg	39	16	9.1	5.0	6429753
Acid Extractable Thallium (Tl)	mg/kg	2.9	0.71	0.60	0.10	6429753
Acid Extractable Tin (Sn)	mg/kg	5.3	1.7	1.2	1.0	6429753
Acid Extractable Uranium (U)	mg/kg	6.2	1.8	0.68	0.10	6429753
Acid Extractable Vanadium (V)	mg/kg	100	88	69	2.0	6429753
Acid Extractable Zinc (Zn)	mg/kg	550	280	260	5.0	6429753

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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BV Labs Job #: B9V1834
Report Date: 2019/11/08

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186
Sampler Initials: MG

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	11.0°C

Results relate only to the items tested.

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BV Labs Job #: B9V1834
Report Date: 2019/11/08

QUALITY ASSURANCE REPORT

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186
Sampler Initials: MG

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
6429731	Acid Extractable Aluminum (Al)	2019/11/07					<10	mg/kg	8.4 (2)	35
6429731	Acid Extractable Antimony (Sb)	2019/11/07	102	75 - 125	108	75 - 125	<2.0	mg/kg	NC (2)	35
6429731	Acid Extractable Arsenic (As)	2019/11/07	103	75 - 125	101	75 - 125	<2.0	mg/kg	29 (2)	35
6429731	Acid Extractable Barium (Ba)	2019/11/07	NC	75 - 125	99	75 - 125	<5.0	mg/kg	0.83 (2)	35
6429731	Acid Extractable Beryllium (Be)	2019/11/07	106	75 - 125	105	75 - 125	<2.0	mg/kg	NC (2)	35
6429731	Acid Extractable Bismuth (Bi)	2019/11/07	107	75 - 125	105	75 - 125	<2.0	mg/kg	NC (2)	35
6429731	Acid Extractable Boron (B)	2019/11/07	101	75 - 125	104	75 - 125	<50	mg/kg	NC (2)	35
6429731	Acid Extractable Cadmium (Cd)	2019/11/07	100	75 - 125	99	75 - 125	<0.30	mg/kg	NC (2)	35
6429731	Acid Extractable Chromium (Cr)	2019/11/07	105	75 - 125	99	75 - 125	<2.0	mg/kg	15 (2)	35
6429731	Acid Extractable Cobalt (Co)	2019/11/07	105	75 - 125	102	75 - 125	<1.0	mg/kg	16 (2)	35
6429731	Acid Extractable Copper (Cu)	2019/11/07	100	75 - 125	99	75 - 125	<2.0	mg/kg	17 (2)	35
6429731	Acid Extractable Iron (Fe)	2019/11/07					<50	mg/kg	7.7 (2)	35
6429731	Acid Extractable Lead (Pb)	2019/11/07	106	75 - 125	103	75 - 125	<0.50	mg/kg	16 (2)	35
6429731	Acid Extractable Lithium (Li)	2019/11/07	120	75 - 125	107	75 - 125	<2.0	mg/kg	6.2 (2)	35
6429731	Acid Extractable Manganese (Mn)	2019/11/07	NC	75 - 125	102	75 - 125	<2.0	mg/kg	8.5 (2)	35
6429731	Acid Extractable Mercury (Hg)	2019/11/07	99	75 - 125	104	75 - 125	<0.10	mg/kg	NC (2)	35
6429731	Acid Extractable Molybdenum (Mo)	2019/11/07	109	75 - 125	101	75 - 125	<2.0	mg/kg	NC (2)	35
6429731	Acid Extractable Nickel (Ni)	2019/11/07	105	75 - 125	101	75 - 125	<2.0	mg/kg	2.5 (2)	35
6429731	Acid Extractable Rubidium (Rb)	2019/11/07	104	75 - 125	102	75 - 125	<2.0	mg/kg	7.4 (2)	35
6429731	Acid Extractable Selenium (Se)	2019/11/07	103	75 - 125	106	75 - 125	<1.0	mg/kg	NC (2)	35
6429731	Acid Extractable Silver (Ag)	2019/11/07	102	75 - 125	101	75 - 125	<0.50	mg/kg	NC (2)	35
6429731	Acid Extractable Strontium (Sr)	2019/11/07	113	75 - 125	103	75 - 125	<5.0	mg/kg	3.2 (2)	35
6429731	Acid Extractable Thallium (Tl)	2019/11/07	107	75 - 125	105	75 - 125	<0.10	mg/kg	9.9 (2)	35
6429731	Acid Extractable Tin (Sn)	2019/11/07	113	75 - 125	107	75 - 125	<1.0	mg/kg	NC (2)	35
6429731	Acid Extractable Uranium (U)	2019/11/07	108	75 - 125	104	75 - 125	<0.10	mg/kg	24 (2)	35
6429731	Acid Extractable Vanadium (V)	2019/11/07	107	75 - 125	101	75 - 125	<2.0	mg/kg	5.8 (2)	35
6429731	Acid Extractable Zinc (Zn)	2019/11/07	130 (1)	75 - 125	99	75 - 125	<5.0	mg/kg	27 (2)	35
6429753	Acid Extractable Aluminum (Al)	2019/11/07					<10	mg/kg	2.5 (4)	35
6429753	Acid Extractable Antimony (Sb)	2019/11/07	91 (3)	75 - 125	105	75 - 125	<2.0	mg/kg	4.2 (4)	35
6429753	Acid Extractable Arsenic (As)	2019/11/07	103 (3)	75 - 125	103	75 - 125	<2.0	mg/kg	4.2 (4)	35
6429753	Acid Extractable Barium (Ba)	2019/11/07	NC (3)	75 - 125	102	75 - 125	<5.0	mg/kg	7.0 (4)	35

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
6429753	Acid Extractable Beryllium (Be)	2019/11/07	109 (3)	75 - 125	103	75 - 125	<2.0	mg/kg	NC (4)	35
6429753	Acid Extractable Bismuth (Bi)	2019/11/07	105 (3)	75 - 125	105	75 - 125	<2.0	mg/kg	NC (4)	35
6429753	Acid Extractable Boron (B)	2019/11/07	87 (3)	75 - 125	101	75 - 125	<50	mg/kg	NC (4)	35
6429753	Acid Extractable Cadmium (Cd)	2019/11/07	101 (3)	75 - 125	98	75 - 125	<0.30	mg/kg	2.4 (4)	35
6429753	Acid Extractable Chromium (Cr)	2019/11/07	107 (3)	75 - 125	98	75 - 125	<2.0	mg/kg	3.3 (4)	35
6429753	Acid Extractable Cobalt (Co)	2019/11/07	105 (3)	75 - 125	101	75 - 125	<1.0	mg/kg	6.1 (4)	35
6429753	Acid Extractable Copper (Cu)	2019/11/07	NC (3)	75 - 125	97	75 - 125	<2.0	mg/kg	1.3 (4)	35
6429753	Acid Extractable Iron (Fe)	2019/11/07					<50	mg/kg	0.24 (4)	35
6429753	Acid Extractable Lead (Pb)	2019/11/07	NC (3)	75 - 125	103	75 - 125	<0.50	mg/kg	8.1 (4)	35
6429753	Acid Extractable Lithium (Li)	2019/11/07	114 (3)	75 - 125	105	75 - 125	<2.0	mg/kg	4.2 (4)	35
6429753	Acid Extractable Manganese (Mn)	2019/11/07	NC (3)	75 - 125	100	75 - 125	<2.0	mg/kg	5.4 (4)	35
6429753	Acid Extractable Mercury (Hg)	2019/11/07	98 (3)	75 - 125	106	75 - 125	<0.10	mg/kg	NC (4)	35
6429753	Acid Extractable Molybdenum (Mo)	2019/11/07	108 (3)	75 - 125	103	75 - 125	<2.0	mg/kg	NC (4)	35
6429753	Acid Extractable Nickel (Ni)	2019/11/07	112 (3)	75 - 125	101	75 - 125	<2.0	mg/kg	1.3 (4)	35
6429753	Acid Extractable Rubidium (Rb)	2019/11/07	98 (3)	75 - 125	101	75 - 125	<2.0	mg/kg	11 (4)	35
6429753	Acid Extractable Selenium (Se)	2019/11/07	99 (3)	75 - 125	103	75 - 125	<1.0	mg/kg	NC (4)	35
6429753	Acid Extractable Silver (Ag)	2019/11/07	100 (3)	75 - 125	96	75 - 125	<0.50	mg/kg	13 (4)	35
6429753	Acid Extractable Strontium (Sr)	2019/11/07	109 (3)	75 - 125	103	75 - 125	<5.0	mg/kg	1.1 (4)	35
6429753	Acid Extractable Thallium (Tl)	2019/11/07	103 (3)	75 - 125	106	75 - 125	<0.10	mg/kg	4.7 (4)	35
6429753	Acid Extractable Tin (Sn)	2019/11/07	93 (3)	75 - 125	107	75 - 125	<1.0	mg/kg	10 (4)	35
6429753	Acid Extractable Uranium (U)	2019/11/07	106 (3)	75 - 125	104	75 - 125	<0.10	mg/kg	3.6 (4)	35
6429753	Acid Extractable Vanadium (V)	2019/11/07	NC (3)	75 - 125	101	75 - 125	<2.0	mg/kg	9.6 (4)	35

Bureau Veritas Laboratories 200 Bluewater Rd, Suite 105, Bedford, Nova Scotia Canada B4B 1G9 Tel: 902-420-0203 Toll-free: 800-565-7227 Fax: 902-420-8612 www.bvlabs.com

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
6429753	Acid Extractable Zinc (Zn)	2019/11/07	NC (3)	75 - 125	100	75 - 125	<5.0	mg/kg	4.2 (4)	35

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Recovery is within QC acceptance limits. < 10 % of compounds in multi-component analysis in violation.

(2) Duplicate Parent ID

(3) Matrix Spike Parent ID [LFQ034-01]

(4) Duplicate Parent ID [LFQ034-01]

Bureau Veritas Laboratories 200 Bluewater Rd, Suite 105, Bedford, Nova Scotia Canada B4B 1G9 Tel: 902-420-0203 Toll-free: 800-565-7227 Fax: 902-420-8612 www.bvlabs.com

BV Labs Job #: B9V1834
Report Date: 2019/11/08

GHD Limited
Client Project #: 11198639-04
Site Location: Glencore
Your P.O. #: 73517186
Sampler Initials: MG

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Eric Dearman, Scientific Specialist

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports.
For Service Group specific validation please refer to the Validation Signature Page.

Bureau Veritas Laboratories 200 Bluewater Rd, Suite 105, Bedford, Nova Scotia Canada B4B 1G9 Tel: 902-420-0203 Toll-free: 800-565-7227 Fax: 902-420-8612 www.bvlabs.com

Custody Tracking Form

T118653

Please use this form for custody tracking when submitting the work instructions via eTR (electronic Test Requisition). Please ensure your form has a barcode or a BV Labs eTR confirmation number in the top right hand side. This number links your electronic submission to your samples.

First Sample: 19SS-14 (0-0.15m)
Last Sample: SOIL-QA/QC-10
Sample Count: 21

Relinquished By				Received By			
MIKE GRAVES		Date	2019/11/04			Date	
		Time (24 HR)	14:00			Time (24 HR)	
		Date				Date	
		Time (24 HR)				Time (24 HR)	
		Date				Date	2019 NOV 5 9:49
		Time (24 HR)				Time (24 HR)	

Submission Triage Information

Sampled By: MIKE GRAVES

# of Coolers/Pkgs: 1

Rush ☐ Immediate Test ☐ Food Residue ☐

Micro ☐ Food Chemistry ☐

***** LAB USE ONLY *****

Received At

Labeled By

Verified By

Comments: B9V1834

Custody Seal		Cooling Media	Temperature °C		
Present (Y/N)	Intact (Y/N)		1	2	3
			11	11	11

Shipped from FREDTON

Appendix D
EPC Output Sheets

UCL Statistics for Uncensored Full Data Sets

User Selected Options	
Date/Time of Computation	ProUCL 5.11/6/2020 9:23:42 AM
From File	WorkSheet.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Arsenic (mg/kg)

General Statistics

Total Number of Observations	13	Number of Distinct Observations	13
		Number of Missing Observations	0
Minimum	17	Mean	82.31
Maximum	260	Median	62
SD	62.91	Std. Error of Mean	17.45
Coefficient of Variation	0.764	Skewness	2.14

Normal GOF Test

Shapiro Wilk Test Statistic	0.772	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.866	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.26	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.234	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	113.4	95% Adjusted-CLT UCL (Chen-1995)	122.1
		95% Modified-t UCL (Johnson-1978)	115.1

Gamma GOF Test

A-D Test Statistic	0.44	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.741	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.169	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.239	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	2.519	k star (bias corrected MLE)	1.989
Theta hat (MLE)	32.67	Theta star (bias corrected MLE)	41.38
nu hat (MLE)	65.5	nu star (bias corrected)	51.72
MLE Mean (bias corrected)	82.31	MLE Sd (bias corrected)	58.36
		Approximate Chi Square Value (0.05)	36.2
Adjusted Level of Significance	0.0301	Adjusted Chi Square Value	34.36

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50)	117.6	95% Adjusted Gamma UCL (use when n<50)	123.9

UCL Statistics for Uncensored Full Data Sets

User Selected Options	
Date/Time of Computation	ProUCL 5.11/6/2020 9:23:42 AM
From File	WorkSheet.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.963	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.866	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.156	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.234	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	2.833	Mean of logged Data	4.199
Maximum of Logged Data	5.561	SD of logged Data	0.667

Assuming Lognormal Distribution

95% H-UCL	130.2	90% Chebyshev (MVUE) UCL	128.8
95% Chebyshev (MVUE) UCL	150.2	97.5% Chebyshev (MVUE) UCL	179.8
99% Chebyshev (MVUE) UCL	238.1		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	111	95% Jackknife UCL	113.4
95% Standard Bootstrap UCL	109.9	95% Bootstrap-t UCL	147.1
95% Hall's Bootstrap UCL	259.7	95% Percentile Bootstrap UCL	110.2
95% BCA Bootstrap UCL	124.3		
90% Chebyshev(Mean, Sd) UCL	134.7	95% Chebyshev(Mean, Sd) UCL	158.4
97.5% Chebyshev(Mean, Sd) UCL	191.3	99% Chebyshev(Mean, Sd) UCL	255.9

Suggested UCL to Use

95% Adjusted Gamma UCL	123.9		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

UCL Statistics for Uncensored Full Data Sets

User Selected Options	
Date/Time of Computation	ProUCL 5.11/6/2020 9:26:44 AM
From File	WorkSheet.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Arsenic (mg/kg)

General Statistics

Total Number of Observations	13	Number of Distinct Observations	11
		Number of Missing Observations	0
Minimum	8.5	Mean	27.12
Maximum	83	Median	22
SD	17.97	Std. Error of Mean	4.985
Coefficient of Variation	0.663	Skewness	2.817

Normal GOF Test

Shapiro Wilk Test Statistic	0.648	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.866	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.294	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.234	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	36	95% Adjusted-CLT UCL (Chen-1995)	39.48
		95% Modified-t UCL (Johnson-1978)	36.65

Gamma GOF Test

A-D Test Statistic	1.054	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.737	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.234	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.238	Detected data appear Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics

k hat (MLE)	3.89	k star (bias corrected MLE)	3.044
Theta hat (MLE)	6.97	Theta star (bias corrected MLE)	8.909
nu hat (MLE)	101.1	nu star (bias corrected)	79.14
MLE Mean (bias corrected)	27.12	MLE Sd (bias corrected)	15.54
		Approximate Chi Square Value (0.05)	59.64
Adjusted Level of Significance	0.0301	Adjusted Chi Square Value	57.24

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50)	35.98	95% Adjusted Gamma UCL (use when n<50)	37.49

UCL Statistics for Uncensored Full Data Sets

User Selected Options	
Date/Time of Computation	ProUCL 5.11/6/2020 9:26:44 AM
From File	WorkSheet.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.874	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.866	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.214	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.234	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	2.14	Mean of logged Data	3.166
Maximum of Logged Data	4.419	SD of logged Data	0.507

Assuming Lognormal Distribution

95% H-UCL	36.76	90% Chebyshev (MVUE) UCL	38.21
95% Chebyshev (MVUE) UCL	43.44	97.5% Chebyshev (MVUE) UCL	50.7
99% Chebyshev (MVUE) UCL	64.95		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	35.31	95% Jackknife UCL	36
95% Standard Bootstrap UCL	35.11	95% Bootstrap-t UCL	48.3
95% Hall's Bootstrap UCL	73.93	95% Percentile Bootstrap UCL	35.46
95% BCA Bootstrap UCL	41.62		
90% Chebyshev(Mean, Sd) UCL	42.07	95% Chebyshev(Mean, Sd) UCL	48.84
97.5% Chebyshev(Mean, Sd) UCL	58.24	99% Chebyshev(Mean, Sd) UCL	76.71

Suggested UCL to Use

95% Adjusted Gamma UCL	37.49		

When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test

When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

UCL Statistics for Uncensored Full Data Sets

User Selected Options	
Date/Time of Computation	ProUCL 5.11/6/2020 9:27:45 AM
From File	WorkSheet.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Lead (mg/kg)

General Statistics

Total Number of Observations	13	Number of Distinct Observations	12
		Number of Missing Observations	0
Minimum	170	Mean	2493
Maximum	6900	Median	1500
SD	2080	Std. Error of Mean	576.9
Coefficient of Variation	0.834	Skewness	1.157

Normal GOF Test

Shapiro Wilk Test Statistic	0.869	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.866	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.222	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.234	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	3521	95% Adjusted-CLT UCL (Chen-1995)	3640
		95% Modified-t UCL (Johnson-1978)	3552

Gamma GOF Test

A-D Test Statistic	0.251	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.751	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.147	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.241	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	1.449	k star (bias corrected MLE)	1.166
Theta hat (MLE)	1721	Theta star (bias corrected MLE)	2139
nu hat (MLE)	37.66	nu star (bias corrected)	30.3
MLE Mean (bias corrected)	2493	MLE Sd (bias corrected)	2309
		Approximate Chi Square Value (0.05)	18.73
Adjusted Level of Significance	0.0301	Adjusted Chi Square Value	17.45

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	4033	95% Adjusted Gamma UCL (use when n<50)	4331

UCL Statistics for Uncensored Full Data Sets

User Selected Options	
Date/Time of Computation	ProUCL 5.11/6/2020 9:27:45 AM
From File	WorkSheet.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.937	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.866	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.181	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.234	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	5.136	Mean of logged Data	7.438
Maximum of Logged Data	8.839	SD of logged Data	1.021

Assuming Lognormal Distribution

95% H-UCL	6697	90% Chebyshev (MVUE) UCL	5192
95% Chebyshev (MVUE) UCL	6317	97.5% Chebyshev (MVUE) UCL	7879
99% Chebyshev (MVUE) UCL	10948		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	3442	95% Jackknife UCL	3521
95% Standard Bootstrap UCL	3413	95% Bootstrap-t UCL	4019
95% Hall's Bootstrap UCL	3995	95% Percentile Bootstrap UCL	3465
95% BCA Bootstrap UCL	3562		
90% Chebyshev(Mean, Sd) UCL	4224	95% Chebyshev(Mean, Sd) UCL	5008
97.5% Chebyshev(Mean, Sd) UCL	6096	99% Chebyshev(Mean, Sd) UCL	8233

Suggested UCL to Use

95% Student's-t UCL	3521		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

UCL Statistics for Uncensored Full Data Sets

User Selected Options	
Date/Time of Computation	ProUCL 5.11/6/2020 9:28:31 AM
From File	WorkSheet.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Lead (mg/kg)

General Statistics

Total Number of Observations	13	Number of Distinct Observations	12
		Number of Missing Observations	0
Minimum	22	Mean	362.2
Maximum	2000	Median	230
SD	503	Std. Error of Mean	139.5
Coefficient of Variation	1.389	Skewness	3.333

Normal GOF Test

Shapiro Wilk Test Statistic	0.511	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.866	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.377	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.234	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	610.8	95% Adjusted-CLT UCL (Chen-1995)	729.4
		95% Modified-t UCL (Johnson-1978)	632.3

Gamma GOF Test

A-D Test Statistic	1.09	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.755	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.261	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.242	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	1.17	k star (bias corrected MLE)	0.951
Theta hat (MLE)	309.6	Theta star (bias corrected MLE)	380.8
nu hat (MLE)	30.41	nu star (bias corrected)	24.73
MLE Mean (bias corrected)	362.2	MLE Sd (bias corrected)	371.4
		Approximate Chi Square Value (0.05)	14.4
Adjusted Level of Significance	0.0301	Adjusted Chi Square Value	13.29

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	621.8	95% Adjusted Gamma UCL (use when n<50)	673.8

UCL Statistics for Uncensored Full Data Sets

User Selected Options	
Date/Time of Computation	ProUCL 5.11/6/2020 9:28:31 AM
From File	WorkSheet.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.881	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.866	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.217	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.234	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	3.091	Mean of logged Data	5.407
Maximum of Logged Data	7.601	SD of logged Data	1.009

Assuming Lognormal Distribution

95% H-UCL	854.1	90% Chebyshev (MVUE) UCL	669.9
95% Chebyshev (MVUE) UCL	814.1	97.5% Chebyshev (MVUE) UCL	1014
99% Chebyshev (MVUE) UCL	1408		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	591.6	95% Jackknife UCL	610.8
95% Standard Bootstrap UCL	587.6	95% Bootstrap-t UCL	1258
95% Hall's Bootstrap UCL	1683	95% Percentile Bootstrap UCL	631.2
95% BCA Bootstrap UCL	752.5		
90% Chebyshev(Mean, Sd) UCL	780.7	95% Chebyshev(Mean, Sd) UCL	970.3
97.5% Chebyshev(Mean, Sd) UCL	1233	99% Chebyshev(Mean, Sd) UCL	1750

Suggested UCL to Use

95% Chebyshev (Mean, Sd) UCL	970.3		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

UCL Statistics for Uncensored Full Data Sets

User Selected Options	
Date/Time of Computation	ProUCL 5.11/6/2020 9:29:21 AM
From File	WorkSheet.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Thallium (mg/kg)

General Statistics

Total Number of Observations	13	Number of Distinct Observations	11
		Number of Missing Observations	0
Minimum	0.63	Mean	7.641
Maximum	21	Median	4.6
SD	6.646	Std. Error of Mean	1.843
Coefficient of Variation	0.87	Skewness	1.169

Normal GOF Test

Shapiro Wilk Test Statistic	0.839	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.866	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.281	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.234	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	10.93	95% Adjusted-CLT UCL (Chen-1995)	11.31
		95% Modified-t UCL (Johnson-1978)	11.03

Gamma GOF Test

A-D Test Statistic	0.328	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.751	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.203	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.241	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	1.418	k star (bias corrected MLE)	1.142
Theta hat (MLE)	5.389	Theta star (bias corrected MLE)	6.691
nu hat (MLE)	36.87	nu star (bias corrected)	29.69
MLE Mean (bias corrected)	7.641	MLE Sd (bias corrected)	7.15
		Approximate Chi Square Value (0.05)	18.25
Adjusted Level of Significance	0.0301	Adjusted Chi Square Value	16.98

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50)	12.43	95% Adjusted Gamma UCL (use when n<50)	13.36

UCL Statistics for Uncensored Full Data Sets

User Selected Options	
Date/Time of Computation	ProUCL 5.11/6/2020 9:29:21 AM
From File	WorkSheet.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.953	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.866	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.144	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.234	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-0.462	Mean of logged Data	1.641
Maximum of Logged Data	3.045	SD of logged Data	0.998

Assuming Lognormal Distribution

95% H-UCL	19.27	90% Chebyshev (MVUE) UCL	15.27
95% Chebyshev (MVUE) UCL	18.54	97.5% Chebyshev (MVUE) UCL	23.07
99% Chebyshev (MVUE) UCL	31.98		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	10.67	95% Jackknife UCL	10.93
95% Standard Bootstrap UCL	10.47	95% Bootstrap-t UCL	12.04
95% Hall's Bootstrap UCL	12.35	95% Percentile Bootstrap UCL	10.77
95% BCA Bootstrap UCL	11		
90% Chebyshev(Mean, Sd) UCL	13.17	95% Chebyshev(Mean, Sd) UCL	15.67
97.5% Chebyshev(Mean, Sd) UCL	19.15	99% Chebyshev(Mean, Sd) UCL	25.98

Suggested UCL to Use

95% Adjusted Gamma UCL	13.36		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

UCL Statistics for Uncensored Full Data Sets

User Selected Options	
Date/Time of Computation	ProUCL 5.11/6/2020 9:30:07 AM
From File	WorkSheet.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Thallium (mg/kg)

General Statistics

Total Number of Observations	13	Number of Distinct Observations	13
		Number of Missing Observations	0
Minimum	0.13	Mean	1.516
Maximum	8.5	Median	0.94
SD	2.137	Std. Error of Mean	0.593
Coefficient of Variation	1.409	Skewness	3.38

Normal GOF Test

Shapiro Wilk Test Statistic	0.493	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.866	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.389	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.234	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	2.572	95% Adjusted-CLT UCL (Chen-1995)	3.085
		95% Modified-t UCL (Johnson-1978)	2.665

Gamma GOF Test

A-D Test Statistic	1.233	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.754	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.261	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.242	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	1.254	k star (bias corrected MLE)	1.016
Theta hat (MLE)	1.209	Theta star (bias corrected MLE)	1.492
nu hat (MLE)	32.61	nu star (bias corrected)	26.42
MLE Mean (bias corrected)	1.516	MLE Sd (bias corrected)	1.504
		Approximate Chi Square Value (0.05)	15.7
Adjusted Level of Significance	0.0301	Adjusted Chi Square Value	14.53

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	2.551	95% Adjusted Gamma UCL (use when n<50)	2.756

UCL Statistics for Uncensored Full Data Sets

User Selected Options	
Date/Time of Computation	ProUCL 5.11/6/2020 9:30:07 AM
From File	WorkSheet.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.876	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.866	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.191	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.234	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-2.04	Mean of logged Data	-0.0327
Maximum of Logged Data	2.14	SD of logged Data	0.911

Assuming Lognormal Distribution

95% H-UCL	2.98	90% Chebyshev (MVUE) UCL	2.545
95% Chebyshev (MVUE) UCL	3.061	97.5% Chebyshev (MVUE) UCL	3.777
99% Chebyshev (MVUE) UCL	5.184		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	2.491	95% Jackknife UCL	2.572
95% Standard Bootstrap UCL	2.462	95% Bootstrap-t UCL	5.813
95% Hall's Bootstrap UCL	6.885	95% Percentile Bootstrap UCL	2.68
95% BCA Bootstrap UCL	3.258		
90% Chebyshev(Mean, Sd) UCL	3.294	95% Chebyshev(Mean, Sd) UCL	4.1
97.5% Chebyshev(Mean, Sd) UCL	5.217	99% Chebyshev(Mean, Sd) UCL	7.413

Suggested UCL to Use

95% H-UCL	2.98		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

ProUCL computes and outputs H-statistic based UCLs for historical reasons only.

H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.

It is therefore recommended to avoid the use of H-statistic based 95% UCLs.

Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.

Appendix E
eDATpro

about GHD

GHD is one of the world's leading professional services companies operating in the global markets of water, energy and resources, environment, property and buildings, and transportation. We provide engineering, environmental, and construction services to private and public sector clients.

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