ATTACHMENT 59

Facility Monitoring Plan - Landfill and Waste Transfer Station

Rev 1
April 24, 2026

CITY OF IQALUIT

Facility Monitoring Plan

Landfill and Waste Transfer Station

December 2020 – 19-9543

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Acronyms, Abbreviations, Definitions

– B –

BTEX, *benzene, toluene, ethylbenzene and xylenes*

– C –

C&D, *Construction and Demolition*
CALA, *Canadian Association of Laboratory Accreditation Inc.*
CCME, *Canadian Council of the Ministers of the Environment*
CSedQG, *Canadian Sediment Quality Guideline*
CSQG, *Canadian Soil Quality Guideline*
CWS, *Canada Wide Standards*
CWQG, *Canadian Water Quality Guideline*

– D –

DGPS, *Differential global positional system*
Dillon, *Dillon Consulting Limited*
DO*, Dissolved Oxygen*

– E –

EQGs, *Environmental Quality Guidelines*
EXP, *EXP Services Inc.*

– F –

FMP, *Facility Monitoring Program*

– L –

LTM, *Long-Term Monitoring*

– M –

MDL, *Method Detection Limit*

– N –

NWB, *Nunavut Water Board*
NWNSRTA, *The Nunavut Waters and Nunavut Surface Rights Tribunal Act*

– O –

ORP, *oxidation reduction potential*

– P –

PAHs, *polycyclic aromatic hydrocarbons*

PHCs, *petroleum hydrocarbons*

– Q –

QA/QC, *Quality Assurance/Quality Control*

– R –

RDL, *Reportable Detection Limit*

RPD, *Relative Percent Difference*

– S –

SCC, *Standards Council of Canada*

– T –

TDS, *total dissolved solids*

– V –

VOCs, *volatile organic compounds*

VSECs, *Valued Species of Environmental Concern*

– W –

WTS, *Waste Transfer Station*

1.0 Introduction

Dillon Consulting Limited (Dillon) was retained by the City of Iqaluit (the City) to prepare a Facility Monitoring Program (FMP) for the City's new solid waste management facility – incorporating requirements for the waste transfer station (WTS), landfill access road and new landfill (referred to as the Landfill).

The goal of the FMP is to evaluate and identify present and future potential risks to human health and the environment from the site conditions during WTS and landfill operations.

1.1 Regulatory Framework

In Nunavut, there are several acts and regulations applicable to waste management. The primary legislation governing waste management in Nunavut is *The Nunavut Waters and Nunavut Surface Rights Tribunal Act* (NWNSRTA), which establishes the Nunavut Water Board (NWB). A summary of the regulations, acts, legislation and guidelines relating to the construction and operation of the Landfill and WTS are presented in **Table 1-1**.

Table 1-1: Applicable Regulations, Acts, Guidelines and By-Laws

Regulation/Act/Guideline/Bylaw	Source
Building Bylaw #710	City of Iqaluit
Highway Traffic Bylaw #319	City of Iqaluit
Civic Holiday Bylaw #735	City of Iqaluit
Noise Bylaw #599	City of Iqaluit
Solid Waste Amendment By-Law #544	City of Iqaluit
Solid Waste By-Law #341	City of Iqaluit
Solid Waste By-Law Amendment #830	City of Iqaluit
Nunavut Waters and Nunavut Surface Rights Tribunal Act	Government of Canada
Water License Terms and Conditions	Government of Nunavut
Nunavut Environmental Protection Act	Government of Nunavut
Nunavut Public Health Act and General Sanitation Regulations	Government of Nunavut
Nunavut Wildlife Act	Government of Nunavut
Motor Vehicle Act	Government of Nunavut
Contingency Planning and Spill Reporting in Nunavut	Government of Nunavut
Waste Lead and Lead Paint (2014)	Government of Nunavut
Pesticide Regulations	Government of Nunavut
Biomedical and Pharmaceutical Waste	Government of Nunavut
Used Oil and Waste Fuel	Government of Nunavut

Regulation/Act/Guideline/Bylaw	Source
A Guide to Spill Contingency Planning and Reporting	Government of Nunavut
Waste Batteries (2011)	Government of Nunavut
Waste Solvent (2011)	Government of Nunavut
Waste Paint (2010)	Government of Nunavut
Waste Asbestos (2011)	Government of Nunavut
Waste Antifreeze (2011)	Government of Nunavut
Ozone Depleting Substances (2011)	Government of Nunavut
General Management of Hazardous Wastes (2010)	Government of Nunavut
Dust Suppression	Government of Nunavut
Ambient Air Quality (2011)	Government of Nunavut
Environmental Guideline for Used Oil and Waste Fuel	Government of Nunavut

1.1.1 Nunavut Regulatory Context and Water License Requirements

Water licenses and their terms and conditions are the primary means through which municipal solid waste facilities are regulated in Nunavut. The primary goal of a water license is to ensure that contaminants from solid waste disposal sites do not enter watercourses or water bodies. The most relevant Federal and Territorial legislation, applicable to solid waste management in Nunavut are detailed below:

The Solid Waste Management Plan (Government of Nunavut, 2014) outlines the key sections of the NWNSRTA that relate to waste management in Nunavut which include:

- Section 12, which states that no person shall deposit or permit the deposit of waste in waters in Nunavut or any other place in Nunavut under conditions which the waste (or any other waste that results from the deposit of that waste), may enter waters in Nunavut except under the conditions of a license;
- Section 14 to 34, which established and describe the NWB, including the size of the NWB, the position of the NWB and their responsibilities and various rules regarding the NWB's organization structure and governance;
- Sections 42 to 81, which describes the rules governing the issuing of licenses by the NWB. Topics addressed by the sections include the maximum term for a license, application requirements, the application procedure, including when a public hearing is and is not required, conditions under which the Board may issue a license, the ability of the Board to include conditions and monitoring requirements in the license, and the requirement of the public sector; and
- Sections 85 to 94, which address enforcement of the NWNSRTA. In particular, Section 86 provides inspectors with the authority to examine works or take samples when they have reasonable ground to believe waste is entering waters and to examine any relevant documents or records. Section 87 provides inspectors with the authority to order those in charge of the wastes to take remedial

measures to remedy those situations. Section 90 to 94 addresses offences and punishments, including terms for fines and imprisonment.

Examples of typical water license terms and conditions, as they relate to solid waste management include:

- Conditions for an effluent monitoring program, including sampling locations, frequencies and parameters;
- Post of signage for the monitoring program;
- Requirements for submitting copies of studies, reports and plans to the NWB, including:
  - Operations and Maintenance manuals;
  - Construction design and drawings, including as-built; and
  - Abandonment and restoration plans.
- The disposal of and permanent containment of all solid wastes at the solid waste disposal facilities;
- The segregation and storing of all hazardous materials and hazardous waste within the solid waste disposal facilities in a manner to prevent the deposit of deleterious substances into water, until such a time that the materials can be removed for proper disposal at a licensed facility;
- The implementation of measures to ensure leachate from solid waste disposal facilities and hazardous storage areas do not enter water; and
- Annual reports that summarize:
  - Water monitoring results; modifications or major maintenance work carried out on waste disposal facilities, unauthorized discharges and follow-up actions;
  - Abandonment and restoration work recently completed or planned;
  - Updates to operation and maintenance manuals; relevant studies; and
  - Other details requested by the NWB.

Water licenses for solid waste facilities are required to be renewed before they expire. If an Operator's water license expires before it can be renewed, the operator is required to discontinue using the solid waste facility, as well as any water covered by the water license. Otherwise, the Operator will be in contravention of the Nunavut Land Claims Agreement and the NWNSRTA. The expiry of the license does not relieve the City of its obligations imposed by the license.

The WTS and Landfill will be obligated to follow the conditions outlined in their water license, which has not been received to date.

1.1.2 Contaminated Sites Management

The Government of Nunavut Department of Environment Guideline for the Management of Contaminated Sites (revised December 2014) has adopted the federal CCME guidelines for the management of contaminated sites within its jurisdiction.

The federal environmental quality guidelines (EQGs) were developed based on the level of risk a contaminant poses to human health and/or the environment. Soil guidelines are characterized by texture (i.e., fine/coarse). Soil texture at the site is considered to be coarse, with >50% particle sizes greater than 75 µm. The soil EQGs are also categorized by land use (i.e., agricultural/wildland, residential/parkland, commercial and industrial). The WTS and Landfill are both characterized under the industrial land use. The industrial land use criteria will be used as screening values to evaluate potential risk to human health and environment at the waste transfer station, as the surrounding land use is also considered to be industrial land use. The wildland screening values will be used at the Landfill, as the surrounding land use is wildlands, and sampling locations are either located at the property boundary or outside of the property boundary. The specific guidelines that will be used to evaluate potential impacts to surface water, sediment and soil include the following:

- Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health (CSQGs), (CCME, 1999 with updates);
- Canada-Wide Standards for Petroleum Hydrocarbons in Soil (CWS-PHC), (CCME, 2008);
- Canadian Soil Quality Guidelines Polycyclic Aromatic Hydrocarbons fact sheet (CCME, 2010;
- Canadian Environmental Guidelines. Canadian Sediment Quality Guidelines (CSedQG) for the Protection of Aquatic Life (CCME, 2007, with updates); and
- Canadian Environmental Quality Guidelines. Canadian Water Quality Guidelines (CWQG) for the Protection of Aquatic Life (CCME, 2007, with updates).

Active layer groundwater results will be compared to the surface water quality guidelines, as the applicable exposure and migration pathways for this intermittent migration pathway are surface water receptors. Overland flow is the primary mode of water transport in the area. Active layer groundwater is not used as a drinking water source in Iqaluit, NU. The site lies within the continuous permafrost zone.

Given the distance to the nearest marine receptor with no direct, major tributary, guidelines that are protective of freshwater aquatic life are considered applicable.

Where background parameters were observed to exceed the federal EQGs (i.e., based on the findings from the baseline reporting, or other applicable geochemical datasets for the region), the elevated background parameter value measured concentrations will be used as the screening value threshold.

2.0 Background

2.1 Site Overview and Location

The solid waste transfer station (WTS) is located within the urban area of the City of Iqaluit (City), where residential and commercial waste will be hauled to, processed and compacted into bales or in the case of waste food and cardboard, shredded for use as a fuel source for an on-site biomass boiler. Wood, furniture and select construction and demolition (C&D) wastes will also be shredded for landfilling. The resulting solid waste bales and a smaller amount of unbaled C&D waste will be trucked to an engineered balefill/landfill site (Landfill) located approximately 6 km from the WTS. The vehicles transferring the waste bales will access the road leading to the Landfill from the WTS, to avoid having the transfer vehicle travel through the City.

Other planned features for the WTS include a public drop off area for household hazardous wastes (HHW) and a vehicle logger/compactor unit; in both instances, allowing for the preparations of waste materials prior to shipping to approved management facilities in the south.

Development of the proposed facilities is scheduled to commence in 2020, with facility commissioning occurring in the fall of 2022.

Site Plans for the WTS and Landfill are shown respectively in **Figure 1** and **Figure 2** (attached).

2.2 Climate

Climate Normals data for period 1971 to 2000 and 1981 to 2010 of the Iqaluit weather station show the following:

Table 2-1: Climate Normals Data (1971 to 2000) Iqaluit, NU

Time Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1971 to 2000	-26.6	-28.0	-23.7	-14.8	-4.4	3.6	7.7	6.8	2.2	-4.9	-12.8	-22.7
1981 to 2010	-26.9	-27.5	-23.2	-14.2	-4.4	3.6	8.2	7.1	2.6	-3.7	-12.0	-21.3

When comparing the two data periods it shows that the mean annual air temperature increased from -9.8 °C to -9.3 °C, the mean summer air temperature increased from 5.1 °C to 5.4 °C, and the mean winter air temperature increased from -17.2 °C to -16.6 °C.

2.3 Ecological Characterization of the Site

A physical and biological assessment was conducted by EXP Services Inc. (EXP) for the City of Iqaluit in 2018 for the Landfill location. The ecological characterization for the Landfill location is assumed to be adequate for the waste transfer station, which is located within the City of Iqaluit limits.

No confirmed species at risk were recorded on or adjacent to the proposed facility location. In general, the area is characterized by a combination of bare rocky outcrops, grasses and lichens.

Identified potential habitat and breeding areas include the following:

- Identified potential habitat for Lemming, which plays an important ecological role that influences predator populations including Arctic Fox, Ermine, and Snowy Owl. A detailed inventory of potential wildlife species was not conducted for the site;
- Rock outcrops in proximity to the east boundary of the property provide suitable nesting habitat for Peregrine Falcon. The Peregrine Falcon is listed as Special Concern in Schedule 1 of the Species at Risk Act (SARA). Breeding bird surveys for Peregrine and other arctic birds has been recommended and results are pending;
- Evidence for past use by Barren-ground Caribou was observed at the Landfill location. While Caribou herds have not been observed in the Iqaluit region for several decades, there is the potential for population fluctuation and migration pattern change. Potential loss and impacts to Caribou habitat should be evaluated;
- The surface water body to the west of the Landfill has been anecdotally noted to contain Arctic Char and other fish species; and
- Surface water on the Site drains into Carney Creek, which then flows into Frobisher Bay. Frobisher Bay and connecting inland waters have been identified as important habitat for Arctic Char (considered to be Valued Species of Environmental Concern – VSECs)

2.4 Baseline Conditions

A baseline conditions assessment of the WTS and the Landfill was conducted by Dillon for the City of Iqaluit in 2019. Soil results from EXP's 2018 physical and biological assessment of the Landfill location were used for the baseline condition assessment of the Landfill.

Soil and/or groundwater investigations were conducted by Dillon at the proposed WTS and Landfill locations in July and September 2019, respectively. At the WTS, five drive-point monitoring wells were installed, four of which into test pit excavations and one by manual means. Sixteen surface soil samples were collected from various APECs across the WTS area. Groundwater samples were collected from newly installed monitoring wells hosting groundwater. Surface water sampling was conducted at a watercourse running adjacent to the WTS boundaries to the north, northeast and east. At the Landfill, five existing monitoring wells and three nearby surface water bodies were sampled. Soil, groundwater,

and surface water samples were submitted to Bureau Veritas for laboratory analysis of benzene, toluene, ethylbenzene and groundwater (BTEX), petroleum hydrocarbons (PHCs), polycyclic aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs), glycols, and, per-and poly-fluorinated alkyl substances (PFAS).

The 2019 (Dillon Consulting Limited) baseline conditions assessment report is attached as **Appendix A**. Summaries of the relevant findings for the WTS and Landfill are provided in the following sections.

The 2018 Physical and Environmental Assessment is attached as **Appendix B**. Summaries of the relevant findings for the Landfill are provided below in **Section 2.4.2**.

2.4.1 Waste Transfer Station

On July 16 and 17, 2019, Dillon conducted shallow soil sampling at the WTS. Three areas were targeted: The Fire Fighting Training Area (FFTA) and two City yards, one northwest of the FFTA and one south of the FFTA. Soil samples were collected from two test pits and sixteen surface locations within the proposed WTS boundaries. Surface soil sample locations were selected based on potential for environmental impact resulting from current and/or former materials storage, operations, or other activities. At the WTS, soil results indicated PHC F3 and select PAHs exceeded referenced guidelines in 2019. Impacts were observed across the WTS area, including the FFTA and City yards.

Groundwater samples were collected at monitoring wells 19MW-02, 19MW-03 and 19MW-04 in July 2019. Depth to groundwater ranged from 1.21 m below top of casing (m btoc) to 2.28 m btoc. Groundwater flow direction could not be determined as no survey of the well network was conducted. No measurable LNAPL was recorded in any of the monitoring wells in July 2019. Results for groundwater sampling indicated select PAH and PFAS compounds, as well as dissolved copper, exceeded referenced guidelines from the City yards and boundaries of the FFTA.

Surface water samples were also collected from three locations along the adjacent watercourse in July 2019. Surface water results were below the applicable guidelines.

WTS soil and groundwater analytical results appear to be the result of historical operations, activities, and chemical or debris storage in this area.

2.4.2 Landfill

Nine shallow soil samples were collected by EXP from across the Landfill location and submitted for laboratory analyses of metals and inorganics, PHCs, VOCs, and PAHs (EXP, 2018). No exceedances, except low pH (4.07 to 5.69), were identified for the location.

Five previously existing monitoring wells (W-107 to W-111) were monitored and sampled on September 5 to 6, 2019. Groundwater samples were collected by Dillon at monitoring wells W-107 to W-111 in

September 2019. Recharge rates were noted to be slow. Dissolved and total metals, nitrite (as N) and sulphate concentrations in groundwater were observed to exceed the referenced guidelines for one or more parameters at each monitoring well location.

Surface water samples were collected from three locations (WS-100 to WS-102) from nearby water bodies in September 2019. Surface water results were below the applicable guidelines.

The Landfill groundwater results, while exceeding referenced guidelines, are considered to be representative of background geological conditions: elevated concentrations in soil and surrounding bedrock, and limited buffering capacity in the surrounding geological materials (as indicated by low pH observed in soils).

3.0 Monitoring Plan

There are three identified stages during landfill operation: construction, operation and maintenance and post-closure. Monitoring programs will differ in frequency and focus depending on the stage of the landfill. The monitoring program contained herein is intended for the operation and maintenance stage of the landfill. Long-Term Monitoring (LTM) that will take place during the post-closure stage will include an emphasis on Visual Monitoring and Seepage Monitoring of the landfill isolation cover.

The following operational monitoring activities are recommended:

- Visual Monitoring;
- Soil Temperature Monitoring;
- Seepage Monitoring;
- Soil Sampling (if seepage is observed);
- Surface Water Monitoring;
- Sediment Sampling; and
- Natural Environmental Monitoring.

Seepage and soil sampling will be completed as required based on landfill performance, and are not viewed as necessary at this time for the waste transfer station. No thermistors have been installed at the WTS; therefore, soil temperature monitoring will be conducted at the landfill only.

Any field equipment employed should be maintained, calibrated, and used per manufacturer's requirements, and industry best practices.

Field procedures and methodologies should be conducted in accordance with industry standards and/or best practices (e.g., the Guidance Manual for Environmental Site Characterization in Support of Environmental and Human Health Risk Assessment by the CCME, 2016).

3.1 Visual Monitoring

Visual monitoring documents information on the condition of the daily cover, associated berms, culverts, site activities (changes from year to year) and site drainage. Observations should be documented with photographs. Photograph locations will be established in the first year of monitoring, and these will be used to monitor future changes. Additional photos documenting site activities and changes to the site will be taken.

3.1.1 Visual Monitoring Plan

The visual inspections will look for evidence of erosion, frost action, vegetation (changes including growth or stress), staining, seepage points, exposed debris, breeches, condition of monitoring instruments and conditions of any warning signage.

At the Landfill, regular visual inspections (i.e., weekly) will be conducted to check the physical integrity of the berms, leachate pond conditions, etc. while the landfill is in operation. Specifically, visual monitoring will be conducted during and following spring freshet and major rainfall events (i.e., greater than 10 mm rainfall within a 24-hour period).

A complete inspection of the leachate collection system elements (manhole, pump, hosing and holding ponds) shall be conducted on an annual basis.

Photographs will be taken to document the condition and substantiate the recorded observations. Pre-determined photograph locations will be established in the first year of monitoring, and these will be used to monitor future changes. At a minimum, photographs should be taken from each of these locations during each monitoring event.

Observations will be recorded, including dimensions and location of each feature and its extent using a differential global positional system (DGPS) unit, noting significant changes.

3.2 Soil Temperature Monitoring

Soil temperature monitoring documents the changing climatic conditions that may impact the integrity of the facility. Seasonal effects and annual trends will be collected and compared over the years to the initial design assumptions regarding permafrost depth and active layer variable thickness.

3.2.1 Soil Temperature Monitoring Plan

Data will be retrieved from each of the data logger stations installed at the Landfill (or retrieved by manual methods, monthly). Once the data is retrieved and confirmed to be retrieved by a second party, the memory of the logger may be deleted to make space for the following years' measurements. Additional manual readings will be taken from each of the four thermistor strings that were installed at the landfill facility, as shown in Error! Reference source not found. (attached).

The readings will be placed into a spreadsheet that converts the voltage readings to ^{o}C. The data will be compared with the anticipated design maximum and minimum assumptions for the facility location. Specifically, anticipated permafrost depth and active layer thickness will be recorded and compared to design assumptions. The data will be presented in a graph in the annual report.

Soil temperature monitoring locations are shown in **Table 3-1**.

Table 3-1: Soil Temperature Monitoring Locations

Facility	Monitoring Station ID	Node #	Node Depth (mbgs)	Easting (UTM83)	Northing (UTM83)
Landfill	T-107	1	+1.3	521118.485	7076084.874
		2	+0.8		
		3	0.3		
		4	0.8		
		5	1.3		
		6	1.8		
		7	2.3		
		8	2.8		
		9	3.3		
		10	3.8		
		11	4.3		
		12	4.8		
		13	5.3		
		14	5.8		
		15	6.3		
		16	6.8		
Landfill	T-108	1	+1.0	520951.525	7075784.502
		2	+0.5		
		3	0.0		
		4	0.5		
		5	1.5		
		6	2.0		
		7	2.5		
		8	3.0		
		9	3.5		
		10	4.0		
		11	4.5		
		12	5.0		
		13	5.5		
		14	6.0		
		15	6.5		
		16	7.0		
Landfill	T-109	1	+1.8	520669.000	7076311.199
		2	+1.3		
		3	+0.7		
		4	+0.2		

Facility	Monitoring Station ID	Node #	Node Depth (mbgs)	Easting (UTM83)	Northing (UTM83)
		5	0.3		
		6	1.2		
		7	1.7		
		8	2.2		
		9	2.7		
		10	3.2		
		11	3.7		
		12	4.2		
		13	4.7		
		14	5.2		
		15	5.7		
		16	6.2		
Landfill	T-110	1	+1.5	520760.676	7076653.9
		2	+1.0		
		3	+0.5		
		4	0.0		
		5	0.5		
		6	1.0		
		7	1.5		
		8	2.0		
		9	2.5		
		10	3.0		
		11	3.5		
		12	4.0		
		13	4.5		
		14	5.0		
		15	5.5		
		16	6.0		
Landfill	T-111	1	+2.0	521441.000	7076739.000
		2	+1.5		
		3	+1.0		
		4	+0.5		
		5	0.0		
		6	0.5		
		7	1.0		
		8	1.5		
		9	2.0		

Facility	Monitoring Station ID	Node #	Node Depth (mbgs)	Easting (UTM83)	Northing (UTM83)
		10	2.5		
		11	3.0		
		12	3.5		
		13	4.0		
		14	4.5		
		15	5.0		
		16	5.5		

Notes:
mbgs denotes metres below ground surface
"+" in front of a depth denotes above ground surface (i.e., +2.0 denotes 2.0 metres above ground surface)

3.3 Seepage Monitoring

Observed areas for potential seepage identified along the berms will be noted during the Visual Inspection. Water that contacts unfrozen landfill waste may become acidic and contain elevated concentrations of constituents (e.g., metals). Seepage monitoring, in combination with visual inspections, will assist in identifying whether containment measures are sufficient, or whether corrective action is required.

3.3.1 Seepage Monitoring Plan

Potential observe areas of seepage on the surface and edges of the berms will be noted during the Visual Inspection. As the berms are to be constructed as part of a geomembrane-lined landfill, seepage is limited to springs along uncapped slopes. Seepage along the berms is not anticipated. If seepage is identified, seepage samples will be collected (where sufficient volume exists) and analyzed for:

- Field parameters including pH, conductivity, temperature;
- Petroleum Hydrocarbons (PHCs) Fractions F1 to F4, including benzene, toluene, ethylbenzene and xylenes (BTEX);
- Total metals;
- Polycyclic Aromatic Hydrocarbons (PAHs); and
- Major ions, hardness, total dissolved solids, total suspended solids.

The results will be compared to baseline sample concentrations, as well as the applicable License requirements (Section 3.10) and CCME guidelines (Section 1.1.2). Soil may also be collected at any potential seepage point as per **Section 3.4**. Results will be reported summarized and tabulated in the annual report to the City.

3.4 Soil Sampling

Soil sampling would be conducted on an as-needed basis in the event of observed seepage at the landfill, and or based on site activities and observations at the waste transfer station.

When soil samples are retrieved, the results will be compared to baseline sample concentrations and CCME guidelines (**Section 1.1.2**). Results will be reported summarized and tabulated in the annual report to the City.

3.4.1 Surface Water Monitoring Plan

Surface water sampling will be conducted at pre-determined surface water sampling stations that have been identified below in **Table 3-2** and are shown in **Figure 1** and **Figure 2**. These sampling stations correspond with the sampling stations established during the baseline monitoring.

During the landfill operation stage, each station will be monitored monthly for field parameters including pH, temperature, conductivity, Dissolved Oxygen (DO) and turbidity using a field-calibrated multi-meter (e.g., YSI ProDSS Multi-parameter Water Quality Meter). Equipment calibration and operation should be conducted following the manufacturer's recommendations and/or specifications.

In addition to monthly monitoring for field parameters, surface water sampling during the twice-annual FMP will be analysed for:

- Field parameters as described above;
- PHCs Fractions F1 to F4, including BTEX;
- Total Metals;
- PAHs;
- Phenols; and,
- Major ions, hardness, total dissolved solids, total suspended solids.

Analytical results will be compared to baseline sample concentrations, applicable license requirements, and, the Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guidelines (CWQGs), for the protection of freshwater aquatic life.

Surface water monitoring locations are shown below in **Table 3-2.**

Table 3-2: Surface Water Monitoring Locations

Facility	Monitoring Station ID	Easting (UTM83)	Northing (UTM83)	Monitoring Type	Monitoring Frequency
WTS	SW1	522504.900	7070955.410	Field measurements	Monthly
				Field measurements + surface water samples	Twice per year
	SW2	522582.950	7070828.940	Field measurements	Monthly
				Field measurements + surface water samples	Twice per year
	SW3	522652.770	7070728.700	Field measurements	Monthly
				Field measurements + surface water samples	Twice per year
Landfill	WS-100	521440.475	7076184.088	Field measurements	Monthly
				Field measurements + surface water samples	Twice per year
	WS-101	520238.151	7076753.751	Field measurements	Monthly
				Field measurements + surface water samples	Twice per year
	WS-102	520353.135	7076116.866	Field measurements	Monthly
				Field measurements + surface water samples	Twice per year
	WS-103 (leachate discharge point)	TBD	TBD	Field measurements	None
				Field measurements + surface water samples	Twice per year (to characterize) and, upon discharge.

Notes:
TBD denotes To Be Determined, i.e., location to be established upon final design/construction. Approximate location shown in **Figure 2**.

The results will be compared to baseline sample concentrations, as well as the applicable License requirements (**Section 3.10**) and CCME guidelines (**Section 1.1.2**). Results will be reported summarized and tabulated in the annual report to the City.

3.5 Sediment Samplings

The natural drainage at both sites is influenced by the bedrock structure. Sediment samples are not a part of the facility monitoring program but may be introduced upon site closure or to whether surface water sample concentrations warrant further investigation. Sampling locations will correspond with surface water monitoring locations. Analysed samples will be compared to baseline/background samples, as well as the applicable CCME guidelines (**Section 1.1.2**). Results will be reported, summarized and tabulated in the annual report to the City.

3.6 Active Layer Groundwater Monitoring

Active Layer Groundwater sampling will be conducted at pre-determined groundwater sampling stations that have been identified, and are presented below in **Table 3-3** and are shown on **Figure 1** and **Figure 2.** These sample stations correspond with the sampling stations established during the baseline monitoring.

During the landfill operation stage, each station will be monitored monthly for field parameters, including pH, temperature, conductivity, Dissolved Oxygen (DO) and turbidity using a field-calibrated multi-meter. It is anticipated that these monthly sampling events will be limited to months when the active layer is thawed and groundwater is available (i.e., June to September).

In addition to monthly monitoring for field parameters, groundwater sampling during the twice-annual FMP will be analysed for:

- Field parameters as described above;
- PHCs Fractions F1 to F4, including BTEX;
- Total metals;
- Dissolved metals;
- PFAS (WTS only)
- PAHs; and,
- Dissolved major ions (including alkalinity), hardness, total dissolved solids and total suspended solids.

Analysed samples will be compared to baseline/background samples, applicable License requirements, as well as the applicable CCME guidelines (**Section 1.1.2**). Results will be reported, summarized and tabulated in the annual report to the City.

Groundwater monitoring locations are shown below in **Table 3-3.**

Table 3-3: Groundwater Monitoring Locations

Facility	Monitoring Station ID	Easting (UTM83)	Northing (UTM83)	Monitoring Type	Monitoring Frequency
WTS	19MW-01	522597.930	7070755.780	Field measurements	Monthly
				Field measurements + surface water samples	Twice per year
	19MW-02	522541.680	7070812.280	Field measurements	Monthly
				Field measurements + surface water samples	Twice per year
	19MW-03	522945.780	7070726.690	Field measurements	Monthly
				Field measurements + surface water samples	Twice per year
	19MW-04	522477.550	7070799.770	Field measurements	Monthly
				Field measurements + surface water samples	Twice per year
	19MW-05	522493.750	7070873.090	Field measurements	Monthly
				Field measurements + surface water samples	Twice per year
Landfill	W-107	521118.485	7076109.874	Field measurements	Monthly
				Field measurements + surface water samples	Twice per year
	W-108	520951.525	7075809.502	Field measurements	Monthly
				Field measurements + surface water samples	Twice per year
	W-109	520669.000	7076331.199	Field measurements	Monthly
				Field measurements + surface water samples	Twice per year
	W-110	520760.676	7076678.900	Field measurements	Monthly
				Field measurements + surface water samples	Twice per year
	W-111	521441.000	7076739.000	Field measurements	Monthly
				Field measurements + surface water samples	Twice per year

3.7 Natural Environment Monitoring

Natural environment data will be collected as part of the facility monitoring program for both the WTS and the Landfill. This will include the following:

- Observations of animal usage at the site (i.e., direct observations, tracks, feces, etc.); and,
- Discussions with locals knowledgeable with the site regarding site usage.

A more detailed natural environment monitoring plan will be developed for the LTM upon site closure.

3.8 Effluent Discharge Limits

No direct discharge of effluent is anticipated to occur with currently planned site activities. Should seepage be identified or discharge events occur, the sample results will be compared against water quality criteria as defined under the Licence. As of March 2020, the City has elected to move forward with collection, containment, and characterization of the leachate during initial operation of the landfill. Preferable treatment methodologies will then be based upon the volume of leachate generated and chemical characteristics of the leachate under regular operating conditions.

As leachate is generated and pumped to the new holding lagoons, it is recommended that weekly sampling be undertaken for the first month, switching to monthly sampling afterwards. If the quality varies significantly, more frequent sampling should be undertaken to properly identify the raw leachate quality. The parameters that should be examined (at a minimum) are:

- cBOD;
- BOD;
- COD;
- TSS;
- TKN;
- TP;
- pH;
- Temperature;
- Total chlorine;
- Unionized ammonia;
- Total ammonia;
- Oil and grease;
- Total dissolved metals;
- Total metals;
- Total phenols;
- Total coliforms; and
- Fecal coliforms.

Should it be determined that storage volumes within the ponds are nearing design capacity, the City, in consultation with the Nunavut Water Board, will access contingency actions which may include transporting quantities of effluent via pumper truck from the site to either the West 40 landfill (e.g., controlled discharge through the existing waste mass) or the City's WWTP. The City WWTP (designed in 2016 and commissioned in 2019) was intended for processing organic loading, namely BOD and TSS;based on typical leachate quality, this has a risk of upsetting the plant. Given the risk of treatment upset at the WWTP, leachate quality should be assessed and formally approved for receiving by the WWTP operator prior to transfer.

As secondary contingency (to be implemented only with the approval of NWB), a valved discharge manhole at the second storage pond will allow for the controlled release of effluent to a gravel bed diffuser. The implementation of the secondary contingency measure will necessitate additional surface water monitoring requirements at the Landfill site.

Table 3-4: Effluent Discharge limits as per the Water Licence

Parameter	Maximum Concentration of any Grab Sample (mg/L)
TBD	TBD
TBD	TBD
TBD	TBD
TBD	TBD
TBD	TBD

Notes:
TBD denotes To Be Determined

3.9 Quality Assurance and Control Plan

The data quality objectives for this site are to produce a data set that is representative, and consistent in methodologies between sampling periods. A quality assurance and quality control (QA/QC) plan has been developed to meet these objectives.

3.9.1 Soil/Sediment Samples

Samples will be collected from test pits or sediments manually excavated with hand tools (shovel and/or hand shovel) which will be decontaminated between locations using Alconox and distilled water. Field personnel will use a new pair of Nitrile gloves for each sample station. Each solid sample will be collected in laboratory supplied containers that are specific for their analyses (i.e., metals/inorganics plastic bag, methanol vials and jars for organics). Jars will be filled with soil such that no headspace remains in the jars. Samples collected for analysis of volatiles (i.e., VOCs and/or BTEX) will be collected in two 40 mL clear glass vials with methanol for preservation.

Soil sampling locations will be backfilled after the collection of soil samples. Sampling locations will be photographed during sampling and after backfilling is completed, and these photographs will be included in the photographic records (**Section3.1.1**).

3.9.2 Surface Water/Groundwater Samples

Surface water samples will be collected by dipping laboratory supplied containers with the appropriate preservative directly into the water body. Stirring up/contact with sediments is to be avoided to minimize introducing potential bias to the surface water samples. Surface water sampling will be conducted before sediment sampling.

Groundwater samples will be collected using the low flow technique (electric or manual pump) into clean, laboratory supplied containers. Due to the remote nature of the site and sampling locations, coupled with a potential for low productivity of groundwater in the monitoring wells, opportunistic sampling will be completed (as needed) following a limited purge. A limited purge of one bailer volume followed by sample collection provides a better chance of collecting a full suite of samples for lab analysis. Groundwater samples to be submitted for metals analysis will be field-filtered and preserved to maintain sample integrity.

Field personnel will use a new pair of nitrile gloves at each sampling station.

Field parameters to be monitored (both surface water and groundwater) using a calibrated multimeter include pH, temperature, conductivity, oxidation-reduction potential (ORP), dissolved oxygen (DO), and total dissolved solids (TDS). The field meter will be decontaminated between each sampling station using Alconox and water.

3.9.3 Quality Assurance/Quality Control

A field quality assurance/quality control (QA/QC) program will be followed that is consistent with the CCME's Guidance Manual for Environmental Site Characterization in Support of Environmental and Human Health Risk assessment (CCME, 2016). The goal of QA/QC is to limit errors and bias in sampling and analysis through the implementation of management, assessment, and control measures.

Analytical laboratories should be accredited by either the Canadian Association of Laboratory Accreditation Inc. (CALA) and/or through the Standards Council of Canada (SCC). Mandated protocols for specific parameters (e.g., CCME PHC Fractions F1 to F4 as defined in the Canada-Wide Standard for Petroleum Hydrocarbons in Soil, CCME, 2008) should be followed as applicable.

Two types of QA/QC samples have been identified for this program: field duplicate and blank samples. Samples will be given sequential, alphanumerical coding prior to being submitted to the analytical laboratories. The coding will be used to mask information concerning site location, sample type, or possible concentrations in the samples.

3.9.3.1 Field Duplicate Samples

Field duplicates are where split samples or co-located samples are obtained in the field using the same sampling procedure and are submitted to the analytical laboratory "blind". These are used to assess sampling and analysis precision. The recommended frequency for field duplicates is 1 in 10 samples (i.e., 10%). The analytical laboratory will provide its own laboratory duplicate samples. The recommended frequency for laboratory duplicate samples is 1 in 20 samples (i.e., 20%).

The sampling and analytical precision will be evaluated by calculating the relative percent difference (RPD) for a sample and duplicate pair using the following equation:

RPD = |X1-X2| / ([X1+X2]/2) x 100

Where:
X1 is the parent sample concentration.
X2 is the duplicate sample concentration.

The calculated RPD for field duplicates will be compared against a value approximately 2 times that of the analytical laboratory's RPD criteria to account for the greater variability anticipated in field duplicate samples (as compared to laboratory duplicate samples). The calculated RPD will be method and analytical laboratory-specific, and the values to be used for each parameter group will be clearly defined in the summary reports.

RPDs cannot be calculated when either the parent or duplicate sample concentrations are below or near the analytical method detection limits (MDLs). RPDs can only be calculated when the concentrations detected in both the parent and duplicate sample are greater than five times the reportable detection limit (RDL) or MDL. Alternative criteria are proposed for evaluating the data when one or both of the results is less than the RDL or MDL and is adapted from Zeiner (1994). When both concentrations are below the RDL or MDL, no calculation/evaluation criteria is required. A summary of the different scenarios is provided in **Table 3-5.**

Table 3-5: Criteria for the Evaluation of Duplicate Sample Results

Scenario	X1	X2	Criteria for Acceptance (Soil/Sediment)	Criteria for Acceptance (Water)
1	Non-detect	Non-detect	Acceptable precision, no evaluation required	
2	Non-detect	Detect	X2 – (0.5xMDL) < 2xMDL	X2 – (0.5xMD)L < MDL
3	Value	Value	Calculated RPD < (parameter, analytical laboratory specific RPD)	Calculated RPD < (parameter, analytical laboratory specific RPD)
4	Value	Detect	|X2-X1| < 2 x MDL	|X2-X1| < MDL

Notes:
Non-detect denotes concentrations that are below the RDL/MDL.
Detect denotes concentrations that are above the RDL/MDL, but less than 5 x the RDL/MDL.
Value denotes concentrations that are greater than 5 x the RDL/MDL.
In Scenario D, when the result reported is less than half the quantitation limit, half the limit will be used in the equation.

3.9.3.2 Blank Samples

There are three types of blank samples: trip, equipment and field.

- **Trip Blanks:**
  - Where a clean sample of the matrix being analyzed is transported to and from the site unopened using the same container as the samples analyzed; used to assess whether cross-contamination occurred during sample transport and storage. The recommended frequency for

equipment blanks is 1 in 10 samples (i.e., 10%) being analyzed for volatile parameters (e.g., VOCs, BTEX, PAHs).

- **Equipment Blanks:**
  - Prepared in the field, where for example, contaminant-free water (distilled-deionized) or air is passed through a sampling device (e.g., pump and tubing); used to assess equipment decontamination procedures. The recommended frequency for equipment blanks is 1 in 10 samples (i.e., 10%).
- **Field Blanks:**
  - Which consist of a clean sample (e.g., distilled-deionized water) where the sample container is exposed to sampling conditions (i.e., cap removed) or where an ambient air sample is obtained; used to check for artifacts introduced by background conditions. The recommended frequency for equipment blanks is 1 in 10 samples (i.e., 10%) being analyzed for volatile parameters (e.g., VOCs, BTEX, PAHs).

4.0 Monitoring Schedule and Reporting

4.1 Schedule

During Landfill Operation, the recommended initial monitoring frequency will be semi-annual, capturing site information upon spring melt, and again in the late summer/early fall before freeze-up. When groundwater and surface water are accessible for monitoring, monthly surface water and groundwater field parameter measurements will be collected. At a minimum, monthly thermistor measurements will be retrieved from the Landfill.

A detailed LTM will be developed prior to site closure.

4.2 Reporting

4.2.1 Nunavut Water Board Annual Reporting

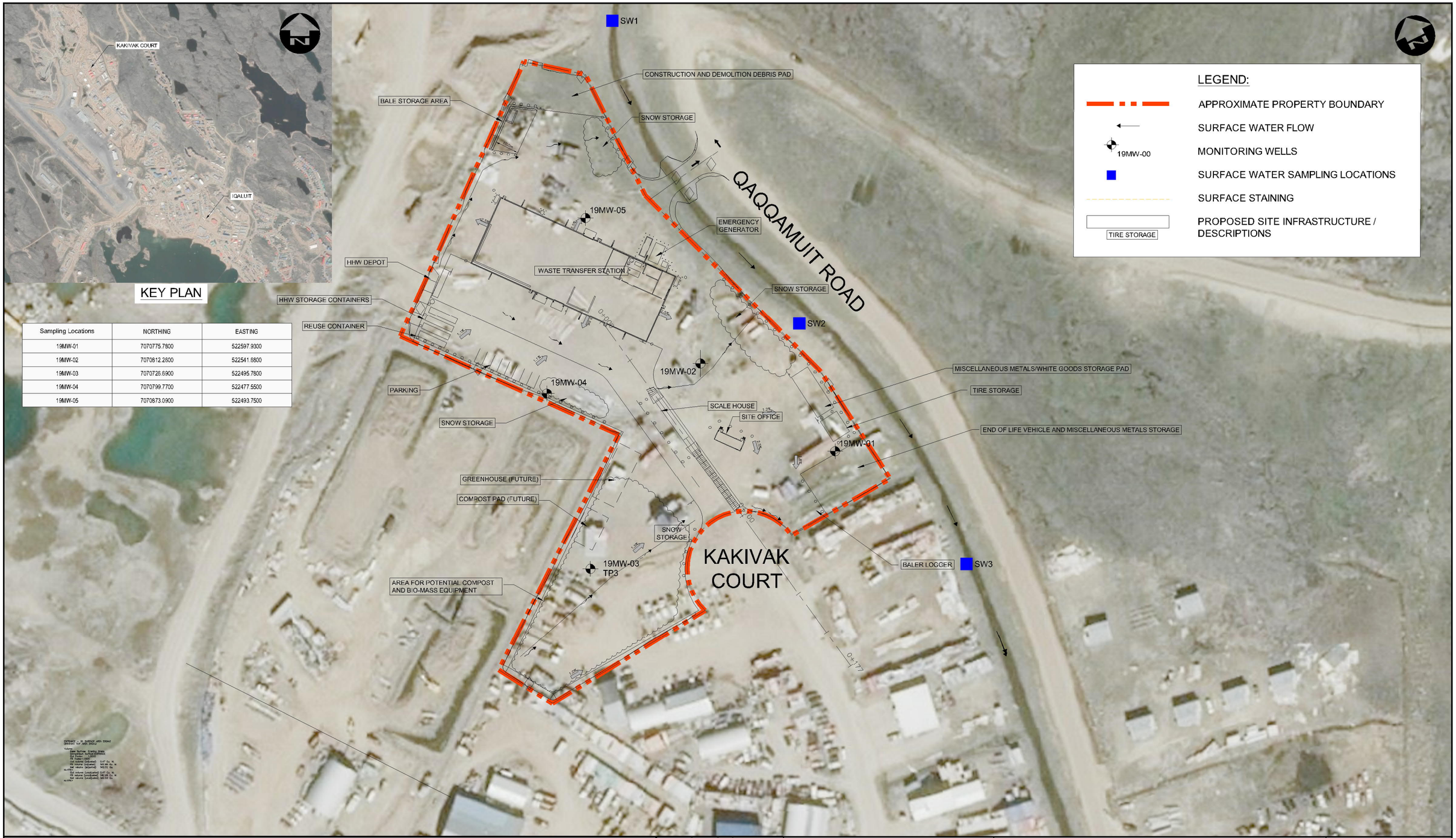
It is anticipated that annual reporting will be submitted to the Nunavut Water Board in accordance with the Water Licence. Items to be included in the report will be outlined in the Water Licence.

4.2.2 Facility Monitoring Reporting

Upon the completion of the semi-annual monitoring events, one Annual Facility Monitoring Report will be created as per contractual agreements between the City of Iqaluit and Dillon. The report will include:

- An executive summary describing the main observations, assessment and conclusion (visual inspection results, assessment and conclusions) and any items to be addressed during subsequent site visits;
- An outline of annual work program activities, including work objectives and scope of work, location map, site plan, timing of and weather conditions during field work, field staff and schedule, approach/methodology and equipment used for each monitoring component, and any deviations from the monitoring plan;
- Annotated drawings of the Landfill and WTS areas showing all visual inspection features, photograph viewpoints, chemical monitoring sample points and surface water flow directions;
- Analytical data from any chemical testing will be tabulated in excel format and presented;
- Formal laboratory certificates will be included as an appendix;
- A discussion and comparison of chemical data to both historical and background concentrations, as well as to the selected EQGs (Section 1.1.2);
- A discussion on QA/QC relative to the analytical results;
- An analysis of the overall performance of the Landfill and WTS areas, based on a combination of current and historical (when available) visual, geotechnical, and chemical values;
- Review concentrations and trends to evaluate future monitoring requirements; and,
- Recommendations for future action and conclusions.

Figures



KEY PLAN

Sampling Locations	NORTHING	EASTING
19MW-01	7070775.7800	522597.9300
19MW-02	7070812.2600	522541.6800
19MW-03	7070726.6900	522495.7800
19MW-04	7070799.7700	522477.5500
19MW-05	7070873.0900	522493.7500

Iqaluit

DILLON CONSULTING

DATE OCTOBER 2020

PROJECT **CITY OF IQALUIT**
FACILITY MONITORING PLAN

PROJECT NO. **19-9543**

TITLE **WASTE TRANSFER STATION**
PROPOSED FACILITY LAYOUT

FIGURE NO. **1**

FileName:c:\pw working directory\projects 2019\50dbc\dms2133819\9543-05-site-fig-01.dwg

Appendix A

Baseline Environmental Data Collection Report (Dillon Consulting Limited, 2019)

DILLON CONSULTING

CITY OF IQALUIT

Baseline Environmental Data Collection

Future Landfill and Waste Transfer Station

October 2019 | 19-9543

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Acronyms, Abbreviations, Definitions

– B –
BTEX, benzene, toluene, ethylbenzene and xylenes

– C –
C&D, Construction and Demolition
CALA, Canadian Association of Laboratory Accreditation Inc.
CCME, Canadian Council of the Ministers of the Environment
CSQG, Canadian Soil Quality Guideline
CWS, Canada Wide Standards
CWQG, Canadian Water Quality Guideline

– D –
DO, Dissolved Oxygen

– E –
EXP, EXP Services Inc.

– N –
NWB, Nunavut Water Board

– O –
ORP, oxidation reduction potential

– P –
PAHs, polycyclic aromatic hydrocarbons
PFAS, per- and polyfluoroalkyl substances
PHCs, petroleum hydrocarbons

– Q –
QA/QC, Quality Assurance/Quality Control

– R –
RDL, Reportable Detection Limit
RPD, Relative Percent Difference

– V –
VOCs, volatile organic compounds

– W –
WTS, Waste Transfer Station

Executive Summary

Soil and/or groundwater investigations were conducted at the proposed waste transfer station (WTS) and landfill site (Landfill) locations in July and September 2019, respectively. At the WTS, five drive-point monitoring wells were installed, four of which into test pit excavations and one by manual means. Sixteen surface soil samples were collected from various areas of potential environmental concern (APECs) across the WTS area. Groundwater samples were collected from newly installed monitoring wells hosting groundwater. Surface water sampling was conducted at a water course running adjacent to the WTS boundaries to the north, northeast and east. At the Landfill, five existing monitoring wells and three nearby surface water bodies were sampled. Soil and water samples were submitted to Bureau Veritas for laboratory analyses.

Waste Transfer Station

WTS soil results indicated petroleum hydrocarbon (PHC) F3 and select polycyclic aromatic hydrocarbons (PAHs) exceeded referenced guidelines in 2019. Impacts were observed across the WTS area, including the Fire Fighting Training Area (FFTA) and the City's yards.

Groundwater samples were collected at monitoring wells 19MW-02, 19MW-03 and 19MW-04 in July 2019. Depth to groundwater ranged from 1.21 m below top of casing (m btoc) to 2.28 m btoc. Groundwater flow direction could not be determined as no survey of the well network was conducted. No measureable light non-aqueous phase liquid (LNAPL) was recorded in any of the monitoring wells in July 2019. Results for groundwater sampling indicated select PAHs and per- and polyfluoroalkyl substances compounds, as well as dissolved copper, exceeded referenced guidelines from the City's yards and boundaries of the FFTA.

Surface water samples were also collected from three locations along the adjacent water course in July 2019. Surface water results were below the applicable guidelines.

WTS soil and groundwater analytical results appear to be the result of historical operations, activities, and chemical or debris storage in this area.

Landfill

Dissolved and total metals, nitrite (as N) and sulphate concentrations in groundwater were observed to exceed the referenced guidelines for one or more parameters at each monitoring well location. Sedimentation in collected groundwater samples as a result of limited available groundwater for sampling may have influenced (i.e., biased high) the analytical results in groundwater.

Surface water samples were collected from three locations (WS-100 to WS-102) from nearby water bodies in September 2019. Surface water results were below the applicable guidelines.

The Landfill groundwater results, while exceeding referenced guidelines, are considered to represent background geological conditions: elevated concentrations in soil and surrounding bedrock, and limited buffering capacity in the surrounding geological materials.

1.0 Introduction

1.1 Background

The City of Iqaluit (the City) is in the process of implementing its Solid Waste Management Strategy to service their near and long-term (75 years) municipal solid waste disposal requirements. Founded on a previously-completed conceptual design and facility siting exercise, key elements of the project include a solid WTS within the immediate urban area of the City, where residential and commercial waste will be hauled to, processed, and compacted in bales with the objective of using wood and corrugated cardboard as a fuel source for an on-site biomass boiler. Tires, metal, and some construction and demolition (C&D) wastes will also be shredded and or baled for landfilling or transported south for recycling. The resulting solid waste bales and possibly a smaller amount of unbaled C&D waste will be trucked to an engineered balefill landfill site located approximately 6 km from the WTS. Vehicles transferring the waste bales will access the road leading to the Landfill from the waste transfer station to avoid having the transfer vehicle travel through the City. Development of the proposed facilities is scheduled to commence in 2020 with facility commissioning occurring in 2022.

Iqaluit is located at the south end of Baffin Island, on Frobisher Bay at 64° 44' N latitude and 68° 31' E longitude. Access to the City is limited, with the only year-round access provided by commercial aircraft; sealift can also be utilized during the summer months. The Landfill is located approximately 6 km northwest of the City and occupies an approximate area of 22 ha (Figure 1). The WTS is located at the end of Kakivak Court (Figure 2). The WTS occupies an area of approximately 2.4 ha and comprises an office building, scale house, transfer station, and contaminant storage area.

1.2 Objective and Scope of Work

The objective of the 2019 baseline environmental data collection program was to characterize baseline conditions at the WTS and Landfill, including soil and/or groundwater quality assessment.

The following activities were completed as part of the 2019 scope of work for the WTS and Landfill:

WTS

- Preparation of a site-specific Health and Safety Plan;
- Soil sampling at various areas of potential environmental concern (APECs);
- Advancement of test pits to facilitate well installations;
- Installation of drive-point groundwater monitoring wells;
- Groundwater monitoring and collection of groundwater and surface water samples; and
- Preparation of a report summarizing the 2019 baseline data collection program.

Landfill

- Preparation of a site-specific Health and Safety Plan;
- Groundwater monitoring at existing monitoring wells;
- Groundwater and surface water sampling of monitoring wells and nearby surface water bodies; and,
- Preparation of a report summarizing the 2019 baseline data collection program.

2.0 Regulatory Framework

Canadian Council of Ministers of the Environment (CCME) Health Canada guidelines were used for reference purposes in the selection of soil and groundwater guideline values for potential parameters of concern at the site. Given the site settings, current land use and dominant soil particle size, the following guideline documents were used for comparison to laboratory results:

Soil

- CCME Tier 1 Soil Quality Guidelines, Commercial Land Use, Coarse-Grained Soil (1999);
- CCME Canadian Soil Quality Guidelines, Commercial Land Use, Coarse-Grained Soil (1999);
- CCME Canada-Wide Standards (CWS) for Petroleum Hydrocarbons, Commercial Land Use, Coarse-Grained Soil (potable and non-potable water) (2008);
- Draft Federal Soil and Groundwater Quality Guideline for PFOS based on a commercial land use scenario as presented in the Government of Canada's "Interim Advice to Federal Custodian Departments for the Management of Federal Contaminated Sites Containing Perfluorooctane Sulfonate (PFOS) and other Per- and Polyfluoroalkyl Substances (PFAS)", Version 1.4.1, (2018); and
- Updates to Health Canada Soil Screening Values for Perfluoroalkylated Substances (PFAS) for Commercial/Industrial land use (2019).

Groundwater and Surface Water

- Draft Federal Soil and Groundwater Quality Guideline for PFOS based on a commercial land use scenario as presented in the Government of Canada's "Interim Advice to Federal Custodian Departments for the Management of Federal Contaminated Sites Containing Perfluorooctane Sulfonate (PFOS) and other Per- and Polyfluoroalkyl Substances (PFAS)", Version 1.4.1, (2018);
- Health Canada Water Screening Values for Perfluoroalkylated Substances (2018);
- Federal Contaminated Sites Action Plan (FCSAP) Guidance Document on Federal Interim Groundwater Quality Guidelines for Federal Contaminated Sites (2016), Tier 1 Guidelines for Commercial/Industrial land use and coarse and fine textured soils; and,
- CCME Canada Water Quality Guidelines (CWQGs) for the Protection of Freshwater Aquatic Life, 1999.

Commercial land use was selected as the baseline conditions screening criteria. Groundwater, for the purposes of this report, refers to active layer groundwater. Active layer groundwater is not used for potable use in the City of Iqaluit. The Health Canada Water Screening Values for Perfluoroalkylated Substances will be used for screening, in lieu of available guidelines protective of environmental receptors.

3.0 Field Program

3.1 Waste Transfer Station

The field program at the WTS was conducted between July 16 and 18, 2019, and consisted of shallow soil sampling, installation of drive-point monitoring wells, groundwater monitoring, and groundwater and surface water sampling.

3.1.1 Soil Sampling and Drive Point Installation

On July 16 and 17, 2019, shallow soil sampling was conducted at the WTS. Three areas were targeted: The Fire Fighting Training Area (FFTA) and two City yards, one northwest of the FFTA and one south of the FFTA. The investigation areas and associated sampling locations are shown on Figure 3.

Soil samples were collected from the upper 10 to 15 cm of soil at each sampling location, placed in laboratory-supplied jars and stored in an ice-filled cooler pending submission. A total of 16 soil samples were collected from the three areas and submitted for laboratory analysis of one or more of: benzene, toluene, ethylbenzene, and xylenes (collectively known as BTEX), petroleum hydrocarbon (PHC) fractions F1 to F4, volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), glycols, PFAS, and particle size.

On July 18, 2019, drive-point monitoring wells were installed at five locations at the WTS (19MW-01 to 19MW-05; Figure 3). Attempts were made to install the monitoring wells by hand; however, refusal was encountered at depths of less than 30 cm at several locations. Consequently, Nunavut Excavating was contracted to advance test pit excavations to facilitate installation of the drive-point wells.

Soil samples were collected from the base of two test pits (TP-1 and TP-4), placed in laboratory-supplied jars and stored in an ice-filled cooler. Samples were analyzed for BTEX, PHC F1 to F4 and PAHs. Soil samples were submitted to Bureau Veritas Laboratories (Bureau Veritas; formerly Maxxam Analytics Inc.) of Ottawa, Ontario. Soil samples were analyzed within specified laboratory hold times. Chain of Custody documentation, provided by Bureau Veritas, was completed by Dillon field technicians and accompanied the laboratory submissions.

3.1.2 Groundwater and Surface Water Monitoring and Sampling

Newly installed monitoring wells were monitored and sampled on July 18, 2019. Drive-point wells were monitored and sampled using the following procedure:

- Measuring depth to light non-aqueous phase liquid (LNAPL; if present), depth to groundwater and depth to well bottom, using a Heron oil/water interface probe. Measurements were recorded relative to the surveyed top of PVC casing.

- Monitoring equipment was decontaminated using a Liquinox® solution, organic-free water rinse and clean paper towel, upon removal from the monitoring well.

Groundwater samples were collected by Dillon personnel using low-flow sampling techniques. Of the five groundwater monitoring wells installed, only three hosted water (19MW-02 to 19MW-04). While groundwater was present at 19MW-05, insufficient water was available to permit sample collection after purging. Sample collection included the following activities:

- Clean ¼" (6 mm) low density polyethylene (LDPE) tubing was installed in the monitoring well with the intake point placed approximately 0.25 m above the bottom of the well within the screened zone.
- The ¼" LDPE tubing was connected above ground to MasterFlex silicone tubing that was fit to a flow-rate adjustable peristaltic pump. Pumped groundwater was directed through a flow-through cell that was connected to a calibrated YSI 556 multi-parameter meter for the measurement of the following field parameters: pH, electrical conductivity, temperature, dissolved oxygen, oxygen reduction potential and turbidity.
- The monitoring well was purged using a peristaltic pump at a low-flow rate (less than 500 mL/min).
- Field parameters were monitored and recorded at regular intervals during purging until the values stabilized.
- Upon achieving stabilization, the field parameters were recorded and the flow-through cell was disconnected. Groundwater samples were collected in clean, laboratory-supplied containers for one or more of BTEX, PHC F1 to F2, VOCs, glycols, dissolved metals and PFAS.
- Samples were placed in ice-filled coolers and placed in cold storage pending submission to Bureau Veritas in Ottawa, Ontario.

Surface water samples were collected from three locations (SW-1 to SW-3) along the water course adjacent to the north and east boundaries of the investigation areas (Figure 3). Sample collection consisted of placement of clean, laboratory-supplied containers in a flowing portion of the stream for analysis of BTEX, PHC F1 to F2 and total metals. Samples were placed in ice-filled coolers and placed in cold storage pending submission to Bureau Veritas in Ottawa, Ontario.

Groundwater and surface water samples were analyzed within specified laboratory hold times. Chain of Custody documentation, provided by Bureau Veritas, was completed by Dillon field technicians and accompanied the laboratory submissions.

3.2 Landfill

The field program at the Landfill was conducted between September 5 and 6, 2019 and consisted of groundwater monitoring and surface water sampling.

3.2.1 Groundwater and Surface Water Monitoring and Sampling

Five previously existing monitoring wells (W-107 to W-111) were monitored and sampled on September 5-6, 2019. Monitoring well locations are presented on Figure 4. Wells were monitored using the following procedure:

- Removing the monitoring well cap and measuring standpipe organic vapour readings using a RKI Eagle portable gas detector, calibrated to a hexane standard and operated in "methane elimination" response mode;
- Measuring depth to light non-aqueous phase liquid (LNAPL; if present), depth to groundwater, and depth to well bottom using a Heron oil/water interface probe. Measurements were recorded relative to the surveyed top of PVC casing; and
- Monitoring equipment was decontaminated using a Liquinox® solution, organic-free water rinse and clean paper towel upon removal from the monitoring well.

Groundwater samples were collected by Dillon personnel using low-flow sampling techniques. Sample collection included the following activities:

- Clean ¼" (6 mm) low density polyethylene (LDPE) tubing was installed in the monitoring well with the intake point placed approximately 0.25 m above the bottom of the well within the screened zone.
- The ¼" LDPE tubing was connected above ground to MasterFlex silicone tubing that was fit to a flow-rate adjustable peristaltic pump. Pumped groundwater was directed through a flow-through cell that was connected to a calibrated YSI Pro DSS multi-parameter water quality meter for the measurement of the following field parameters: pH, electrical conductivity (EC), temperature, dissolved oxygen (DO), oxygen reduction potential (ORP) and turbidity;
- The monitoring well was purged using a peristaltic pump at a low-flow rate (less than 150 mL/min). Due to slow recharge rates, a full purge and/or stabilization of field parameters could not be obtained prior to sampling. Groundwater samples were collected to enable data collection.
- Field parameters were recorded and the flow-through cell was disconnected. Groundwater samples were collected in clean, laboratory-supplied containers for one or more of routine water quality, ammonia-nitrogen (NH_4-N), total Kjeldahl nitrogen (TKN), and dissolved metals and trace elements (including low-level cadmium).
- Samples were placed in ice-filled coolers and placed in cold storage pending submission to Bureau Veritas Laboratories (Bureau Veritas; formerly Maxxam Analytics Inc.) of Yellowknife, Northwest Territories.

Surface water samples were collected from three locations (WS-100 to WS-102) in water bodies to the east, west and northwest of the proposed Landfill (Figure 4). Field parameters were measured (pH, EC, temperature, DO, ORP and turbidity) and samples were collected in clean, laboratory-supplied containers from beneath the surface at the shores of the water bodies for analysis of one or more of routine water quality, NH_4-N, TKN and total metals and trace elements (including low-level cadmium).

Samples were placed in ice-filled coolers pending submission to Bureau Veritas in Yellowknife, Northwest Territories.

Chain of Custody documentation, provided by Bureau Veritas, was completed by Dillon field technicians and accompanied all laboratory submissions.

4.0 Results

4.1 Waste Transfer Station

4.1.1 Soil Quality

Results from sampling of shallow soil and test pit locations are presented in Tables 1 and 2 (attached). Specific sample locations and soil results are presented on Figure 5a. Borehole logs are presented in Appendix A and Laboratory Certificates of Analyses for July 2019 soil sampling are included as Appendix B.

Soil samples were collected from two test pits and 16 surface locations within the proposed WTS boundaries. Surface soil sample locations were selected based on potential for environmental impact resulting from current and/or former materials storage, operations, or other activities.

Results are summarized as follows:

- Headspace organic vapour readings ranged from non-detectable to 30 parts per million (ppm);
- Concentrations in soil for BTEX and PHC parameters were below the referenced guidelines, except for PHC fraction F3 at SS08;
- VOC concentrations were less than laboratory reportable detection limits (RDLs) and referenced guidelines – the RDL for trichloroethene exceeded the referenced guideline;
- Glycols concentrations were below laboratory RDLs and the referenced guidelines;
- PFAS concentrations were below the referenced guidelines; and,
- Select PAH parameter concentrations exceeded the referenced guidelines.

Exceedances observed in soil at the WTS are summarized below in Table 4-1.

Table 4-1: Soil Analytical Exceedances at the Waste Transfer Station

Parameter	Sample Location		SS03	SS04	SS05	SS06	SS07	SS08	SS13	SS14	TP4
	CWS for PHCs	CCME CSQG									3.0 mbgs
PHC fraction F3	1700	n.v.	n.e.	n.e.	n.e.	n.e.		2400	n.e.	n.e.	n.e.
Acenaphthene	n.v.	0.28	3.4	2.1	n.e.	n.e.	0.61	n.e.	n.e.	n.e.	n.e.
Benzo (a) pyrene	n.v.	1.4	5.1	4.5	n.e.	n.e.	n.e.	n.e.	n.e.	n.e.	n.e.
Fluorene	n.v.	0.25	4.6	2.8	n.e.	n.e.	0.78	n.e.	n.e.	n.e.	n.e.
Naphthalene	n.v.	0.013	1.3	0.6	n.e.	n.e.	0.14	n.e.	n.e.	n.e.	n.e.
Phenanthrene	n.v.	0.046	22	15	0.068	0.94	4.1	n.e.	0.062	0.056	0.082

Table Notes:
Concentrations presented in mg/kg.
SS Soil samples taken at 0.1 – 0.2 metres below ground surface.
TP Soil samples taken at variable depths as noted in Table.
CWS for PHCs denotes Canada Wide Standards for PHCs in Soil, Commercial land use, non-potable groundwater, coarse-grained (2008)
CCME CSQG denotes CCME Canadian Soil Quality Guidelines, Commercial Land Use, Coarse-Grained Soil (1999)
n.e. denotes no exceedance.
n.m. denotes not measured
n.v. denotes no value

Soil exceeding referenced guidelines was observed across the WTS area, including the FFTA and the City yards. These exceedances appear to be the result of historical operations, activities and storage in these areas (as reported in the Phase II Environmental Site Assessment by EXP Consulting Ltd. in 2018).

4.1.2 Groundwater Monitoring

Groundwater monitoring data collected from drive point monitoring wells in July 2019 is presented in Table 3 (attached). Depth to groundwater ranged from 1.21 m below top of casing (m btoc) to 2.28 m btoc. Groundwater flow direction could not be determined as no survey of the well network was conducted.

No measureable LNAPL was recorded in any of the monitoring wells in July 2019.

4.1.3 Groundwater and Surface Water Quality

Groundwater samples were collected at monitoring wells 19MW-02, 19MW-03 and 19MW-04 in July 2019. Surface water samples were also collected from three locations along the adjacent water course in July 2019. Groundwater analytical results are presented in Table 4 and 5, (attached), and on Figure 5b. Surface water analytical results are presented in Table 6 (attached), and on Figure 5b. Laboratory Certificates of Analysis are included as Appendix B.

Results are summarized as follows:

- Concentrations for BTEX and PHC fractions F1 and F2 in groundwater were less than RDLs and/or referenced guidelines;
- VOC and glycols concentrations in groundwater were less than laboratory reportable detection limits (RDLs) and referenced guidelines;
- Metals concentrations in groundwater were below the referenced guidelines with the exception of copper, which exceeded at each sampled monitoring well location;
- Select PFAS concentrations in groundwater exceeded the referenced guidelines at 19MW-02;
- Multiple PAH RDLs were observed to exceed the referenced guidelines;
- Select PAH parameter concentrations in groundwater exceeded the referenced guidelines at 19MW-04; and,
- Surface water results for each parameter analyzed was below the referenced guidelines.

Groundwater exceedances were observed within the City yards and along the boundaries of the former FFTA and are summarized below in Table 4-2.

Table 4-2: Groundwater Analytical Exceedances at the Waste Transfer Station

Parameter	Sample Location		19MW-02	19MW-03	19MW-04
	FIGQG	HC SV			
Benzo (a) pyrene	0.000015	n.v.	n.e.	n.e.	0.000026
Fluoranthene	0.00004	n.v.			0.000066
Pyrene	0.000025	n.v.			0.000051
Dissolved Copper	0.002	n.v.	0.01	0.0062	0.0032
PFHpA	n.v.	0.0002	0.00037	n.e.	n.m.
PFHxA	n.v.	0.0002	0.00055	n.e.	n.m.
PFNA	n.v.	0.00002	0.00012	n.e.	n.m.
PFPeA	n.v.	0.0002	0.00099	n.e.	n.m.
6:2 FtS	n.v.	0.0002	0.0016	n.e.	n.m.

Table Notes:
Concentrations presented in mg/L.
FIGQG denotes Federal Interim Groundwater Quality Guidelines (mg/L)
HC SV denotes Health Canada Screening Values for PFAS
n.e. denotes no exceedance.
n.m. denotes not measured
n.v. denotes no value
PFHpA denotes Perfluoroheptanoic Acid
PFHxA denotes Perfluorohexanoic Acid
PFNA denotes Perfluorononanoic Acid
PFPeA denotes Perfluoropentanoic Acid
6:2 FtS denotes 6:2 Fluorotelomer Sulfonate

4.2 Landfill

4.2.1 Groundwater and Surface Water Quality

Groundwater samples were collected at monitoring wells W-107 to W-111 in September 2019. Surface water samples were also collected from three locations (WS-100 to WS-102) from nearby water bodies in September 2019. Groundwater and surface water analytical results are presented in Table 7 and Table 8, respectively (attached), and on Figure 6. The Laboratory Certificate of Analysis is included as Appendix B. Results are summarized as follows:

- Concentrations for routine water quality parameters were below the referenced guidelines for parameters analyzed, with the exception of nitrate (as N) and sulphate at W-107;
- Select dissolved and/or total metals concentrations in groundwater exceeded referenced guidelines at each monitoring well location; and
- Surface water results for each parameter analyzed was below the referenced guidelines.

Groundwater exceedances are summarized in Tables 4-3 below.

Table 4-3: Groundwater Analytical Exceedances at the Landfill

Parameter	Sample Location FIGQG	W-107	W-108	W-109	W-110	W-111
Nitrite as N	0.06	0.15	n.e.	n.e.	n.e.	n.e.
Dissolved Sulphate	100	1400	n.e.	n.e.	n.e.	n.e.
Dissolved Aluminum	0.005	n.e.	0.0083	0.015	0.014	0.014
Dissolved Cadmium	0.00009	0.00014	n.e.	0.007	n.e.	n.e.
Dissolved Copper	0.002	0.0047	0.0039	0.0074	0.0039	0.004
Dissolved Iron	0.3	0.63	n.e.	n.e.	n.e.	n.e.

Table Notes:
Concentrations presented in mg/L.
FIGQG denotes Federal Interim Groundwater Quality Guidelines (mg/L)
n.e. denotes no exceedance.

Due to slow recharge rates, opportunistic sampling was performed at each monitoring well. As a result, some sediment was present in groundwater samples despite being field-filtered prior to submission. It is possible that the exceedances of referenced guidelines observed in 2019 resulted, in part, from the presence of sediment in the samples.

Considering that no significant development or anthropogenic activity is expected to have occurred in this area prior to sampling, it is reasonable to assume that groundwater and surface water results observed in 2019 are the reflection of background water quality, as well as potential influence from the presence of sediment in the samples.

4.3 Quality Assurance/Quality Control

The results of the field quality assurance/quality control (QA/QC) program are summarized in Table 9 and Table 10 (attached), which includes laboratory analytical results for blank samples (i.e., equipment and field), blind field duplicates, and relative percent difference (RPD).
A QA/QC note was provided in the laboratory certificate of analysis (COA) and a summary is provided as follows:

- Samples submitted to the lab met temperature requirements;
- Sample hold times were exceeded for W109, W110 and W111; and
- Detection limits were raised during the analysis of metals (for the September samples submitted), PAHs (SS03, SS04, SS06 and SS07) and PFAS for 19MW-02 due to the sample matrix; samples required dilution.

Analyzed field duplicates had results suitable for quantitative calculation of RPD. The RPD was not calculated for those parameters where one or both of the results associated with the original and/or field duplicate sample exhibited concentrations less than five times the RDL. The acceptable criteria were based on the laboratory RPD acceptance criteria, as provided in the COAs and are provided in their respective analytical tables.

Overall laboratory data quality is considered acceptable and the results representative with no identification of significant quality issues requiring further investigation or resampling.

5.0 Summary

Soil and/or groundwater investigations were conducted at the proposed WTS and Landfill locations in July and September 2019, respectively. At the WTS, five drive-point monitoring wells were installed, four of which into test pit excavations and one by manual means. Sixteen surface soil samples were collected from various APECs across the WTS area. Groundwater samples were collected from newly installed monitoring wells hosting groundwater. Surface water sampling was conducted at a water course running adjacent to the WTS boundaries to the north, northeast and east. At the Landfill, five existing monitoring wells and three nearby surface water bodies were sampled. Soil and water samples were submitted to Bureau Veritas for laboratory analyses.

5.1 Waste Transfer Station

WTS soil results indicated PHC F3 and select PAHs exceeded referenced guidelines in 2019. Impacts were observed across the WTS area, including the FFTA and City yards.

Groundwater samples were collected at monitoring wells 19MW-02, 19MW-03 and 19MW-04 in July 2019. Depth to groundwater ranged from 1.21 m below top of casing (m btoc) to 2.28 m btoc. Groundwater flow direction could not be determined as no survey of the well network was conducted. No measureable LNAPL was recorded in any of the monitoring wells in July 2019. Results for groundwater sampling indicated select PAH and PFAS compounds, as well as dissolved copper, exceeded referenced guidelines from the City yards and boundaries of the FFTA.

Surface water samples were also collected from three locations along the adjacent water course in July 2019. Surface water results were below the applicable guidelines.

WTS soil and groundwater analytical results appear to be the result of historical operations, activities, and chemical or debris storage in this area.

5.2 Landfill

Dissolved and total metals, nitrite (as N) and sulphate concentrations in groundwater were observed to exceed the referenced guidelines for one or more parameters at each monitoring well location. Sedimentation in collected groundwater samples as a result of limited available groundwater for sampling may have influenced (i.e., biased high) the analytical results in groundwater.

Surface water samples were collected from three locations (WS-100 to WS-102) from nearby water bodies in September 2019. Surface water results were below the applicable guidelines.

The Landfill groundwater and surface water results, while exceeding referenced guidelines, are considered to represent background geological conditions: elevated concentrations in soil and surrounding bedrock, and limited buffering capacity in the surrounding geological materials.

6.0 Closure

This report was prepared exclusively for the purposes, project and Site location outlined in the report. The report is based on information provided to, or obtained by Dillon as indicated in the report, and applies solely to site conditions existing at the time of the Site investigation. Although a reasonable investigation was conducted by Dillon, Dillon's investigation was by no means exhaustive and cannot be construed as a certification of the absence of all potential impacts at the Site. Rather, Dillon's report represents a reasonable review of available information within an agreed work scope, schedule and budget. It is therefore possible that currently unrecognized areas of concern may exist at the Site, and that the levels of potential impact may vary across the Site. Further review and updating of the report may be required as local and Site conditions, and the regulatory and planning frameworks, change over time.

This report was prepared by Dillon for the sole benefit of our Client, The City of Iqaluit. The material in it reflects Dillon's best judgment in light of the information available to it at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions made based on it, are the responsibilities of such third parties. Dillon accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

Respectfully submitted,

DILLON CONSULTING LIMITED

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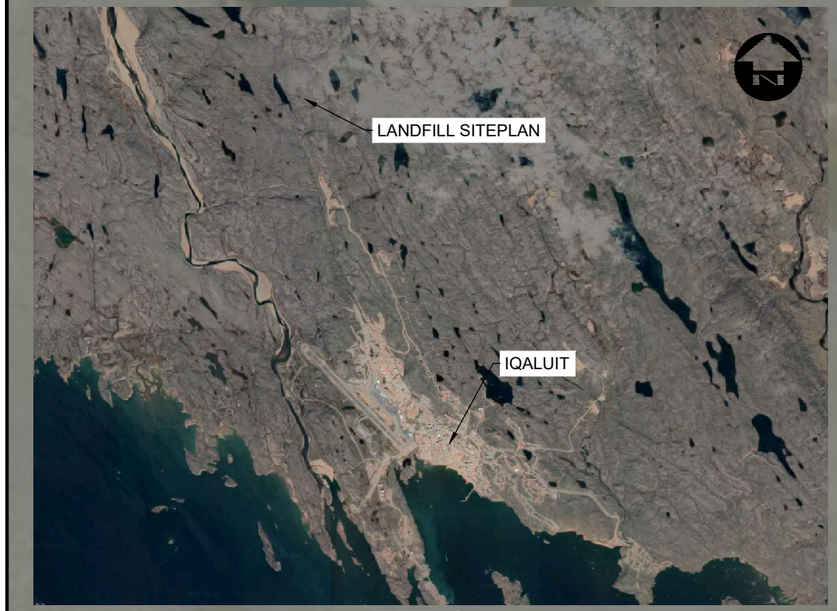
Keith Barnes, P.Eng.
Project Manager

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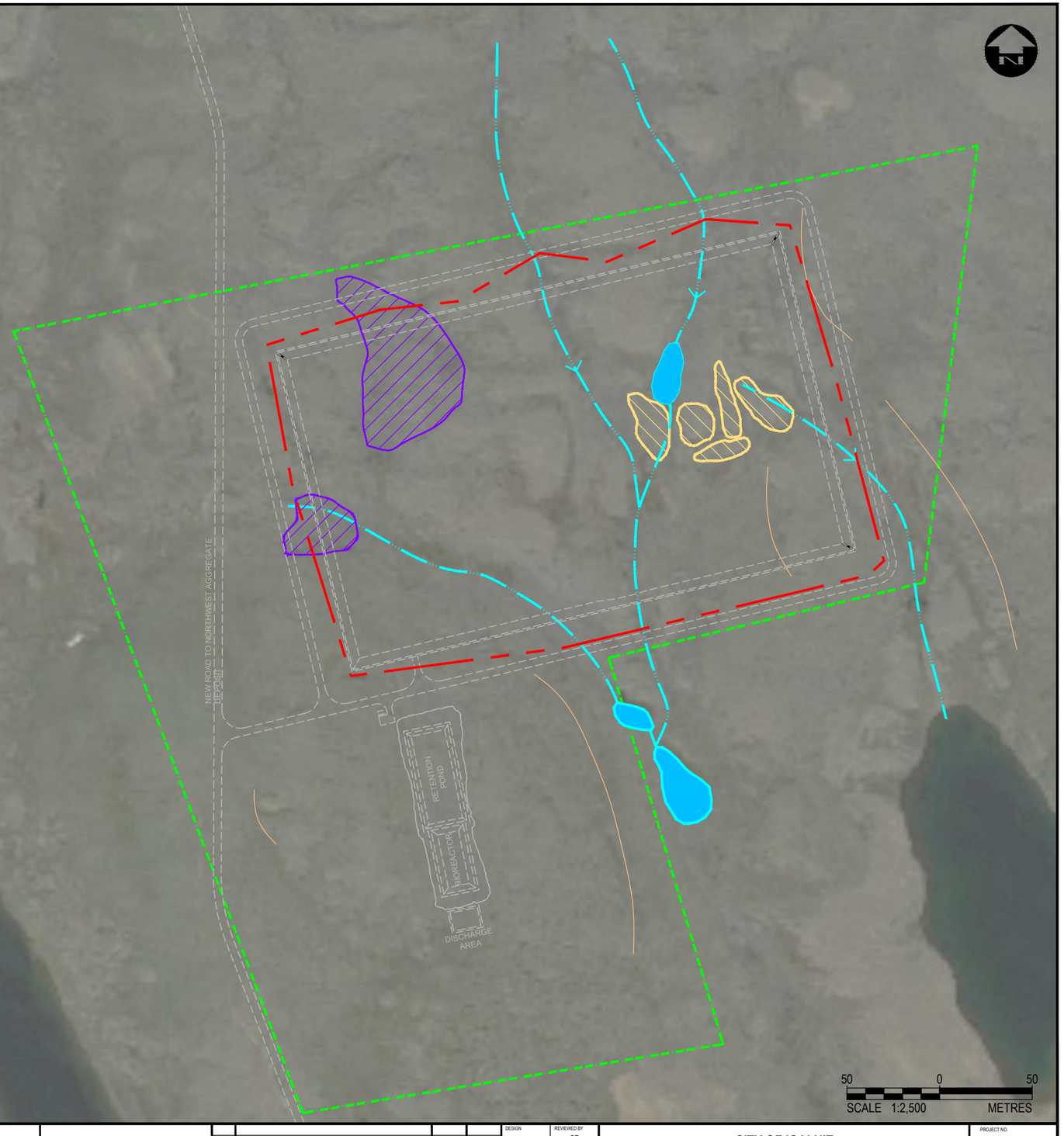
Indra Kalinovich, Ph.D., C.Chem.
Senior Technical Reviewer

CMR:slg

Figures



KEYPLAN



LEGEND:

- SITE PROPERTY BOUNDARY
- 75 YEAR LANDFILL FOOTPRINT
- BOULDER FIELD
- GLACIOFLUVIAL TERRACE
- SURFACE WATER PONDING
- SURFACE WATER FLOW
- BEDROCK OUTCROP
- PROPOSED INFRASTRUCTURE

50 0 50
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CITY OF IQALUIT

SOLID WASTE LANDFILL
PROPOSED FACILITY LAYOUT

PROJECT NO. 19-9543

FIGURE NO. 1



KEY PLAN

LEGEND:

APPROXIMATE PROPERTY BOUNDARY

CONSTRUCTION AND DEMOLITION DEBRIS PAD

BALE STORAGE AREA

SNOW STORAGE

QAQQAMUIT ROAD

EMERGENCY GENERATOR

HHW DEPOT

WASTE TRANSFER STATION

SNOW STORAGE

HHW STORAGE CONTAINERS

REUSE CONTAINER

MISCELLANEOUS METALS/WHITE GOODS STORAGE PAD

TIRE STORAGE

PARKING

SCALE HOUSE

SITE OFFICE

SNOW STORAGE

END OF LIFE VEHICLE AND MISCELLANEOUS METALS STORAGE

GREENHOUSE (FUTURE)

COMPOST PAD (FUTURE)

SNOW STORAGE

KAKIVAK COURT

BALER LOGGER

AREA FOR POTENTIAL COMPOST AND BIO-MASS EQUIPMENT

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PROJECT NO. 19-9543

WASTE TRANSFER STATION
PROPOSED FACILITY LAYOUT

FIGURE NO. 2

KEY PLAN

KAKIVAK COURT

IQALUIT

QAQQAMUIT ROAD

KAKIVAK COURT

SW1

SW2

SW3

SS01

SS02

SS03

SS05

SS06

SS07

SS08

SS09

SS10

SS11

SS12

SS13

SS14

SS15

SS16

19MW-01

19MW-02

19MW-03
TP3

19MW-04

19MW-05

LEGEND:

- APPROXIMATE PROPERTY BOUNDARY
- WATER FLOW
- WATER SAMPLING LOCATIONS
- MONITORING WELLS (19MW-00)
- TEST PITS (TP1)
- HYDROCARBON SOIL SAMPLE LOCATIONS (APPROXIMATE LOCATION)
- PFAS SOIL SAMPLE LOCATIONS (APPROXIMATE LOCATION)
- GLYCOL SOIL SAMPLE LOCATIONS (APPROXIMATE LOCATION)

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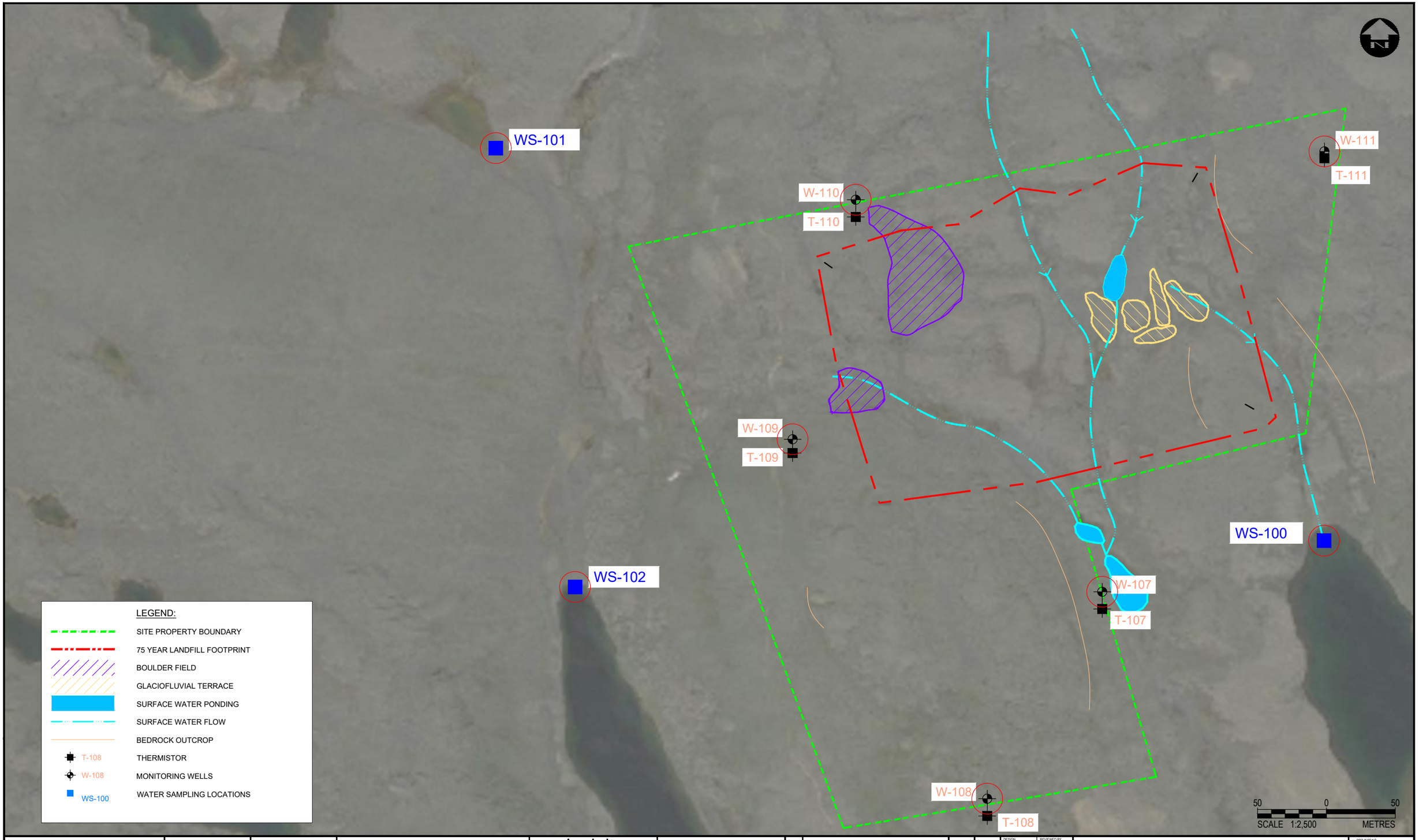
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WASTE TRANSFER STATION
ENVIRONMENTAL SAMPLING LOCATIONS

PROJECT NO.: 19-9543

FIGURE NO.: 3



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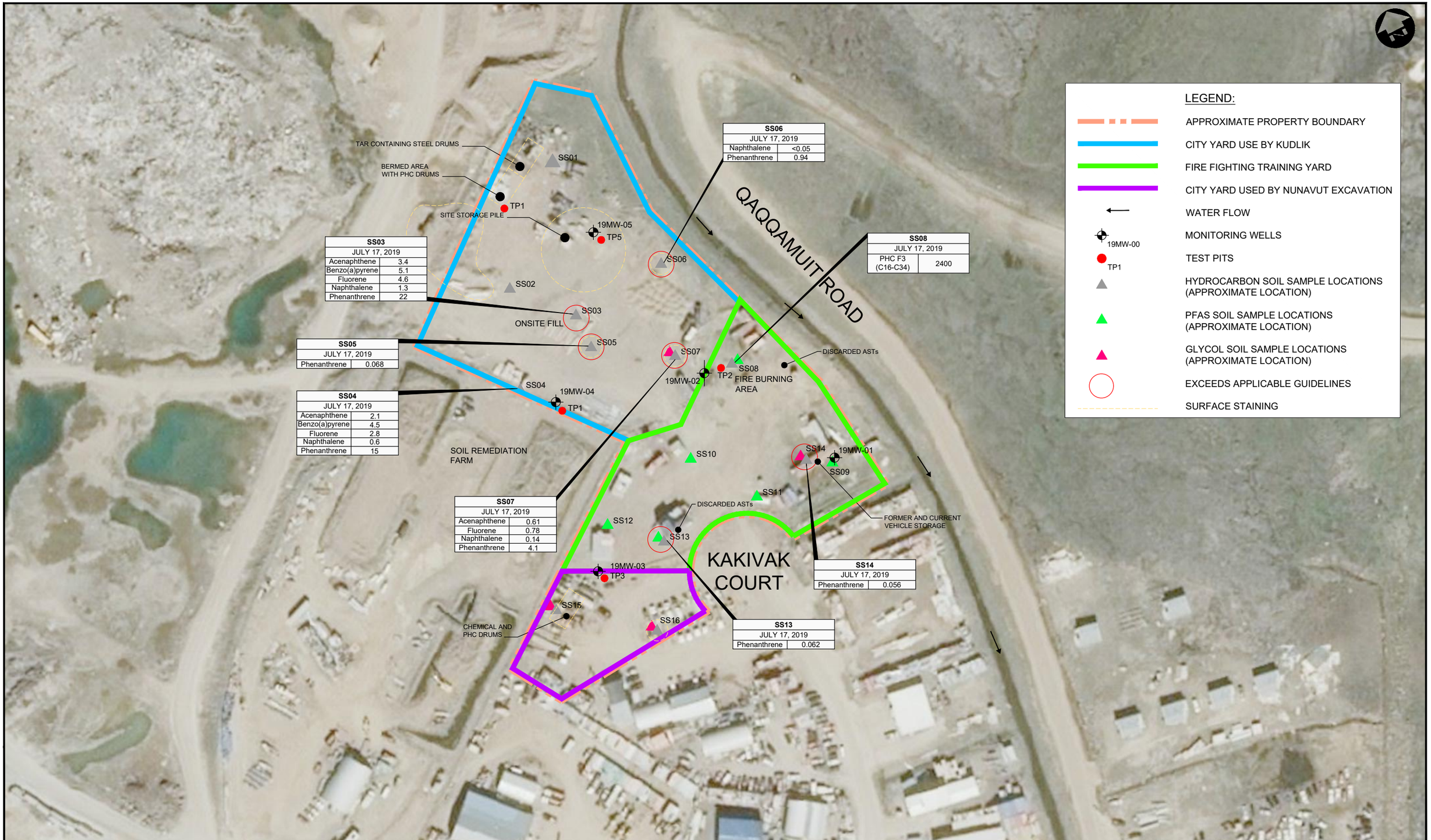
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SOLID WASTE LANDFILL ENVIRONMENTAL SAMPLING LOCATIONS

PROJECT NO. 19-9543

FIGURE NO. 4



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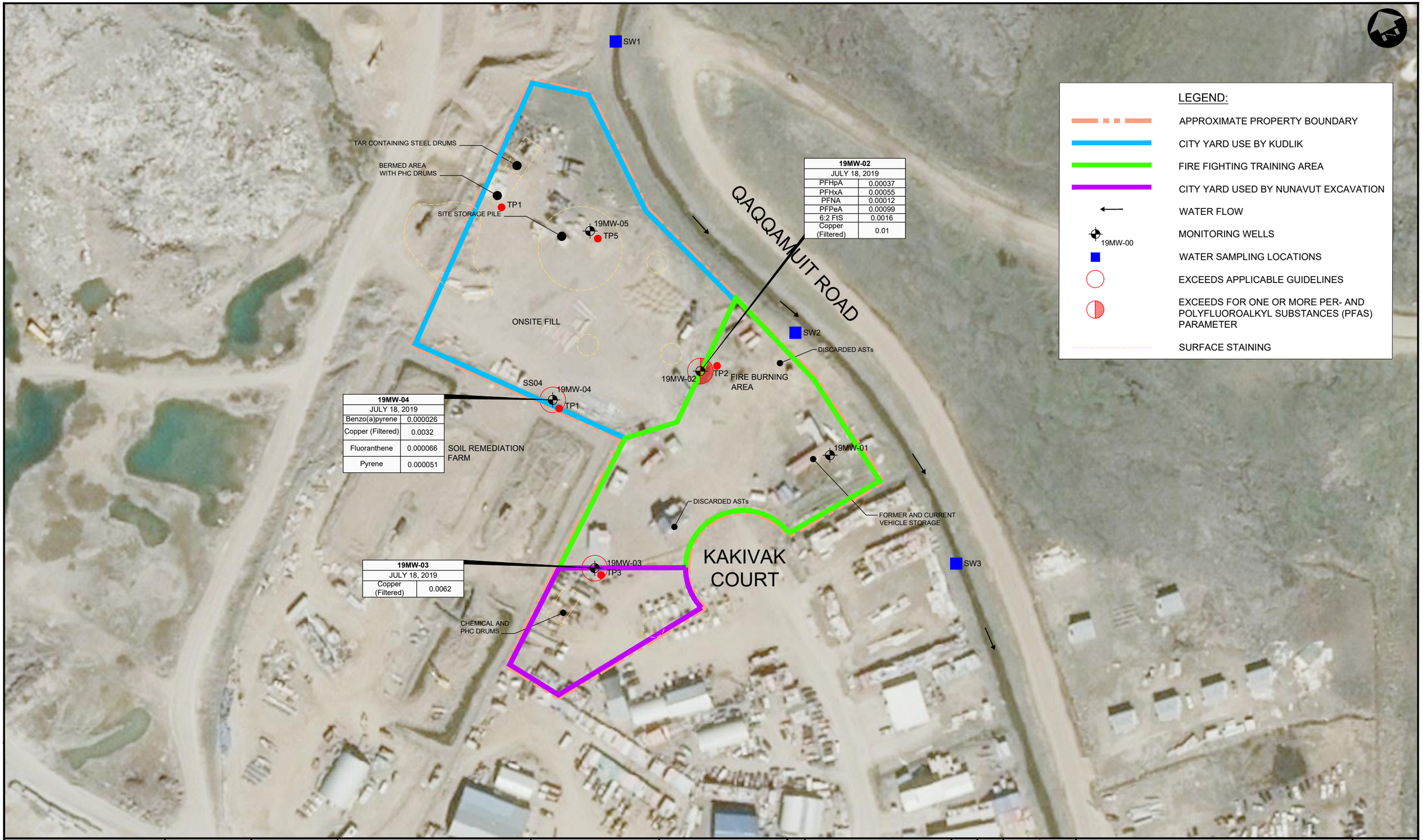
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PROJECT NO.: 19-9543

WASTE TRANSFER STATION
2019 SOIL ANALYTICAL RESULTS

FIGURE NO.: 5a



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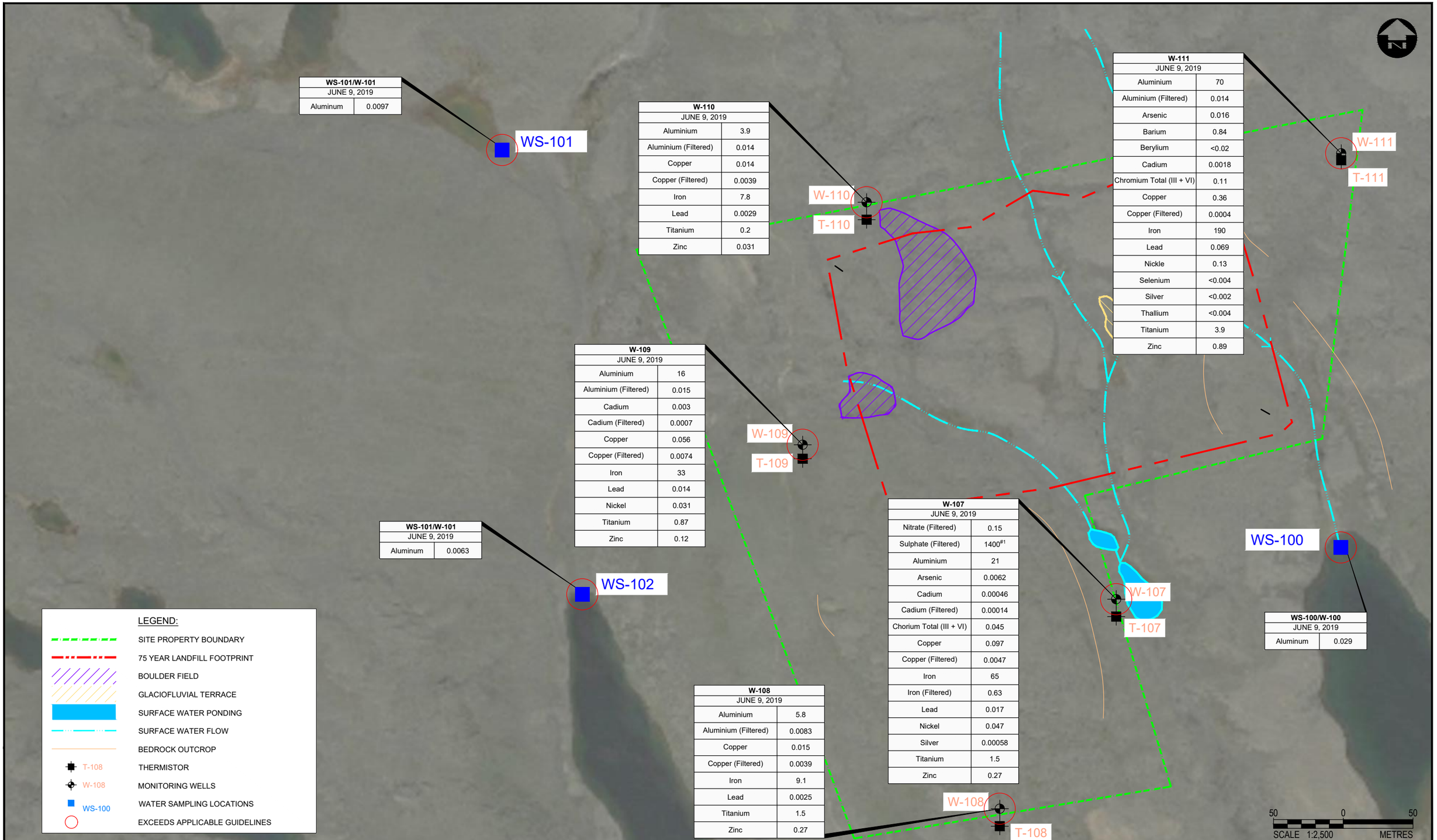
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WASTE TRANSFER STATION
2019 GROUNDWATER ANALYTICAL RESULTS

PROJECT NO.: 19-9543

FIGURE NO.: 5b



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SOLID WASTE LANDFILL 2019 GROUNDWATER AND SURFACE WATER ANALYTICAL RESULTS

PROJECT NO. 19-9543

FIGURE NO. 6

Tables

Table 1: Analytical Results for Soils at the Waste Transfer Station

								Sample Name	SS01	SS02	SS03	SS04	SS04	SS05	SS06	SS07	SS08	SS09	SS10	SS12	SS13	SS14	SS15	SS16	TP1	TP4
								Sample Date	2019-07-17	2019-07-17	2019-07-17	2019-07-17	2019-07-17	2019-07-17	2019-07-17	2019-07-17	2019-07-17	2019-07-17	2019-07-17	2019-07-17	2019-07-17	2019-07-17	2019-07-17	2019-07-17	2019-07-18	2019-07-18
	Parameter	Units	EQL	CCME SQGL Tier 1 - Commercial (Coarse)	CSQG Commercial Use (Coarse Grained)	CWS for PHC - Commercial, Coarse (Non-Potable GW)	CWS for PHC - Commercial, Coarse (Potable GW)																				
Particle Size	% >75um	%	1	-	-	-	-	-	-	-	-	90	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Sieve - #200 (<0.075mm)	%	1	-	-	-	-	-	-	-	-	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Petroleum Hydrocarbons (PHCs)	Reached Baseline at C50	-	-	-	-	-	-	1[#1]	0[#2]	0[#2]	0[#2]	-	1[#1]	0[#2]	0[#2]	1[#1]	-	-	-	0[#2]	1[#1]	1[#1]	1[#1]	1[#1]	1[#1]	1[#1]
	PHC F1 (C6-C10)	mg/kg	10	240	-	-	-	<10	<10	<10	<10	-	<10	<10	<10	<10	-	-	-	<10	<10	<10	<10	<10	<10	<10
	PHC F1 (C6-C10) - BTEX	mg/kg	10	240	-	320	240	<10	<10	<10	<10	-	<10	<10	<10	<10	-	-	-	<10	<10	<10	<10	<10	<10	<10
	PHC F2 (C10-C16)	mg/kg	10	260	-	260	260	<10	<10	17	29	-	<10	17	11	130	-	-	-	<10	<10	<10	<10	<10	<10	<10
	PHC F3 (C16-C34)	mg/kg	50	1700	-	1700	1700	540	140	280	720	-	<50	140	210	2400	-	-	-	120	75	370	96	<50	<50	<50
	PHC F4 (C34-C50)	mg/kg	50	3300	-	3300	3300	<50	77	180	450	-	<50	170	140	150	-	-	-	59	<50	160	<50	<50	<50	<50
Sample Preparation	Moisture Content (dried @ 103°C)	mg/kg	1000					2900	2400	2900	4400	-	2100	5700	3400	6700	17,000	2000	1700	3600	14,000	4200	2400	5100	6300
Volatile Organic Compounds (VOCs)	1,1,1,2-tetrachloroethane	mg/kg	0.05	-	-	-	-	<0.05	-	-	<0.05	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-
	1,1,1-trichloroethane	mg/kg	0.05	50	50	-	-	<0.05	-	-	<0.05	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-
	1,1,2,2-tetrachloroethane	mg/kg	0.05	50	50	-	-	<0.05	-	-	<0.05	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-
	1,1,2-trichloroethane	mg/kg	0.05	0.01|50	50	-	-	<0.05	-	-	<0.05	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-
	1,1-dichloroethane	mg/kg	0.05	50	50	-	-	<0.05	-	-	<0.05	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-
	1,1-dichloroethene	mg/kg	0.05	50	50	-	-	<0.05	-	-	<0.05	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-
	1,2-dibromoethane (Ethylene dibromide)	mg/kg	0.05	-	-	-	-	<0.05	-	-	<0.05	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-
	1,2-dichloroethane	mg/kg	0.05	50	50	-	-	<0.05	-	-	<0.05	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-
	1,2-dichloropropane	mg/kg	0.05	50	50	-	-	<0.05	-	-	<0.05	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-
	1,3-Dichloropropene	mg/kg	0.05	-	-	-	-	<0.05	-	-	<0.05	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-
	Acetone	mg/kg	0.5	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-	-	-	-	-	-	<0.5	-	-	-
	Bromoform	mg/kg	0.05	-	-	-	-	<0.05	-	-	<0.05	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-
	Carbon tetrachloride	mg/kg	0.05	50	50	-	-	<0.05	-	-	<0.05	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-
	Bromodichloroethane	mg/kg	0.05	-	-	-	-	<0.05	-	-	<0.05	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-
	Bromoethane	mg/kg	0.05	-	-	-	-	<0.05	-	-	<0.05	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-
	Chlorobenzene	mg/kg	0.05	10	10	-	-	<0.05	-	-	<0.05	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-
	Chlorodibromomethane	mg/kg	0.05	-	-	-	-	<0.05	-	-	<0.05	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-
	Chloroform	mg/kg	0.05	50	50	-	-	<0.05	-	-	<0.05	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-
	cis-1,2-dichloroethene	mg/kg	0.05	-	-	-	-	<0.05	-	-	<0.05	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-
	cis-1,3-dichloropropene	mg/kg	0.03	-	-	-	-	<0.03	-	-	<0.03	-	-	-	-	-	-	-	-	-	-	<0.03	-	-	-
	Dichlorodifluoromethane	mg/kg	0.05	-	-	-	-	<0.05	-	-	<0.05	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-
	Dichloromethane	mg/kg	0.05	50	50	-	-	<0.05	-	-	<0.05	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-
	Hexane	mg/kg	0.05	-	6.5	-	-	<0.05	-	-	<0.05	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-
	Methyl Ethyl Ketone (MEK)	mg/kg	0.5	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-	-	-	-	-	-	<0.5	-	-	-
	Methyl tert-Butyl Ether (MTBE)	mg/kg	0.05	-	-	-	-	<0.05	-	-	<0.05	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-
	Styrene	mg/kg	0.05	50	50	-	-	<0.05	-	-	<0.05	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-
	Trichloroethene	mg/kg	0.05	-	0.01	-	-	<0.05	-	-	<0.05	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-
	Tetrachloroethene	mg/kg	0.05	0.5|50	0.5	-	-	<0.05	-	-	<0.05	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-
	trans-1,2-dichloroethene	mg/kg	0.05	-	-	-	-	<0.05	-	-	<0.05	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-
	trans-1,3-dichloropropene	mg/kg	0.04	-	-	-	-	<0.04	-	-	<0.04	-	-	-	-	-	-	-	-	-	-	<0.04	-	-	-
	Trichlorofluoromethane	mg/kg	0.05	-	-	-	-	<0.05	-	-	<0.05	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-
	Vinyl chloride	mg/kg	0.02	-	-	-	-	<0.02	-	-	<0.02	-	-	-	-	-	-	-	-	-	-	<0.02	-	-	-
BTEX	Benzene	mg/kg	0.02	0.03	0.03	-	-	<0.02	<0.02	<0.02	<0.02	-	<0.02	<0.02	<0.02	<0.02	-	-	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	Toluene	mg/kg	0.02	0.37	0.37	-	-	0.042	<0.02	<0.02	0.028	-	<0.02	<0.02	<0.02	<0.02	-	-	-	<0.02	0.098	0.034	<0.02	<0.02	<0.02
	Ethylbenzene	mg/kg	0.02	0.082	0.082	-	-	<0.02	<0.02	<0.02	<0.02	-	<0.02	<0.02	<0.02	<0.02	-	-	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	Xylene (m & p)	mg/kg	0.02	-	-	-	-	<0.02	<0.04	<0.04	<0.02	-	<0.04	<0.04	<0.04	<0.04	-	-	-	<0.04	0.056	<0.02	<0.04	<0.04	<0.04
	Xylene (o)	mg/kg	0.02	-	-	-	-	<0.02	<0.02	<0.02	<0.02	-	<0.02	<0.02	<0.02	<0.02	-	-	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	Xylenes Total	mg/kg	0.02	11	11	-	-	<0.02	<0.04	<0.04	<0.02	-	<0.04	<0.04	<0.04	<0.04	-	-	-	<0.04	0.056	<0.02	<0.04	<0.04	<0.04
Polycyclic Aromatic Hydrocarbons (PAHs)	1-Methylnaphthalene	mg/kg	0.005	-	-	-	-	<0.005	<0.005	0.58	0.36	-	<0.005	<0.05	0.089	<0.005	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
	2-Methylnaphthalene	mg/kg	0.005	-	-	-	-	<0.005	<0.005	0.83	0.41	-	<0.005	<0.05	0.099	<0.005	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
	1 & 2 Methylnaphthalene	mg/kg	0.0071	-	-	-	-	<0.0071	<0.0071	1.4	0.77	-	<0.0071	<0.071	0.19	<0.0071	-	-	-	<0.0071	<0.0071	<0.0071	<0.0071	<0.0071	<0.0071
	Acenaphthene	mg/kg	0.005	0.28	0.28	-	-	<0.005	0.0056	3.4	2.1	-	0.0091	0.14	0.61	<0.005	-	-	-	0.01	0.0089	<0.005	<0.005	<0.005	0.011
	Acenaphthylene	mg/kg	0.005	320	320	-	-	<0.005	<0.005	<0.05	<0.05	-	<0.005	<0.05	<0.05	<0.005	-	-	-	<0.005	<0.005	0.013	<0.005	<0.005	<0.005
	Anthracene	mg/kg	0.005	32	32	-	-	<0.005	0.013	7.2	5	-	0.022	0.34	1.4	<0.005	-	-	-	0.021	0.02	0.023	<0.005	<0.005	0.029
	Benzo(a)anthracene	mg/kg	0.005	10	10	-	-	<0.005	0.026	7.2	6	-	0.04	0.38	1.6	<0.005	-	-	-	0.059	0.018	0.02	<0.005	<0.005	0.048
	Benzo(a) pyrene	mg/kg	0.005	1.4	1.4	-	-	<0.005	0.029	5.1	4.5	-	0.035	0.31	1.2	<0.005	-	-	-	0.059	0.013	0.024	<0.005	<0.005	0.04
	Benzo(b & k)fluoranthene	mg/kg	0.005	-	-	-	-	<0.005	0.03	6	5.2	-	0.044	0.35	1.4	<0.005	-	-	-	0.073	0.017	0.038	<0.005	<0.005	0.048
	Benzo(g,h,i)perylene	mg/kg	0.005	-	-	-	-	<0.005	0.061	2.4	2.2	-	0.023	0.21	0.63	0.0063	-	-	-	0.057	0.0082	0.044	<0.005	<0.005	0.027
	Benzo(k)fluoranthene	mg/kg	0.005	10	10	-	-	<0.005	0.011	2.5	2.2	-	0.017	0.13	0.56	<0.005	-	-	-	0.026	0.0064	0.011	<0.005	<0.005	0.019
	Chrysene	mg/kg	0.005	-	-	-	-	0.012	0.019	5	4.2	-	0.029	0.3	1.1	<0.005	-	-	-	0.045	0.013	0.012	<0.005	<0.005	0.033
	Dibenz(a,h)anthracene	mg/kg	0.005	10	10	-	-	<0.005	<0.005	0.84	0.75	-	0.0062	<0.05	0.19	<0.005	-	-	-	0.011	<0.005	0.0057	<0.005	<0.005	0.0073
	Fluoranthene	mg/kg	0.005	180	180	-	-	<0.005	0.062	20	15	-	0.098	0.98	4.2	0.0061	-	-	-	0.1	0.05	0.037	<0.005	<0.005	0.11
	Fluorene	mg/kg	0.005	0.25	0.25	-	-	<0.005	0.0065	4.6	2.8	-	0.0094	0.18	0.78	<0.005	-	-	-	0.011	0.011	<0.005	<0.005	<0.005	0.012
	Indeno(1,2,3-c,d)pyrene	mg/kg	0.005	10	10	-	-	<0.005	0.022	2.7	2.5	-	0.023	0.17	0.66	<0.005	-	-	-	0.043	0.0079	0.037	<0.005	<0.005	0.027
	Naphthalene	mg/kg	0.005	0.013	0.013	-	-	<0.005	<0.005	1.3	0.6	-	<0.005	<0.05	0.14	<0.005	-	-	-	0.0071	<0.005	<0.005	<0.005	<0.005	<0.005
	Phenanthrene	mg/kg	0.005	0.046	0.046	-	-	<0.005	0.044	22	15	-	0.068	0.94	4.1	<0.005	-	-	-	0.062	0.056	0.014	<0.005	<0.005	0.082
	Pyrene	mg/kg	0.005	100	100	-	-	0.0056	0.047	13	10	-	0.07	0.7	2.9	0.007	-	-	-	0.077	0.034	0.035	<0.005	<0.005	0.08
SVOCs	1,2-Dichlorobenzene	mg/kg	0.05	10	10	-	-	<0.05	-	-	<0.05	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-
	1,3-dichlorobenzene	mg/kg	0.05	10	10	-	-	<0.05	-	-	<0.05	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-
	1,4-dichlorobenzene	mg/kg	0.05	10	10	-	-	<0.05	-	-	<0.05	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-
Solvents	Methyl Isobutyl Ketone (MIK)	mg/kg	0.5	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-	-	-	-	-	-	<0.5	-	-	-
Glycols	Total Glycol	mg/kg	10	-	-	-	-	-	-	-	-	-	-	-	<10	-	-	-	-	-	<10	<10	<10	-	-
	Diethylene glycol	mg/kg	10	-	-	-	-	-	-	-	-	-	-	-	<10	-	-	-	-	-	<10	<10	<10	-	-
	Ethylene glycol	mg/kg	10	960	960	-	-	-	-	-	-	-	-	-	<10	-	-	-	-	-	<10	<10	<10	-	-
	Propylene glycol	mg/kg	10	-	6210	-	-	-	-	-	-	-	-	-	<10	-	-	-	-	-	<10	<10	<10	-	-

Notes:
#1 YES
#2 NO
mg/kg - milligrams per kilogram
EQL - estimated quantitation limit

				Sample Name	SS08	SS09	SS10	SS12	SS13
				Sample Date	2019-07-17	2019-07-17	2019-07-17	2019-07-17	2019-07-17
			Draft FSQG for PFOS - Comm/Ind - Coarse	HC Soil Screening Value for PFAS - Commercial	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2
Parameter	Units	EQL			(m)	(m)	(m)	(m)	(m)
8:2 Fluorotelomer Sulfonate (8:2 FtS)	mg/g	0.000001	-	0.00121	<0.000001	<0.000001	0.000001	<0.000001	<0.000001
N-Et-FOSA	mg/g	0.000001	-	-	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001
N-Et-FOSE	mg/g	0.000001	-	-	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001
N-Ethyl perfluorooctane sulfonamidoacetic acid	mg/g	0.000001	-	-	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001
N-Me-FOSA	mg/g	0.000001	-	-	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001
N-Methyl perfluorooctane sulfonamidoacetic acid	mg/g	0.000001	-	-	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001
Perfluorobutane Sulfonate (PFBS)	mg/g	0.000001	-	0.092	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001
Perfluorobutanoic acid	mg/g	0.000001	-	0.173	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001
Perfluorodecane Sulfonate	mg/g	0.000001	-	-	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001
Perfluorodecanoic Acid (PFDA)	mg/g	0.000001	-	-	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001
Perfluorododecanoic Acid (PFDoA)	mg/g	0.000001	-	-	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001
Perfluoroheptane sulfonate	mg/g	0.000001	-	-	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001
Perfluoroheptanoic Acid (PFHpA)	mg/g	0.000001	-	0.00121	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001
Perfluorohexane Sulfonate (PFHxS)	mg/g	0.000001	-	0.0035	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001
Perfluorohexanoic Acid (PFHxA)	mg/g	0.000001	-	0.00121	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001
Perfluorononanoic Acid (PFNA)	mg/g	0.000001	-	0.00013	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001
Perfluorooctane Sulfonamide (PFOSA)	mg/g	0.000001	-	-	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001
Perfluorooctane Sulfonate (PFOS)	mg/g	0.000001	0.00014	0.0032	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001
Perfluorooctanoic Acid (PFOA)	mg/g	0.000001	-	0.00105	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001
Perfluoropentanoic Acid (PFPeA)	mg/g	0.000001	-	0.00121	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001
Perfluorotetradecanoic Acid	mg/g	0.000001	-	-	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001
Perfluorotridecanoic Acid	mg/g	0.000001	-	-	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001
Perfluoroundecanoic Acid (PFUnA)	mg/g	0.000001	-	-	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001
6:2 Fluorotelomer Sulfonate (6:2 FtS)	mg/g	0.000001	-	0.00121	0.0000037	<0.000001	<0.000001	<0.000001	<0.000001

Notes:
mg/g - milligrams per gram
EQL - estimated quantitation limit
Draft Federal Soil and Groundwater Quality Guideline for PFOS based on a commercial land use scenario as presented in the Government of Canada's "Interim Advice to Federal Custodian Departments for the management of Federal Contaminated Sites Contaioning Perfluorooctane Sulfonate (PFOS) and other Per- and Polyfluoroalkyl Substances (PFAS)", Version 1.4.1, 2018.
Updates to Health Canada Soil Screening Values for Perfluoroalkylated Substances (PFAS) for Commerical/Industrial land use, 2019.

Table 3: Groundwater Monitoring Results
Baseline Environmental Sampling

Monitoring Well ID	Monitoring Date (dd-mmm-yy)	Depth to Well Bottom (m btoc)	Geology within Screened Interval	Depth to Water (m btoc)	Standpipe Organic Vapour Reading (ppm)	Stick-up Height (m ags)	Top of Casing Elevation (m)	Water Elevation (m asl)
Waste Transfer Station - Monitoring Wells Installed by Dillon (2019)								
19MW-01	18-Jul-19	2.14	Gravel Fill	Dry	-	0.56	-	-
19MW-02	18-Jul-19	2.55	Gravel Fill	2.43	-	1.22	-	-
19MW-03	18-Jul-19	2.54	Gravel Fill	2.26	-	1.05	-	-
19MW-04	18-Jul-19	3.47	Gravel Fill	3.26	-	1.33	-	-
19MW-05	18-Jul-19	3.47	Gravel Fill	2.38	-	1.19	-	-
Landfill - Monitoring Wells Installed by Others								
W-107	06-Sep-19	2.76	-	1.56	210	1.27	-	-
W-108	06-Sep-19	3.37	-	2.15	110	1.21	-	-
W-109	05-Sep-19	3.02	-	1.675	85	1.257	-	-
W-110	05-Sep-19	3.67	-	1.799	110	1.09	-	-
W-111	05-Sep-19	3.38	-	2.53	130	1.705	-	-

Notes:
(-) - No Data
Dry - Well was dry at time of sampling
m - meters
m btoc - meters below top of casing
m asl - meters above sea level
m ags - meters above ground surface
Survey - Not conducted

				Sample Name	19MW-02	19MW-03	19MW-04
				Sample Date	2019-07-18	2019-07-18	2019-07-18
				Fed Interim GWQG - Tier 1, Commercial/Industrial, Coarse			
	Parameter	Units	EQL	mg/L			
Petroleum Hydrocarbons (PHCs)	Reached Baseline at C50	-	-	-	YES	YES	YES
	PHC F1 (C6-C10)	mg/L	0.025	9.1	<0.025	<0.025	<0.025
	PHC F1 (C6-C10) - BTEX	mg/L	0.025	9.1	<0.025	<0.025	<0.025
	PHC F2 (C10-C16)	mg/L	0.1	1.3	0.17	<0.1	<0.1
	PHC F3 (C16-C34)	mg/L	0.2	-	<0.2	<0.2	<0.2
	PHC F4 (C34-C50)	mg/L	0.2	-	<0.2	<0.2	<0.2
Volatile Organic Compounds (VOCs)	1,1,1,2-tetrachloroethane	mg/L	0.0005	0.066	-	<0.0005	<0.0005
	1,1,1-trichloroethane	mg/L	0.0002	1.1	-	<0.0002	<0.0002
	1,1,2,2-tetrachloroethane	mg/L	0.0005	0.063	-	<0.0005	<0.0005
	1,1,2-trichloroethane	mg/L	0.0005	0.091	-	<0.0005	<0.0005
	1,1-dichloroethane	mg/L	0.0002	6.6	-	<0.0002	<0.0002
	1,1-dichloroethene	mg/L	0.0002	0.49	-	<0.0002	<0.0002
	1,2-dibromoethane (Ethylene dibromide)	mg/L	0.0002	0.0051	-	<0.0002	<0.0002
	1,2-dichloroethane	mg/L	0.0005	0.1	-	<0.0005	<0.0005
	1,2-dichloropropane	mg/L	0.0002	0.33	-	<0.0002	<0.0002
	1,3-Dichloropropene	mg/L	0.0005	0.1	-	<0.0005	<0.0005
	Acetone	mg/L	0.01	13	-	<0.01	<0.01
	Bromoform	mg/L	0.001	3.7	-	<0.001	<0.001
	Carbon tetrachloride	mg/L	0.0002	0.0068	-	<0.0002	<0.0002
	Bromodichloroethane	mg/L	0.0005	-	-	<0.0005	<0.0005
	Bromoethane	mg/L	0.0005	-	-	<0.0005	<0.0005
	Chlorobenzene	mg/L	0.0002	0.0013	-	<0.0002	<0.0002
	Chlorodibromomethane	mg/L	0.0005	10	-	<0.0005	<0.0005
	Chloroform	mg/L	0.0002	0.0018	-	<0.0002	<0.0002
	cis-1,2-dichloroethene	mg/L	0.0005	0.03	-	<0.0005	<0.0005
	cis-1,3-dichloropropene	mg/L	0.0003	-	-	<0.0003	<0.0003
	Dichlorodifluoromethane	mg/L	0.001	-	-	<0.001	<0.001
	Dichloromethane	mg/L	0.002	0.098	-	<0.002	<0.002
	Hexane	mg/L	0.001	-	-	<0.001	<0.001
	Methyl Ethyl Ketone (MEK)	mg/L	0.01	150	-	<0.01	<0.01
	Methyl tert-Butyl Ether (MTBE)	mg/L	0.0005	4.3	-	<0.0005	<0.0005
	Styrene	mg/L	0.0005	0.072	-	<0.0005	<0.0005
	Trichloroethene	mg/L	0.0002	0.029	-	<0.0002	<0.0002
	Tetrachloroethene	mg/L	0.0002	0.11	-	<0.0002	<0.0002
	trans-1,2-dichloroethene	mg/L	0.0005	0.03	-	<0.0005	<0.0005
	trans-1,3-dichloropropene	mg/L	0.0004	-	-	<0.0004	<0.0004
	Trichlorofluoromethane	mg/L	0.0005	-	-	<0.0005	<0.0005
	Vinyl chloride	mg/L	0.0002	0.013	-	<0.0002	<0.0002
BTEX	Benzene	mg/L	0.0002	0.69	<0.0002	<0.0002	<0.0002
	Toluene	mg/L	0.0002	0.083	<0.0002	<0.0002	<0.0002
	Ethylbenzene	mg/L	0.0002	11	<0.0002	<0.0002	<0.0002
	Xylene (m & p)	mg/L	0.0002	-	<0.0004	<0.0002	<0.0002
	Xylene (o)	mg/L	0.0002	-	<0.0002	<0.0002	<0.0002
	Xylenes Total	mg/L	0.0002	18	<0.0004	<0.0002	<0.0002
Polycyclic Aromatic Hydrocarbons (PAHs)	1-Methylnaphthalene	mg/L	0.00005	-	0.000057	<0.00005	<0.00005
	2-Methylnaphthalene	mg/L	0.00005	-	<0.00005	<0.00005	<0.00005
	1 & 2 Methylnaphthalene	mg/L	0.000071	0.18	<0.000071	<0.000071	<0.000071
	Acenaphthene	mg/L	0.00005	0.0058	<0.00005	<0.00005	<0.00005
	Acenaphthylene	mg/L	0.00005	0.046	<0.00005	<0.00005	<0.00005
	Anthracene	mg/L	0.00005	0.000012	<0.00005	<0.00005	<0.00005
	Benzo(a)anthracene	mg/L	0.00005	0.000018	<0.00005	<0.00005	<0.00005
	Benzo(a) pyrene	mg/L	0.00001	0.000015	<0.00001	<0.00001	0.000026
	Benzo(b & k)fluoranthene	mg/L	0.00005	-	<0.00005	<0.00005	<0.00005
	Benzo(g,h,i)perylene	mg/L	0.00005	0.00017	<0.00005	<0.00005	<0.00005
	Benzo(k)fluoranthene	mg/L	0.00005	0.00048	<0.00005	<0.00005	<0.00005
	Chrysene	mg/L	0.00005	0.0014	<0.00005	<0.00005	<0.00005
	Dibenz(a,h)anthracene	mg/L	0.00005	0.00026	<0.00005	<0.00005	<0.00005
	Fluoranthene	mg/L	0.00005	0.00004	<0.00005	<0.00005	0.000066
	Fluorene	mg/L	0.00005	0.003	<0.00005	<0.00005	<0.00005
	Indeno(1,2,3-c,d)pyrene	mg/L	0.00005	0.00021	<0.00005	<0.00005	<0.00005
	Naphthalene	mg/L	0.00005	0.0011	<0.00005	<0.00005	<0.00005
	Phenanthrene	mg/L	0.00003	0.0004	<0.00003	<0.00003	0.000065
	Pyrene	mg/L	0.00005	0.000025	<0.00005	<0.00005	0.000051
SVOCs	1,2-Dichlorobenzene	mg/L	0.0005	0.0007	-	<0.0005	<0.0005
	1,3-dichlorobenzene	mg/L	0.0005	0.042	-	<0.0005	<0.0005
	1,4-dichlorobenzene	mg/L	0.0005	0.026	-	<0.0005	<0.0005
Solvents	Methyl Isobutyl Ketone (MIK)	mg/L	0.005	58	-	<0.005	<0.005
Glycols	Total Glycol	mg/L	5	-	<5	<5	-
	Diethylene glycol	mg/L	5	-	<5	<5	-
	Ethylene glycol	mg/L	5	190	<5	<5	-
	Propylene glycol	mg/L	5	500	<5	<5	-
Metals	Antimony (Filtered)	mg/L	0.0005	2	<0.0005	<0.0005	<0.0005
	Arsenic (Filtered)	mg/L	0.001	0.005	0.0014	<0.001	<0.001
	Barium (Filtered)	mg/L	0.002	2.9	0.013	0.0057	0.0043
	Beryllium (Filtered)	mg/L	0.0005	0.0053	<0.0005	<0.0005	<0.0005
	Boron (Filtered)	mg/L	0.01	1.5	0.047	0.076	0.063
	Cadmium (Filtered)	mg/L	0.0001	0.00009	<0.0001	<0.0001	<0.0001
	Chromium (6+)	mg/L	0.0005	-	<0.0005	<0.0005	<0.0005
	Chromium Total (III+VI) (Filtered)	mg/L	0.005	0.0089	<0.005	<0.005	<0.005
	Cobalt (Filtered)	mg/L	0.0005	-	0.00052	<0.0005	<0.0005
	Copper (Filtered)	mg/L	0.001	0.002	0.01	0.0062	0.0032
	Lead (Filtered)	mg/L	0.0005	0.001	0.00084	<0.0005	0.00075
	Mercury	mg/L	0.0001	0.000016	<0.0001	<0.0001	<0.0001
	Molybdenum (Filtered)	mg/L	0.0005	0.073	0.0012	0.0016	0.001
	Nickel (Filtered)	mg/L	0.001	0.025	0.0026	<0.001	<0.001
	Selenium (Filtered)	mg/L	0.002	0.001	<0.002	<0.002	<0.002
	Silver (Filtered)	mg/L	0.0001	0.00025	<0.0001	<0.0001	<0.0001
	Sodium (Filtered)	mg/L	0.1	-	5.6	6.5	5.1
	Thallium (Filtered)	mg/L	0.00005	0.0008	<0.00005	<0.00005	<0.00005
	Uranium (Filtered)	mg/L	0.0001	0.015	0.00078	0.0013	0.00079
	Vanadium (Filtered)	mg/L	0.0005	-	0.0016	<0.0005	<0.0005
	Zinc (Filtered)	mg/L	0.005	0.03	0.0097	<0.005	<0.005

Notes:

Grey shaded cells - exceedance of Federal Interim Groundwater Quality Guidelines - Tier 1, Commercial/Industrial, Coarse

EQL - estimated quantitation limit

mg/L - milligrams per litre

Underline - EQL exceeds guideline

Federal Contaminated Sites Action Plan (FCSAP) Guidance Document on Federal Interim Groundwater Quality Guidelines for Federal Contaminated Sites (2016), Tier 1 Guidelines (Commercial/Indu

							Sample Name	19MW-02	19MW-03
							Sample Date	2019-07-18	2019-07-18
	Parameter	Units	EQL	Draft FEQG for PFOS - GW Final (Ecological Receptors)	Draft FEQG for PFOS - Surface Water	HC Drinking Water Screening Value for PFAS			
Perfluoroalkyl Substances	8:2 Fluorotelomer Sulfonate (8:2 FtS)	mg/L	0.00002	-	-	0.0002		0.00016	<0.00002
	N-Et-FOSA	mg/L	0.00002	-	-	-		<0.00002	<0.00002
	N-Et-FOSE	mg/L	0.00002	-	-	-		<0.00002	<0.00002
	N-Ethyl perfluorooctane sulfonamidoacetic acid	mg/L	0.00002	-	-	-		<0.00002	<0.00002
	N-Me-FOSA	mg/L	0.00002	-	-	-		<0.00002	<0.00002
	N-Methyl perfluorooctane sulfonamidoacetic acid	mg/L	0.00002	-	-	-		<0.00002	<0.00002
	Perfluorobutane Sulfonate (PFBS)	mg/L	0.00002	-	-	0.015		<0.00002	<0.00002
	Perfluorobutanoic acid	mg/L	0.00002	-	-	0.03		0.00012	0.00003
	Perfluorodecane Sulfonate	mg/L	0.00002	-	-	-		<0.00002	<0.00002
	Perfluorodecanoic Acid (PFDA)	mg/L	0.00002	-	-	-		<0.00002	<0.00002
	Perfluorododecanoic Acid (PFDoA)	mg/L	0.00002	-	-	-		<0.00002	<0.00002
	Perfluoroheptane sulfonate	mg/L	0.00002	-	-	-		<0.00002	<0.00002
	Perfluoroheptanoic Acid (PFHpA)	mg/L	0.00002	-	-	0.0002		0.00037	0.000042
	Perfluorohexane Sulfonate (PFHxS)	mg/L	0.00002	-	-	0.0006		<0.00002	0.000036
	Perfluorohexanoic Acid (PFHxA)	mg/L	0.00002	-	-	0.0002		0.00055	0.000055
	Perfluorononanoic Acid (PFNA)	mg/L	0.00002	-	-	0.00002		0.00012	<0.00002
	Perfluorooctane Sulfonamide (PFOSA)	mg/L	0.00002	-	-	-		<0.00002	<0.00002
	Perfluorooctane Sulfonate (PFOS)	mg/L	0.00002	0.0068	0.0068	-		0.00004	0.00026
	Perfluorooctanoic Acid (PFOA)	mg/L	0.00002	-	-	-		0.00032	0.000059
	Perfluoropentanoic Acid (PFPeA)	mg/L	0.00002	-	-	0.0002		0.00099	0.000086
	Perfluorotetradecanoic Acid	mg/L	0.00002	-	-	-		<0.00002	<0.00002
	Perfluorotridecanoic Acid	mg/L	0.00002	-	-	-		<0.00002	<0.00002
	Perfluoroundecanoic Acid (PFUnA)	mg/L	0.00002	-	-	-		<0.00002	<0.00002
	N-Methylperfluorooctanesulfonamidoethanol (N-MeFOSE)	ug/L	0.02	-	-	-		<0.02	<0.02
	Perfluorononanesulfonic acid (PFNS)	ug/L	0.02	-	-	-		<0.02	<0.02
	Perfluoropentansulfonic acid (PFPeS)	ug/L	0.02	-	-	-		<0.02	<0.02
	6:2 Fluorotelomer Sulfonate (6:2 FtS)	mg/L	0.00002	-	-	0.0002		0.0016	0.000046

Notes:
mg/L - milligrams per litre
EQL - estimated quantitation limit
Draft Federal Soil and Groundwater Quality Guideline for PFOS based on a commercial land use scenario as presented in the Government of Canada's "Interim Advice to Federal Custodian Departments for the management of Federal Contaminated Sites Contaioning Perfluorooctane Sulfonate (PFOS) and other Per- and Polyfluoroalkyl Substances (PFAS)", Version 1.4.1, 2018.
Health Canada Water Screening Values for Perfluoroalkylated Substances, 2018.

				Sample Name	SW1	SW2	SW3
				Sample Date	2019-07-16	2019-07-16	2019-07-16
				CCME CWQG for the Protection of Freshwater Aquatic Life - Long Term			
	Parameter	Units	EQL	mg/L			
Petroleum Hydrocarbons (PHCs)	Reached Baseline at C50	-	-	-	YES	YES	YES
	PHC F1 (C6-C10)	mg/L	0.025	-	<0.025	<0.025	<0.025
	PHC F1 (C6-C10) - BTEX	mg/L	0.025	-	<0.025	<0.025	<0.025
	PHC F2 (C10-C16)	mg/L	0.1	-	<0.1	<0.1	<0.1
	PHC F3 (C16-C34)	mg/L	0.2	-	<0.2	<0.2	<0.2
	PHC F4 (C34-C50)	mg/L	0.2	-	<0.2	<0.2	<0.2
BTEX	Benzene	mg/L	0.0002	0.37	<0.0002	<0.0002	<0.0002
	Toluene	mg/L	0.0002	0.002	<0.0002	<0.0002	<0.0002
	Ethylbenzene	mg/L	0.0002	0.09	<0.0002	<0.0002	<0.0002
	Xylene (m & p)	mg/L	0.0002	-	<0.0004	<0.0004	<0.0004
	Xylene (o)	mg/L	0.0002	-	<0.0002	<0.0002	<0.0002
	Xylenes Total	mg/L	0.0002	-	<0.0004	<0.0004	<0.0004
Polycyclic Aromatic Hydrocarbons (PAHs)	1-Methylnaphthalene	mg/L	0.00005	-	<0.00005	<0.00005	<0.00005
	2-Methylnaphthalene	mg/L	0.00005	-	<0.00005	<0.00005	<0.00005
	1 & 2 Methylnaphthalene	mg/L	0.000071	-	<0.000071	<0.000071	<0.000071
	Acenaphthene	mg/L	0.00005	0.0058	<0.00005	<0.00005	<0.00005
	Acenaphthylene	mg/L	0.00005	-	<0.00005	<0.00005	<0.00005
	Anthracene	mg/L	0.00005	0.000012	<0.00005	<0.00005	<0.00005
	Benzo(a)anthracene	mg/L	0.00005	0.000018	<0.00005	<0.00005	<0.00005
	Benzo(a) pyrene	mg/L	0.00001	0.000015	<0.00001	<0.00001	<0.00001
	Benzo(b & k)fluoranthene	mg/L	0.00005	-	<0.00005	<0.00005	<0.00005
	Benzo(g,h,i)perylene	mg/L	0.00005	-	<0.00005	<0.00005	<0.00005
	Benzo(k)fluoranthene	mg/L	0.00005	-	<0.00005	<0.00005	<0.00005
	Chrysene	mg/L	0.00005	-	<0.00005	<0.00005	<0.00005
	Dibenz(a,h)anthracene	mg/L	0.00005	-	<0.00005	<0.00005	<0.00005
	Fluoranthene	mg/L	0.00005	0.00004	<0.00005	<0.00005	<0.00005
	Fluorene	mg/L	0.00005	0.003	<0.00005	<0.00005	<0.00005
	Indeno(1,2,3-c,d)pyrene	mg/L	0.00005	-	<0.00005	<0.00005	<0.00005
	Naphthalene	mg/L	0.00005	0.0011	<0.00005	<0.00005	<0.00005
	Phenanthrene	mg/L	0.00003	0.0004	<0.00003	<0.00003	<0.00003
	Pyrene	mg/L	0.00005	0.000025	<0.00005	<0.00005	<0.00005
Metals	Antimony	mg/L	0.0005	-	<0.0005	<0.0005	<0.0005
	Arsenic	mg/L	0.001	0.005	<0.001	<0.001	<0.001
	Barium	mg/L	0.002	-	0.0028	0.0028	0.0029
	Beryllium	mg/L	0.0005	0.0053	<0.0005	<0.0005	<0.0005
	Boron	mg/L	0.01	1.5	<0.01	<0.01	<0.01
	Cadmium	mg/L	0.0001	0.00009	<0.0001	<0.0001	<0.0001
	Chromium (6+)	mg/L	0.0005	-	<0.0005	<0.0005	<0.0005
	Chromium Total (III+VI) (Filtered)	mg/L	0.005	-	<0.005	<0.005	<0.005
	Cobalt	mg/L	0.0005	-	<0.0005	<0.0005	<0.0005
	Copper	mg/L	0.001	See footnote 1	<0.001	<0.001	<0.001
	Lead	mg/L	0.0005	See footnote 1	<0.0005	<0.0005	<0.0005
	Mercury	mg/L	0.0001	0.000016	<0.0001	<0.0001	<0.0001
	Molybdenum	mg/L	0.0005	0.073	<0.0005	<0.0005	<0.0005
	Nickel	mg/L	0.001	See footnote 1	<0.001	<0.001	<0.001
	Selenium	mg/L	0.002	0.001	<0.002	<0.002	<0.002
	Silver	mg/L	0.0001	0.00025	<0.0001	<0.0001	<0.0001
	Sodium	mg/L	0.1	-	1	1	1.1
	Thallium	mg/L	0.00005	0.0008	<0.00005	<0.00005	<0.00005
	Uranium	mg/L	0.0001	0.015	<0.0001	<0.0001	<0.0001
	Vanadium	mg/L	0.0005	-	<0.0005	<0.0005	<0.0005
	Zinc	mg/L	0.005	0.007	<0.005	<0.005	<0.005

Notes:
1 - Copper, lead, and nickel guidelines vary with hardness. See CCME CWQG
Grey shaded cells - exceedance of CCME Canadian Water Quality Guideline for the Protection of Freshwater Aquatic Life
EQL - estimated quantitation limit
mg/L - milligrams per litre
Underline - EQL exceeds guideline
Federal Contaminated Sites Action Plan (FCSAP) Guidance Document on Federal Interim Groundwater Quality Guidelines for Federal Contaminated Sites (2016), Tier 1 Guidelines (Commercial/Indu

				Sample Name	W-107	W-108	W-109	W-110
				Sample Date	2019-09-06	2019-09-06	2019-09-05	2019-09-05
				Fed Interim GWQG - Tier 1, Commercial/Industrial, Coarse				
	Parameter	Units	EQL	mg/L				
General Chemistry	Bicarbonate	mg/L	1	-	570	77	160	47
	Carbonate	mg/L	1	-	<1	<1	<1	<1
	Hydroxide	mg/L	1	-	<1	<1	<1	<1
	Alkalinity (total) as CaCO3	mg/L	1	-	460	63	130	39
	Phenolphthalein Alkalinity	mg/L	1	-	<1	<1	<1	<1
	Ammonia (as N)	mg/L	0.015	-	0.26	0.023	0.016	0.019
	Kjeldahl Nitrogen Total	mg/L	0.05	-	2.3[1]	0.17	3.4[1]	0.24
	Nitrate (as N) (Filtered)	mg/L	0.01	-	0.018	0.064	<0.01	0.083
	Nitrate (as NO3-) (Filtered)	mg/L	0.044	13	0.08	0.29	<0.044	0.37
	Nitrate + Nitrite (as N)	mg/L	0.014	-	0.17	0.064	<0.014	0.083
	Nitrite (as N) (Filtered)	mg/L	0.01	0.06	0.15	<0.01	<0.01	<0.01
	Nitrite (as NO2-) (Filtered)	mg/L	0.033	-	0.5	<0.033	<0.033	<0.033
	Phosphorus	mg/L	0.1	-	2.3	0.15	0.67	<0.1
	Phosphorus (Filtered)	mg/L	0.1	-	<0.1	<0.1	<0.1	<0.1
	Electrical conductivity (lab)	µS/cm	2	-	3000	140	250	89
	Chloride (Filtered)	mg/L	1	120	80	2	2.3	1.9
	pH (Lab)	pH Unit	-	6.5-9	7.55	7.67	7.88	7.71
	Sulphate (SO4) (Filtered)	mg/L	1	100	1400[1]	4.5	<1	3.8
Calculated Parameters	Hardness (as CaCO3)	mg/L	0.5	-	1900	64	110	40
	Ionic Balance	%	-	-	1.6	2.3	7.2	4.8
	Total Dissolved Solids (TDS) - Calculated	mg/L	10	-	2400	70	120	45
	Anions Total	meq/L	-	-	41	1.4	2.6	0.91
	Cations Total	meq/L	-	-	40	1.4	2.3	0.83
Metals	Aluminium (Filtered)	mg/L	0.003	0.005	0.0044	0.0083	0.015	0.014
	Antimony (Filtered)	mg/L	0.0006	2	0.0023	<0.0006	0.00087	<0.0006
	Arsenic (Filtered)	mg/L	0.0002	0.005	0.00036	<0.0002	<0.0002	<0.0002
	Barium (Filtered)	mg/L	0.01	2.9	0.059	<0.01	0.017	<0.01
	Beryllium (Filtered)	mg/L	0.001	0.0053	<0.001	<0.001	<0.001	<0.001
	Boron (Filtered)	mg/L	0.02	1.5	<0.02	<0.02	<0.02	<0.02
	Cadmium (Filtered)	mg/L	0.00002	0.00009	0.00014	0.000025	0.0007	<0.00002
	Calcium (Filtered)	mg/L	0.3	-	260	21	40	12
	Chromium Total (III+VI) (Filtered)	mg/L	0.001	0.0089	<0.001	<0.001	<0.001	<0.001
	Cobalt (Filtered)	mg/L	0.0003	-	0.011	<0.0003	<0.0003	<0.0003
	Copper (Filtered)	mg/L	0.0002	0.002	0.0047	0.0039	0.0074	0.0039
	Iron (Filtered)	mg/L	0.06	0.3	0.63	<0.06	<0.06	<0.06
	Lead (Filtered)	mg/L	0.0002	0.001	0.00023	<0.0002	<0.0002	<0.0002
	Lithium (Filtered)	mg/L	0.02	-	<0.02	<0.02	<0.02	<0.02
	Magnesium (Filtered)	mg/L	0.2	-	310	2.7	2.8	2.3
	Manganese (Filtered)	mg/L	0.004	-	8.1	0.009	0.014	0.012
	Molybdenum (Filtered)	mg/L	0.0002	0.073	0.003	0.0005	0.00081	0.00038
	Nickel (Filtered)	mg/L	0.0005	0.025	0.0094	0.0048	0.0011	<0.0005
	Potassium (Filtered)	mg/L	0.3	-	4.3	0.44	0.6	<0.3
	Selenium (Filtered)	mg/L	0.0002	0.001	<0.0002	<0.0002	<0.0002	<0.0002
	Silicon (Filtered)	mg/L	0.1	-	7.7	2.8	2.3	2.1
	Silver (Filtered)	mg/L	0.0001	0.00025	<0.0001	<0.0001	<0.0001	<0.0001
	Sodium (Filtered)	mg/L	0.5	-	22	1.3	1.1	0.83
	Strontium (Filtered)	mg/L	0.02	-	0.54	0.043	0.055	0.02
	Sulphur (as S) (Filtered)	mg/L	0.2	-	470	1.5	0.53	1.1
	Thallium (Filtered)	mg/L	0.0002	0.0008	<0.0002	<0.0002	<0.0002	<0.0002
	Tin (Filtered)	mg/L	0.001	-	<0.001	<0.001	<0.001	<0.001
	Titanium (Filtered)	mg/L	0.001	0.1	<0.001	<0.001	<0.001	<0.001
	Uranium (Filtered)	mg/L	0.0001	0.015	0.012	<0.0001	0.00024	<0.0001
	Vanadium (Filtered)	mg/L	0.001	-	<0.001	<0.001	<0.001	<0.001
	Zinc (Filtered)	mg/L	0.003	0.03	0.0072	0.0039	0.0043	0.0036

Notes:

[1] Detection limits raised due to dilution to bring analyte within the calibrated range.

Grey shaded cells - exceedance of Federal Interim Groundwater Quality Guidelines - Tier 1, Commercial/Industrial, Coarse

mg/L - milligrams per litre

EQL - estimated quantitation limit

Underline - EQL exceeds guideline

				Sample Name	W-111
				Sample Date	2019-09-05
				Fed Interim GWQG - Tier 1, Commercial/Industrial, Coarse	
	Parameter	Units	EQL	mg/L	
General Chemistry	Bicarbonate	mg/L	1	-	73
	Carbonate	mg/L	1	-	<1
	Hydroxide	mg/L	1	-	<1
	Alkalinity (total) as CaCO3	mg/L	1	-	60
	Phenolphthalein Alkalinity	mg/L	1	-	<1
	Ammonia (as N)	mg/L	0.015	-	0.03
	Kjeldahl Nitrogen Total	mg/L	0.05	-	14[1]
	Nitrate (as N) (Filtered)	mg/L	0.01	-	0.044
	Nitrate (as NO3-) (Filtered)	mg/L	0.044	13	0.2
	Nitrate + Nitrite (as N)	mg/L	0.014	-	0.044
	Nitrite (as N) (Filtered)	mg/L	0.01	0.06	<0.01
	Nitrite (as NO2-) (Filtered)	mg/L	0.033	-	<0.033
	Phosphorus	mg/L	0.1	-	5.1
	Phosphorus (Filtered)	mg/L	0.1	-	<0.1
	Electrical conductivity (lab)	µS/cm	2	-	130
	Chloride (Filtered)	mg/L	1	120	1.3
	pH (Lab)	pH Unit	-	6.5-9	8.11
	Sulphate (SO4) (Filtered)	mg/L	1	100	3.3
Calculated Parameters	Hardness (as CaCO3)	mg/L	0.5	-	56
	Ionic Balance	%	-	-	5.1
	Total Dissolved Solids (TDS) - Calculated	mg/L	10	-	63
	Anions Total	meq/L	-	-	1.3
	Cations Total	meq/L	-	-	1.2
Metals	Aluminium (Filtered)	mg/L	0.003	0.005	0.014
	Antimony (Filtered)	mg/L	0.0006	2	<0.0006
	Arsenic (Filtered)	mg/L	0.0002	0.005	<0.0002
	Barium (Filtered)	mg/L	0.01	2.9	<0.01
	Beryllium (Filtered)	mg/L	0.001	0.0053	<0.001
	Boron (Filtered)	mg/L	0.02	1.5	<0.02
	Cadmium (Filtered)	mg/L	0.00002	0.00009	0.00003
	Calcium (Filtered)	mg/L	0.3	-	20
	Chromium Total (III+VI) (Filtered)	mg/L	0.001	0.0089	<0.001
	Cobalt (Filtered)	mg/L	0.0003	-	<0.0003
	Copper (Filtered)	mg/L	0.0002	0.002	0.004
	Iron (Filtered)	mg/L	0.06	0.3	<0.06
	Lead (Filtered)	mg/L	0.0002	0.001	<0.0002
	Lithium (Filtered)	mg/L	0.02	-	<0.02
	Magnesium (Filtered)	mg/L	0.2	-	1.4
	Manganese (Filtered)	mg/L	0.004	-	0.011
	Molybdenum (Filtered)	mg/L	0.0002	0.073	0.0013
	Nickel (Filtered)	mg/L	0.0005	0.025	<0.0005
	Potassium (Filtered)	mg/L	0.3	-	0.37
	Selenium (Filtered)	mg/L	0.0002	0.001	<0.0002
	Silicon (Filtered)	mg/L	0.1	-	3.4
	Silver (Filtered)	mg/L	0.0001	0.00025	<0.0001
	Sodium (Filtered)	mg/L	0.5	-	1.1
	Strontium (Filtered)	mg/L	0.02	-	0.029
	Sulphur (as S) (Filtered)	mg/L	0.2	-	1.2
	Thallium (Filtered)	mg/L	0.0002	0.0008	<0.0002
	Tin (Filtered)	mg/L	0.001	-	<0.001
	Titanium (Filtered)	mg/L	0.001	0.1	<0.001
	Uranium (Filtered)	mg/L	0.0001	0.015	0.00019
	Vanadium (Filtered)	mg/L	0.001	-	<0.001
	Zinc (Filtered)	mg/L	0.003	0.03	0.0032

Notes:

[1] Detection limits raised due to dilution to bring analyte within the calibrated range.

Grey shaded cells - exceedance of Federal Interim Groundwater Quality Guidelines - Tier 1, Commercial/Industrial, Coarse

mg/L - milligrams per litre

EQL - estimated quantitation limit

Underline - EQL exceeds guideline

				Sample Name	WS-100	WS-101	WS-102
				Sample Date	2019-09-06	2019-09-06	2019-09-06
				CCME CWQG for the Protection of Freshwater Aquatic Life - Long Term			
	Parameter	Units	EQL	mg/L			
General Chemistry	Bicarbonate	mg/L	1	-	33	84	53
	Carbonate	mg/L	1	-	<1	<1	<1
	Hydroxide	mg/L	1	-	<1	<1	<1
	Alkalinity (total) as CaCO3	mg/L	1	-	27	69	44
	Phenolphthalein Alkalinity	mg/L	1	-	<1	<1	<1
	Ammonia (as N)	mg/L	0.015	See footnote 1	0.023	0.022	<0.015
	Kjeldahl Nitrogen Total	mg/L	0.05	-	0.13	0.3	0.1
	Nitrate (as N) (Filtered)	mg/L	0.01	-	<0.01	<0.01	<0.01
	Nitrate (as NO3-) (Filtered)	mg/L	0.044	13	<0.044	<0.044	<0.044
	Nitrate + Nitrite (as N)	mg/L	0.014	-	<0.014	<0.014	<0.014
	Nitrite (as N) (Filtered)	mg/L	0.01		<0.01	<0.01	<0.01
	Nitrite (as NO2-) (Filtered)	mg/L	0.033		<0.033	<0.033	<0.033
	Phosphorus	mg/L	0.1	-	<0.1	<0.1	<0.1
	Phosphorus (Filtered)	mg/L	0.1	-	-	-	-
	Electrical conductivity (lab)	µS/cm	2	-	61	160	96
	Chloride (Filtered)	mg/L	1	120	1.9	2.3	<1
	pH (Lab)	pH Unit	-		7.72	8.03	7.77
	Sulphate (SO4) (Filtered)	mg/L	1		2.8	8.5	4
Calculated Parameters	Hardness (as CaCO3)	mg/L	0.5	-	27	75	46
	Ionic Balance	%	-	-	6.6	2	0.83
	Total Dissolved Solids (TDS) - Calculated	mg/L	10	-	32	83	48
	Anions Total	meq/L	-	-	0.65	1.6	0.96
	Cations Total	meq/L	-	-	0.57	1.6	0.94
Metals	Aluminium	mg/L	0.003	0.1 (see footnote 2)	0.029	0.0097	0.0063
	Antimony	mg/L	0.0006	-	<0.0006	<0.0006	<0.0006
	Arsenic	mg/L	0.0002	0.005	<0.0002	<0.0002	<0.0002
	Barium	mg/L	0.01	-	<0.01	<0.01	<0.01
	Beryllium	mg/L	0.001	-	<0.001	<0.001	<0.001
	Boron	mg/L	0.02	1.5	<0.02	<0.02	<0.02
	Cadmium	mg/L	0.00002	0.00009	<0.00002	<0.00002	<0.00002
	Calcium	mg/L	0.3	-	8.4	25	15
	Chromium Total (III+VI)	mg/L	0.001	-	<0.001	<0.001	<0.001
	Cobalt	mg/L	0.0003	-	<0.0003	<0.0003	<0.0003
	Copper	mg/L	0.0002	See footnote 3	0.00044	0.00064	0.00069
	Iron	mg/L	0.06	0.3	<0.06	0.097	<0.06
	Lead	mg/L	0.0002	See footnote 3	<0.0002	<0.0002	<0.0002
	Lithium	mg/L	0.02	-	<0.02	<0.02	<0.02
	Magnesium	mg/L	0.2	-	0.78	1.8	1.4
	Manganese	mg/L	0.004	-	<0.004	<0.004	<0.004
	Molybdenum	mg/L	0.0002	0.073	<0.0002	0.00023	0.00023
	Nickel	mg/L	0.0005	See footnote 3	<0.0005	<0.0005	<0.0005
	Potassium	mg/L	0.3	-	<0.3	0.3	<0.3
	Selenium	mg/L	0.0002	0.001	<0.0002	<0.0002	<0.0002
	Silicon	mg/L	0.1	-	1.1	2.1	1.3
	Silver	mg/L	0.0001	0.00025	<0.0001	<0.0001	<0.0001
	Sodium	mg/L	0.5	-	0.59	1.2	0.75
	Strontium	mg/L	0.02	-	<0.02	0.035	0.021
	Sulphur (as S)	mg/L	0.2	-	0.85	2.7	1.3
	Thallium	mg/L	0.0002	0.0008	<0.0002	<0.0002	<0.0002
	Tin	mg/L	0.001	-	<0.001	<0.001	<0.001
	Titanium	mg/L	0.001	-	<0.001	<0.001	<0.001
	Uranium	mg/L	0.0001	0.015	<0.0001	<0.0001	<0.0001
	Vanadium	mg/L	0.001	-	<0.001	<0.001	<0.001
	Zinc	mg/L	0.003	0.007	<0.003	<0.003	<0.003

Notes:

1 - Ammonia guideline varies with pH and temperature. See Ammonia Factsheet (CCME CWQG)

2 - Aluminum guideline varies with pH. See CCME CWQG

3 - Copper, lead, and nickel guidelines vary with hardness. See CCME CWQG

Grey shaded cells - exceedance of CCME Canadian Water Quality Guideline for the Protection of Freshwater Aquatic Life

mg/L - milligrams per litre

EQL - estimated quantitation limit

Underline - EQL exceeds guideline

SDG	B9K5175	B9K5175	
Field ID	TP1	QAQC01	**RPD**
Sampled Date/Time	2019-07-18 14:25	2019-07-18 14:25	

Chem_Group	ChemName	Units	EQL			
Petroleum Hydrocarbons (PHCs)	Reached Baseline at C50	-		1	1	0
	PHC F1 (C6-C10)	mg/kg	10	<10	<10	0
	PHC F1 (C6-C10) - BTEX	mg/kg	10	<10	<10	0
	PHC F2 (C10-C16)	mg/kg	10	<10	<10	0
	PHC F3 (C16-C34)	mg/kg	50	<50	<50	0
	PHC F4 (C34-C50)	mg/kg	50	<50	<50	0
Sample Preparation	Moisture Content (dried @ 103°C)	mg/kg	1000	5100	5400	6
BTEX	Benzene	mg/kg	0.02	<0.02	<0.02	0
	Toluene	mg/kg	0.02	<0.02	<0.02	0
	Ethylbenzene	mg/kg	0.02	<0.02	<0.02	0
	Xylene (m & p)	mg/kg	0.04	<0.04	<0.04	0
	Xylene (o)	mg/kg	0.02	<0.02	<0.02	0
	Xylenes Total	mg/kg	0.04	<0.04	<0.04	0
Polycyclic Aromatic Hydrocarbons (PAHs)	1-Methylnaphthalene	mg/kg	0.005	<0.005	<0.005	0
	2-Methylnaphthalene	mg/kg	0.005	<0.005	<0.005	0
	1 & 2 Methylnaphthalene	mg/kg	0.0071	<0.0071	<0.0071	0
	Acenaphthene	mg/kg	0.005	<0.005	<0.005	0
	Acenaphthylene	mg/kg	0.005	<0.005	<0.005	0
	Anthracene	mg/kg	0.005	<0.005	<0.005	0
	Benzo(a)anthracene	mg/kg	0.005	<0.005	<0.005	0
	Benzo(a) pyrene	mg/kg	0.005	<0.005	<0.005	0
	Benzo(b & k)fluoranthene	mg/kg	0.005	<0.005	<0.005	0
	Benzo(g,h,i)perylene	mg/kg	0.005	<0.005	<0.005	0
	Benzo(k)fluoranthene	mg/kg	0.005	<0.005	<0.005	0
	Chrysene	mg/kg	0.005	<0.005	<0.005	0
	Dibenz(a,h)anthracene	mg/kg	0.005	<0.005	<0.005	0
	Fluoranthene	mg/kg	0.005	<0.005	<0.005	0
	Fluorene	mg/kg	0.005	<0.005	<0.005	0
	Indeno(1,2,3-c,d)pyrene	mg/kg	0.005	<0.005	<0.005	0
	Naphthalene	mg/kg	0.005	<0.005	<0.005	0
	Phenanthrene	mg/kg	0.005	<0.005	<0.005	0
	Pyrene	mg/kg	0.005	<0.005	<0.005	0

*RPDs have only been considered where a concentration is greater than 1 times the EQL.

**High RPDs are in bold (Acceptable RPDs for each EQL multiplier range are: 80 (1-10 x EQL); 50 (10-30 x EQL); 30 (> 30 x EQL))

***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laborat

SDG	M086514,M046197	M086514,M046197	RPD	M086514,M046197	M086514,M046197	RPD	M086514,M046197	M086514,M046197	RPD
Field ID	W-110	QA/QC 2		WS-100	QA/QC 3		WS-102	QA/QC 4	
Sampled Date/Time	2019-09-05	2019-09-05		2019-09-06 10:00	2019-09-06 10:00		2019-09-06	2019-09-06	

Chem_Group	ChemName	Units	EQL									
General Chemistry	Bicarbonate	mg/l	1	47	48	2	**33**	**<1**	**188**	53	55	4
	Carbonate	mg/l	1	<1	<1	0	<1	<1	0	<1	<1	0
	Hydroxide	mg/l	1	<1	<1	0	<1	<1	0	<1	<1	0
	Alkalinity (total) as CaCO3	mg/l	1	39	39	0	**27**	**<1**	**186**	44	45	2
	Phenolphthalein Alkalinity	mg/l	1	<1	<1	0	<1	<1	0	<1	<1	0
	Ammonia (as N)	mg/l	0.015	0.019	0.016	17	0.023	0.022	4	**<0.015**	**0.046**	**102**
	Kjeldahl Nitrogen Total	mg/l	0.05	0.24	0.19	23	**0.13**	**<0.05**	**89**	0.1	0.1	0
	Nitrate (as N) (Filtered)	mg/l	0.01	0.083	0.082	1	<0.01	<0.01	0	<0.01	<0.01	0
	Nitrate (as NO3-) (Filtered)	mg/l	0.044	0.37	0.36	3	<0.044	<0.044	0	<0.044	<0.044	0
	Nitrate + Nitrite (as N)	mg/l	0.014	0.083	0.082	1	<0.014	<0.014	0	<0.014	<0.014	0
	Nitrite (as N) (Filtered)	mg/l	0.01	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0
	Nitrite (as NO2-) (Filtered)	mg/l	0.033	<0.033	<0.033	0	<0.033	<0.033	0	<0.033	<0.033	0
	Phosphorus	mg/l	0.1	<0.1	0.1	0	<0.1	<0.1	0	<0.1	<0.1	0
	Phosphorus (Filtered)	mg/l	0.1	<0.1	<0.1	0						
	Electrical conductivity (lab)	µS/cm	2	89	87	2	**61**	**<2**	**187**	96	100	4
	Chloride (Filtered)	mg/l	1	1.9	1.4	30	1.9	<1	62	<1	1.3	26
	pH (Lab)	pH Unit		7.71	7.7	0	7.72	5.74	29	7.77	7.87	1
	Sulphate (SO4) (Filtered)	mg/l	1	3.8	3.8	0	**2.8**	**<1**	**95**	4	4	0
Calculated Parameters	Hardness (as CaCO3)	mg/l	0.5	40	40	0	**27**	**<0.5**	**193**	46	46	0
	Ionic Balance	%		4.8	4.1	16				0.83	3.5	123
	Total Dissolved Solids (TDS) - Calculated	mg/l	10	45	44	2	**32**	**<10**	**105**	48	50	4
	Anions Total	meq/L		0.91	0.91	0	0.65	0.0E0	200	0.96	1	4
	Cations Total	meq/L		0.83	0.84	1	0.57	0.003	198	0.94	0.95	1
Metals	Aluminium	mg/l	0.003	3.9	4	3	**0.029**	**0.0041**	**150**	0.0063	0.0081	25
	Aluminium (Filtered)	mg/l	0.003	0.014	0.014	0						
	Antimony	mg/l	0.0006	<0.0006	<0.0006	0	<0.0006	<0.0006	0	<0.0006	<0.0006	0
	Antimony (Filtered)	mg/l	0.0006	<0.0006	<0.0006	0						
	Arsenic	mg/l	0.0002	0.00073	0.00064	13	<0.0002	<0.0002	0	<0.0002	<0.0002	0
	Arsenic (Filtered)	mg/l	0.0002	<0.0002	<0.0002	0						
	Barium	mg/l	0.01	0.035	0.036	3	<0.01	<0.01	0	<0.01	<0.01	0
	Barium (Filtered)	mg/l	0.01	<0.01	<0.01	0						
	Beryllium	mg/l	0.001	<0.001	<0.001	0	<0.001	<0.001	0	<0.001	<0.001	0
	Beryllium (Filtered)	mg/l	0.001	<0.001	<0.001	0						
	Boron	mg/l	0.02	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0
	Boron (Filtered)	mg/l	0.02	<0.02	<0.02	0						
	Cadmium	mg/l	2e-005	0.000054	0.000056	4	<0.00002	<0.00002	0	<0.00002	<0.00002	0
	Cadmium (Filtered)	mg/l	2e-005	<0.00002	<0.00002	0						
	Calcium	mg/l	0.3	13	13	0	**8.4**	**<0.3**	**186**	15	15	0
	Calcium (Filtered)	mg/l	0.3	12	12	0	**9.4**	**<0.3**	**188**	16	16	0
	Chromium Total (III+VI)	mg/l	0.001	0.0058	0.0062	7	<0.001	<0.001	0	<0.001	<0.001	0
	Chromium Total (III+VI) (Filtered)	mg/l	0.001	<0.001	<0.001	0						
	Cobalt	mg/l	0.0003	0.0031	0.003	3	<0.0003	<0.0003	0	<0.0003	<0.0003	0
	Cobalt (Filtered)	mg/l	0.0003	<0.0003	<0.0003	0						
	Copper	mg/l	0.0002	0.014	0.014	0	0.00044	0.00023	63	0.00069	0.00074	7
	Copper (Filtered)	mg/l	0.0002	**0.0039**	**0.0011**	**112**						
	Iron	mg/l	0.06	7.8	7.8	0	<0.06	<0.06	0	<0.06	<0.06	0
	Iron (Filtered)	mg/l	0.06	<0.06	<0.06	0	<0.06	<0.06	0	<0.06	<0.06	0

			SDG Field ID Sampled Date/Time	M086514,M046197 W-110 2019-09-05	M086514,M046197 QA/QC 2 2019-09-05	RPD	M086514,M046197 WS-100 2019-09-06 10:00	M086514,M046197 QA/QC 3 2019-09-06 10:00	RPD	M086514,M046197 WS-102 2019-09-06	M086514,M046197 QA/QC 4 2019-09-06	RPD
	Lead	mg/l	0.0002	0.0029	0.003	3	<0.0002	<0.0002	0	<0.0002	<0.0002	0
	Lead (Filtered)	mg/l	0.0002	<0.0002	<0.0002	0						
	Lithium	mg/l	0.02	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0
	Lithium (Filtered)	mg/l	0.02	<0.02	<0.02	0						
	Magnesium	mg/l	0.2	4.2	4.2	0	**0.78**	**<0.2**	**118**	1.4	1.4	0
	Magnesium (Filtered)	mg/l	0.2	2.3	2.3	0	**0.87**	**<0.2**	**125**	1.4	1.5	7
	Manganese	mg/l	0.004	0.18	0.18	0	<0.004	<0.004	0	<0.004	<0.004	0
	Manganese (Filtered)	mg/l	0.004	0.012	0.012	0	<0.004	<0.004	0	<0.004	<0.004	0
	Molybdenum	mg/l	0.0002	0.00047	0.00048	2	<0.0002	<0.0002	0	0.00023	0.00025	8
	Molybdenum (Filtered)	mg/l	0.0002	0.00038	0.00032	17						
	Nickel	mg/l	0.0005	0.0064	0.0064	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0
	Nickel (Filtered)	mg/l	0.0005	<0.0005	<0.0005	0						
	Potassium	mg/l	0.3	0.88	0.87	1	<0.3	<0.3	0	<0.3	<0.3	0
	Potassium (Filtered)	mg/l	0.3	<0.3	<0.3	0	<0.3	<0.3	0	<0.3	<0.3	0
	Selenium	mg/l	0.0002	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.0002	0
	Selenium (Filtered)	mg/l	0.0002	<0.0002	<0.0002	0						
	Silicon	mg/l	0.1	8.4	8.3	1	**1.1**	**<0.1**	**167**	1.3	1.3	0
	Silicon (Filtered)	mg/l	0.1	2.1	2.1	0						
	Silver	mg/l	0.0001	<0.0001	<0.0001	0	<0.0001	<0.0001	0	<0.0001	<0.0001	0
	Silver (Filtered)	mg/l	0.0001	<0.0001	<0.0001	0						
	Sodium	mg/l	0.5	1	1	0	0.59	<0.5	17	0.75	0.74	1
	Sodium (Filtered)	mg/l	0.5	0.83	0.84	1	0.66	<0.5	28	0.8	0.8	0
	Strontium	mg/l	0.02	0.026	0.026	0	<0.02	<0.02	0	0.021	0.021	0
	Strontium (Filtered)	mg/l	0.02	0.02	<0.02	0						
	Sulphur (as S)	mg/l	0.2	1.2	1.1	9	**0.85**	**<0.2**	**124**	1.3	1.3	0
	Sulphur (as S) (Filtered)	mg/l	0.2	1.1	1.1	0						
	Thallium	mg/l	0.0002	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.0002	0
	Thallium (Filtered)	mg/l	0.0002	<0.0002	<0.0002	0						
	Tin	mg/l	0.001	<0.001	<0.001	0	<0.001	<0.001	0	<0.001	<0.001	0
	Tin (Filtered)	mg/l	0.001	<0.001	<0.001	0						
	Titanium	mg/l	0.001	0.2	0.19	5	<0.001	0.0012	18	<0.001	<0.001	0
	Titanium (Filtered)	mg/l	0.001	<0.001	0.0012	18						
	Uranium	mg/l	0.0001	0.00014	0.00026	60	<0.0001	<0.0001	0	<0.0001	<0.0001	0
	Uranium (Filtered)	mg/l	0.0001	<0.0001	<0.0001	0						
	Vanadium	mg/l	0.001	0.007	0.0067	4	<0.001	<0.001	0	<0.001	<0.001	0
	Vanadium (Filtered)	mg/l	0.001	<0.001	<0.001	0						
	Zinc	mg/l	0.003	0.031	0.032	3	<0.003	<0.003	0	<0.003	<0.003	0
	Zinc (Filtered)	mg/l	0.003	0.0036	<0.003	18						

*RPDs have only been considered where a concentration is greater than 1 times the EQL.

**High RPDs are in bold (Acceptable RPDs for each EQL multiplier range are: 80 (1-10 x EQL); 50 (10-30 x EQL); 30 (> 30 x EQL))

***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

Appendix A

Borehole Logs

Dillon Consulting Limited
200 - 334 11 Ave SE
Calgary, Alberta, T2G 0Y2
Telephone: 403.215.8880
Fax: 403.215.8889

19MW-01

Client: City of Iqaluit
Project No.: 19-9543
Drilling Co.: Nunavut Excavating
Supervised by: A.Hounsell

Project: Iqaluit WTS and Landfill Design
Location: City of Iqaluit
Drilling Method: Test Pitting
Date Started: 18-Jul-19 Date Completed: 18-Jul-19

Depth Scale (m)	Stratigraphic Description	Lithology	Depth (m)	Well Construction	Sample: Method	Sample: Number	Sample: VOC	Depth Scale (m)
1.0	Gravel fill with large cobbles mixed throughout from surface to test pit completion or rejection.		1.58	Stick-up (m): 0.56 Below ground riser. Screened section.				1.0

DILLON MW IQALUIT WTS LOGS.GPJ DILLON TEMPLATE.GDT 19-10-16

LITHOLOGY SYMBOLS Gravel

METHOD SYMBOLS

Dillon Consulting Limited
200 - 334 11 Ave SE
Calgary, Alberta, T2G 0Y2
Telephone: 403.215.8880
Fax: 403.215.8889

19MW-02

Client: City of Iqaluit
Project No.: 19-9543
Drilling Co.: Nunavut Excavating
Supervised by: A.Hounsell

Project: Iqaluit WTS and Landfill Design
Location: City of Iqaluit
Drilling Method: Test Pitting
Date Started: 18-Jul-19 Date Completed: 18-Jul-19

Depth Scale (m)	Stratigraphic Description	Lithology	Depth (m)	Well Construction	Sample: Method	Sample: Number	Sample: VOC	Depth Scale (m)
	Gravel fill with large cobbles mixed throughout from surface to test pit completion or rejection.			Stick-up (m): 1.22 Below ground riser. Screened section.				
1.0								1.0
			1.33					

LITHOLOGY SYMBOLS: Gravel

METHOD SYMBOLS

DILLON MW IQALUIT WTS LOGS.GPJ DILLON TEMPLATE.GDT 19-10-16

Dillon Consulting Limited
200 - 334 11 Ave SE
Calgary, Alberta, T2G 0Y2
Telephone: 403.215.8880
Fax: 403.215.8889

19MW-03

Client: City of Iqaluit
Project No.: 19-9543
Drilling Co.: Nunavut Excavating
Supervised by: A.Hounsell

Project: Iqaluit WTS and Landfill Design
Location: City of Iqaluit
Drilling Method: Test Pitting
Date Started: 18-Jul-19 Date Completed: 18-Jul-19

Depth Scale (m)	Stratigraphic Description	Lithology	Depth (m)	Well Construction	Sample: Method	Sample: Number	Sample: VOC	Depth Scale (m)
	Gravel fill with large cobbles mixed throughout from surface to test pit completion or rejection.			Stick-up (m): 1.05 Below ground riser. Screened section.				
1.0								1.0
			1.49					

DILLON MW IQALUIT WTS LOGS.GPJ DILLON TEMPLATE.GDT 19-10-16

LITHOLOGY SYMBOLS Gravel

METHOD SYMBOLS

Dillon Consulting Limited
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Calgary, Alberta, T2G 0Y2
Telephone: 403.215.8880
Fax: 403.215.8889

19MW-04

Client: City of Iqaluit
Project No.: 19-9543
Drilling Co.: Nunavut Excavating
Supervised by: A.Hounsell

Project: Iqaluit WTS and Landfill Design
Location: City of Iqaluit
Drilling Method: Test Pitting
Date Started: 18-Jul-19 Date Completed: 18-Jul-19

Depth Scale (m)	Stratigraphic Description	Lithology	Depth (m)	Well Construction	Sample: Method	Sample: Number	Sample: VOC	Depth Scale (m)
0	Gravel fill with large cobbles mixed throughout from surface to test pit completion or rejection.			Stick-up (m): 1.33				0
				Below ground riser.				
1.0								1.0
				Screened section.				
2.0								2.0
			2.14					

DILLON MW IQALUIT WTS LOGS.GPJ DILLON TEMPLATE.GDT 19-10-16

LITHOLOGY SYMBOLS: Gravel

METHOD SYMBOLS

Dillon Consulting Limited
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Calgary, Alberta, T2G 0Y2
Telephone: 403.215.8880
Fax: 403.215.8889

19MW-05

Client: City of Iqaluit
Project No.: 19-9543
Drilling Co.: Nunavut Excavating
Supervised by: A.Hounsell

Project: Iqaluit WTS and Landfill Design
Location: City of Iqaluit
Drilling Method: Test Pitting
Date Started: 18-Jul-19 Date Completed: 18-Jul-19

Depth Scale (m)	Stratigraphic Description	Lithology	Depth (m)	Well Construction	Sample: Method	Sample: Number	Sample: VOC	Depth Scale (m)
	Gravel fill with large cobbles mixed throughout from surface to test pit completion or rejection.			Stick-up (m): 1.19				
				Below ground riser.				
1.0								1.0
				Screened section.				
2.0								2.0
			2.28					

LITHOLOGY SYMBOLS: Gravel

METHOD SYMBOLS

DILLON MW IQALUIT WTS LOGS.GPJ DILLON TEMPLATE.GDT 19-10-16

Appendix B

Laboratory Certificate of Analyses

Your Project #: 19-9543
Your C.O.C. #: 727706-01-01

Attention: Andrew Hounsell

Dillon Consulting Limited
334 - 11th Ave SE
Suite 200
Calgary, AB
CANADA T2G 0Y2

Report Date: 2019/08/09
Report #: R5831866
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9K5175
Received: 2019/07/24, 11:45

Sample Matrix: Soil
Samples Received: 18

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Methylnaphthalene Sum (1)	15	N/A	2019/07/31	CAM SOP-00301	EPA 8270D m
1,3-Dichloropropene Sum (1)	3	N/A	2019/07/30		EPA 8260C m
Petroleum Hydro. CCME F1 & BTEX in Soil (1, 2)	1	N/A	2019/07/29	CAM SOP-00315	CCME PHC-CWS m
Petroleum Hydro. CCME F1 & BTEX in Soil (1, 2)	11	N/A	2019/07/30	CAM SOP-00315	CCME PHC-CWS m
Petroleum Hydrocarbons F2-F4 in Soil (1, 3)	15	2019/07/29	2019/07/30	CAM SOP-00316	CCME CWS m
Glycols in Soil by GC-FID (1)	4	N/A	2019/07/29	CAM SOP-00322	EPA 8015 m
Moisture (1)	3	N/A	2019/07/26	CAM SOP-00445	Carter 2nd ed 51.2 m
Moisture (1)	15	N/A	2019/07/27	CAM SOP-00445	Carter 2nd ed 51.2 m
PAH Compounds in Soil by GC/MS (SIM) (1)	15	2019/07/30	2019/07/31	CAM SOP-00318	EPA 8270D m
PFAS in soil by SPE/LCMS (1, 4)	5	2019/08/02	2019/08/04	CAM SOP-00894	ASTM D7968-17a m
Volatile Organic Compounds and F1 PHCs (1)	2	N/A	2019/07/27	CAM SOP-00230	EPA 8260C m
Volatile Organic Compounds and F1 PHCs (1)	1	N/A	2019/07/29	CAM SOP-00230	EPA 8260C 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.
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.

Your Project #: 19-9543
Your C.O.C. #: 727706-01-01

Attention: Andrew Hounsell

Dillon Consulting Limited
334 - 11th Ave SE
Suite 200
Calgary, AB
CANADA T2G 0Y2

Report Date: 2019/08/09
Report #: R5831866
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9K5175

Received: 2019/07/24, 11:45

* 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 Mississauga

(2) No lab extraction date is given for F1BTEX & VOC samples that are field preserved with methanol. Extraction date is the date sampled unless otherwise stated.

(3) All CCME PHC results met required criteria unless otherwise stated in the report. The CWS PHC methods employed by Bureau Veritas Laboratories conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following "Alberta Environment's Interpretation of the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil Validation of Performance-Based Alternative Methods September 2003". Documentation is available upon request. Modifications from Reference Method for the Canada-wide Standard for Petroleum Hydrocarbons in Soil-Tier 1 Method: F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction.

(4) Per- and polyfluoroalkyl substances (PFAS) identified as surrogates on the certificate of analysis represent the extracted internal standard.

Encryption Key



Christine Gripton
Senior Project Manager
09 Aug 2019 13:31:48

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Christine Gripton, Senior Project Manager
Email: Christine.Gripton@bvlabs.com
Phone# (519)652-9444

==========

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.

O.REG 153 PAHS (SOIL)

BV Labs ID		KIY529			KIY530		KIY531		
Sampling Date		2019/07/17 10:05			2019/07/17 10:30		2019/07/17 10:50		
COC Number		727706-01-01			727706-01-01		727706-01-01		
	UNITS	SS01	RDL	QC Batch	SS02	RDL	SS03	RDL	QC Batch
Inorganics									
Moisture	%				2.4	1.0	2.9	1.0	6250990
Calculated Parameters									
Methylnaphthalene, 2-(1-)	ug/g	<0.0071	0.0071	6248794	<0.0071	0.0071	1.4	0.071	6248794
Polyaromatic Hydrocarbons									
Acenaphthene	ug/g	<0.0050	0.0050	6255270	0.0056	0.0050	3.4	0.050	6255270
Acenaphthylene	ug/g	<0.0050	0.0050	6255270	<0.0050	0.0050	<0.050	0.050	6255270
Anthracene	ug/g	<0.0050	0.0050	6255270	0.013	0.0050	7.2	0.050	6255270
Benzo(a)anthracene	ug/g	<0.0050	0.0050	6255270	0.026	0.0050	7.2	0.050	6255270
Benzo(a)pyrene	ug/g	<0.0050	0.0050	6255270	0.029	0.0050	5.1	0.050	6255270
Benzo(b/j)fluoranthene	ug/g	<0.0050	0.0050	6255270	0.030	0.0050	6.0	0.050	6255270
Benzo(g,h,i)perylene	ug/g	<0.0050	0.0050	6255270	0.061	0.0050	2.4	0.050	6255270
Benzo(k)fluoranthene	ug/g	<0.0050	0.0050	6255270	0.011	0.0050	2.5	0.050	6255270
Chrysene	ug/g	0.012	0.0050	6255270	0.019	0.0050	5.0	0.050	6255270
Dibenz(a,h)anthracene	ug/g	<0.0050	0.0050	6255270	<0.0050	0.0050	0.84	0.050	6255270
Fluoranthene	ug/g	<0.0050	0.0050	6255270	0.062	0.0050	20	0.050	6255270
Fluorene	ug/g	<0.0050	0.0050	6255270	0.0065	0.0050	4.6	0.050	6255270
Indeno(1,2,3-cd)pyrene	ug/g	<0.0050	0.0050	6255270	0.022	0.0050	2.7	0.050	6255270
1-Methylnaphthalene	ug/g	<0.0050	0.0050	6255270	<0.0050	0.0050	0.58	0.050	6255270
2-Methylnaphthalene	ug/g	<0.0050	0.0050	6255270	<0.0050	0.0050	0.83	0.050	6255270
Naphthalene	ug/g	<0.0050	0.0050	6255270	<0.0050	0.0050	1.3	0.050	6255270
Phenanthrene	ug/g	<0.0050	0.0050	6255270	0.044	0.0050	22	0.050	6255270
Pyrene	ug/g	0.0056	0.0050	6255270	0.047	0.0050	13	0.050	6255270
Surrogate Recovery (%)									
D10-Anthracene	%	97		6255270	99		114		6255270
D14-Terphenyl (FS)	%	106		6255270	109		127		6255270
D8-Acenaphthylene	%	90		6255270	91		106		6255270

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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O.REG 153 PAHS (SOIL)

BV Labs ID		KIY532			KIY533		KIY534	KIY535		
Sampling Date		2019/07/17 11:20			2019/07/17 12:00		2019/07/17 12:10	2019/07/17 12:35		
COC Number		727706-01-01			727706-01-01		727706-01-01	727706-01-01		
	UNITS	**SS04**	**RDL**	**QC Batch**	**SS05**	**RDL**	**SS06**	**SS07**	**RDL**	**QC Batch**
Inorganics										
Moisture	%				2.1	1.0	5.7	3.4	1.0	6250990
Calculated Parameters										
Methylnaphthalene, 2-(1-)	ug/g	0.77	0.071	6248794	<0.0071	0.0071	<0.071	0.19	0.071	6248794
Polyaromatic Hydrocarbons										
Acenaphthene	ug/g	2.1	0.050	6255270	0.0091	0.0050	0.14	0.61	0.050	6255270
Acenaphthylene	ug/g	<0.050	0.050	6255270	<0.0050	0.0050	<0.050	<0.050	0.050	6255270
Anthracene	ug/g	5.0	0.050	6255270	0.022	0.0050	0.34	1.4	0.050	6255270
Benzo(a)anthracene	ug/g	6.0	0.050	6255270	0.040	0.0050	0.38	1.6	0.050	6255270
Benzo(a)pyrene	ug/g	4.5	0.050	6255270	0.035	0.0050	0.31	1.2	0.050	6255270
Benzo(b/j)fluoranthene	ug/g	5.2	0.050	6255270	0.044	0.0050	0.35	1.4	0.050	6255270
Benzo(g,h,i)perylene	ug/g	2.2	0.050	6255270	0.023	0.0050	0.21	0.63	0.050	6255270
Benzo(k)fluoranthene	ug/g	2.2	0.050	6255270	0.017	0.0050	0.13	0.56	0.050	6255270
Chrysene	ug/g	4.2	0.050	6255270	0.029	0.0050	0.30	1.1	0.050	6255270
Dibenz(a,h)anthracene	ug/g	0.75	0.050	6255270	0.0062	0.0050	<0.050	0.19	0.050	6255270
Fluoranthene	ug/g	15	0.050	6255270	0.098	0.0050	0.98	4.2	0.050	6255270
Fluorene	ug/g	2.8	0.050	6255270	0.0094	0.0050	0.18	0.78	0.050	6255270
Indeno(1,2,3-cd)pyrene	ug/g	2.5	0.050	6255270	0.023	0.0050	0.17	0.66	0.050	6255270
1-Methylnaphthalene	ug/g	0.36	0.050	6255270	<0.0050	0.0050	<0.050	0.089	0.050	6255270
2-Methylnaphthalene	ug/g	0.41	0.050	6255270	<0.0050	0.0050	<0.050	0.099	0.050	6255270
Naphthalene	ug/g	0.60	0.050	6255270	<0.0050	0.0050	<0.050	0.14	0.050	6255270
Phenanthrene	ug/g	15	0.050	6255270	0.068	0.0050	0.94	4.1	0.050	6255270
Pyrene	ug/g	10	0.050	6255270	0.070	0.0050	0.70	2.9	0.050	6255270
Surrogate Recovery (%)										
D10-Anthracene	%	108		6255270	105		110	101		6255270
D14-Terphenyl (FS)	%	123		6255270	113		114	104		6255270
D8-Acenaphthylene	%	105		6255270	96		100	91		6255270

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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O.REG 153 PAHS (SOIL)

BV Labs ID		KIY536	KIY541			KIY541		
Sampling Date		2019/07/17 13:50	2019/07/17 14:55			2019/07/17 14:55		
COC Number		727706-01-01	727706-01-01			727706-01-01		
	UNITS	SS08	SS13	RDL	QC Batch	SS13 Lab-Dup	RDL	QC Batch
Inorganics								
Moisture	%	6.7	3.6	1.0	6250990			
Calculated Parameters								
Methylnaphthalene, 2-(1-)	ug/g	<0.0071	<0.0071	0.0071	6248794			
Polyaromatic Hydrocarbons								
Acenaphthene	ug/g	<0.0050	0.010	0.0050	6255270	0.014	0.0050	6255270
Acenaphthylene	ug/g	<0.0050	<0.0050	0.0050	6255270	<0.0050	0.0050	6255270
Anthracene	ug/g	<0.0050	0.021	0.0050	6255270	0.022	0.0050	6255270
Benzo(a)anthracene	ug/g	<0.0050	0.059	0.0050	6255270	0.059	0.0050	6255270
Benzo(a)pyrene	ug/g	<0.0050	0.059	0.0050	6255270	0.061	0.0050	6255270
Benzo(b/j)fluoranthene	ug/g	<0.0050	0.073	0.0050	6255270	0.076	0.0050	6255270
Benzo(g,h,i)perylene	ug/g	0.0063	0.057	0.0050	6255270	0.060	0.0050	6255270
Benzo(k)fluoranthene	ug/g	<0.0050	0.026	0.0050	6255270	0.028	0.0050	6255270
Chrysene	ug/g	<0.0050	0.045	0.0050	6255270	0.046	0.0050	6255270
Dibenz(a,h)anthracene	ug/g	<0.0050	0.011	0.0050	6255270	0.012	0.0050	6255270
Fluoranthene	ug/g	0.0061	0.10	0.0050	6255270	0.11	0.0050	6255270
Fluorene	ug/g	<0.0050	0.011	0.0050	6255270	0.013	0.0050	6255270
Indeno(1,2,3-cd)pyrene	ug/g	<0.0050	0.043	0.0050	6255270	0.045	0.0050	6255270
1-Methylnaphthalene	ug/g	<0.0050	<0.0050	0.0050	6255270	<0.0050	0.0050	6255270
2-Methylnaphthalene	ug/g	<0.0050	<0.0050	0.0050	6255270	0.0050	0.0050	6255270
Naphthalene	ug/g	<0.0050	0.0071	0.0050	6255270	0.012	0.0050	6255270
Phenanthrene	ug/g	<0.0050	0.062	0.0050	6255270	0.073	0.0050	6255270
Pyrene	ug/g	0.0070	0.077	0.0050	6255270	0.086	0.0050	6255270
Surrogate Recovery (%)								
D10-Anthracene	%	86	94		6255270	99		6255270
D14-Terphenyl (FS)	%	108	101		6255270	110		6255270
D8-Acenaphthylene	%	97	86		6255270	93		6255270

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

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BV Labs Job #: B9K5175
Report Date: 2019/08/09

Dillon Consulting Limited
Client Project #: 19-9543
Sampler Initials: AH

O.REG 153 PAHS (SOIL)

BV Labs ID		KIY542			KIY543			KIY544		
Sampling Date		2019/07/17 16:30			2019/07/17 17:30			2019/07/17 17:45		
COC Number		727706-01-01			727706-01-01			727706-01-01		
	UNITS	SS14	RDL	QC Batch	SS15	RDL	QC Batch	SS16	RDL	QC Batch
Inorganics										
Moisture	%	14	1.0	6250990				2.4	1.0	6250990
Calculated Parameters										
Methylnaphthalene, 2-(1-)	ug/g	<0.0071	0.0071	6248794	<0.0071	0.0071	6249634	<0.0071	0.0071	6249634
Polyaromatic Hydrocarbons										
Acenaphthene	ug/g	0.0089	0.0050	6255270	<0.0050	0.0050	6255270	<0.0050	0.0050	6255270
Acenaphthylene	ug/g	<0.0050	0.0050	6255270	0.013	0.0050	6255270	<0.0050	0.0050	6255270
Anthracene	ug/g	0.020	0.0050	6255270	0.023	0.0050	6255270	<0.0050	0.0050	6255270
Benzo(a)anthracene	ug/g	0.018	0.0050	6255270	0.020	0.0050	6255270	<0.0050	0.0050	6255270
Benzo(a)pyrene	ug/g	0.013	0.0050	6255270	0.024	0.0050	6255270	<0.0050	0.0050	6255270
Benzo(b/j)fluoranthene	ug/g	0.017	0.0050	6255270	0.038	0.0050	6255270	<0.0050	0.0050	6255270
Benzo(g,h,i)perylene	ug/g	0.0082	0.0050	6255270	0.044	0.0050	6255270	<0.0050	0.0050	6255270
Benzo(k)fluoranthene	ug/g	0.0064	0.0050	6255270	0.011	0.0050	6255270	<0.0050	0.0050	6255270
Chrysene	ug/g	0.013	0.0050	6255270	0.012	0.0050	6255270	<0.0050	0.0050	6255270
Dibenz(a,h)anthracene	ug/g	<0.0050	0.0050	6255270	0.0057	0.0050	6255270	<0.0050	0.0050	6255270
Fluoranthene	ug/g	0.050	0.0050	6255270	0.037	0.0050	6255270	<0.0050	0.0050	6255270
Fluorene	ug/g	0.011	0.0050	6255270	<0.0050	0.0050	6255270	<0.0050	0.0050	6255270
Indeno(1,2,3-cd)pyrene	ug/g	0.0079	0.0050	6255270	0.037	0.0050	6255270	<0.0050	0.0050	6255270
1-Methylnaphthalene	ug/g	<0.0050	0.0050	6255270	<0.0050	0.0050	6255270	<0.0050	0.0050	6255270
2-Methylnaphthalene	ug/g	<0.0050	0.0050	6255270	<0.0050	0.0050	6255270	<0.0050	0.0050	6255270
Naphthalene	ug/g	<0.0050	0.0050	6255270	<0.0050	0.0050	6255270	<0.0050	0.0050	6255270
Phenanthrene	ug/g	0.056	0.0050	6255270	0.014	0.0050	6255270	<0.0050	0.0050	6255270
Pyrene	ug/g	0.034	0.0050	6255270	0.035	0.0050	6255270	<0.0050	0.0050	6255270
Surrogate Recovery (%)										
D10-Anthracene	%	92		6255270	96		6255270	97		6255270
D14-Terphenyl (FS)	%	102		6255270	113		6255270	105		6255270
D8-Acenaphthylene	%	90		6255270	91		6255270	88		6255270

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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O.REG 153 PAHS (SOIL)

BV Labs ID		KIY545	KIY546	KIY548		
Sampling Date		2019/07/18 14:25	2019/07/18 14:25	2019/07/18 15:45		
COC Number		727706-01-01	727706-01-01	727706-01-01		
	UNITS	TP1	QAQC01	TP4	RDL	QC Batch
Inorganics						
Moisture	%	5.1	5.4	6.3	1.0	6250990
Calculated Parameters						
Methylnaphthalene, 2-(1-)	ug/g	<0.0071	<0.0071	<0.0071	0.0071	6249634
Polyaromatic Hydrocarbons						
Acenaphthene	ug/g	<0.0050	<0.0050	0.011	0.0050	6255270
Acenaphthylene	ug/g	<0.0050	<0.0050	<0.0050	0.0050	6255270
Anthracene	ug/g	<0.0050	<0.0050	0.029	0.0050	6255270
Benzo(a)anthracene	ug/g	<0.0050	<0.0050	0.048	0.0050	6255270
Benzo(a)pyrene	ug/g	<0.0050	<0.0050	0.040	0.0050	6255270
Benzo(b/j)fluoranthene	ug/g	<0.0050	<0.0050	0.048	0.0050	6255270
Benzo(g,h,i)perylene	ug/g	<0.0050	<0.0050	0.027	0.0050	6255270
Benzo(k)fluoranthene	ug/g	<0.0050	<0.0050	0.019	0.0050	6255270
Chrysene	ug/g	<0.0050	<0.0050	0.033	0.0050	6255270
Dibenz(a,h)anthracene	ug/g	<0.0050	<0.0050	0.0073	0.0050	6255270
Fluoranthene	ug/g	<0.0050	<0.0050	0.11	0.0050	6255270
Fluorene	ug/g	<0.0050	<0.0050	0.012	0.0050	6255270
Indeno(1,2,3-cd)pyrene	ug/g	<0.0050	<0.0050	0.027	0.0050	6255270
1-Methylnaphthalene	ug/g	<0.0050	<0.0050	<0.0050	0.0050	6255270
2-Methylnaphthalene	ug/g	<0.0050	<0.0050	<0.0050	0.0050	6255270
Naphthalene	ug/g	<0.0050	<0.0050	<0.0050	0.0050	6255270
Phenanthrene	ug/g	<0.0050	<0.0050	0.082	0.0050	6255270
Pyrene	ug/g	<0.0050	<0.0050	0.080	0.0050	6255270
Surrogate Recovery (%)						
D10-Anthracene	%	100	99	98		6255270
D14-Terphenyl (FS)	%	108	107	107		6255270
D8-Acenaphthylene	%	93	91	91		6255270

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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BV Labs Job #: B9K5175
Report Date: 2019/08/09

Dillon Consulting Limited
Client Project #: 19-9543
Sampler Initials: AH

O.REG 153 PETROLEUM HYDROCARBONS (SOIL)

BV Labs ID		KIY530	KIY531	KIY533	KIY534	KIY535	KIY536		
Sampling Date		2019/07/17 10:30	2019/07/17 10:50	2019/07/17 12:00	2019/07/17 12:10	2019/07/17 12:35	2019/07/17 13:50		
COC Number		727706-01-01	727706-01-01	727706-01-01	727706-01-01	727706-01-01	727706-01-01		
	UNITS	**SS02**	**SS03**	**SS05**	**SS06**	**SS07**	**SS08**	**RDL**	**QC Batch**
BTEX & F1 Hydrocarbons									
Benzene	ug/g	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	6252645
Toluene	ug/g	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	6252645
Ethylbenzene	ug/g	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	6252645
o-Xylene	ug/g	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	6252645
p+m-Xylene	ug/g	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	0.040	6252645
Total Xylenes	ug/g	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	0.040	6252645
F1 (C6-C10)	ug/g	<10	<10	<10	<10	<10	<10	10	6252645
F1 (C6-C10) - BTEX	ug/g	<10	<10	<10	<10	<10	<10	10	6252645
F2-F4 Hydrocarbons									
F2 (C10-C16 Hydrocarbons)	ug/g	<10	17	<10	17	11	130	10	6252122
F3 (C16-C34 Hydrocarbons)	ug/g	140	280	<50	140	210	2400	50	6252122
F4 (C34-C50 Hydrocarbons)	ug/g	77	180	<50	170	140	150	50	6252122
Reached Baseline at C50	ug/g	No	No	Yes	No	No	Yes		6252122
Surrogate Recovery (%)									
1,4-Difluorobenzene	%	104	104	104	103	103	105		6252645
4-Bromofluorobenzene	%	98	98	97	96	98	98		6252645
D10-Ethylbenzene	%	91	89	89	89	94	93		6252645
D4-1,2-Dichloroethane	%	98	98	97	97	97	97		6252645
o-Terphenyl	%	89	89	89	91	87	104		6252122

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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O.REG 153 PETROLEUM HYDROCARBONS (SOIL)

BV Labs ID		KIY536			KIY541			KIY541		
Sampling Date		2019/07/17 13:50			2019/07/17 14:55			2019/07/17 14:55		
COC Number		727706-01-01			727706-01-01			727706-01-01		
	UNITS	SS08 Lab-Dup	RDL	QC Batch	SS13	RDL	QC Batch	SS13 Lab-Dup	RDL	QC Batch
BTEX & F1 Hydrocarbons										
Benzene	ug/g	<0.020	0.020	6252645	<0.020	0.020	6252645			
Toluene	ug/g	<0.020	0.020	6252645	<0.020	0.020	6252645			
Ethylbenzene	ug/g	<0.020	0.020	6252645	<0.020	0.020	6252645			
o-Xylene	ug/g	<0.020	0.020	6252645	<0.020	0.020	6252645			
p+m-Xylene	ug/g	<0.040	0.040	6252645	<0.040	0.040	6252645			
Total Xylenes	ug/g	<0.040	0.040	6252645	<0.040	0.040	6252645			
F1 (C6-C10)	ug/g	<10	10	6252645	<10	10	6252645			
F1 (C6-C10) - BTEX	ug/g	<10	10	6252645	<10	10	6252645			
F2-F4 Hydrocarbons										
F2 (C10-C16 Hydrocarbons)	ug/g				<10	10	6252122	<10	10	6252122
F3 (C16-C34 Hydrocarbons)	ug/g				120	50	6252122	120	50	6252122
F4 (C34-C50 Hydrocarbons)	ug/g				59	50	6252122	71	50	6252122
Reached Baseline at C50	ug/g				No		6252122	No		6252122
Surrogate Recovery (%)										
1,4-Difluorobenzene	%	104		6252645	103		6252645			
4-Bromofluorobenzene	%	99		6252645	98		6252645			
D10-Ethylbenzene	%	90		6252645	90		6252645			
D4-1,2-Dichloroethane	%	96		6252645	97		6252645			
o-Terphenyl	%				91		6252122	94		6252122

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

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O.REG 153 PETROLEUM HYDROCARBONS (SOIL)

BV Labs ID		KIY542	KIY544	KIY545	KIY546	KIY548		
Sampling Date		2019/07/17 16:30	2019/07/17 17:45	2019/07/18 14:25	2019/07/18 14:25	2019/07/18 15:45		
COC Number		727706-01-01	727706-01-01	727706-01-01	727706-01-01	727706-01-01		
	UNITS	SS14	SS16	TP1	QAQC01	TP4	RDL	QC Batch
BTEX & F1 Hydrocarbons								
Benzene	ug/g	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	6252645
Toluene	ug/g	0.098	<0.020	<0.020	<0.020	<0.020	0.020	6252645
Ethylbenzene	ug/g	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	6252645
o-Xylene	ug/g	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	6252645
p+m-Xylene	ug/g	0.056	<0.040	<0.040	<0.040	<0.040	0.040	6252645
Total Xylenes	ug/g	0.056	<0.040	<0.040	<0.040	<0.040	0.040	6252645
F1 (C6-C10)	ug/g	<10	<10	<10	<10	<10	10	6252645
F1 (C6-C10) - BTEX	ug/g	<10	<10	<10	<10	<10	10	6252645
F2-F4 Hydrocarbons								
F2 (C10-C16 Hydrocarbons)	ug/g	<10	<10	<10	<10	<10	10	6252122
F3 (C16-C34 Hydrocarbons)	ug/g	75	96	<50	<50	<50	50	6252122
F4 (C34-C50 Hydrocarbons)	ug/g	<50	<50	<50	<50	<50	50	6252122
Reached Baseline at C50	ug/g	Yes	Yes	Yes	Yes	Yes		6252122
Surrogate Recovery (%)								
1,4-Difluorobenzene	%	104	105	105	103	104		6252645
4-Bromofluorobenzene	%	96	96	98	96	98		6252645
D10-Ethylbenzene	%	95	87	91	84	87		6252645
D4-1,2-Dichloroethane	%	97	99	98	99	99		6252645
o-Terphenyl	%	94	93	95	96	90		6252122

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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O.REG 153 VOCS BY HS & F1-F4 (SOIL)

BV Labs ID		KIY529	KIY532			KIY532		
Sampling Date		2019/07/17 10:05	2019/07/17 11:20			2019/07/17 11:20		
COC Number		727706-01-01	727706-01-01			727706-01-01		
	UNITS	SS01	SS04	RDL	QC Batch	SS04 Lab-Dup	RDL	QC Batch
Inorganics								
Moisture	%	2.9	4.4	1.0	6250990			
Calculated Parameters								
1,3-Dichloropropene (cis+trans)	ug/g	<0.050	<0.050	0.050	6248943			
Volatile Organics								
Acetone (2-Propanone)	ug/g	<0.50	<0.50	0.50	6250043	<0.50	0.50	6250043
Benzene	ug/g	<0.020	<0.020	0.020	6250043	<0.020	0.020	6250043
Bromodichloromethane	ug/g	<0.050	<0.050	0.050	6250043	<0.050	0.050	6250043
Bromoform	ug/g	<0.050	<0.050	0.050	6250043	<0.050	0.050	6250043
Bromomethane	ug/g	<0.050	<0.050	0.050	6250043	<0.050	0.050	6250043
Carbon Tetrachloride	ug/g	<0.050	<0.050	0.050	6250043	<0.050	0.050	6250043
Chlorobenzene	ug/g	<0.050	<0.050	0.050	6250043	<0.050	0.050	6250043
Chloroform	ug/g	<0.050	<0.050	0.050	6250043	<0.050	0.050	6250043
Dibromochloromethane	ug/g	<0.050	<0.050	0.050	6250043	<0.050	0.050	6250043
1,2-Dichlorobenzene	ug/g	<0.050	<0.050	0.050	6250043	<0.050	0.050	6250043
1,3-Dichlorobenzene	ug/g	<0.050	<0.050	0.050	6250043	<0.050	0.050	6250043
1,4-Dichlorobenzene	ug/g	<0.050	<0.050	0.050	6250043	<0.050	0.050	6250043
Dichlorodifluoromethane (FREON 12)	ug/g	<0.050	<0.050	0.050	6250043	<0.050	0.050	6250043
1,1-Dichloroethane	ug/g	<0.050	<0.050	0.050	6250043	<0.050	0.050	6250043
1,2-Dichloroethane	ug/g	<0.050	<0.050	0.050	6250043	<0.050	0.050	6250043
1,1-Dichloroethylene	ug/g	<0.050	<0.050	0.050	6250043	<0.050	0.050	6250043
cis-1,2-Dichloroethylene	ug/g	<0.050	<0.050	0.050	6250043	<0.050	0.050	6250043
trans-1,2-Dichloroethylene	ug/g	<0.050	<0.050	0.050	6250043	<0.050	0.050	6250043
1,2-Dichloropropane	ug/g	<0.050	<0.050	0.050	6250043	<0.050	0.050	6250043
cis-1,3-Dichloropropene	ug/g	<0.030	<0.030	0.030	6250043	<0.030	0.030	6250043
trans-1,3-Dichloropropene	ug/g	<0.040	<0.040	0.040	6250043	<0.040	0.040	6250043
Ethylbenzene	ug/g	<0.020	<0.020	0.020	6250043	<0.020	0.020	6250043
Ethylene Dibromide	ug/g	<0.050	<0.050	0.050	6250043	<0.050	0.050	6250043
Hexane	ug/g	<0.050	<0.050	0.050	6250043	<0.050	0.050	6250043
Methylene Chloride(Dichloromethane)	ug/g	<0.050	<0.050	0.050	6250043	<0.050	0.050	6250043
Methyl Ethyl Ketone (2-Butanone)	ug/g	<0.50	<0.50	0.50	6250043	<0.50	0.50	6250043
Methyl Isobutyl Ketone	ug/g	<0.50	<0.50	0.50	6250043	<0.50	0.50	6250043
Methyl t-butyl ether (MTBE)	ug/g	<0.050	<0.050	0.050	6250043	<0.050	0.050	6250043
Styrene	ug/g	<0.050	<0.050	0.050	6250043	<0.050	0.050	6250043
1,1,1,2-Tetrachloroethane	ug/g	<0.050	<0.050	0.050	6250043	<0.050	0.050	6250043

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

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O.REG 153 VOCS BY HS & F1-F4 (SOIL)

BV Labs ID		KIY529	KIY532			KIY532		
Sampling Date		2019/07/17 10:05	2019/07/17 11:20			2019/07/17 11:20		
COC Number		727706-01-01	727706-01-01			727706-01-01		
	UNITS	SS01	SS04	RDL	QC Batch	SS04 Lab-Dup	RDL	QC Batch
1,1,2,2-Tetrachloroethane	ug/g	<0.050	<0.050	0.050	6250043	<0.050	0.050	6250043
Tetrachloroethylene	ug/g	<0.050	<0.050	0.050	6250043	<0.050	0.050	6250043
Toluene	ug/g	0.042	0.028	0.020	6250043	0.032	0.020	6250043
1,1,1-Trichloroethane	ug/g	<0.050	<0.050	0.050	6250043	<0.050	0.050	6250043
1,1,2-Trichloroethane	ug/g	<0.050	<0.050	0.050	6250043	<0.050	0.050	6250043
Trichloroethylene	ug/g	<0.050	<0.050	0.050	6250043	<0.050	0.050	6250043
Trichlorofluoromethane (FREON 11)	ug/g	<0.050	<0.050	0.050	6250043	<0.050	0.050	6250043
Vinyl Chloride	ug/g	<0.020	<0.020	0.020	6250043	<0.020	0.020	6250043
p+m-Xylene	ug/g	<0.020	<0.020	0.020	6250043	<0.020	0.020	6250043
o-Xylene	ug/g	<0.020	<0.020	0.020	6250043	<0.020	0.020	6250043
Total Xylenes	ug/g	<0.020	<0.020	0.020	6250043	<0.020	0.020	6250043
F1 (C6-C10)	ug/g	<10	<10	10	6250043	<10	10	6250043
F1 (C6-C10) - BTEX	ug/g	<10	<10	10	6250043	<10	10	6250043
F2-F4 Hydrocarbons								
F2 (C10-C16 Hydrocarbons)	ug/g	<10	29	10	6252122			
F3 (C16-C34 Hydrocarbons)	ug/g	540	720	50	6252122			
F4 (C34-C50 Hydrocarbons)	ug/g	<50	450	50	6252122			
Reached Baseline at C50	ug/g	Yes	No		6252122			
Surrogate Recovery (%)								
o-Terphenyl	%	92	90		6252122			
4-Bromofluorobenzene	%	93	93		6250043	93		6250043
D10-o-Xylene	%	97	105		6250043	108		6250043
D4-1,2-Dichloroethane	%	100	100		6250043	102		6250043
D8-Toluene	%	101	101		6250043	102		6250043

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

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O.REG 153 VOCS BY HS & F1-F4 (SOIL)

BV Labs ID		KIY543		
Sampling Date		2019/07/17 17:30		
COC Number		727706-01-01		
	UNITS	SS15	RDL	QC Batch
Inorganics				
Moisture	%	4.2	1.0	6250990
Calculated Parameters				
1,3-Dichloropropene (cis+trans)	ug/g	<0.050	0.050	6248943
Volatile Organics				
Acetone (2-Propanone)	ug/g	<0.50	0.50	6250043
Benzene	ug/g	<0.020	0.020	6250043
Bromodichloromethane	ug/g	<0.050	0.050	6250043
Bromoform	ug/g	<0.050	0.050	6250043
Bromomethane	ug/g	<0.050	0.050	6250043
Carbon Tetrachloride	ug/g	<0.050	0.050	6250043
Chlorobenzene	ug/g	<0.050	0.050	6250043
Chloroform	ug/g	<0.050	0.050	6250043
Dibromochloromethane	ug/g	<0.050	0.050	6250043
1,2-Dichlorobenzene	ug/g	<0.050	0.050	6250043
1,3-Dichlorobenzene	ug/g	<0.050	0.050	6250043
1,4-Dichlorobenzene	ug/g	<0.050	0.050	6250043
Dichlorodifluoromethane (FREON 12)	ug/g	<0.050	0.050	6250043
1,1-Dichloroethane	ug/g	<0.050	0.050	6250043
1,2-Dichloroethane	ug/g	<0.050	0.050	6250043
1,1-Dichloroethylene	ug/g	<0.050	0.050	6250043
cis-1,2-Dichloroethylene	ug/g	<0.050	0.050	6250043
trans-1,2-Dichloroethylene	ug/g	<0.050	0.050	6250043
1,2-Dichloropropane	ug/g	<0.050	0.050	6250043
cis-1,3-Dichloropropene	ug/g	<0.030	0.030	6250043
trans-1,3-Dichloropropene	ug/g	<0.040	0.040	6250043
Ethylbenzene	ug/g	<0.020	0.020	6250043
Ethylene Dibromide	ug/g	<0.050	0.050	6250043
Hexane	ug/g	<0.050	0.050	6250043
Methylene Chloride(Dichloromethane)	ug/g	<0.050	0.050	6250043
Methyl Ethyl Ketone (2-Butanone)	ug/g	<0.50	0.50	6250043
Methyl Isobutyl Ketone	ug/g	<0.50	0.50	6250043
Methyl t-butyl ether (MTBE)	ug/g	<0.050	0.050	6250043
Styrene	ug/g	<0.050	0.050	6250043
1,1,1,2-Tetrachloroethane	ug/g	<0.050	0.050	6250043
1,1,2,2-Tetrachloroethane	ug/g	<0.050	0.050	6250043

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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O.REG 153 VOCS BY HS & F1-F4 (SOIL)

BV Labs ID		KIY543		
Sampling Date		2019/07/17 17:30		
COC Number		727706-01-01		
	UNITS	SS15	RDL	QC Batch
Tetrachloroethylene	ug/g	<0.050	0.050	6250043
Toluene	ug/g	0.034	0.020	6250043
1,1,1-Trichloroethane	ug/g	<0.050	0.050	6250043
1,1,2-Trichloroethane	ug/g	<0.050	0.050	6250043
Trichloroethylene	ug/g	<0.050	0.050	6250043
Trichlorofluoromethane (FREON 11)	ug/g	<0.050	0.050	6250043
Vinyl Chloride	ug/g	<0.020	0.020	6250043
p+m-Xylene	ug/g	<0.020	0.020	6250043
o-Xylene	ug/g	<0.020	0.020	6250043
Total Xylenes	ug/g	<0.020	0.020	6250043
F1 (C6-C10)	ug/g	<10	10	6250043
F1 (C6-C10) - BTEX	ug/g	<10	10	6250043
F2-F4 Hydrocarbons				
F2 (C10-C16 Hydrocarbons)	ug/g	<10	10	6252122
F3 (C16-C34 Hydrocarbons)	ug/g	370	50	6252122
F4 (C34-C50 Hydrocarbons)	ug/g	160	50	6252122
Reached Baseline at C50	ug/g	Yes		6252122
Surrogate Recovery (%)				
o-Terphenyl	%	92		6252122
4-Bromofluorobenzene	%	91		6250043
D10-o-Xylene	%	101		6250043
D4-1,2-Dichloroethane	%	101		6250043
D8-Toluene	%	103		6250043

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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BV Labs Job #: B9K5175
Report Date: 2019/08/09

Dillon Consulting Limited
Client Project #: 19-9543
Sampler Initials: AH

RESULTS OF ANALYSES OF SOIL

BV Labs ID		KIY536			KIY537	KIY538	KIY540		
Sampling Date		2019/07/17 13:50			2019/07/17 14:10	2019/07/17 14:20	2019/07/17 14:45		
COC Number		727706-01-01			727706-01-01	727706-01-01	727706-01-01		
	UNITS	SS08	RDL	QC Batch	SS09	SS10	SS12	RDL	QC Batch
Inorganics									
Moisture	%				17	2.0	1.7	1.0	6250464
Perfluorinated Compounds									
Perfluorobutanoic acid	ug/kg	<1.0	1.0	6262247	<1.0	<1.0	<1.0	1.0	6262247
Perfluoropentanoic Acid (PFPeA)	ug/kg	<1.0	1.0	6262247	<1.0	<1.0	<1.0	1.0	6262247
Perfluorohexanoic Acid (PFHxA)	ug/kg	<1.0	1.0	6262247	<1.0	<1.0	<1.0	1.0	6262247
Perfluoroheptanoic Acid (PFHpA)	ug/kg	<1.0	1.0	6262247	<1.0	<1.0	<1.0	1.0	6262247
Perfluorooctanoic Acid (PFOA)	ug/kg	<1.0	1.0	6262247	<1.0	<1.0	<1.0	1.0	6262247
Perfluorononanoic Acid (PFNA)	ug/kg	<1.0	1.0	6262247	<1.0	<1.0	<1.0	1.0	6262247
Perfluorodecanoic Acid (PFDA)	ug/kg	<1.0	1.0	6262247	<1.0	<1.0	<1.0	1.0	6262247
Perfluoroundecanoic Acid (PFUnA)	ug/kg	<1.0	1.0	6262247	<1.0	<1.0	<1.0	1.0	6262247
Perfluorododecanoic Acid (PFDoA)	ug/kg	<1.0	1.0	6262247	<1.0	<1.0	<1.0	1.0	6262247
Perfluorotridecanoic Acid	ug/kg	<1.0	1.0	6262247	<1.0	<1.0	<1.0	1.0	6262247
Perfluorotetradecanoic Acid	ug/kg	<1.0	1.0	6262247	<1.0	<1.0	<1.0	1.0	6262247
Perfluorobutanesulfonic acid	ug/kg	<1.0	1.0	6262247	<1.0	<1.0	<1.0	1.0	6262247
Perfluoropentanesulfonic acid	ug/kg	<1.0	1.0	6262247	<1.0	<1.0	<1.0	1.0	6262247
Perfluorohexanesulfonic acid	ug/kg	<1.0	1.0	6262247	<1.0	<1.0	<1.0	1.0	6262247
Perfluoroheptanesulfonic acid	ug/kg	<1.0	1.0	6262247	<1.0	<1.0	<1.0	1.0	6262247
Perfluorooctanesulfonic acid	ug/kg	<1.0	1.0	6262247	<1.0	<1.0	<1.0	1.0	6262247
Perfluorononanesulfonic acid	ug/kg	<1.0	1.0	6262247	<1.0	<1.0	<1.0	1.0	6262247
Perfluorodecanesulfonic acid (PFDS)	ug/kg	<1.0	1.0	6262247	<1.0	<1.0	<1.0	1.0	6262247
Perfluorooctane Sulfonamide (PFOSA)	ug/kg	<1.0	1.0	6262247	<1.0	<1.0	<1.0	1.0	6262247
EtFOSA	ug/kg	<1.0	1.0	6262247	<1.0	<1.0	<1.0	1.0	6262247
MeFOSA	ug/kg	<1.0	1.0	6262247	<1.0	<1.0	<1.0	1.0	6262247
EtFOSE	ug/kg	<1.0	1.0	6262247	<1.0	<1.0	<1.0	1.0	6262247
MeFOSE	ug/kg	<1.0	1.0	6262247	<1.0	<1.0	<1.0	1.0	6262247
EtFOSAA	ug/kg	<1.0	1.0	6262247	<1.0	<1.0	<1.0	1.0	6262247
MeFOSAA	ug/kg	<1.0	1.0	6262247	<1.0	<1.0	<1.0	1.0	6262247
6:2 Fluorotelomer sulfonic acid	ug/kg	3.7	1.0	6262247	<1.0	<1.0	<1.0	1.0	6262247
8:2 Fluorotelomer sulfonic acid	ug/kg	<1.0	1.0	6262247	<1.0	1.0	<1.0	1.0	6262247
Surrogate Recovery (%)									
13C2-6:2-Fluorotelomersulfonic Acid	%	98		6262247	89	100	101		6262247
13C2-8:2-Fluorotelomersulfonic Acid	%	98		6262247	85	93	92		6262247
13C2-Perfluorodecanoic acid	%	95		6262247	78	91	94		6262247
13C2-Perfluorododecanoic acid	%	93		6262247	71	84	86		6262247
13C2-Perfluorohexanoic acid	%	101		6262247	93	103	105		6262247

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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RESULTS OF ANALYSES OF SOIL

BV Labs ID		KIY536			KIY537	KIY538	KIY540		
Sampling Date		2019/07/17 13:50			2019/07/17 14:10	2019/07/17 14:20	2019/07/17 14:45		
COC Number		727706-01-01			727706-01-01	727706-01-01	727706-01-01		
	UNITS	SS08	RDL	QC Batch	SS09	SS10	SS12	RDL	QC Batch
13C2-perfluorotetradecanoic acid	%	90		6262247	60	68	76		6262247
13C2-Perfluoroundecanoic acid	%	94		6262247	76	88	91		6262247
13C3-Perfluorobutanesulfonic acid	%	100		6262247	87	99	101		6262247
13C4-Perfluorobutanoic acid	%	97		6262247	89	99	100		6262247
13C4-Perfluoroheptanoic acid	%	99		6262247	88	100	102		6262247
13C4-Perfluorooctanesulfonic acid	%	95		6262247	80	92	93		6262247
13C4-Perfluorooctanoic acid	%	96		6262247	85	96	99		6262247
13C5-Perfluorononanoic acid	%	99		6262247	85	96	99		6262247
13C5-Perfluoropentanoic acid	%	96		6262247	88	98	100		6262247
13C8-Perfluorooctane Sulfonamide	%	84		6262247	58	83	82		6262247
18O2-Perfluorohexanesulfonic acid	%	97		6262247	85	96	94		6262247
D3-MeFOSA	%	66		6262247	60	65	55		6262247
D3-MeFOSAA	%	98		6262247	81	88	92		6262247
D5-EtFOSA	%	71		6262247	67	72	55		6262247
D5-EtFOSAA	%	89		6262247	69	87	85		6262247
D7-MeFOSE	%	75		6262247	67	81	76		6262247
D9-EtFOSE	%	77		6262247	62	81	70		6262247

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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RESULTS OF ANALYSES OF SOIL

BV Labs ID		KIY541		
Sampling Date		2019/07/17 14:55		
COC Number		727706-01-01		
	UNITS	SS13	RDL	QC Batch
Perfluorinated Compounds				
Perfluorobutanoic acid	ug/kg	<1.0	1.0	6262247
Perfluoropentanoic Acid (PFPeA)	ug/kg	<1.0	1.0	6262247
Perfluorohexanoic Acid (PFHxA)	ug/kg	<1.0	1.0	6262247
Perfluoroheptanoic Acid (PFHpA)	ug/kg	<1.0	1.0	6262247
Perfluorooctanoic Acid (PFOA)	ug/kg	<1.0	1.0	6262247
Perfluorononanoic Acid (PFNA)	ug/kg	<1.0	1.0	6262247
Perfluorodecanoic Acid (PFDA)	ug/kg	<1.0	1.0	6262247
Perfluoroundecanoic Acid (PFUnA)	ug/kg	<1.0	1.0	6262247
Perfluorododecanoic Acid (PFDoA)	ug/kg	<1.0	1.0	6262247
Perfluorotridecanoic Acid	ug/kg	<1.0	1.0	6262247
Perfluorotetradecanoic Acid	ug/kg	<1.0	1.0	6262247
Perfluorobutanesulfonic acid	ug/kg	<1.0	1.0	6262247
Perfluoropentanesulfonic acid	ug/kg	<1.0	1.0	6262247
Perfluorohexanesulfonic acid	ug/kg	<1.0	1.0	6262247
Perfluoroheptanesulfonic acid	ug/kg	<1.0	1.0	6262247
Perfluorooctanesulfonic acid	ug/kg	<1.0	1.0	6262247
Perfluorononanesulfonic acid	ug/kg	<1.0	1.0	6262247
Perfluorodecanesulfonic acid (PFDS)	ug/kg	<1.0	1.0	6262247
Perfluorooctane Sulfonamide (PFOSA)	ug/kg	<1.0	1.0	6262247
EtFOSA	ug/kg	<1.0	1.0	6262247
MeFOSA	ug/kg	<1.0	1.0	6262247
EtFOSE	ug/kg	<1.0	1.0	6262247
MeFOSE	ug/kg	<1.0	1.0	6262247
EtFOSAA	ug/kg	<1.0	1.0	6262247
MeFOSAA	ug/kg	<1.0	1.0	6262247
6:2 Fluorotelomer sulfonic acid	ug/kg	<1.0	1.0	6262247
8:2 Fluorotelomer sulfonic acid	ug/kg	<1.0	1.0	6262247
Surrogate Recovery (%)				
13C2-6:2-Fluorotelomersulfonic Acid	%	102		6262247
13C2-8:2-Fluorotelomersulfonic Acid	%	92		6262247
13C2-Perfluorodecanoic acid	%	93		6262247
13C2-Perfluorododecanoic acid	%	89		6262247
13C2-Perfluorohexanoic acid	%	106		6262247
13C2-perfluorotetradecanoic acid	%	90		6262247

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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RESULTS OF ANALYSES OF SOIL

BV Labs ID		KIY541		
Sampling Date		2019/07/17 14:55		
COC Number		727706-01-01		
	UNITS	SS13	RDL	QC Batch
13C2-Perfluoroundecanoic acid	%	91		6262247
13C3-Perfluorobutanesulfonic acid	%	99		6262247
13C4-Perfluorobutanoic acid	%	101		6262247
13C4-Perfluoroheptanoic acid	%	102		6262247
13C4-Perfluorooctanesulfonic acid	%	93		6262247
13C4-Perfluorooctanoic acid	%	98		6262247
13C5-Perfluorononanoic acid	%	97		6262247
13C5-Perfluoropentanoic acid	%	102		6262247
13C8-Perfluorooctane Sulfonamide	%	85		6262247
18O2-Perfluorohexanesulfonic acid	%	99		6262247
D3-MeFOSA	%	65		6262247
D3-MeFOSAA	%	90		6262247
D5-EtFOSA	%	67		6262247
D5-EtFOSAA	%	91		6262247
D7-MeFOSE	%	82		6262247
D9-EtFOSE	%	76		6262247

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

GLYCOLS BY GC-FID (SOIL)

BV Labs ID		KIY535	KIY542	KIY542	KIY543	KIY544		
Sampling Date		2019/07/17 12:35	2019/07/17 16:30	2019/07/17 16:30	2019/07/17 17:30	2019/07/17 17:45		
COC Number		727706-01-01	727706-01-01	727706-01-01	727706-01-01	727706-01-01		
	UNITS	SS07	SS14	SS14 Lab-Dup	SS15	SS16	RDL	QC Batch
Glycols								
Propylene Glycol	mg/kg	<10	<10	<10	<10	<10	10	6252918
Ethylene Glycol	mg/kg	<10	<10	<10	<10	<10	10	6252918
Diethylene Glycol	mg/kg	<10	<10	<10	<10	<10	10	6252918
Total Glycol	mg/kg	<10	<10	<10	<10	<10	10	6252918

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

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GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	5.0°C

Sample KIY531 [SS03] : PAH analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Sample KIY532 [SS04] : PAH analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Sample KIY534 [SS06] : PAH analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Sample KIY535 [SS07] : PAH analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6250043	AYA	Matrix Spike [KIY532-02]	4-Bromofluorobenzene	2019/07/27		96	%	60 - 140
			D10-o-Xylene	2019/07/27		105	%	60 - 130
			D4-1,2-Dichloroethane	2019/07/27		100	%	60 - 140
			D8-Toluene	2019/07/27		106	%	60 - 140
			Acetone (2-Propanone)	2019/07/27		89	%	60 - 140
			Benzene	2019/07/27		98	%	60 - 140
			Bromodichloromethane	2019/07/27		93	%	60 - 140
			Bromoform	2019/07/27		96	%	60 - 140
			Bromomethane	2019/07/27		134	%	60 - 140
			Carbon Tetrachloride	2019/07/27		96	%	60 - 140
			Chlorobenzene	2019/07/27		96	%	60 - 140
			Chloroform	2019/07/27		92	%	60 - 140
			Dibromochloromethane	2019/07/27		100	%	60 - 140
			1,2-Dichlorobenzene	2019/07/27		95	%	60 - 140
			1,3-Dichlorobenzene	2019/07/27		100	%	60 - 140
			1,4-Dichlorobenzene	2019/07/27		104	%	60 - 140
			Dichlorodifluoromethane (FREON 12)	2019/07/27		109	%	60 - 140
			1,1-Dichloroethane	2019/07/27		94	%	60 - 140
			1,2-Dichloroethane	2019/07/27		97	%	60 - 140
			1,1-Dichloroethylene	2019/07/27		104	%	60 - 140
			cis-1,2-Dichloroethylene	2019/07/27		91	%	60 - 140
			trans-1,2-Dichloroethylene	2019/07/27		99	%	60 - 140
			1,2-Dichloropropane	2019/07/27		90	%	60 - 140
			cis-1,3-Dichloropropene	2019/07/27		88	%	60 - 140
			trans-1,3-Dichloropropene	2019/07/27		93	%	60 - 140
			Ethylbenzene	2019/07/27		94	%	60 - 140
			Ethylene Dibromide	2019/07/27		96	%	60 - 140
			Hexane	2019/07/27		101	%	60 - 140
			Methylene Chloride(Dichloromethane)	2019/07/27		95	%	60 - 140
			Methyl Ethyl Ketone (2-Butanone)	2019/07/27		93	%	60 - 140
			Methyl Isobutyl Ketone	2019/07/27		95	%	60 - 140
			Methyl t-butyl ether (MTBE)	2019/07/27		83	%	60 - 140
			Styrene	2019/07/27		97	%	60 - 140
			1,1,1,2-Tetrachloroethane	2019/07/27		103	%	60 - 140
			1,1,2,2-Tetrachloroethane	2019/07/27		96	%	60 - 140
			Tetrachloroethylene	2019/07/27		94	%	60 - 140
			Toluene	2019/07/27		91	%	60 - 140
			1,1,1-Trichloroethane	2019/07/27		96	%	60 - 140
			1,1,2-Trichloroethane	2019/07/27		101	%	60 - 140
			Trichloroethylene	2019/07/27		99	%	60 - 140
			Trichlorofluoromethane (FREON 11)	2019/07/27		113	%	60 - 140
			Vinyl Chloride	2019/07/27		108	%	60 - 140
			p+m-Xylene	2019/07/27		99	%	60 - 140
			o-Xylene	2019/07/27		95	%	60 - 140
			F1 (C6-C10)	2019/07/27		91	%	60 - 140
6250043	AYA	Spiked Blank	4-Bromofluorobenzene	2019/07/27		97	%	60 - 140
			D10-o-Xylene	2019/07/27		86	%	60 - 130
			D4-1,2-Dichloroethane	2019/07/27		103	%	60 - 140
			D8-Toluene	2019/07/27		104	%	60 - 140
			Acetone (2-Propanone)	2019/07/27		95	%	60 - 140
			Benzene	2019/07/27		104	%	60 - 130
			Bromodichloromethane	2019/07/27		99	%	60 - 130
			Bromoform	2019/07/27		101	%	60 - 130
			Bromomethane	2019/07/27		143 (1)	%	60 - 140

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Carbon Tetrachloride	2019/07/27		103	%	60 - 130
			Chlorobenzene	2019/07/27		100	%	60 - 130
			Chloroform	2019/07/27		98	%	60 - 130
			Dibromochloromethane	2019/07/27		104	%	60 - 130
			1,2-Dichlorobenzene	2019/07/27		98	%	60 - 130
			1,3-Dichlorobenzene	2019/07/27		102	%	60 - 130
			1,4-Dichlorobenzene	2019/07/27		107	%	60 - 130
			Dichlorodifluoromethane (FREON 12)	2019/07/27		116	%	60 - 140
			1,1-Dichloroethane	2019/07/27		100	%	60 - 130
			1,2-Dichloroethane	2019/07/27		103	%	60 - 130
			1,1-Dichloroethylene	2019/07/27		111	%	60 - 130
			cis-1,2-Dichloroethylene	2019/07/27		96	%	60 - 130
			trans-1,2-Dichloroethylene	2019/07/27		105	%	60 - 130
			1,2-Dichloropropane	2019/07/27		96	%	60 - 130
			cis-1,3-Dichloropropene	2019/07/27		95	%	60 - 130
			trans-1,3-Dichloropropene	2019/07/27		97	%	60 - 130
			Ethylbenzene	2019/07/27		99	%	60 - 130
			Ethylene Dibromide	2019/07/27		101	%	60 - 130
			Hexane	2019/07/27		109	%	60 - 130
			Methylene Chloride(Dichloromethane)	2019/07/27		101	%	60 - 130
			Methyl Ethyl Ketone (2-Butanone)	2019/07/27		99	%	60 - 140
			Methyl Isobutyl Ketone	2019/07/27		102	%	60 - 130
			Methyl t-butyl ether (MTBE)	2019/07/27		89	%	60 - 130
			Styrene	2019/07/27		102	%	60 - 130
			1,1,1,2-Tetrachloroethane	2019/07/27		108	%	60 - 130
			1,1,2,2-Tetrachloroethane	2019/07/27		101	%	60 - 130
			Tetrachloroethylene	2019/07/27		100	%	60 - 130
			Toluene	2019/07/27		96	%	60 - 130
			1,1,1-Trichloroethane	2019/07/27		104	%	60 - 130
			1,1,2-Trichloroethane	2019/07/27		106	%	60 - 130
			Trichloroethylene	2019/07/27		106	%	60 - 130
			Trichlorofluoromethane (FREON 11)	2019/07/27		122	%	60 - 130
			Vinyl Chloride	2019/07/27		115	%	60 - 130
			p+m-Xylene	2019/07/27		104	%	60 - 130
			o-Xylene	2019/07/27		101	%	60 - 130
			F1 (C6-C10)	2019/07/27		94	%	80 - 120
6250043	AYA	Method Blank	4-Bromofluorobenzene	2019/07/27		93	%	60 - 140
			D10-o-Xylene	2019/07/27		97	%	60 - 130
			D4-1,2-Dichloroethane	2019/07/27		100	%	60 - 140
			D8-Toluene	2019/07/27		102	%	60 - 140
			Acetone (2-Propanone)	2019/07/27	<0.50		ug/g	
			Benzene	2019/07/27	<0.020		ug/g	
			Bromodichloromethane	2019/07/27	<0.050		ug/g	
			Bromoform	2019/07/27	<0.050		ug/g	
			Bromomethane	2019/07/27	<0.050		ug/g	
			Carbon Tetrachloride	2019/07/27	<0.050		ug/g	
			Chlorobenzene	2019/07/27	<0.050		ug/g	
			Chloroform	2019/07/27	<0.050		ug/g	
			Dibromochloromethane	2019/07/27	<0.050		ug/g	
			1,2-Dichlorobenzene	2019/07/27	<0.050		ug/g	
			1,3-Dichlorobenzene	2019/07/27	<0.050		ug/g	
			1,4-Dichlorobenzene	2019/07/27	<0.050		ug/g	
			Dichlorodifluoromethane (FREON 12)	2019/07/27	<0.050		ug/g	
			1,1-Dichloroethane	2019/07/27	<0.050		ug/g	

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			1,2-Dichloroethane	2019/07/27	<0.050		ug/g	
			1,1-Dichloroethylene	2019/07/27	<0.050		ug/g	
			cis-1,2-Dichloroethylene	2019/07/27	<0.050		ug/g	
			trans-1,2-Dichloroethylene	2019/07/27	<0.050		ug/g	
			1,2-Dichloropropane	2019/07/27	<0.050		ug/g	
			cis-1,3-Dichloropropene	2019/07/27	<0.030		ug/g	
			trans-1,3-Dichloropropene	2019/07/27	<0.040		ug/g	
			Ethylbenzene	2019/07/27	<0.020		ug/g	
			Ethylene Dibromide	2019/07/27	<0.050		ug/g	
			Hexane	2019/07/27	<0.050		ug/g	
			Methylene Chloride(Dichloromethane)	2019/07/27	<0.050		ug/g	
			Methyl Ethyl Ketone (2-Butanone)	2019/07/27	<0.50		ug/g	
			Methyl Isobutyl Ketone	2019/07/27	<0.50		ug/g	
			Methyl t-butyl ether (MTBE)	2019/07/27	<0.050		ug/g	
			Styrene	2019/07/27	<0.050		ug/g	
			1,1,1,2-Tetrachloroethane	2019/07/27	<0.050		ug/g	
			1,1,2,2-Tetrachloroethane	2019/07/27	<0.050		ug/g	
			Tetrachloroethylene	2019/07/27	<0.050		ug/g	
			Toluene	2019/07/27	<0.020		ug/g	
			1,1,1-Trichloroethane	2019/07/27	<0.050		ug/g	
			1,1,2-Trichloroethane	2019/07/27	<0.050		ug/g	
			Trichloroethylene	2019/07/27	<0.050		ug/g	
			Trichlorofluoromethane (FREON 11)	2019/07/27	<0.050		ug/g	
			Vinyl Chloride	2019/07/27	<0.020		ug/g	
			p+m-Xylene	2019/07/27	<0.020		ug/g	
			o-Xylene	2019/07/27	<0.020		ug/g	
			Total Xylenes	2019/07/27	<0.020		ug/g	
			F1 (C6-C10)	2019/07/27	<10		ug/g	
			F1 (C6-C10) - BTEX	2019/07/27	<10		ug/g	
6250043	AYA	RPD [KIY532-02]	Acetone (2-Propanone)	2019/07/27	NC		%	50
			Benzene	2019/07/27	NC		%	50
			Bromodichloromethane	2019/07/27	NC		%	50
			Bromoform	2019/07/27	NC		%	50
			Bromomethane	2019/07/27	NC		%	50
			Carbon Tetrachloride	2019/07/27	NC		%	50
			Chlorobenzene	2019/07/27	NC		%	50
			Chloroform	2019/07/27	NC		%	50
			Dibromochloromethane	2019/07/27	NC		%	50
			1,2-Dichlorobenzene	2019/07/27	NC		%	50
			1,3-Dichlorobenzene	2019/07/27	NC		%	50
			1,4-Dichlorobenzene	2019/07/27	NC		%	50
			Dichlorodifluoromethane (FREON 12)	2019/07/27	NC		%	50
			1,1-Dichloroethane	2019/07/27	NC		%	50
			1,2-Dichloroethane	2019/07/27	NC		%	50
			1,1-Dichloroethylene	2019/07/27	NC		%	50
			cis-1,2-Dichloroethylene	2019/07/27	NC		%	50
			trans-1,2-Dichloroethylene	2019/07/27	NC		%	50
			1,2-Dichloropropane	2019/07/27	NC		%	50
			cis-1,3-Dichloropropene	2019/07/27	NC		%	50
			trans-1,3-Dichloropropene	2019/07/27	NC		%	50
			Ethylbenzene	2019/07/27	NC		%	50
			Ethylene Dibromide	2019/07/27	NC		%	50
			Hexane	2019/07/27	NC		%	50
			Methylene Chloride(Dichloromethane)	2019/07/27	NC		%	50

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Methyl Ethyl Ketone (2-Butanone)	2019/07/27	NC		%	50
			Methyl Isobutyl Ketone	2019/07/27	NC		%	50
			Methyl t-butyl ether (MTBE)	2019/07/27	NC		%	50
			Styrene	2019/07/27	NC		%	50
			1,1,1,2-Tetrachloroethane	2019/07/27	NC		%	50
			1,1,2,2-Tetrachloroethane	2019/07/27	NC		%	50
			Tetrachloroethylene	2019/07/27	NC		%	50
			Toluene	2019/07/27	13		%	50
			1,1,1-Trichloroethane	2019/07/27	NC		%	50
			1,1,2-Trichloroethane	2019/07/27	NC		%	50
			Trichloroethylene	2019/07/27	NC		%	50
			Trichlorofluoromethane (FREON 11)	2019/07/27	NC		%	50
			Vinyl Chloride	2019/07/27	NC		%	50
			p+m-Xylene	2019/07/27	NC		%	50
			o-Xylene	2019/07/27	NC		%	50
			Total Xylenes	2019/07/27	NC		%	50
			F1 (C6-C10)	2019/07/27	NC		%	30
			F1 (C6-C10) - BTEX	2019/07/27	NC		%	30
6250464	JMP	RPD	Moisture	2019/07/26	0.80		%	20
6250990	JMP	RPD	Moisture	2019/07/27	1.4		%	20
6252122	GUL	Matrix Spike [KIY541-01]	o-Terphenyl	2019/07/30		100	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2019/07/30		103	%	50 - 130
			F3 (C16-C34 Hydrocarbons)	2019/07/30		87	%	50 - 130
			F4 (C34-C50 Hydrocarbons)	2019/07/30		86	%	50 - 130
6252122	GUL	Spiked Blank	o-Terphenyl	2019/07/30		95	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2019/07/30		97	%	80 - 120
			F3 (C16-C34 Hydrocarbons)	2019/07/30		85	%	80 - 120
			F4 (C34-C50 Hydrocarbons)	2019/07/30		85	%	80 - 120
6252122	GUL	Method Blank	o-Terphenyl	2019/07/30		93	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2019/07/30	<10		ug/g	
			F3 (C16-C34 Hydrocarbons)	2019/07/30	<50		ug/g	
			F4 (C34-C50 Hydrocarbons)	2019/07/30	<50		ug/g	
6252122	GUL	RPD [KIY541-01]	F2 (C10-C16 Hydrocarbons)	2019/07/30	NC		%	30
			F3 (C16-C34 Hydrocarbons)	2019/07/30	1.4		%	30
			F4 (C34-C50 Hydrocarbons)	2019/07/30	18		%	30
6252645	JP5	Matrix Spike [KIY536-03]	1,4-Difluorobenzene	2019/07/29		104	%	60 - 140
			4-Bromofluorobenzene	2019/07/29		98	%	60 - 140
			D10-Ethylbenzene	2019/07/29		91	%	60 - 140
			D4-1,2-Dichloroethane	2019/07/29		97	%	60 - 140
			Benzene	2019/07/29		88	%	60 - 140
			Toluene	2019/07/29		92	%	60 - 140
			Ethylbenzene	2019/07/29		92	%	60 - 140
			o-Xylene	2019/07/29		88	%	60 - 140
			p+m-Xylene	2019/07/29		90	%	60 - 140
			F1 (C6-C10)	2019/07/29		94	%	60 - 140
6252645	JP5	Spiked Blank	1,4-Difluorobenzene	2019/07/29		105	%	60 - 140
			4-Bromofluorobenzene	2019/07/29		99	%	60 - 140
			D10-Ethylbenzene	2019/07/29		87	%	60 - 140
			D4-1,2-Dichloroethane	2019/07/29		98	%	60 - 140
			Benzene	2019/07/29		88	%	60 - 140
			Toluene	2019/07/29		90	%	60 - 140
			Ethylbenzene	2019/07/29		91	%	60 - 140
			o-Xylene	2019/07/29		88	%	60 - 140
			p+m-Xylene	2019/07/29		92	%	60 - 140

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			F1 (C6-C10)	2019/07/29		92	%	80 - 120
6252645	JP5	Method Blank	1,4-Difluorobenzene	2019/07/29		104	%	60 - 140
			4-Bromofluorobenzene	2019/07/29		98	%	60 - 140
			D10-Ethylbenzene	2019/07/29		88	%	60 - 140
			D4-1,2-Dichloroethane	2019/07/29		98	%	60 - 140
			Benzene	2019/07/29	<0.020		ug/g	
			Toluene	2019/07/29	<0.020		ug/g	
			Ethylbenzene	2019/07/29	<0.020		ug/g	
			o-Xylene	2019/07/29	<0.020		ug/g	
			p+m-Xylene	2019/07/29	<0.040		ug/g	
			Total Xylenes	2019/07/29	<0.040		ug/g	
			F1 (C6-C10)	2019/07/29	<10		ug/g	
			F1 (C6-C10) - BTEX	2019/07/29	<10		ug/g	
6252645	JP5	RPD [KIY536-03]	Benzene	2019/07/29	NC		%	50
			Toluene	2019/07/29	NC		%	50
			Ethylbenzene	2019/07/29	NC		%	50
			o-Xylene	2019/07/29	NC		%	50
			p+m-Xylene	2019/07/29	NC		%	50
			Total Xylenes	2019/07/29	NC		%	50
			F1 (C6-C10)	2019/07/29	NC		%	30
			F1 (C6-C10) - BTEX	2019/07/29	NC		%	30
6252918	GUL	Matrix Spike [KIY542-02]	Propylene Glycol	2019/07/29		94	%	60 - 140
			Ethylene Glycol	2019/07/29		84	%	60 - 140
			Diethylene Glycol	2019/07/29		77	%	60 - 140
6252918	GUL	Spiked Blank	Propylene Glycol	2019/07/29		100	%	60 - 140
			Ethylene Glycol	2019/07/29		86	%	60 - 140
			Diethylene Glycol	2019/07/29		80	%	60 - 140
6252918	GUL	Method Blank	Propylene Glycol	2019/07/29	<10		mg/kg	
			Ethylene Glycol	2019/07/29	<10		mg/kg	
			Diethylene Glycol	2019/07/29	<10		mg/kg	
			Total Glycol	2019/07/29	<10		mg/kg	
6252918	GUL	RPD [KIY542-02]	Propylene Glycol	2019/07/29	NC		%	50
			Ethylene Glycol	2019/07/29	NC		%	50
			Diethylene Glycol	2019/07/29	NC		%	50
			Total Glycol	2019/07/29	NC		%	50
6255270	RAJ	Matrix Spike [KIY541-01]	D10-Anthracene	2019/07/31		87	%	50 - 130
			D14-Terphenyl (FS)	2019/07/31		95	%	50 - 130
			D8-Acenaphthylene	2019/07/31		83	%	50 - 130
			Acenaphthene	2019/07/31		93	%	50 - 130
			Acenaphthylene	2019/07/31		91	%	50 - 130
			Anthracene	2019/07/31		90	%	50 - 130
			Benzo(a)anthracene	2019/07/31		105	%	50 - 130
			Benzo(a)pyrene	2019/07/31		97	%	50 - 130
			Benzo(b/j)fluoranthene	2019/07/31		90	%	50 - 130
			Benzo(g,h,i)perylene	2019/07/31		100	%	50 - 130
			Benzo(k)fluoranthene	2019/07/31		90	%	50 - 130
			Chrysene	2019/07/31		101	%	50 - 130
			Dibenz(a,h)anthracene	2019/07/31		110	%	50 - 130
			Fluoranthene	2019/07/31		109	%	50 - 130
			Fluorene	2019/07/31		96	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2019/07/31		98	%	50 - 130
			1-Methylnaphthalene	2019/07/31		102	%	50 - 130
			2-Methylnaphthalene	2019/07/31		92	%	50 - 130
			Naphthalene	2019/07/31		86	%	50 - 130

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Phenanthrene	2019/07/31		91	%	50 - 130
			Pyrene	2019/07/31		110	%	50 - 130
6255270	RAJ	Spiked Blank	D10-Anthracene	2019/07/31		99	%	50 - 130
			D14-Terphenyl (FS)	2019/07/31		104	%	50 - 130
			D8-Acenaphthylene	2019/07/31		91	%	50 - 130
			Acenaphthene	2019/07/31		100	%	50 - 130
			Acenaphthylene	2019/07/31		97	%	50 - 130
			Anthracene	2019/07/31		98	%	50 - 130
			Benzo(a)anthracene	2019/07/31		110	%	50 - 130
			Benzo(a)pyrene	2019/07/31		100	%	50 - 130
			Benzo(b/j)fluoranthene	2019/07/31		95	%	50 - 130
			Benzo(g,h,i)perylene	2019/07/31		102	%	50 - 130
			Benzo(k)fluoranthene	2019/07/31		104	%	50 - 130
			Chrysene	2019/07/31		100	%	50 - 130
			Dibenz(a,h)anthracene	2019/07/31		108	%	50 - 130
			Fluoranthene	2019/07/31		114	%	50 - 130
			Fluorene	2019/07/31		102	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2019/07/31		105	%	50 - 130
			1-Methylnaphthalene	2019/07/31		109	%	50 - 130
			2-Methylnaphthalene	2019/07/31		99	%	50 - 130
			Naphthalene	2019/07/31		93	%	50 - 130
			Phenanthrene	2019/07/31		95	%	50 - 130
			Pyrene	2019/07/31		109	%	50 - 130
6255270	RAJ	Method Blank	D10-Anthracene	2019/07/31		100	%	50 - 130
			D14-Terphenyl (FS)	2019/07/31		107	%	50 - 130
			D8-Acenaphthylene	2019/07/31		88	%	50 - 130
			Acenaphthene	2019/07/31	<0.0050		ug/g	
			Acenaphthylene	2019/07/31	<0.0050		ug/g	
			Anthracene	2019/07/31	<0.0050		ug/g	
			Benzo(a)anthracene	2019/07/31	<0.0050		ug/g	
			Benzo(a)pyrene	2019/07/31	<0.0050		ug/g	
			Benzo(b/j)fluoranthene	2019/07/31	<0.0050		ug/g	
			Benzo(g,h,i)perylene	2019/07/31	<0.0050		ug/g	
			Benzo(k)fluoranthene	2019/07/31	<0.0050		ug/g	
			Chrysene	2019/07/31	<0.0050		ug/g	
			Dibenz(a,h)anthracene	2019/07/31	<0.0050		ug/g	
			Fluoranthene	2019/07/31	<0.0050		ug/g	
			Fluorene	2019/07/31	<0.0050		ug/g	
			Indeno(1,2,3-cd)pyrene	2019/07/31	<0.0050		ug/g	
			1-Methylnaphthalene	2019/07/31	<0.0050		ug/g	
			2-Methylnaphthalene	2019/07/31	<0.0050		ug/g	
			Naphthalene	2019/07/31	<0.0050		ug/g	
			Phenanthrene	2019/07/31	<0.0050		ug/g	
			Pyrene	2019/07/31	<0.0050		ug/g	
6255270	RAJ	RPD [KIY541-01]	Acenaphthene	2019/07/31	28		%	40
			Acenaphthylene	2019/07/31	NC		%	40
			Anthracene	2019/07/31	2.4		%	40
			Benzo(a)anthracene	2019/07/31	0.72		%	40
			Benzo(a)pyrene	2019/07/31	2.2		%	40
			Benzo(b/j)fluoranthene	2019/07/31	4.8		%	40
			Benzo(g,h,i)perylene	2019/07/31	5.1		%	40
			Benzo(k)fluoranthene	2019/07/31	4.5		%	40
			Chrysene	2019/07/31	1.8		%	40
			Dibenz(a,h)anthracene	2019/07/31	1.6		%	40

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Fluoranthene	2019/07/31	8.4		%	40
			Fluorene	2019/07/31	21		%	40
			Indeno(1,2,3-cd)pyrene	2019/07/31	5.4		%	40
			1-Methylnaphthalene	2019/07/31	NC		%	40
			2-Methylnaphthalene	2019/07/31	0.50		%	40
			Naphthalene	2019/07/31	NC		%	40
			Phenanthrene	2019/07/31	16		%	40
			Pyrene	2019/07/31	11		%	40
6262247	AKH	Matrix Spike	13C2-6:2-Fluorotelomersulfonic Acid	2019/08/03		91	%	50 - 150
			13C2-8:2-Fluorotelomersulfonic Acid	2019/08/03		85	%	50 - 150
			13C2-Perfluorodecanoic acid	2019/08/03		86	%	50 - 150
			13C2-Perfluorododecanoic acid	2019/08/03		81	%	50 - 150
			13C2-Perfluorohexanoic acid	2019/08/03		91	%	50 - 150
			13C2-perfluorotetradecanoic acid	2019/08/03		71	%	50 - 150
			13C2-Perfluoroundecanoic acid	2019/08/03		82	%	50 - 150
			13C3-Perfluorobutanesulfonic acid	2019/08/03		91	%	50 - 150
			13C4-Perfluorobutanoic acid	2019/08/03		90	%	50 - 150
			13C4-Perfluoroheptanoic acid	2019/08/03		90	%	50 - 150
			13C4-Perfluorooctanesulfonic acid	2019/08/03		87	%	50 - 150
			13C4-Perfluorooctanoic acid	2019/08/03		90	%	50 - 150
			13C5-Perfluorononanoic acid	2019/08/03		88	%	50 - 150
			13C5-Perfluoropentanoic acid	2019/08/03		89	%	50 - 150
			13C8-Perfluorooctane Sulfonamide	2019/08/03		75	%	50 - 150
			18O2-Perfluorohexanesulfonic acid	2019/08/03		92	%	50 - 150
			D3-MeFOSA	2019/08/03		54	%	50 - 150
			D3-MeFOSAA	2019/08/03		78	%	50 - 150
			D5-EtFOSA	2019/08/03		57	%	50 - 150
			D5-EtFOSAA	2019/08/03		76	%	50 - 150
			D7-MeFOSE	2019/08/03		67	%	50 - 150
			D9-EtFOSE	2019/08/03		63	%	50 - 150
			Perfluorobutanoic acid	2019/08/03		93	%	70 - 130
			Perfluoropentanoic Acid (PFPeA)	2019/08/03		91	%	70 - 130
			Perfluorohexanoic Acid (PFHxA)	2019/08/03		94	%	70 - 130
			Perfluoroheptanoic Acid (PFHpA)	2019/08/03		88	%	70 - 130
			Perfluorooctanoic Acid (PFOA)	2019/08/03		89	%	70 - 130
			Perfluorononanoic Acid (PFNA)	2019/08/03		95	%	70 - 130
			Perfluorodecanoic Acid (PFDA)	2019/08/03		94	%	70 - 130
			Perfluoroundecanoic Acid (PFUnA)	2019/08/03		93	%	70 - 130
			Perfluorododecanoic Acid (PFDoA)	2019/08/03		89	%	70 - 130
			Perfluorotridecanoic Acid	2019/08/03		101	%	70 - 130
			Perfluorotetradecanoic Acid	2019/08/03		89	%	70 - 130
			Perfluorobutanesulfonic acid	2019/08/03		88	%	70 - 130
			Perfluoropentanesulfonic acid	2019/08/03		93	%	70 - 130
			Perfluorohexanesulfonic acid	2019/08/03		90	%	70 - 130
			Perfluoroheptanesulfonic acid	2019/08/03		88	%	70 - 130
			Perfluorooctanesulfonic acid	2019/08/03		95	%	70 - 130
			Perfluorononanesulfonic acid	2019/08/03		89	%	70 - 130
			Perfluorodecanesulfonic acid (PFDS)	2019/08/03		86	%	70 - 130
			Perfluorooctane Sulfonamide (PFOSA)	2019/08/03		84	%	70 - 130
			EtFOSA	2019/08/03		90	%	70 - 130
			MeFOSA	2019/08/03		94	%	70 - 130
			EtFOSE	2019/08/03		95	%	70 - 130
			MeFOSE	2019/08/03		87	%	70 - 130
			EtFOSAA	2019/08/03		93	%	70 - 130

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			MeFOSAA	2019/08/03		96	%	70 - 130
			6:2 Fluorotelomer sulfonic acid	2019/08/03		87	%	70 - 130
			8:2 Fluorotelomer sulfonic acid	2019/08/03		91	%	70 - 130
6262247	AKH	Spiked Blank	13C2-6:2-Fluorotelomersulfonic Acid	2019/08/04		89	%	50 - 150
			13C2-8:2-Fluorotelomersulfonic Acid	2019/08/04		82	%	50 - 150
			13C2-Perfluorodecanoic acid	2019/08/04		81	%	50 - 150
			13C2-Perfluorododecanoic acid	2019/08/04		77	%	50 - 150
			13C2-Perfluorohexanoic acid	2019/08/04		88	%	50 - 150
			13C2-perfluorotetradecanoic acid	2019/08/04		71	%	50 - 150
			13C2-Perfluoroundecanoic acid	2019/08/04		82	%	50 - 150
			13C3-Perfluorobutanesulfonic acid	2019/08/04		87	%	50 - 150
			13C4-Perfluorobutanoic acid	2019/08/04		87	%	50 - 150
			13C4-Perfluoroheptanoic acid	2019/08/04		86	%	50 - 150
			13C4-Perfluorooctanesulfonic acid	2019/08/04		84	%	50 - 150
			13C4-Perfluorooctanoic acid	2019/08/04		85	%	50 - 150
			13C5-Perfluorononanoic acid	2019/08/04		85	%	50 - 150
			13C5-Perfluoropentanoic acid	2019/08/04		87	%	50 - 150
			13C8-Perfluorooctane Sulfonamide	2019/08/04		74	%	50 - 150
			18O2-Perfluorohexanesulfonic acid	2019/08/04		87	%	50 - 150
			D3-MeFOSA	2019/08/04		50	%	50 - 150
			D3-MeFOSAA	2019/08/04		86	%	50 - 150
			D5-EtFOSA	2019/08/04		48 (2)	%	50 - 150
			D5-EtFOSAA	2019/08/04		75	%	50 - 150
			D7-MeFOSE	2019/08/04		69	%	50 - 150
			D9-EtFOSE	2019/08/04		68	%	50 - 150
			Perfluorobutanoic acid	2019/08/04		93	%	70 - 130
			Perfluoropentanoic Acid (PFPeA)	2019/08/04		89	%	70 - 130
			Perfluorohexanoic Acid (PFHxA)	2019/08/04		91	%	70 - 130
			Perfluoroheptanoic Acid (PFHpA)	2019/08/04		88	%	70 - 130
			Perfluorooctanoic Acid (PFOA)	2019/08/04		89	%	70 - 130
			Perfluorononanoic Acid (PFNA)	2019/08/04		93	%	70 - 130
			Perfluorodecanoic Acid (PFDA)	2019/08/04		94	%	70 - 130
			Perfluoroundecanoic Acid (PFUnA)	2019/08/04		91	%	70 - 130
			Perfluorododecanoic Acid (PFDoA)	2019/08/04		92	%	70 - 130
			Perfluorotridecanoic Acid	2019/08/04		100	%	70 - 130
			Perfluorotetradecanoic Acid	2019/08/04		90	%	70 - 130
			Perfluorobutanesulfonic acid	2019/08/04		86	%	70 - 130
			Perfluoropentanesulfonic acid	2019/08/04		88	%	70 - 130
			Perfluorohexanesulfonic acid	2019/08/04		90	%	70 - 130
			Perfluoroheptanesulfonic acid	2019/08/04		86	%	70 - 130
			Perfluorooctanesulfonic acid	2019/08/04		92	%	70 - 130
			Perfluorononanesulfonic acid	2019/08/04		88	%	70 - 130
			Perfluorodecanesulfonic acid (PFDS)	2019/08/04		89	%	70 - 130
			Perfluorooctane Sulfonamide (PFOSA)	2019/08/04		86	%	70 - 130
			EtFOSA	2019/08/04		90	%	70 - 130
			MeFOSA	2019/08/04		86	%	70 - 130
			EtFOSE	2019/08/04		95	%	70 - 130
			MeFOSE	2019/08/04		89	%	70 - 130
			EtFOSAA	2019/08/04		90	%	70 - 130
			MeFOSAA	2019/08/04		92	%	70 - 130
			6:2 Fluorotelomer sulfonic acid	2019/08/04		86	%	70 - 130
			8:2 Fluorotelomer sulfonic acid	2019/08/04		95	%	70 - 130
6262247	AKH	Method Blank	13C2-6:2-Fluorotelomersulfonic Acid	2019/08/04		103	%	50 - 150
			13C2-8:2-Fluorotelomersulfonic Acid	2019/08/04		95	%	50 - 150

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			13C2-Perfluorodecanoic acid	2019/08/04		96	%	50 - 150
			13C2-Perfluorododecanoic acid	2019/08/04		91	%	50 - 150
			13C2-Perfluorohexanoic acid	2019/08/04		109	%	50 - 150
			13C2-perfluorotetradecanoic acid	2019/08/04		86	%	50 - 150
			13C2-Perfluoroundecanoic acid	2019/08/04		92	%	50 - 150
			13C3-Perfluorobutanesulfonic acid	2019/08/04		104	%	50 - 150
			13C4-Perfluorobutanoic acid	2019/08/04		103	%	50 - 150
			13C4-Perfluoroheptanoic acid	2019/08/04		102	%	50 - 150
			13C4-Perfluorooctanesulfonic acid	2019/08/04		97	%	50 - 150
			13C4-Perfluorooctanoic acid	2019/08/04		99	%	50 - 150
			13C5-Perfluorononanoic acid	2019/08/04		98	%	50 - 150
			13C5-Perfluoropentanoic acid	2019/08/04		104	%	50 - 150
			13C8-Perfluorooctane Sulfonamide	2019/08/04		82	%	50 - 150
			18O2-Perfluorohexanesulfonic acid	2019/08/04		99	%	50 - 150
			D3-MeFOSA	2019/08/04		52	%	50 - 150
			D3-MeFOSAA	2019/08/04		92	%	50 - 150
			D5-EtFOSA	2019/08/04		54	%	50 - 150
			D5-EtFOSAA	2019/08/04		91	%	50 - 150
			D7-MeFOSE	2019/08/04		81	%	50 - 150
			D9-EtFOSE	2019/08/04		78	%	50 - 150
			Perfluorobutanoic acid	2019/08/04	<1.0		ug/kg	
			Perfluoropentanoic Acid (PFPeA)	2019/08/04	<1.0		ug/kg	
			Perfluorohexanoic Acid (PFHxA)	2019/08/04	<1.0		ug/kg	
			Perfluoroheptanoic Acid (PFHpA)	2019/08/04	<1.0		ug/kg	
			Perfluorooctanoic Acid (PFOA)	2019/08/04	<1.0		ug/kg	
			Perfluorononanoic Acid (PFNA)	2019/08/04	<1.0		ug/kg	
			Perfluorodecanoic Acid (PFDA)	2019/08/04	<1.0		ug/kg	
			Perfluoroundecanoic Acid (PFUnA)	2019/08/04	<1.0		ug/kg	
			Perfluorododecanoic Acid (PFDoA)	2019/08/04	<1.0		ug/kg	
			Perfluorotridecanoic Acid	2019/08/04	<1.0		ug/kg	
			Perfluorotetradecanoic Acid	2019/08/04	<1.0		ug/kg	
			Perfluorobutanesulfonic acid	2019/08/04	<1.0		ug/kg	
			Perfluoropentanesulfonic acid	2019/08/04	<1.0		ug/kg	
			Perfluorohexanesulfonic acid	2019/08/04	<1.0		ug/kg	
			Perfluoroheptanesulfonic acid	2019/08/04	<1.0		ug/kg	
			Perfluorooctanesulfonic acid	2019/08/04	<1.0		ug/kg	
			Perfluorononanesulfonic acid	2019/08/04	<1.0		ug/kg	
			Perfluorodecanesulfonic acid (PFDS)	2019/08/04	<1.0		ug/kg	
			Perfluorooctane Sulfonamide (PFOSA)	2019/08/04	<1.0		ug/kg	
			EtFOSA	2019/08/04	<1.0		ug/kg	
			MeFOSA	2019/08/04	<1.0		ug/kg	
			EtFOSE	2019/08/04	<1.0		ug/kg	
			MeFOSE	2019/08/04	<1.0		ug/kg	
			EtFOSAA	2019/08/04	<1.0		ug/kg	
			MeFOSAA	2019/08/04	<1.0		ug/kg	
			6:2 Fluorotelomer sulfonic acid	2019/08/04	<1.0		ug/kg	
			8:2 Fluorotelomer sulfonic acid	2019/08/04	<1.0		ug/kg	
6262247	AKH	RPD	Perfluorobutanoic acid	2019/08/04	NC		%	30
			Perfluoropentanoic Acid (PFPeA)	2019/08/04	NC		%	30
			Perfluorohexanoic Acid (PFHxA)	2019/08/04	NC		%	30
			Perfluoroheptanoic Acid (PFHpA)	2019/08/04	NC		%	30
			Perfluorooctanoic Acid (PFOA)	2019/08/04	NC		%	30
			Perfluorononanoic Acid (PFNA)	2019/08/04	NC		%	30
			Perfluorodecanoic Acid (PFDA)	2019/08/04	NC		%	30

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Perfluoroundecanoic Acid (PFUnA)	2019/08/04	NC		%	30
			Perfluorododecanoic Acid (PFDoA)	2019/08/04	NC		%	30
			Perfluorotridecanoic Acid	2019/08/04	NC		%	30
			Perfluorotetradecanoic Acid	2019/08/04	NC		%	30
			Perfluorobutanesulfonic acid	2019/08/04	NC		%	30
			Perfluorohexanesulfonic acid	2019/08/04	NC		%	30
			Perfluoroheptanesulfonic acid	2019/08/04	NC		%	30
			Perfluorooctanesulfonic acid	2019/08/04	NC		%	30
			Perfluorodecanesulfonic acid (PFDS)	2019/08/04	NC		%	30
			Perfluorooctane Sulfonamide (PFOSA)	2019/08/04	NC		%	25
			EtFOSAA	2019/08/04	NC		%	30
			MeFOSAA	2019/08/04	NC		%	30
			6:2 Fluorotelomer sulfonic acid	2019/08/04	NC		%	30
			8:2 Fluorotelomer sulfonic acid	2019/08/04	NC		%	30

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) The recovery was above the upper control limit. This may represent a high bias in some results for this specific analyte. For results that were not detected (ND), this potential bias has no impact.

(2) Extracted internal standard analyte recovery was below the defined lower control limit (LCL) which may result in increased variability of the associated native analyte result (N-Ethylperfluorooctane sulfonamide).

Bureau Veritas Laboratories 32 Colonnade Rd, Unit #1000, Nepean, ON K2E 7J6 Phone: 613 274-0573 Fax: 613 274-0574 Website: www.bvlabs.com

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Colm McNamara, Senior Analyst, Liquid Chromatography

Ewa Pranjic, M.Sc., C.Chem, 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 32 Colonnade Rd, Unit #1000, Nepean, ON K2E 7J6 Phone: 613 274-0573 Fax: 613 274-0574 Website: www.bvlabs.com

BUREAU VERITAS

Bureau Veritas Laboratories
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel:(905) 817-5700 Toll-free:800-563-6266 Fax:(905) 817-5777 www.bvlabs.com

24-Jul-19 11:45
Cristina (Maria) Bacchus

B9K5175

Page 1 of 2

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:			
Company Name:	#19397 Dillon Consulting Limited	Company Name:		Quotation #:		y:	
Attention:	Andrew Hounsell	Attention:	Andrew Hounsell	P.O. #:	J_L ENV-989	Bottle Order #:	
Address:	334 - 11th Ave SE Suite 200 Calgary AB T2G 0Y2	Address:		Project:	19-9543		727706
Tel:	(403) 215-8880 Fax: (403) 215-8889	Tel:	(403) 604-7164 Fax:	Project Name:		COC #:	Project Manager:
Email:	AHounsell@dillon.ca KBarnes@dillon.ca	Email:	AHounsell@dillon.ca	Site #:		C#727706-01-01	Cristina (Maria) Bacchus
				Sampled By:	A. Hounsell		

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BV LABS DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011): ☐ Table 1 ☐ Res/Park ☐ Medium/Fine ☐ Table 2 ☐ Ind/Comm ☐ Coarse ☐ Table 3 ☐ Agri/Other ☐ For RSC ☐ Table ___

Other Regulations: ☐ CCME ☐ Sanitary Sewer Bylaw ☐ Reg 558. ☐ Storm Sewer Bylaw ☐ MISA Municipality ☐ PWQO ☐ Other

Special Instructions

Include Criteria on Certificate of Analysis (Y/N)? ____

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

Regular (Standard) TAT: [X]
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: ____ Time Required: ____ ☐
Rush Confirmation Number: ____ *(call lab for #)*

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): Metals / Hg / Cr VI	Petroleum Hydrocarbons	PAHs	Glycols in Soil by GC-FID	VOCs by HS	PFAS in soil by SPE/LCMS	# of Bottles	Comments
1		SS01	July 17, 2019	10:05	Soil		X	X		X		5	
2		SS02		10:30			X	X				3	On ice
3		SS03		10:50			X	X				3	
4		SS04		11:20			X	X		X		5	
5		SS05		12:00			X	X				3	
6		SS06		12:10			X	X				3	
7		SS07		12:35			X	X	X			4	
8		SS08		13:50			X	X			X	4	
9		SS09		14:10							X	1	
10		SS10		14:20							X	1	

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Andrew Hounsell / Andrew Hounsell	19/07/19	11:30	Ian Campbell	2019/07/24	11:45	
				19/07/25	0800	

Laboratory Use Only

Time Sensitive	Temperature (°C) on Receipt	Custody Seal Present	Yes	No
	4.5.6	Intact	✓	

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BV LABS' 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.BVLABS.COM/TERMS-AND-CONDITIONS.

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVLABS.COM/RESOURCES/CHAIN-OF-CUSTODY-FORMS.

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BV LABS

White: BV Labs Yellow: Client

Bureau Veritas Canada (2019) Inc.

Bureau Veritas Laboratories
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel:(905) 817-5700 Toll-free:800-563-6266 Fax:(905) 817-5777 www.bvlabs.com

CHAIN OF CUSTODY RECORD

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:		Laboratory Use Only:	
Company Name:	#19397 Dillon Consulting Limited	Company Name:		Quotation #:		BV Labs Job #:	Bottle Order #: 727706
Attention:	Andrew Hounsell	Attention:	Andrew Hounsell	P.O. #:			
Address:	334 - 11th Ave SE Suite 200 Calgary AB T2G 0Y2	Address:		Project:	19-9543	COC #: C#727706-02-01	Project Manager: Cristina (Maria) Bacchus
Tel:	(403) 215-8880 Fax: (403) 215-8889	Tel:	(403) 604-7164 Fax:	Project Name:			
Email:	AHounsell@dillon.ca Kbarnes@dillon.ca	Email:	AHounsell@dillon.ca	Site #:			
				Sampled By:	A.Hounsell		

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BV LABS DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011)	Other Regulations	Special Instructions
☐ Table 1 ☐ Res/Park ☐ Medium/Fine ☐ Table 2 ☐ Ind/Comm ☐ Coarse ☐ Table 3 ☐ Agri/Other ☐ For RSC ☐ Table ___	☐ CCME ☐ Sanitary Sewer Bylaw ☐ Reg 558 ☐ Storm Sewer Bylaw ☐ MISA Municipality ___ ☐ PWQO ☐ Other ___	

Include Criteria on Certificate of Analysis (Y/N)? ___

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

Regular (Standard) TAT: X
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: ___ Time Required: ___ ☐
Rush Confirmation Number: ___ *(call lab for #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): Metals / Hg / Cr VI	Petroleum Hydrocarbons	PAHs	Glycols in Soil by GC-FID	VOCs by HS	PFAS in soil by SPE/LCMS					# of Bottles	Comments
1		SS11	July 17, 2019	14:35	Soil						X					1	H- HOLD
2		SS12		14:45							X					1	
3		SS13		14:55			X	X			X					4	
4		SS14		16:30			X	X	X							4	
5		SS15		17:30			X	X	X	X						6	
6		SS16		17:45			X	X	X							4	On ice
7		TP1	July 18, 2019	14:25			X	X								3	RECEIVED IN OTTAWA
8		QAQC01		14:25			X	X								3	
9		QAQC02		16:00	Soil		H									2	
10		TP4		15:45	Soil		X	X								3	

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Andrew Hounsell / Andrew Hounsell	19/07/19	11:30	Ian Campbell	2019/07/24	11:45	
					9:00	

Laboratory Use Only				
Time Sensitive	Temperature (°C) on Recei	Custody Seal	Yes	No
	4.5.6	Present	✓	
		Intact	✓	

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BV LABS' 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.BVLABS.COM/TERMS-AND-CONDITIONS.

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVLABS.COM/RESOURCES/CHAIN-OF-CUSTODY-FORMS. 5714 2110 1/20

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BV LABS

White: BV Labs Yellow: Client

Bureau Veritas Canada (2019) Inc.

Your Project #: 19-9543
Your C.O.C. #: 727706-03-01

Attention: Andrew Hounsell

Dillon Consulting Limited
334 - 11th Ave SE
Suite 200
Calgary, AB
CANADA T2G 0Y2

Report Date: 2019/07/31
Report #: R5821187
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9K5213
Received: 2019/07/24, 11:45

Sample Matrix: Soil
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Sieve, 75um (1)	1	N/A	2019/07/29	CAM SOP-00467	Carter 2nd ed 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.
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 Mississauga

Your Project #: 19-9543
Your C.O.C. #: 727706-03-01

Attention: Andrew Hounsell

Dillon Consulting Limited
334 - 11th Ave SE
Suite 200
Calgary, AB
CANADA T2G 0Y2

Report Date: 2019/07/31
Report #: R5821187
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9K5213
Received: 2019/07/24, 11:45

Encryption Key



Bureau Veritas Laboratories
31 Jul 2019 17:01:05

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Christine Gripton, Senior Project Manager
Email: Christine.Gripton@bvlabs.com
Phone# (519)652-9444
==========
This report has been generated and distributed using a secure automated process.
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 #: B9K5213
Report Date: 2019/07/31

Dillon Consulting Limited
Client Project #: 19-9543
Sampler Initials: AH

RESULTS OF ANALYSES OF SOIL

BV Labs ID		KIY675		
Sampling Date		2019/07/17 12:30		
COC Number		727706-03-01		
	UNITS	SS04	RDL	QC Batch
Miscellaneous Parameters				
Grain Size	%	COARSE	N/A	6252165
Sieve - #200 (<0.075mm)	%	10	1	6252165
Sieve - #200 (>0.075mm)	%	90	1	6252165

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

Bureau Veritas Laboratories 32 Colonnade Rd, Unit #1000, Nepean, ON K2E 7J6 Phone: 613 274-0573 Fax: 613 274-0574 Website: www.bvlabs.com

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	5.0°C

Results relate only to the items tested.

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Report Date: 2019/07/31

Dillon Consulting Limited
Client Project #: 19-9543
Sampler Initials: AH

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6252165	GYA	QC Standard	Sieve - #200 (<0.075mm)	2019/07/30		56	%	53 - 58
			Sieve - #200 (>0.075mm)	2019/07/30		44	%	42 - 47
6252165	GYA	RPD	Sieve - #200 (<0.075mm)	2019/07/29	0.24		%	20
			Sieve - #200 (>0.075mm)	2019/07/29	0.40		%	20

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

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BV Labs Job #: B9K5213
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VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Ewa Pranjic, M.Sc., C.Chem, Scientific Specialist

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BUREAU VERITAS

Bureau Veritas Laboratories
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel:(905) 817-5700 Toll-free:800-563-6266 Fax:(905) 817-5777 www.bvlabs.com

24-Jul-19 11:45
Cristina (Maria) Bacchus

B9K5213

Page 1 of 1

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:	
Company Name:	#19397 Dillon Consulting Limited	Company Name:		Quotation #:	
Attention:	Andrew Hounsell	Attention:	Andrew Hounsell	P.O. #:	
Address:	334 - 11th Ave SE Suite 200	Address:		Project:	19-9543
	Calgary AB T2G 0Y2			Project Name:	
Tel:	(403) 215-8880 Fax: (403) 215-8889	Tel:	(403) 604-7164 Fax:	Site #:	
Email:	AHounsell@dillon.ca kbarnes@dillon.ca	Email:	AHounsell@dillon.ca	Sampled By:	

J_L ENV-989

Bottle Order #: 727706

COC #: C#727706-03-01

Project Manager: Cristina (Maria) Bacchus

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BV LABS DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011)
- ☐ Table 1 ☐ Res/Park ☐ Medium/Fine
- ☐ Table 2 ☐ Ind/Comm ☐ Coarse
- ☐ Table 3 ☐ Agri/Other ☐ For RSC
- ☐ Table ___

Other Regulations
- ☐ CCME ☐ Sanitary Sewer Bylaw
- ☐ Reg 558 ☐ Storm Sewer Bylaw
- ☐ MISA Municipality ___
- ☐ PWQO
- ☐ Other ___

Special Instructions

Include Criteria on Certificate of Analysis (Y/N)? ___

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

Regular (Standard) TAT: X
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: ___ Time Required: ___ ☐
Rush Confirmation Number: ___ *(call lab for #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): Metals / Hg / Cr VI	Petroleum Hydrocarbons	PAHs	Glycols in Soil by GC-FID	VOCs by HS	PFAS in soil by SPE/LCMS	Grain Size	# of Bottles	Comments
1		SS04	July 17, 2019	12:30	Soil							X	1	
2														on ice
3														RECEIVED IN OTTAWA
4														
5														
6														
7														
8														
9														
10														

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Andrew Hounsell	19/07/19	11:30		2019/07/24	11:45	
				WG/07/25	VSW	

Laboratory Use Only

Time Sensitive	Temperature (°C) on Recei	Custody Seal	Yes	No
	4.5.6	Present	✓	
		Intact	✓	

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BV LABS' 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.BVLABS.COM/TERMS-AND-CONDITIONS.

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVLABS.COM/RESOURCES/CHAIN-OF-CUSTODY-FORMS. 5/7/14 2/11/0 1/2/0

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BV LABS

White: BV Labs Yellow: Client

Bureau Veritas Canada (2019) Inc.

Your Project #: 19-9543
Your C.O.C. #: 727707-01-01

Attention: Andrew Hounsell

Dillon Consulting Limited
334 - 11th Ave SE
Suite 200
Calgary, AB
CANADA T2G 0Y2

Report Date: 2019/08/06
Report #: R5828219
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9K5262
Received: 2019/07/24, 11:45

Sample Matrix: Water
Samples Received: 7

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Methylnaphthalene Sum (1)	7	N/A	2019/07/31	CAM SOP-00301	EPA 8270D m
1,3-Dichloropropene Sum (1)	2	N/A	2019/07/30		EPA 8260C m
Chromium (VI) in Water (1)	7	N/A	2019/07/29	CAM SOP-00436	EPA 7199 m
Petroleum Hydro. CCME F1 & BTEX in Water (1)	5	N/A	2019/07/29	CAM SOP-00315	CCME PHC-CWS m
Petroleum Hydrocarbons F2-F4 in Water (1, 2)	2	2019/07/30	2019/07/30	CAM SOP-00316	CCME PHC-CWS m
Petroleum Hydrocarbons F2-F4 in Water (1, 2)	5	2019/07/30	2019/07/31	CAM SOP-00316	CCME PHC-CWS m
Glycols in Water by GC/FID (1)	2	N/A	2019/07/30	CAM SOP-00322	based on EPA 8015
Mercury (1)	7	2019/07/29	2019/07/29	CAM SOP-00453	EPA 7470A m
Dissolved Metals by ICPMS (1)	7	N/A	2019/07/30	CAM SOP-00447	EPA 6020B m
PAH Compounds in Water by GC/MS (SIM) (1)	2	2019/07/30	2019/07/30	CAM SOP-00318	EPA 8270D m
PAH Compounds in Water by GC/MS (SIM) (1)	5	2019/07/30	2019/07/31	CAM SOP-00318	EPA 8270D m
PFAS in water by SPE/LCMS (1, 3)	2	2019/07/31	2019/08/01	CAM SOP-00894	EPA 537 m
Volatile Organic Compounds and F1 PHCs (1)	2	N/A	2019/07/29	CAM SOP-00230	EPA 8260C 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.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Your Project #: 19-9543
Your C.O.C. #: 727707-01-01

Attention: Andrew Hounsell

Dillon Consulting Limited
334 - 11th Ave SE
Suite 200
Calgary, AB
CANADA T2G 0Y2

Report Date: 2019/08/06
Report #: R5828219
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9K5262
Received: 2019/07/24, 11:45

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 Mississauga

(2) All CCME PHC results met required criteria unless otherwise stated in the report. The CWS PHC methods employed by Bureau Veritas Laboratories conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following "Alberta Environment's Interpretation of the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil Validation of Performance-Based Alternative Methods September 2003". Documentation is available upon request. Modifications from Reference Method for the Canada-wide Standard for Petroleum Hydrocarbons in Soil-Tier 1 Method: F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction.

(3) Per- and polyfluoroalkyl substances (PFAS) identified as surrogates on the certificate of analysis represent the extracted internal standard.

Encryption Key



Bureau Veritas Laboratories
06 Aug 2019 16:37:37

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Christine Gripton, Senior Project Manager
Email: Christine.Gripton@bvlabs.com
Phone# (519)652-9444

==========

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RESULTS OF ANALYSES OF WATER

BV Labs ID		KIY873		KIY875		
Sampling Date		2019/07/18 20:55		2019/07/18 21:55		
COC Number		727707-01-01		727707-01-01		
	UNITS	19MW-02	RDL	19MW-03	RDL	QC Batch
Perfluorinated Compounds						
Perfluorobutanoic acid	ug/L	0.12	0.020	0.030	0.020	6257053
Perfluoropentanoic Acid (PFPeA)	ug/L	0.99	0.020	0.086	0.020	6257053
Perfluorohexanoic Acid (PFHxA)	ug/L	0.55	0.020	0.055	0.020	6257053
Perfluoroheptanoic Acid (PFHpA)	ug/L	0.37	0.020	0.042	0.020	6257053
Perfluorooctanoic Acid (PFOA)	ug/L	0.32	0.020	0.059	0.020	6257053
Perfluorononanoic Acid (PFNA)	ug/L	0.12	0.020	<0.020	0.020	6257053
Perfluorodecanoic Acid (PFDA)	ug/L	<0.020	0.020	<0.020	0.020	6257053
Perfluoroundecanoic Acid (PFUnA)	ug/L	<0.020	0.020	<0.020	0.020	6257053
Perfluorododecanoic Acid (PFDoA)	ug/L	<0.020	0.020	<0.020	0.020	6257053
Perfluorotridecanoic Acid	ug/L	<0.020	0.020	<0.020	0.020	6257053
Perfluorotetradecanoic Acid	ug/L	<0.020	0.020	<0.020	0.020	6257053
Perfluorobutanesulfonic acid	ug/L	<0.020	0.020	<0.020	0.020	6257053
Perfluoropentanesulfonic acid	ug/L	<0.020	0.020	<0.020	0.020	6257053
Perfluorohexanesulfonic acid	ug/L	<0.020	0.020	0.036	0.020	6257053
Perfluoroheptanesulfonic acid	ug/L	<0.020	0.020	<0.020	0.020	6257053
Perfluorooctanesulfonic acid	ug/L	0.040	0.020	0.26	0.020	6257053
Perfluorononanesulfonic acid	ug/L	<0.020	0.020	<0.020	0.020	6257053
Perfluorodecanesulfonic acid (PFDS)	ug/L	<0.020	0.020	<0.020	0.020	6257053
Perfluorooctane Sulfonamide (PFOSA)	ug/L	<0.020	0.020	<0.020	0.020	6257053
EtFOSA	ug/L	<0.020	0.020	<0.020	0.020	6257053
MeFOSA	ug/L	<0.020	0.020	<0.020	0.020	6257053
EtFOSE	ug/L	<0.020	0.020	<0.020	0.020	6257053
MeFOSE	ug/L	<0.020	0.020	<0.020	0.020	6257053
EtFOSAA	ug/L	<0.020	0.020	<0.020	0.020	6257053
MeFOSAA	ug/L	<0.020	0.020	<0.020	0.020	6257053
6:2 Fluorotelomer sulfonic acid	ug/L	1.6	0.20	0.046	0.020	6257053
8:2 Fluorotelomer sulfonic acid	ug/L	0.16	0.020	<0.020	0.020	6257053
Surrogate Recovery (%)						
13C2-6:2-Fluorotelomersulfonic Acid	%	97		101		6257053
13C2-8:2-Fluorotelomersulfonic Acid	%	87		89		6257053
13C2-Perfluorodecanoic acid	%	92		92		6257053
13C2-Perfluorododecanoic acid	%	68		79		6257053
13C2-Perfluorohexanoic acid	%	97		104		6257053
13C2-perfluorotetradecanoic acid	%	27 (1)		64		6257053

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) Extracted internal standard analyte recovery was below the defined lower control limit (LCL). Laboratory spiked water resulted in satisfactory recovery of the extracted internal standard analyte. When considered together, these QC data suggest that matrix interferences may be increasing the variability of the associated native analyte result (Perfluorotetradecanoic acid - PFTeDA).

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Dillon Consulting Limited
Client Project #: 19-9543
Sampler Initials: AH

RESULTS OF ANALYSES OF WATER

BV Labs ID		KIY873		KIY875		
Sampling Date		2019/07/18 20:55		2019/07/18 21:55		
COC Number		727707-01-01		727707-01-01		
	UNITS	19MW-02	RDL	19MW-03	RDL	QC Batch
13C2-Perfluoroundecanoic acid	%	87		84		6257053
13C3-Perfluorobutanesulfonic acid	%	92		95		6257053
13C4-Perfluorobutanoic acid	%	79		88		6257053
13C4-Perfluoroheptanoic acid	%	94		95		6257053
13C4-Perfluorooctanesulfonic acid	%	92		90		6257053
13C4-Perfluorooctanoic acid	%	94		96		6257053
13C5-Perfluorononanoic acid	%	95		98		6257053
13C5-Perfluoropentanoic acid	%	88		97		6257053
13C8-Perfluorooctane Sulfonamide	%	81		79		6257053
18O2-Perfluorohexanesulfonic acid	%	93		95		6257053
D3-MeFOSA	%	63		70		6257053
D3-MeFOSAA	%	89		87		6257053
D5-EtFOSA	%	60		71		6257053
D5-EtFOSAA	%	83		84		6257053
D7-MeFOSE	%	71		76		6257053
D9-EtFOSE	%	63		74		6257053

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

BV Labs Job #: B9K5262
Report Date: 2019/08/06

Dillon Consulting Limited
Client Project #: 19-9543
Sampler Initials: AH

GLYCOLS BY GC-FID (WATER)

BV Labs ID		KIY873	KIY875		
Sampling Date		2019/07/18 20:55	2019/07/18 21:55		
COC Number		727707-01-01	727707-01-01		
	UNITS	19MW-02	19MW-03	RDL	QC Batch
Glycols					
Propylene Glycol	mg/L	<5	<5	5	6253488
Ethylene Glycol	mg/L	<5	<5	5	6253488
Diethylene Glycol	mg/L	<5	<5	5	6253488
Total Glycol	mg/L	<5	<5	5	6253488

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Bureau Veritas Laboratories 32 Colonnade Rd, Unit #1000, Nepean, ON K2E 7J6 Phone: 613 274-0573 Fax: 613 274-0574 Website: www.bvlabs.com

BV Labs Job #: B9K5262
Report Date: 2019/08/06

Dillon Consulting Limited
Client Project #: 19-9543
Sampler Initials: AH

O.REG 153 METALS PACKAGE (WATER)

BV Labs ID		KIY869			KIY869			KIY870	KIY871		
Sampling Date		2019/07/16 19:20			2019/07/16 19:20			2019/07/16 19:40	2019/07/16 20:00		
COC Number		727707-01-01			727707-01-01			727707-01-01	727707-01-01		
	UNITS	SW1	RDL	QC Batch	SW1 Lab-Dup	RDL	QC Batch	SW2	SW3	RDL	QC Batch
Metals											
Chromium (VI)	ug/L	<0.50	0.50	6252715	<0.50	0.50	6252715	<0.50	<0.50	0.50	6252715
Mercury (Hg)	ug/L	<0.1	0.1	6252129				<0.1	<0.1	0.1	6252129
Dissolved Antimony (Sb)	ug/L	<0.50	0.50	6251097				<0.50	<0.50	0.50	6251097
Dissolved Arsenic (As)	ug/L	<1.0	1.0	6251097				<1.0	<1.0	1.0	6251097
Dissolved Barium (Ba)	ug/L	2.8	2.0	6251097				2.8	2.9	2.0	6251097
Dissolved Beryllium (Be)	ug/L	<0.50	0.50	6251097				<0.50	<0.50	0.50	6251097
Dissolved Boron (B)	ug/L	<10	10	6251097				<10	<10	10	6251097
Dissolved Cadmium (Cd)	ug/L	<0.10	0.10	6251097				<0.10	<0.10	0.10	6251097
Dissolved Chromium (Cr)	ug/L	<5.0	5.0	6251097				<5.0	<5.0	5.0	6251097
Dissolved Cobalt (Co)	ug/L	<0.50	0.50	6251097				<0.50	<0.50	0.50	6251097
Dissolved Copper (Cu)	ug/L	<1.0	1.0	6251097				<1.0	<1.0	1.0	6251097
Dissolved Lead (Pb)	ug/L	<0.50	0.50	6251097				<0.50	<0.50	0.50	6251097
Dissolved Molybdenum (Mo)	ug/L	<0.50	0.50	6251097				<0.50	<0.50	0.50	6251097
Dissolved Nickel (Ni)	ug/L	<1.0	1.0	6251097				<1.0	<1.0	1.0	6251097
Dissolved Selenium (Se)	ug/L	<2.0	2.0	6251097				<2.0	<2.0	2.0	6251097
Dissolved Silver (Ag)	ug/L	<0.10	0.10	6251097				<0.10	<0.10	0.10	6251097
Dissolved Sodium (Na)	ug/L	1000	100	6251097				1000	1100	100	6251097
Dissolved Thallium (Tl)	ug/L	<0.050	0.050	6251097				<0.050	<0.050	0.050	6251097
Dissolved Uranium (U)	ug/L	<0.10	0.10	6251097				<0.10	<0.10	0.10	6251097
Dissolved Vanadium (V)	ug/L	<0.50	0.50	6251097				<0.50	<0.50	0.50	6251097
Dissolved Zinc (Zn)	ug/L	<5.0	5.0	6251097				<5.0	<5.0	5.0	6251097

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

Bureau Veritas Laboratories 32 Colonnade Rd, Unit #1000, Nepean, ON K2E 7J6 Phone: 613 274-0573 Fax: 613 274-0574 Website: www.bvlabs.com

O.REG 153 METALS PACKAGE (WATER)

BV Labs ID		KIY872	KIY873	KIY874	KIY875		
Sampling Date		2019/07/18 19:55	2019/07/18 20:55	2019/07/18 20:55	2019/07/18 21:55		
COC Number		727707-01-01	727707-01-01	727707-01-01	727707-01-01		
	UNITS	19MW-04	19MW-02	QAQC03	19MW-03	RDL	QC Batch
Metals							
Chromium (VI)	ug/L	<0.50	<0.50	<0.50	<0.50	0.50	6252715
Mercury (Hg)	ug/L	<0.1	<0.1	<0.1	<0.1	0.1	6252129
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	<0.50	0.50	6251097
Dissolved Arsenic (As)	ug/L	<1.0	1.4	1.2	<1.0	1.0	6251097
Dissolved Barium (Ba)	ug/L	4.3	13	12	5.7	2.0	6251097
Dissolved Beryllium (Be)	ug/L	<0.50	<0.50	<0.50	<0.50	0.50	6251097
Dissolved Boron (B)	ug/L	63	47	46	76	10	6251097
Dissolved Cadmium (Cd)	ug/L	<0.10	<0.10	<0.10	<0.10	0.10	6251097
Dissolved Chromium (Cr)	ug/L	<5.0	<5.0	<5.0	<5.0	5.0	6251097
Dissolved Cobalt (Co)	ug/L	<0.50	0.52	0.53	<0.50	0.50	6251097
Dissolved Copper (Cu)	ug/L	3.2	10	10	6.2	1.0	6251097
Dissolved Lead (Pb)	ug/L	0.75	0.84	<0.50	<0.50	0.50	6251097
Dissolved Molybdenum (Mo)	ug/L	1.0	1.2	1.2	1.6	0.50	6251097
Dissolved Nickel (Ni)	ug/L	<1.0	2.6	2.8	<1.0	1.0	6251097
Dissolved Selenium (Se)	ug/L	<2.0	<2.0	<2.0	<2.0	2.0	6251097
Dissolved Silver (Ag)	ug/L	<0.10	<0.10	<0.10	<0.10	0.10	6251097
Dissolved Sodium (Na)	ug/L	5100	5600	5800	6500	100	6251097
Dissolved Thallium (Tl)	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	6251097
Dissolved Uranium (U)	ug/L	0.79	0.78	0.78	1.3	0.10	6251097
Dissolved Vanadium (V)	ug/L	<0.50	1.6	1.6	<0.50	0.50	6251097
Dissolved Zinc (Zn)	ug/L	<5.0	9.7	9.5	<5.0	5.0	6251097

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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BV Labs Job #: B9K5262
Report Date: 2019/08/06

Dillon Consulting Limited
Client Project #: 19-9543
Sampler Initials: AH

O.REG 153 PAHS (WATER)

BV Labs ID		KIY869	KIY870			KIY870			KIY871		
Sampling Date		2019/07/16 19:20	2019/07/16 19:40			2019/07/16 19:40			2019/07/16 20:00		
COC Number		727707-01-01	727707-01-01			727707-01-01			727707-01-01		
	UNITS	SW1	SW2	RDL	QC Batch	SW2 Lab-Dup	RDL	QC Batch	SW3	RDL	QC Batch
Calculated Parameters											
Methylnaphthalene, 2-(1-)	ug/L	<0.071	<0.071	0.071	6249412				<0.071	0.071	6249412
Polyaromatic Hydrocarbons											
Acenaphthene	ug/L	<0.050	<0.050	0.050	6255011	<0.050	0.050	6255011	<0.050	0.050	6255011
Acenaphthylene	ug/L	<0.050	<0.050	0.050	6255011	<0.050	0.050	6255011	<0.050	0.050	6255011
Anthracene	ug/L	<0.050	<0.050	0.050	6255011	<0.050	0.050	6255011	<0.050	0.050	6255011
Benzo(a)anthracene	ug/L	<0.050	<0.050	0.050	6255011	<0.050	0.050	6255011	<0.050	0.050	6255011
Benzo(a)pyrene	ug/L	<0.010	<0.010	0.010	6255011	<0.010	0.010	6255011	<0.010	0.010	6255011
Benzo(b/j)fluoranthene	ug/L	<0.050	<0.050	0.050	6255011	<0.050	0.050	6255011	<0.050	0.050	6255011
Benzo(g,h,i)perylene	ug/L	<0.050	<0.050	0.050	6255011	<0.050	0.050	6255011	<0.050	0.050	6255011
Benzo(k)fluoranthene	ug/L	<0.050	<0.050	0.050	6255011	<0.050	0.050	6255011	<0.050	0.050	6255011
Chrysene	ug/L	<0.050	<0.050	0.050	6255011	<0.050	0.050	6255011	<0.050	0.050	6255011
Dibenz(a,h)anthracene	ug/L	<0.050	<0.050	0.050	6255011	<0.050	0.050	6255011	<0.050	0.050	6255011
Fluoranthene	ug/L	<0.050	<0.050	0.050	6255011	<0.050	0.050	6255011	<0.050	0.050	6255011
Fluorene	ug/L	<0.050	<0.050	0.050	6255011	<0.050	0.050	6255011	<0.050	0.050	6255011
Indeno(1,2,3-cd)pyrene	ug/L	<0.050	<0.050	0.050	6255011	<0.050	0.050	6255011	<0.050	0.050	6255011
1-Methylnaphthalene	ug/L	<0.050	<0.050	0.050	6255011	<0.050	0.050	6255011	<0.050	0.050	6255011
2-Methylnaphthalene	ug/L	<0.050	<0.050	0.050	6255011	<0.050	0.050	6255011	<0.050	0.050	6255011
Naphthalene	ug/L	<0.050	<0.050	0.050	6255011	<0.050	0.050	6255011	<0.050	0.050	6255011
Phenanthrene	ug/L	<0.030	<0.030	0.030	6255011	<0.030	0.030	6255011	<0.030	0.030	6255011
Pyrene	ug/L	<0.050	<0.050	0.050	6255011	<0.050	0.050	6255011	<0.050	0.050	6255011
Surrogate Recovery (%)											
D10-Anthracene	%	95	105		6255011	94		6255011	99		6255011
D14-Terphenyl (FS)	%	96	107		6255011	94		6255011	103		6255011
D8-Acenaphthylene	%	94	104		6255011	92		6255011	96		6255011

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

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O.REG 153 PAHS (WATER)

BV Labs ID		KIY872	KIY873	KIY874	KIY875		
Sampling Date		2019/07/18 19:55	2019/07/18 20:55	2019/07/18 20:55	2019/07/18 21:55		
COC Number		727707-01-01	727707-01-01	727707-01-01	727707-01-01		
	UNITS	19MW-04	19MW-02	QAQC03	19MW-03	RDL	QC Batch
Calculated Parameters							
Methylnaphthalene, 2-(1-)	ug/L	<0.071	<0.071	<0.071	<0.071	0.071	6249412
Polyaromatic Hydrocarbons							
Acenaphthene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	6255011
Acenaphthylene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	6255011
Anthracene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	6255011
Benzo(a)anthracene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	6255011
Benzo(a)pyrene	ug/L	0.026	<0.010	<0.010	<0.010	0.010	6255011
Benzo(b/j)fluoranthene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	6255011
Benzo(g,h,i)perylene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	6255011
Benzo(k)fluoranthene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	6255011
Chrysene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	6255011
Dibenz(a,h)anthracene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	6255011
Fluoranthene	ug/L	0.066	<0.050	<0.050	<0.050	0.050	6255011
Fluorene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	6255011
Indeno(1,2,3-cd)pyrene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	6255011
1-Methylnaphthalene	ug/L	<0.050	0.057	<0.050	<0.050	0.050	6255011
2-Methylnaphthalene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	6255011
Naphthalene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	6255011
Phenanthrene	ug/L	0.065	<0.030	<0.030	<0.030	0.030	6255011
Pyrene	ug/L	0.051	<0.050	<0.050	<0.050	0.050	6255011
Surrogate Recovery (%)							
D10-Anthracene	%	95	97	89	111		6255011
D14-Terphenyl (FS)	%	98	95	88	112		6255011
D8-Acenaphthylene	%	95	98	90	109		6255011

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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O.REG 153 PHCS, BTEX/F1-F4 (WATER)

BV Labs ID		KIY869	KIY870			KIY870			KIY871		
Sampling Date		2019/07/16 19:20	2019/07/16 19:40			2019/07/16 19:40			2019/07/16 20:00		
COC Number		727707-01-01	727707-01-01			727707-01-01			727707-01-01		
	UNITS	SW1	SW2	RDL	QC Batch	SW2 Lab-Dup	RDL	QC Batch	SW3	RDL	QC Batch
BTEX & F1 Hydrocarbons											
Benzene	ug/L	<0.20	<0.20	0.20	6252333				<0.20	0.20	6252333
Toluene	ug/L	<0.20	<0.20	0.20	6252333				<0.20	0.20	6252333
Ethylbenzene	ug/L	<0.20	<0.20	0.20	6252333				<0.20	0.20	6252333
o-Xylene	ug/L	<0.20	<0.20	0.20	6252333				<0.20	0.20	6252333
p+m-Xylene	ug/L	<0.40	<0.40	0.40	6252333				<0.40	0.40	6252333
Total Xylenes	ug/L	<0.40	<0.40	0.40	6252333				<0.40	0.40	6252333
F1 (C6-C10)	ug/L	<25	<25	25	6252333				<25	25	6252333
F1 (C6-C10) - BTEX	ug/L	<25	<25	25	6252333				<25	25	6252333
F2-F4 Hydrocarbons											
F2 (C10-C16 Hydrocarbons)	ug/L	<100	<100	100	6255020	<100	100	6255020	<100	100	6255020
F3 (C16-C34 Hydrocarbons)	ug/L	<200	<200	200	6255020	<200	200	6255020	<200	200	6255020
F4 (C34-C50 Hydrocarbons)	ug/L	<200	<200	200	6255020	<200	200	6255020	<200	200	6255020
Reached Baseline at C50	ug/L	Yes	Yes		6255020	Yes		6255020	Yes		6255020
Surrogate Recovery (%)											
1,4-Difluorobenzene	%	100	100		6252333				101		6252333
4-Bromofluorobenzene	%	99	101		6252333				98		6252333
D10-Ethylbenzene	%	103	105		6252333				104		6252333
D4-1,2-Dichloroethane	%	93	93		6252333				93		6252333
o-Terphenyl	%	102	101		6255020	101		6255020	103		6255020

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

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O.REG 153 PHCS, BTEX/F1-F4 (WATER)

BV Labs ID		KIY873	KIY874		
Sampling Date		2019/07/18 20:55	2019/07/18 20:55		
COC Number		727707-01-01	727707-01-01		
	UNITS	19MW-02	QAQC03	RDL	QC Batch
BTEX & F1 Hydrocarbons					
Benzene	ug/L	<0.20	<0.20	0.20	6252333
Toluene	ug/L	<0.20	<0.20	0.20	6252333
Ethylbenzene	ug/L	<0.20	<0.20	0.20	6252333
o-Xylene	ug/L	<0.20	<0.20	0.20	6252333
p+m-Xylene	ug/L	<0.40	<0.40	0.40	6252333
Total Xylenes	ug/L	<0.40	<0.40	0.40	6252333
F1 (C6-C10)	ug/L	<25	<25	25	6252333
F1 (C6-C10) - BTEX	ug/L	<25	<25	25	6252333
F2-F4 Hydrocarbons					
F2 (C10-C16 Hydrocarbons)	ug/L	170	160	100	6255020
F3 (C16-C34 Hydrocarbons)	ug/L	<200	<200	200	6255020
F4 (C34-C50 Hydrocarbons)	ug/L	<200	<200	200	6255020
Reached Baseline at C50	ug/L	Yes	Yes		6255020
Surrogate Recovery (%)					
1,4-Difluorobenzene	%	99	99		6252333
4-Bromofluorobenzene	%	100	99		6252333
D10-Ethylbenzene	%	105	101		6252333
D4-1,2-Dichloroethane	%	93	92		6252333
o-Terphenyl	%	101	99		6255020

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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O.REG 153 VOCS BY HS & F1-F4 (WATER)

BV Labs ID		KIY872	KIY875		
Sampling Date		2019/07/18 19:55	2019/07/18 21:55		
COC Number		727707-01-01	727707-01-01		
	UNITS	19MW-04	19MW-03	RDL	QC Batch
Calculated Parameters					
1,3-Dichloropropene (cis+trans)	ug/L	<0.50	<0.50	0.50	6248989
Volatile Organics					
Acetone (2-Propanone)	ug/L	<10	<10	10	6251138
Benzene	ug/L	<0.20	<0.20	0.20	6251138
Bromodichloromethane	ug/L	<0.50	<0.50	0.50	6251138
Bromoform	ug/L	<1.0	<1.0	1.0	6251138
Bromomethane	ug/L	<0.50	<0.50	0.50	6251138
Carbon Tetrachloride	ug/L	<0.20	<0.20	0.20	6251138
Chlorobenzene	ug/L	<0.20	<0.20	0.20	6251138
Chloroform	ug/L	<0.20	<0.20	0.20	6251138
Dibromochloromethane	ug/L	<0.50	<0.50	0.50	6251138
1,2-Dichlorobenzene	ug/L	<0.50	<0.50	0.50	6251138
1,3-Dichlorobenzene	ug/L	<0.50	<0.50	0.50	6251138
1,4-Dichlorobenzene	ug/L	<0.50	<0.50	0.50	6251138
Dichlorodifluoromethane (FREON 12)	ug/L	<1.0	<1.0	1.0	6251138
1,1-Dichloroethane	ug/L	<0.20	<0.20	0.20	6251138
1,2-Dichloroethane	ug/L	<0.50	<0.50	0.50	6251138
1,1-Dichloroethylene	ug/L	<0.20	<0.20	0.20	6251138
cis-1,2-Dichloroethylene	ug/L	<0.50	<0.50	0.50	6251138
trans-1,2-Dichloroethylene	ug/L	<0.50	<0.50	0.50	6251138
1,2-Dichloropropane	ug/L	<0.20	<0.20	0.20	6251138
cis-1,3-Dichloropropene	ug/L	<0.30	<0.30	0.30	6251138
trans-1,3-Dichloropropene	ug/L	<0.40	<0.40	0.40	6251138
Ethylbenzene	ug/L	<0.20	<0.20	0.20	6251138
Ethylene Dibromide	ug/L	<0.20	<0.20	0.20	6251138
Hexane	ug/L	<1.0	<1.0	1.0	6251138
Methylene Chloride(Dichloromethane)	ug/L	<2.0	<2.0	2.0	6251138
Methyl Ethyl Ketone (2-Butanone)	ug/L	<10	<10	10	6251138
Methyl Isobutyl Ketone	ug/L	<5.0	<5.0	5.0	6251138
Methyl t-butyl ether (MTBE)	ug/L	<0.50	<0.50	0.50	6251138
Styrene	ug/L	<0.50	<0.50	0.50	6251138
1,1,1,2-Tetrachloroethane	ug/L	<0.50	<0.50	0.50	6251138
1,1,2,2-Tetrachloroethane	ug/L	<0.50	<0.50	0.50	6251138
Tetrachloroethylene	ug/L	<0.20	<0.20	0.20	6251138
Toluene	ug/L	<0.20	<0.20	0.20	6251138

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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O.REG 153 VOCS BY HS & F1-F4 (WATER)

BV Labs ID		KIY872	KIY875		
Sampling Date		2019/07/18 19:55	2019/07/18 21:55		
COC Number		727707-01-01	727707-01-01		
	UNITS	19MW-04	19MW-03	RDL	QC Batch
1,1,1-Trichloroethane	ug/L	<0.20	<0.20	0.20	6251138
1,1,2-Trichloroethane	ug/L	<0.50	<0.50	0.50	6251138
Trichloroethylene	ug/L	<0.20	<0.20	0.20	6251138
Trichlorofluoromethane (FREON 11)	ug/L	<0.50	<0.50	0.50	6251138
Vinyl Chloride	ug/L	<0.20	<0.20	0.20	6251138
p+m-Xylene	ug/L	<0.20	<0.20	0.20	6251138
o-Xylene	ug/L	<0.20	<0.20	0.20	6251138
Total Xylenes	ug/L	<0.20	<0.20	0.20	6251138
F1 (C6-C10)	ug/L	<25	<25	25	6251138
F1 (C6-C10) - BTEX	ug/L	<25	<25	25	6251138
F2-F4 Hydrocarbons					
F2 (C10-C16 Hydrocarbons)	ug/L	<100	<100	100	6255020
F3 (C16-C34 Hydrocarbons)	ug/L	<200	<200	200	6255020
F4 (C34-C50 Hydrocarbons)	ug/L	<200	<200	200	6255020
Reached Baseline at C50	ug/L	Yes	Yes		6255020
Surrogate Recovery (%)					
o-Terphenyl	%	104	105		6255020
4-Bromofluorobenzene	%	99	99		6251138
D4-1,2-Dichloroethane	%	102	102		6251138
D8-Toluene	%	102	100		6251138

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Bureau Veritas Laboratories 32 Colonnade Rd, Unit #1000, Nepean, ON K2E 7J6 Phone: 613 274-0573 Fax: 613 274-0574 Website: www.bvlabs.com

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	1.3°C
Package 2	3.3°C

Sample KIY873 [19MW-02] : Per- and polyfluoroalkyl substances (PFAS): Due to high concentrations of the target analytes, a reduced sample volume was extracted and analyzed. Detection limits were adjusted accordingly.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6251097	ADA	Matrix Spike	Dissolved Antimony (Sb)	2019/07/30		99	%	80 - 120
			Dissolved Arsenic (As)	2019/07/30		94	%	80 - 120
			Dissolved Barium (Ba)	2019/07/30		92	%	80 - 120
			Dissolved Beryllium (Be)	2019/07/30		98	%	80 - 120
			Dissolved Boron (B)	2019/07/30		94	%	80 - 120
			Dissolved Cadmium (Cd)	2019/07/30		98	%	80 - 120
			Dissolved Chromium (Cr)	2019/07/30		92	%	80 - 120
			Dissolved Cobalt (Co)	2019/07/30		95	%	80 - 120
			Dissolved Copper (Cu)	2019/07/30		98	%	80 - 120
			Dissolved Lead (Pb)	2019/07/30		95	%	80 - 120
			Dissolved Molybdenum (Mo)	2019/07/30		99	%	80 - 120
			Dissolved Nickel (Ni)	2019/07/30		90	%	80 - 120
			Dissolved Selenium (Se)	2019/07/30		97	%	80 - 120
			Dissolved Silver (Ag)	2019/07/30		93	%	80 - 120
			Dissolved Sodium (Na)	2019/07/30		95	%	80 - 120
			Dissolved Thallium (Tl)	2019/07/30		98	%	80 - 120
			Dissolved Uranium (U)	2019/07/30		93	%	80 - 120
			Dissolved Vanadium (V)	2019/07/30		93	%	80 - 120
			Dissolved Zinc (Zn)	2019/07/30		94	%	80 - 120
6251097	ADA	Spiked Blank	Dissolved Antimony (Sb)	2019/07/30		98	%	80 - 120
			Dissolved Arsenic (As)	2019/07/30		98	%	80 - 120
			Dissolved Barium (Ba)	2019/07/30		94	%	80 - 120
			Dissolved Beryllium (Be)	2019/07/30		100	%	80 - 120
			Dissolved Boron (B)	2019/07/30		97	%	80 - 120
			Dissolved Cadmium (Cd)	2019/07/30		99	%	80 - 120
			Dissolved Chromium (Cr)	2019/07/30		96	%	80 - 120
			Dissolved Cobalt (Co)	2019/07/30		101	%	80 - 120
			Dissolved Copper (Cu)	2019/07/30		100	%	80 - 120
			Dissolved Lead (Pb)	2019/07/30		95	%	80 - 120
			Dissolved Molybdenum (Mo)	2019/07/30		101	%	80 - 120
			Dissolved Nickel (Ni)	2019/07/30		96	%	80 - 120
			Dissolved Selenium (Se)	2019/07/30		99	%	80 - 120
			Dissolved Silver (Ag)	2019/07/30		95	%	80 - 120
			Dissolved Sodium (Na)	2019/07/30		100	%	80 - 120
			Dissolved Thallium (Tl)	2019/07/30		96	%	80 - 120
			Dissolved Uranium (U)	2019/07/30		94	%	80 - 120
			Dissolved Vanadium (V)	2019/07/30		95	%	80 - 120
			Dissolved Zinc (Zn)	2019/07/30		99	%	80 - 120
6251097	ADA	Method Blank	Dissolved Antimony (Sb)	2019/07/30	<0.50		ug/L	
			Dissolved Arsenic (As)	2019/07/30	<1.0		ug/L	
			Dissolved Barium (Ba)	2019/07/30	<2.0		ug/L	
			Dissolved Beryllium (Be)	2019/07/30	<0.50		ug/L	
			Dissolved Boron (B)	2019/07/30	<10		ug/L	
			Dissolved Cadmium (Cd)	2019/07/30	<0.10		ug/L	
			Dissolved Chromium (Cr)	2019/07/30	<5.0		ug/L	
			Dissolved Cobalt (Co)	2019/07/30	<0.50		ug/L	
			Dissolved Copper (Cu)	2019/07/30	<1.0		ug/L	
			Dissolved Lead (Pb)	2019/07/30	<0.50		ug/L	
			Dissolved Molybdenum (Mo)	2019/07/30	<0.50		ug/L	
			Dissolved Nickel (Ni)	2019/07/30	<1.0		ug/L	
			Dissolved Selenium (Se)	2019/07/30	<2.0		ug/L	
			Dissolved Silver (Ag)	2019/07/30	<0.10		ug/L	
			Dissolved Sodium (Na)	2019/07/30	<100		ug/L	
			Dissolved Thallium (Tl)	2019/07/30	<0.050		ug/L	

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Uranium (U)	2019/07/30	<0.10		ug/L	
			Dissolved Vanadium (V)	2019/07/30	<0.50		ug/L	
			Dissolved Zinc (Zn)	2019/07/30	<5.0		ug/L	
6251097	ADA	RPD	Dissolved Arsenic (As)	2019/07/30	0.60		%	20
			Dissolved Boron (B)	2019/07/30	0.39		%	20
			Dissolved Cadmium (Cd)	2019/07/30	NC		%	20
			Dissolved Chromium (Cr)	2019/07/30	NC		%	20
			Dissolved Copper (Cu)	2019/07/30	3.8		%	20
			Dissolved Lead (Pb)	2019/07/30	1.5		%	20
			Dissolved Nickel (Ni)	2019/07/30	NC		%	20
			Dissolved Sodium (Na)	2019/07/30	0.54		%	20
			Dissolved Zinc (Zn)	2019/07/30	NC		%	20
6251138	DR1	Matrix Spike	4-Bromofluorobenzene	2019/07/29		100	%	70 - 130
			D4-1,2-Dichloroethane	2019/07/29		104	%	70 - 130
			D8-Toluene	2019/07/29		101	%	70 - 130
			Acetone (2-Propanone)	2019/07/29		113	%	60 - 140
			Benzene	2019/07/29		91	%	70 - 130
			Bromodichloromethane	2019/07/29		89	%	70 - 130
			Bromoform	2019/07/29		93	%	70 - 130
			Bromomethane	2019/07/29		138	%	60 - 140
			Carbon Tetrachloride	2019/07/29		90	%	70 - 130
			Chlorobenzene	2019/07/29		89	%	70 - 130
			Chloroform	2019/07/29		88	%	70 - 130
			Dibromochloromethane	2019/07/29		93	%	70 - 130
			1,2-Dichlorobenzene	2019/07/29		86	%	70 - 130
			1,3-Dichlorobenzene	2019/07/29		87	%	70 - 130
			1,4-Dichlorobenzene	2019/07/29		92	%	70 - 130
			Dichlorodifluoromethane (FREON 12)	2019/07/29		93	%	60 - 140
			1,1-Dichloroethane	2019/07/29		91	%	70 - 130
			1,2-Dichloroethane	2019/07/29		94	%	70 - 130
			1,1-Dichloroethylene	2019/07/29		99	%	70 - 130
			cis-1,2-Dichloroethylene	2019/07/29		85	%	70 - 130
			trans-1,2-Dichloroethylene	2019/07/29		90	%	70 - 130
			1,2-Dichloropropane	2019/07/29		87	%	70 - 130
			cis-1,3-Dichloropropene	2019/07/29		97	%	70 - 130
			trans-1,3-Dichloropropene	2019/07/29		103	%	70 - 130
			Ethylbenzene	2019/07/29		87	%	70 - 130
			Ethylene Dibromide	2019/07/29		94	%	70 - 130
			Hexane	2019/07/29		94	%	70 - 130
			Methylene Chloride(Dichloromethane)	2019/07/29		87	%	70 - 130
			Methyl Ethyl Ketone (2-Butanone)	2019/07/29		98	%	60 - 140
			Methyl Isobutyl Ketone	2019/07/29		94	%	70 - 130
			Methyl t-butyl ether (MTBE)	2019/07/29		84	%	70 - 130
			Styrene	2019/07/29		86	%	70 - 130
			1,1,1,2-Tetrachloroethane	2019/07/29		93	%	70 - 130
			1,1,2,2-Tetrachloroethane	2019/07/29		96	%	70 - 130
			Tetrachloroethylene	2019/07/29		83	%	70 - 130
			Toluene	2019/07/29		89	%	70 - 130
			1,1,1-Trichloroethane	2019/07/29		90	%	70 - 130
			1,1,2-Trichloroethane	2019/07/29		101	%	70 - 130
			Trichloroethylene	2019/07/29		91	%	70 - 130
			Trichlorofluoromethane (FREON 11)	2019/07/29		104	%	70 - 130
			Vinyl Chloride	2019/07/29		108	%	70 - 130
			p+m-Xylene	2019/07/29		89	%	70 - 130

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			o-Xylene	2019/07/29		89	%	70 - 130
			F1 (C6-C10)	2019/07/29		92	%	60 - 140
6251138	DR1	Spiked Blank	4-Bromofluorobenzene	2019/07/29		102	%	70 - 130
			D4-1,2-Dichloroethane	2019/07/29		106	%	70 - 130
			D8-Toluene	2019/07/29		100	%	70 - 130
			Acetone (2-Propanone)	2019/07/29		114	%	60 - 140
			Benzene	2019/07/29		91	%	70 - 130
			Bromodichloromethane	2019/07/29		91	%	70 - 130
			Bromoform	2019/07/29		100	%	70 - 130
			Bromomethane	2019/07/29		139	%	60 - 140
			Carbon Tetrachloride	2019/07/29		88	%	70 - 130
			Chlorobenzene	2019/07/29		89	%	70 - 130
			Chloroform	2019/07/29		88	%	70 - 130
			Dibromochloromethane	2019/07/29		96	%	70 - 130
			1,2-Dichlorobenzene	2019/07/29		86	%	70 - 130
			1,3-Dichlorobenzene	2019/07/29		87	%	70 - 130
			1,4-Dichlorobenzene	2019/07/29		92	%	70 - 130
			Dichlorodifluoromethane (FREON 12)	2019/07/29		96	%	60 - 140
			1,1-Dichloroethane	2019/07/29		92	%	70 - 130
			1,2-Dichloroethane	2019/07/29		98	%	70 - 130
			1,1-Dichloroethylene	2019/07/29		99	%	70 - 130
			cis-1,2-Dichloroethylene	2019/07/29		87	%	70 - 130
			trans-1,2-Dichloroethylene	2019/07/29		90	%	70 - 130
			1,2-Dichloropropane	2019/07/29		88	%	70 - 130
			cis-1,3-Dichloropropene	2019/07/29		90	%	70 - 130
			trans-1,3-Dichloropropene	2019/07/29		94	%	70 - 130
			Ethylbenzene	2019/07/29		85	%	70 - 130
			Ethylene Dibromide	2019/07/29		98	%	70 - 130
			Hexane	2019/07/29		92	%	70 - 130
			Methylene Chloride(Dichloromethane)	2019/07/29		89	%	70 - 130
			Methyl Ethyl Ketone (2-Butanone)	2019/07/29		102	%	60 - 140
			Methyl Isobutyl Ketone	2019/07/29		101	%	70 - 130
			Methyl t-butyl ether (MTBE)	2019/07/29		86	%	70 - 130
			Styrene	2019/07/29		87	%	70 - 130
			1,1,1,2-Tetrachloroethane	2019/07/29		93	%	70 - 130
			1,1,2,2-Tetrachloroethane	2019/07/29		101	%	70 - 130
			Tetrachloroethylene	2019/07/29		82	%	70 - 130
			Toluene	2019/07/29		86	%	70 - 130
			1,1,1-Trichloroethane	2019/07/29		88	%	70 - 130
			1,1,2-Trichloroethane	2019/07/29		102	%	70 - 130
			Trichloroethylene	2019/07/29		91	%	70 - 130
			Trichlorofluoromethane (FREON 11)	2019/07/29		102	%	70 - 130
			Vinyl Chloride	2019/07/29		113	%	70 - 130
			p+m-Xylene	2019/07/29		87	%	70 - 130
			o-Xylene	2019/07/29		87	%	70 - 130
			F1 (C6-C10)	2019/07/29		95	%	60 - 140
6251138	DR1	Method Blank	4-Bromofluorobenzene	2019/07/29		100	%	70 - 130
			D4-1,2-Dichloroethane	2019/07/29		107	%	70 - 130
			D8-Toluene	2019/07/29		98	%	70 - 130
			Acetone (2-Propanone)	2019/07/29	<10		ug/L	
			Benzene	2019/07/29	<0.20		ug/L	
			Bromodichloromethane	2019/07/29	<0.50		ug/L	
			Bromoform	2019/07/29	<1.0		ug/L	
			Bromomethane	2019/07/29	<0.50		ug/L	

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Carbon Tetrachloride	2019/07/29	<0.20		ug/L	
			Chlorobenzene	2019/07/29	<0.20		ug/L	
			Chloroform	2019/07/29	<0.20		ug/L	
			Dibromochloromethane	2019/07/29	<0.50		ug/L	
			1,2-Dichlorobenzene	2019/07/29	<0.50		ug/L	
			1,3-Dichlorobenzene	2019/07/29	<0.50		ug/L	
			1,4-Dichlorobenzene	2019/07/29	<0.50		ug/L	
			Dichlorodifluoromethane (FREON 12)	2019/07/29	<1.0		ug/L	
			1,1-Dichloroethane	2019/07/29	<0.20		ug/L	
			1,2-Dichloroethane	2019/07/29	<0.50		ug/L	
			1,1-Dichloroethylene	2019/07/29	<0.20		ug/L	
			cis-1,2-Dichloroethylene	2019/07/29	<0.50		ug/L	
			trans-1,2-Dichloroethylene	2019/07/29	<0.50		ug/L	
			1,2-Dichloropropane	2019/07/29	<0.20		ug/L	
			cis-1,3-Dichloropropene	2019/07/29	<0.30		ug/L	
			trans-1,3-Dichloropropene	2019/07/29	<0.40		ug/L	
			Ethylbenzene	2019/07/29	<0.20		ug/L	
			Ethylene Dibromide	2019/07/29	<0.20		ug/L	
			Hexane	2019/07/29	<1.0		ug/L	
			Methylene Chloride(Dichloromethane)	2019/07/29	<2.0		ug/L	
			Methyl Ethyl Ketone (2-Butanone)	2019/07/29	<10		ug/L	
			Methyl Isobutyl Ketone	2019/07/29	<5.0		ug/L	
			Methyl t-butyl ether (MTBE)	2019/07/29	<0.50		ug/L	
			Styrene	2019/07/29	<0.50		ug/L	
			1,1,1,2-Tetrachloroethane	2019/07/29	<0.50		ug/L	
			1,1,2,2-Tetrachloroethane	2019/07/29	<0.50		ug/L	
			Tetrachloroethylene	2019/07/29	<0.20		ug/L	
			Toluene	2019/07/29	<0.20		ug/L	
			1,1,1-Trichloroethane	2019/07/29	<0.20		ug/L	
			1,1,2-Trichloroethane	2019/07/29	<0.50		ug/L	
			Trichloroethylene	2019/07/29	<0.20		ug/L	
			Trichlorofluoromethane (FREON 11)	2019/07/29	<0.50		ug/L	
			Vinyl Chloride	2019/07/29	<0.20		ug/L	
			p+m-Xylene	2019/07/29	<0.20		ug/L	
			o-Xylene	2019/07/29	<0.20		ug/L	
			Total Xylenes	2019/07/29	<0.20		ug/L	
			F1 (C6-C10)	2019/07/29	<25		ug/L	
			F1 (C6-C10) - BTEX	2019/07/29	<25		ug/L	
6251138	DR1	RPD	Acetone (2-Propanone)	2019/07/29	3.5		%	30
			Benzene	2019/07/29	NC		%	30
			Bromodichloromethane	2019/07/29	NC		%	30
			Bromoform	2019/07/29	NC		%	30
			Bromomethane	2019/07/29	NC		%	30
			Carbon Tetrachloride	2019/07/29	NC		%	30
			Chlorobenzene	2019/07/29	NC		%	30
			Chloroform	2019/07/29	NC		%	30
			Dibromochloromethane	2019/07/29	NC		%	30
			1,2-Dichlorobenzene	2019/07/29	NC		%	30
			1,3-Dichlorobenzene	2019/07/29	NC		%	30
			1,4-Dichlorobenzene	2019/07/29	NC		%	30
			Dichlorodifluoromethane (FREON 12)	2019/07/29	NC		%	30
			1,1-Dichloroethane	2019/07/29	NC		%	30
			1,2-Dichloroethane	2019/07/29	NC		%	30
			1,1-Dichloroethylene	2019/07/29	NC		%	30

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			cis-1,2-Dichloroethylene	2019/07/29	NC		%	30
			trans-1,2-Dichloroethylene	2019/07/29	NC		%	30
			1,2-Dichloropropane	2019/07/29	NC		%	30
			cis-1,3-Dichloropropene	2019/07/29	NC		%	30
			trans-1,3-Dichloropropene	2019/07/29	NC		%	30
			Ethylbenzene	2019/07/29	NC		%	30
			Ethylene Dibromide	2019/07/29	NC		%	30
			Hexane	2019/07/29	NC		%	30
			Methylene Chloride(Dichloromethane)	2019/07/29	NC		%	30
			Methyl Ethyl Ketone (2-Butanone)	2019/07/29	NC		%	30
			Methyl Isobutyl Ketone	2019/07/29	NC		%	30
			Methyl t-butyl ether (MTBE)	2019/07/29	NC		%	30
			Styrene	2019/07/29	NC		%	30
			1,1,1,2-Tetrachloroethane	2019/07/29	NC		%	30
			1,1,2,2-Tetrachloroethane	2019/07/29	NC		%	30
			Tetrachloroethylene	2019/07/29	NC		%	30
			Toluene	2019/07/29	1.2		%	30
			1,1,1-Trichloroethane	2019/07/29	NC		%	30
			1,1,2-Trichloroethane	2019/07/29	NC		%	30
			Trichloroethylene	2019/07/29	NC		%	30
			Trichlorofluoromethane (FREON 11)	2019/07/29	NC		%	30
			Vinyl Chloride	2019/07/29	NC		%	30
			p+m-Xylene	2019/07/29	NC		%	30
			o-Xylene	2019/07/29	NC		%	30
			Total Xylenes	2019/07/29	NC		%	30
			F1 (C6-C10)	2019/07/29	NC		%	30
			F1 (C6-C10) - BTEX	2019/07/29	NC		%	30
6252129	MEN	Matrix Spike	Mercury (Hg)	2019/07/29		99	%	75 - 125
6252129	MEN	Spiked Blank	Mercury (Hg)	2019/07/29		97	%	80 - 120
6252129	MEN	Method Blank	Mercury (Hg)	2019/07/29	<0.1		ug/L	
6252129	MEN	RPD	Mercury (Hg)	2019/07/29	NC		%	20
6252333	LRA	Matrix Spike	1,4-Difluorobenzene	2019/07/29		102	%	70 - 130
			4-Bromofluorobenzene	2019/07/29		99	%	70 - 130
			D10-Ethylbenzene	2019/07/29		103	%	70 - 130
			D4-1,2-Dichloroethane	2019/07/29		94	%	70 - 130
			Benzene	2019/07/29		97	%	70 - 130
			Toluene	2019/07/29		101	%	70 - 130
			Ethylbenzene	2019/07/29		97	%	70 - 130
			o-Xylene	2019/07/29		97	%	70 - 130
			p+m-Xylene	2019/07/29		98	%	70 - 130
			F1 (C6-C10)	2019/07/29		84	%	70 - 130
6252333	LRA	Spiked Blank	1,4-Difluorobenzene	2019/07/29		101	%	70 - 130
			4-Bromofluorobenzene	2019/07/29		98	%	70 - 130
			D10-Ethylbenzene	2019/07/29		93	%	70 - 130
			D4-1,2-Dichloroethane	2019/07/29		96	%	70 - 130
			Benzene	2019/07/29		94	%	70 - 130
			Toluene	2019/07/29		95	%	70 - 130
			Ethylbenzene	2019/07/29		90	%	70 - 130
			o-Xylene	2019/07/29		88	%	70 - 130
			p+m-Xylene	2019/07/29		90	%	70 - 130
			F1 (C6-C10)	2019/07/29		98	%	70 - 130
6252333	LRA	Method Blank	1,4-Difluorobenzene	2019/07/29		99	%	70 - 130
			4-Bromofluorobenzene	2019/07/29		96	%	70 - 130
			D10-Ethylbenzene	2019/07/29		96	%	70 - 130

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			D4-1,2-Dichloroethane	2019/07/29		96	%	70 - 130
			Benzene	2019/07/29	<0.20		ug/L	
			Toluene	2019/07/29	<0.20		ug/L	
			Ethylbenzene	2019/07/29	<0.20		ug/L	
			o-Xylene	2019/07/29	<0.20		ug/L	
			p+m-Xylene	2019/07/29	<0.40		ug/L	
			Total Xylenes	2019/07/29	<0.40		ug/L	
			F1 (C6-C10)	2019/07/29	<25		ug/L	
			F1 (C6-C10) - BTEX	2019/07/29	<25		ug/L	
6252333	LRA	RPD	F1 (C6-C10)	2019/07/29	NC		%	30
			F1 (C6-C10) - BTEX	2019/07/29	NC		%	30
6252715	LLE	Matrix Spike [KIY869-03]	Chromium (VI)	2019/07/29		104	%	80 - 120
6252715	LLE	Spiked Blank	Chromium (VI)	2019/07/29		104	%	80 - 120
6252715	LLE	Method Blank	Chromium (VI)	2019/07/29	<0.50		ug/L	
6252715	LLE	RPD [KIY869-03]	Chromium (VI)	2019/07/29	NC		%	20
6253488	GUL	Matrix Spike	Propylene Glycol	2019/07/30		111	%	60 - 140
			Ethylene Glycol	2019/07/30		103	%	60 - 140
			Diethylene Glycol	2019/07/30		88	%	60 - 140
6253488	GUL	Spiked Blank	Propylene Glycol	2019/07/30		102	%	60 - 140
			Ethylene Glycol	2019/07/30		88	%	60 - 140
			Diethylene Glycol	2019/07/30		81	%	60 - 140
6253488	GUL	Method Blank	Propylene Glycol	2019/07/30	<5		mg/L	
			Ethylene Glycol	2019/07/30	<5		mg/L	
			Diethylene Glycol	2019/07/30	<5		mg/L	
			Total Glycol	2019/07/30	<5		mg/L	
6253488	GUL	RPD	Propylene Glycol	2019/07/30	NC		%	40
			Ethylene Glycol	2019/07/30	NC		%	40
			Diethylene Glycol	2019/07/30	NC		%	40
			Total Glycol	2019/07/30	NC		%	40
6255011	RAJ	Matrix Spike [KIY869-01]	D10-Anthracene	2019/07/30		97	%	50 - 130
			D14-Terphenyl (FS)	2019/07/30		100	%	50 - 130
			D8-Acenaphthylene	2019/07/30		95	%	50 - 130
			Acenaphthene	2019/07/30		104	%	50 - 130
			Acenaphthylene	2019/07/30		104	%	50 - 130
			Anthracene	2019/07/30		104	%	50 - 130
			Benzo(a)anthracene	2019/07/30		112	%	50 - 130
			Benzo(a)pyrene	2019/07/30		111	%	50 - 130
			Benzo(b/j)fluoranthene	2019/07/30		114	%	50 - 130
			Benzo(g,h,i)perylene	2019/07/30		111	%	50 - 130
			Benzo(k)fluoranthene	2019/07/30		117	%	50 - 130
			Chrysene	2019/07/30		108	%	50 - 130
			Dibenz(a,h)anthracene	2019/07/30		116	%	50 - 130
			Fluoranthene	2019/07/30		115	%	50 - 130
			Fluorene	2019/07/30		107	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2019/07/30		117	%	50 - 130
			1-Methylnaphthalene	2019/07/30		115	%	50 - 130
			2-Methylnaphthalene	2019/07/30		105	%	50 - 130
			Naphthalene	2019/07/30		97	%	50 - 130
			Phenanthrene	2019/07/30		106	%	50 - 130
			Pyrene	2019/07/30		113	%	50 - 130
6255011	RAJ	Spiked Blank	D10-Anthracene	2019/07/31		94	%	50 - 130
			D14-Terphenyl (FS)	2019/07/31		96	%	50 - 130
			D8-Acenaphthylene	2019/07/31		91	%	50 - 130
			Acenaphthene	2019/07/31		99	%	50 - 130

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Acenaphthylene	2019/07/31		98	%	50 - 130
			Anthracene	2019/07/31		98	%	50 - 130
			Benzo(a)anthracene	2019/07/31		107	%	50 - 130
			Benzo(a)pyrene	2019/07/31		107	%	50 - 130
			Benzo(b/j)fluoranthene	2019/07/31		110	%	50 - 130
			Benzo(g,h,i)perylene	2019/07/31		109	%	50 - 130
			Benzo(k)fluoranthene	2019/07/31		109	%	50 - 130
			Chrysene	2019/07/31		105	%	50 - 130
			Dibenz(a,h)anthracene	2019/07/31		113	%	50 - 130
			Fluoranthene	2019/07/31		109	%	50 - 130
			Fluorene	2019/07/31		102	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2019/07/31		113	%	50 - 130
			1-Methylnaphthalene	2019/07/31		110	%	50 - 130
			2-Methylnaphthalene	2019/07/31		100	%	50 - 130
			Naphthalene	2019/07/31		93	%	50 - 130
			Phenanthrene	2019/07/31		101	%	50 - 130
			Pyrene	2019/07/31		105	%	50 - 130
6255011	RAJ	Method Blank	D10-Anthracene	2019/07/30		106	%	50 - 130
			D14-Terphenyl (FS)	2019/07/30		108	%	50 - 130
			D8-Acenaphthylene	2019/07/30		105	%	50 - 130
			Acenaphthene	2019/07/30	<0.050		ug/L	
			Acenaphthylene	2019/07/30	<0.050		ug/L	
			Anthracene	2019/07/30	<0.050		ug/L	
			Benzo(a)anthracene	2019/07/30	<0.050		ug/L	
			Benzo(a)pyrene	2019/07/30	<0.010		ug/L	
			Benzo(b/j)fluoranthene	2019/07/30	<0.050		ug/L	
			Benzo(g,h,i)perylene	2019/07/30	<0.050		ug/L	
			Benzo(k)fluoranthene	2019/07/30	<0.050		ug/L	
			Chrysene	2019/07/30	<0.050		ug/L	
			Dibenz(a,h)anthracene	2019/07/30	<0.050		ug/L	
			Fluoranthene	2019/07/30	<0.050		ug/L	
			Fluorene	2019/07/30	<0.050		ug/L	
			Indeno(1,2,3-cd)pyrene	2019/07/30	<0.050		ug/L	
			1-Methylnaphthalene	2019/07/30	<0.050		ug/L	
			2-Methylnaphthalene	2019/07/30	<0.050		ug/L	
			Naphthalene	2019/07/30	<0.050		ug/L	
			Phenanthrene	2019/07/30	<0.030		ug/L	
			Pyrene	2019/07/30	<0.050		ug/L	
6255011	RAJ	RPD [KIY870-01]	Acenaphthene	2019/07/30	NC		%	30
			Acenaphthylene	2019/07/30	NC		%	30
			Anthracene	2019/07/30	NC		%	30
			Benzo(a)anthracene	2019/07/30	NC		%	30
			Benzo(a)pyrene	2019/07/30	NC		%	30
			Benzo(b/j)fluoranthene	2019/07/30	NC		%	30
			Benzo(g,h,i)perylene	2019/07/30	NC		%	30
			Benzo(k)fluoranthene	2019/07/30	NC		%	30
			Chrysene	2019/07/30	NC		%	30
			Dibenz(a,h)anthracene	2019/07/30	NC		%	30
			Fluoranthene	2019/07/30	NC		%	30
			Fluorene	2019/07/30	NC		%	30
			Indeno(1,2,3-cd)pyrene	2019/07/30	NC		%	30
			1-Methylnaphthalene	2019/07/30	NC		%	30
			2-Methylnaphthalene	2019/07/30	NC		%	30
			Naphthalene	2019/07/30	NC		%	30

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Phenanthrene	2019/07/30	NC		%	30
			Pyrene	2019/07/30	NC		%	30
6255020	GUL	Matrix Spike [KIY871-01]	o-Terphenyl	2019/07/30		103	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2019/07/30		109	%	50 - 130
			F3 (C16-C34 Hydrocarbons)	2019/07/30		NC	%	50 - 130
			F4 (C34-C50 Hydrocarbons)	2019/07/30		121	%	50 - 130
6255020	GUL	Spiked Blank	o-Terphenyl	2019/07/30		107	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2019/07/30		108	%	60 - 130
			F3 (C16-C34 Hydrocarbons)	2019/07/30		120	%	60 - 130
			F4 (C34-C50 Hydrocarbons)	2019/07/30		127	%	60 - 130
6255020	GUL	Method Blank	o-Terphenyl	2019/07/31		98	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2019/07/31	<100		ug/L	
			F3 (C16-C34 Hydrocarbons)	2019/07/31	<200		ug/L	
			F4 (C34-C50 Hydrocarbons)	2019/07/31	<200		ug/L	
6255020	GUL	RPD [KIY870-01]	F2 (C10-C16 Hydrocarbons)	2019/07/31	NC		%	30
			F3 (C16-C34 Hydrocarbons)	2019/07/31	NC		%	30
			F4 (C34-C50 Hydrocarbons)	2019/07/31	NC		%	30
6257053	AKH	Spiked Blank	13C2-6:2-Fluorotelomersulfonic Acid	2019/08/01		100	%	50 - 150
			13C2-8:2-Fluorotelomersulfonic Acid	2019/08/01		92	%	50 - 150
			13C2-Perfluorodecanoic acid	2019/08/01		95	%	50 - 150
			13C2-Perfluorododecanoic acid	2019/08/01		84	%	50 - 150
			13C2-Perfluorohexanoic acid	2019/08/01		95	%	50 - 150
			13C2-perfluorotetradecanoic acid	2019/08/01		83	%	50 - 150
			13C2-Perfluoroundecanoic acid	2019/08/01		89	%	50 - 150
			13C3-Perfluorobutanesulfonic acid	2019/08/01		98	%	50 - 150
			13C4-Perfluorobutanoic acid	2019/08/01		94	%	50 - 150
			13C4-Perfluoroheptanoic acid	2019/08/01		94	%	50 - 150
			13C4-Perfluorooctanesulfonic acid	2019/08/01		94	%	50 - 150
			13C4-Perfluorooctanoic acid	2019/08/01		95	%	50 - 150
			13C5-Perfluorononanoic acid	2019/08/01		94	%	50 - 150
			13C5-Perfluoropentanoic acid	2019/08/01		94	%	50 - 150
			13C8-Perfluorooctane Sulfonamide	2019/08/01		86	%	50 - 150
			18O2-Perfluorohexanesulfonic acid	2019/08/01		91	%	50 - 150
			D3-MeFOSA	2019/08/01		78	%	50 - 150
			D3-MeFOSAA	2019/08/01		86	%	50 - 150
			D5-EtFOSA	2019/08/01		77	%	50 - 150
			D5-EtFOSAA	2019/08/01		82	%	50 - 150
			D7-MeFOSE	2019/08/01		84	%	50 - 150
			D9-EtFOSE	2019/08/01		85	%	50 - 150
			Perfluorobutanoic acid	2019/08/01		113	%	70 - 130
			Perfluoropentanoic Acid (PFPeA)	2019/08/01		108	%	70 - 130
			Perfluorohexanoic Acid (PFHxA)	2019/08/01		111	%	70 - 130
			Perfluoroheptanoic Acid (PFHpA)	2019/08/01		108	%	70 - 130
			Perfluorooctanoic Acid (PFOA)	2019/08/01		112	%	70 - 130
			Perfluorononanoic Acid (PFNA)	2019/08/01		112	%	70 - 130
			Perfluorodecanoic Acid (PFDA)	2019/08/01		112	%	70 - 130
			Perfluoroundecanoic Acid (PFUnA)	2019/08/01		112	%	70 - 130
			Perfluorododecanoic Acid (PFDoA)	2019/08/01		112	%	70 - 130
			Perfluorotridecanoic Acid	2019/08/01		112	%	70 - 130
			Perfluorotetradecanoic Acid	2019/08/01		110	%	70 - 130
			Perfluorobutanesulfonic acid	2019/08/01		104	%	70 - 130
			Perfluoropentanesulfonic acid	2019/08/01		109	%	70 - 130
			Perfluorohexanesulfonic acid	2019/08/01		114	%	70 - 130
			Perfluoroheptanesulfonic acid	2019/08/01		108	%	70 - 130

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Perfluorooctanesulfonic acid	2019/08/01		112	%	70 - 130
			Perfluorononanesulfonic acid	2019/08/01		110	%	70 - 130
			Perfluorodecanesulfonic acid (PFDS)	2019/08/01		102	%	70 - 130
			Perfluorooctane Sulfonamide (PFOSA)	2019/08/01		105	%	70 - 130
			EtFOSA	2019/08/01		108	%	70 - 130
			MeFOSA	2019/08/01		100	%	70 - 130
			EtFOSE	2019/08/01		109	%	70 - 130
			MeFOSE	2019/08/01		104	%	70 - 130
			EtFOSAA	2019/08/01		109	%	70 - 130
			MeFOSAA	2019/08/01		112	%	70 - 130
			6:2 Fluorotelomer sulfonic acid	2019/08/01		100	%	70 - 130
			8:2 Fluorotelomer sulfonic acid	2019/08/01		107	%	70 - 130
6257053	AKH	RPD	Perfluorobutanoic acid	2019/08/01	1.4		%	30
			Perfluoropentanoic Acid (PFPeA)	2019/08/01	1.8		%	30
			Perfluorohexanoic Acid (PFHxA)	2019/08/01	0.80		%	30
			Perfluoroheptanoic Acid (PFHpA)	2019/08/01	2.0		%	30
			Perfluorooctanoic Acid (PFOA)	2019/08/01	2.3		%	30
			Perfluorononanoic Acid (PFNA)	2019/08/01	2.7		%	30
			Perfluorodecanoic Acid (PFDA)	2019/08/01	2.0		%	30
			Perfluoroundecanoic Acid (PFUnA)	2019/08/01	0.93		%	30
			Perfluorododecanoic Acid (PFDoA)	2019/08/01	0.68		%	30
			Perfluorotridecanoic Acid	2019/08/01	2.1		%	30
			Perfluorotetradecanoic Acid	2019/08/01	0.40		%	30
			Perfluorobutanesulfonic acid	2019/08/01	2.9		%	30
			Perfluoropentanesulfonic acid	2019/08/01	1.1		%	30
			Perfluorohexanesulfonic acid	2019/08/01	4.3		%	30
			Perfluoroheptanesulfonic acid	2019/08/01	0.95		%	30
			Perfluorooctanesulfonic acid	2019/08/01	0.68		%	30
			Perfluorononanesulfonic acid	2019/08/01	3.9		%	30
			Perfluorodecanesulfonic acid (PFDS)	2019/08/01	1.1		%	30
			Perfluorooctane Sulfonamide (PFOSA)	2019/08/01	2.6		%	30
			EtFOSA	2019/08/01	0.96		%	30
			MeFOSA	2019/08/01	4.8		%	30
			EtFOSE	2019/08/01	0.66		%	30
			MeFOSE	2019/08/01	0.76		%	30
			EtFOSAA	2019/08/01	2.1		%	30
			MeFOSAA	2019/08/01	5.6		%	30
			6:2 Fluorotelomer sulfonic acid	2019/08/01	3.8		%	30
			8:2 Fluorotelomer sulfonic acid	2019/08/01	8.3		%	30
6257053	AKH	Method Blank	13C2-6:2-Fluorotelomersulfonic Acid	2019/08/01		105	%	50 - 150
			13C2-8:2-Fluorotelomersulfonic Acid	2019/08/01		97	%	50 - 150
			13C2-Perfluorodecanoic acid	2019/08/01		98	%	50 - 150
			13C2-Perfluorododecanoic acid	2019/08/01		87	%	50 - 150
			13C2-Perfluorohexanoic acid	2019/08/01		108	%	50 - 150
			13C2-perfluorotetradecanoic acid	2019/08/01		84	%	50 - 150
			13C2-Perfluoroundecanoic acid	2019/08/01		91	%	50 - 150
			13C3-Perfluorobutanesulfonic acid	2019/08/01		102	%	50 - 150
			13C4-Perfluorobutanoic acid	2019/08/01		102	%	50 - 150
			13C4-Perfluoroheptanoic acid	2019/08/01		106	%	50 - 150
			13C4-Perfluorooctanesulfonic acid	2019/08/01		99	%	50 - 150
			13C4-Perfluorooctanoic acid	2019/08/01		103	%	50 - 150
			13C5-Perfluorononanoic acid	2019/08/01		101	%	50 - 150
			13C5-Perfluoropentanoic acid	2019/08/01		102	%	50 - 150
			13C8-Perfluorooctane Sulfonamide	2019/08/01		90	%	50 - 150

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			18O2-Perfluorohexanesulfonic acid	2019/08/01		104	%	50 - 150
			D3-MeFOSA	2019/08/01		74	%	50 - 150
			D3-MeFOSAA	2019/08/01		88	%	50 - 150
			D5-EtFOSA	2019/08/01		72	%	50 - 150
			D5-EtFOSAA	2019/08/01		80	%	50 - 150
			D7-MeFOSE	2019/08/01		83	%	50 - 150
			D9-EtFOSE	2019/08/01		81	%	50 - 150
			Perfluorobutanoic acid	2019/08/01	<0.020		ug/L	
			Perfluoropentanoic Acid (PFPeA)	2019/08/01	<0.020		ug/L	
			Perfluorohexanoic Acid (PFHxA)	2019/08/01	<0.020		ug/L	
			Perfluoroheptanoic Acid (PFHpA)	2019/08/01	<0.020		ug/L	
			Perfluorooctanoic Acid (PFOA)	2019/08/01	<0.020		ug/L	
			Perfluorononanoic Acid (PFNA)	2019/08/01	<0.020		ug/L	
			Perfluorodecanoic Acid (PFDA)	2019/08/01	<0.020		ug/L	
			Perfluoroundecanoic Acid (PFUnA)	2019/08/01	<0.020		ug/L	
			Perfluorododecanoic Acid (PFDoA)	2019/08/01	<0.020		ug/L	
			Perfluorotridecanoic Acid	2019/08/01	<0.020		ug/L	
			Perfluorotetradecanoic Acid	2019/08/01	<0.020		ug/L	
			Perfluorobutanesulfonic acid	2019/08/01	<0.020		ug/L	
			Perfluoropentanesulfonic acid	2019/08/01	<0.020		ug/L	
			Perfluorohexanesulfonic acid	2019/08/01	<0.020		ug/L	
			Perfluoroheptanesulfonic acid	2019/08/01	<0.020		ug/L	
			Perfluorooctanesulfonic acid	2019/08/01	<0.020		ug/L	
			Perfluorononanesulfonic acid	2019/08/01	<0.020		ug/L	
			Perfluorodecanesulfonic acid (PFDS)	2019/08/01	<0.020		ug/L	
			Perfluorooctane Sulfonamide (PFOSA)	2019/08/01	<0.020		ug/L	
			EtFOSA	2019/08/01	<0.020		ug/L	
			MeFOSA	2019/08/01	<0.020		ug/L	
			EtFOSE	2019/08/01	<0.020		ug/L	
			MeFOSE	2019/08/01	<0.020		ug/L	
			EtFOSAA	2019/08/01	<0.020		ug/L	
			MeFOSAA	2019/08/01	<0.020		ug/L	
			6:2 Fluorotelomer sulfonic acid	2019/08/01	<0.020		ug/L	
			8:2 Fluorotelomer sulfonic acid	2019/08/01	<0.020		ug/L	

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).

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Colm McNamara, Senior Analyst, Liquid Chromatography

Cristina Carriere, Senior 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 32 Colonnade Rd, Unit #1000, Nepean, ON K2E 7J6 Phone: 613 274-0573 Fax: 613 274-0574 Website: www.bvlabs.com

BUREAU VERITAS

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24-Jul-19 11:45
Cristina (Maria) Bacchus
B9K5262

Page 1 of 1

J_L ENV-1421

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:		
Company Name:	#19397 Dillon Consulting Limited	Company Name:		Quotation #:		Bottle Order #: 727707
Attention:	Andrew Hounsell	Attention:	Andrew Hounsell	P.O. #:		
Address:	334 - 11th Ave SE Suite 200 Calgary AB T2G 0Y2	Address:		Project:	19-9543	COC #: C#727707-01-01 / Project Manager: Cristina (Maria) Bacchus
Tel:	(403) 215-8880 Fax: (403) 215-8889	Tel:	(403) 604-7164 Fax:	Project Name:		
Email:	AHounsell@dillon.ca, kbarnes@dillon.ca	Email:	AHounsell@dillon.ca	Site #:		
				Sampled By:		

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BV LABS DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011): ☐ Table 1 ☐ Res/Park ☐ Medium/Fine ☐ Table 2 ☐ Ind/Comm ☐ Coarse ☐ Table 3 ☐ Agri/Other ☐ For RSC ☐ Table ___

Other Regulations: ☐ CCME ☐ Sanitary Sewer Bylaw ☐ Reg 558 ☐ Storm Sewer Bylaw ☐ MISA Municipality ☐ PWQO ☐ Other

Special Instructions

Include Criteria on Certificate of Analysis (Y/N)? ___

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

Regular (Standard) TAT: ☐
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission) ☐
Date Required: ___ Time Required: ___
Rush Confirmation Number: ___ (call lab for #)

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): Metals / Hg / Cr VI	Petroleum Hydrocarbons F2 in Water	Petroleum Hydro. CCME F1 & BTEX in Water	PAHs	Metals Package	Glycols in Water by GC/FID	VOCs by HS	PFAS in water by SPE/LCMS				# of Bottles	Comments
1		SW1	July 16, 2019	19:20	SW		X	X	X	X								SW- Surface Water
2		SW2	↓	19:40	↓		X	X	X	X								GW - Groundwater
3		SW3	↓	20:00	↓		X	X	X	X								H - HOLD
4		19MW-04	July 18, 2019	19:55	GW		X	X	X	X		X						
5		19MW-02		20:55	↓		X	X	X	X	X		X					On ice
6		QAQC03		20:55			X	X	X	X			H					RECEIVED IN OTTAWA
7		19MW-03		21:55			X	X	X	X	X	X	X					
8		QAQC04		22:20			H	H	H	H			H					
9		QAQC05		22:30	↓		H	H	H	H			H					
10																		Cooler #2 Temp: 4, 3, 3

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Cristina Hounsell / Andrew Hounsell	19/07/19	11:30	Emily Jay Campbell	2019/07/24	11.45	
				19/07/25	0 800	

Laboratory Use Only

Time Sensitive	Temperature (°C) on Recei	Custody Seal	Yes	No
	1, 1, 2	Present	✓	
		Intact	✓	

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BV LABS' 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.BVLABS.COM/TERMS-AND-CONDITIONS.

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVLABS.COM/RESOURCES/CHAIN-OF-CUSTODY-FORMS: 5 7 14 2 10 11 20

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BV LABS

White: BV Labs Yellow: Client

Bureau Veritas Canada (2019) Inc.

Your Project #: 19-9543
Site Location: IQALUIT PROPOSED LANDFILL
Your C.O.C. #: M086514, M046197

Attention: KEITH BARNES

DILLON CONSULTING LTD.
Suite 200
334 - 11th Avenue SE
CALGARY, AB
CANADA T2G 0Y2

Report Date: 2019/09/14
Report #: R2781311
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B975084
Received: 2019/09/07, 07:45

Sample Matrix: Water
Samples Received: 13

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO3,HCO3,OH	5	N/A	2019/09/09	AB SOP-00005	SM 23 2320 B m
Alkalinity @25C (pp, total), CO3,HCO3,OH	8	N/A	2019/09/10	AB SOP-00005	SM 23 2320 B m
Cadmium - low level CCME - Dissolved	8	N/A	2019/09/10		Auto Calc
Cadmium - low level CCME (Total)	13	N/A	2019/09/11		Auto Calc
Chloride/Sulphate by Auto Colourimetry	10	N/A	2019/09/10	AB SOP-00020 / AB SOP-00018	SM23-4500-Cl/SO4-E m
Chloride/Sulphate by Auto Colourimetry	3	N/A	2019/09/11	AB SOP-00020 / AB SOP-00018	SM23-4500-Cl/SO4-E m
Conductivity @25C	5	N/A	2019/09/09	AB SOP-00005	SM 23 2510 B m
Conductivity @25C	7	N/A	2019/09/10	AB SOP-00005	SM 23 2510 B m
Conductivity @25C	1	N/A	2019/09/11	AB SOP-00005	SM 23 2510 B m
Hardness	13	N/A	2019/09/10		Auto Calc
Elements by ICP - Dissolved (1)	13	N/A	2019/09/09	AB SOP-00042	EPA 6010d R5 m
Elements by ICP - Total	13	2019/09/10	2019/09/11	AB SOP-00014 / AB SOP-00042	EPA 6010d R4 m
Elements by ICPMS - Dissolved (1)	7	N/A	2019/09/10	AB SOP-00043	EPA 6020b R2 m
Elements by ICPMS - Dissolved (1)	1	N/A	2019/09/13	AB SOP-00043	EPA 6020b R2 m
Elements by ICPMS - Total	13	2019/09/10	2019/09/10	AB SOP-00014 / AB SOP-00043	EPA 6020b R2 m
Ion Balance	13	N/A	2019/09/10		Auto Calc
Sum of cations, anions	13	N/A	2019/09/10		Auto Calc
Ammonia-N (Total)	13	N/A	2019/09/10	AB SOP-00007	SM 23 4500 NH3 A G m
Nitrate and Nitrite	13	N/A	2019/09/10		Auto Calc
Nitrate + Nitrite-N (calculated)	13	N/A	2019/09/10		Auto Calc
Nitrogen (Nitrite - Nitrate) by IC	13	N/A	2019/09/09	AB SOP-00023	SM 23 4110 B m
pH @25°C (2)	5	N/A	2019/09/09	AB SOP-00005	SM 23 4500 H+ B m
pH @25°C (2)	8	N/A	2019/09/10	AB SOP-00005	SM 23 4500 H+ B m
Total Dissolved Solids (Calculated)	4	N/A	2019/09/10		Auto Calc
Total Dissolved Solids (Calculated)	9	N/A	2019/09/11		Auto Calc
Total Kjeldahl Nitrogen	13	2019/09/12	2019/09/13	AB SOP-00008	EPA 351.1 R 1978 m

Remarks:

Your Project #: 19-9543
Site Location: IQALUIT PROPOSED LANDFILL
Your C.O.C. #: M086514, M046197

Attention: KEITH BARNES

DILLON CONSULTING LTD.
Suite 200
334 - 11th Avenue SE
CALGARY, AB
CANADA T2G 0Y2

Report Date: 2019/09/14
Report #: R2781311
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B975084
Received: 2019/09/07, 07:45

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.
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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) Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
(2) The CCME method requires pH to be analysed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the CCME holding time. Bureau Veritas Laboratories endeavours to analyze samples as soon as possible after receipt.

Encryption Key



Bureau Veritas Laboratories
14 Sep 2019 16:34:03

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Ioana Stoica, Key Account Specialist
Email: Ioana.Stoica@bvlabs.com
Phone# (403)735-2227
==========
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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 #: B975084
Report Date: 2019/09/14

DILLON CONSULTING LTD.
Client Project #: 19-9543
Site Location: IQALUIT PROPOSED LANDFILL
Sampler Initials: JH

ROUTINE WATER (WATER)

BV Labs ID		WL2972		WL2973	WL2974	WL2974		WL2978		
Sampling Date		2019/09/06 10:00		2019/09/06 11:00	2019/09/06 12:00	2019/09/06 12:00				
COC Number		M086514		M086514	M086514	M086514		M046197		
	UNITS	W100	QC Batch	W101	W102	W102 Lab-Dup	QC Batch	QA/QC 3	RDL	QC Batch
Calculated Parameters										
Anion Sum	meq/L	0.65	9580945	1.6	0.96	N/A	9580945	0.0000	N/A	9580945
Cation Sum	meq/L	0.57	9580945	1.6	0.94	N/A	9580945	0.0030	N/A	9580945
Hardness (CaCO3)	mg/L	27	9580942	75	46	N/A	9580942	<0.50	0.50	9580942
Ion Balance (% Difference)	%	6.6	9580944	2.0	0.83	N/A	9580944	NC	N/A	9580944
Dissolved Nitrate (NO3)	mg/L	<0.044	9580946	<0.044	<0.044	N/A	9580946	<0.044	0.044	9580946
Nitrate plus Nitrite (N)	mg/L	<0.014	9580947	<0.014	<0.014	N/A	9580947	<0.014	0.014	9580947
Dissolved Nitrite (NO2)	mg/L	<0.033	9580946	<0.033	<0.033	N/A	9580946	<0.033	0.033	9580946
Calculated Total Dissolved Solids	mg/L	32	9580949	83	48	N/A	9580949	<10	10	9580949
Misc. Inorganics										
Conductivity	uS/cm	61	9581330	160	96	97	9582644	<2.0	2.0	9583396
pH	pH	7.72	9581326	8.03	7.77	7.85	9582640	5.74	N/A	9582633
Anions										
Alkalinity (PP as CaCO3)	mg/L	<1.0	9581329	<1.0	<1.0	<1.0	9582642	<1.0	1.0	9582636
Alkalinity (Total as CaCO3)	mg/L	27	9581329	69	44	44	9582642	<1.0	1.0	9582636
Bicarbonate (HCO3)	mg/L	33	9581329	84	53	54	9582642	<1.0	1.0	9582636
Carbonate (CO3)	mg/L	<1.0	9581329	<1.0	<1.0	<1.0	9582642	<1.0	1.0	9582636
Hydroxide (OH)	mg/L	<1.0	9581329	<1.0	<1.0	<1.0	9582642	<1.0	1.0	9582636
Dissolved Chloride (Cl)	mg/L	1.9	9582093	2.3	<1.0	N/A	9582093	<1.0	1.0	9584401
Dissolved Sulphate (SO4)	mg/L	2.8	9582093	8.5	4.0	N/A	9582093	<1.0	1.0	9584401
Nutrients										
Dissolved Nitrite (N)	mg/L	<0.010	9580545	<0.010	<0.010	N/A	9580545	<0.010	0.010	9580545
Dissolved Nitrate (N)	mg/L	<0.010	9580545	<0.010	<0.010	N/A	9580545	<0.010	0.010	9580545
Elements										
Dissolved Calcium (Ca)	mg/L	9.4	9580219	27	16	N/A	9580219	<0.30	0.30	9580219
Dissolved Iron (Fe)	mg/L	<0.060	9580219	0.067	<0.060	N/A	9580219	<0.060	0.060	9580219
Dissolved Magnesium (Mg)	mg/L	0.87	9580219	1.9	1.4	N/A	9580219	<0.20	0.20	9580219
Dissolved Manganese (Mn)	mg/L	<0.0040	9580219	<0.0040	<0.0040	N/A	9580219	<0.0040	0.0040	9580219
Dissolved Potassium (K)	mg/L	<0.30	9580219	<0.30	<0.30	N/A	9580219	<0.30	0.30	9580219
Dissolved Sodium (Na)	mg/L	0.66	9580219	1.2	0.80	N/A	9580219	<0.50	0.50	9580219

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

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BV Labs Job #: B975084
Report Date: 2019/09/14

DILLON CONSULTING LTD.
Client Project #: 19-9543
Site Location: IQALUIT PROPOSED LANDFILL
Sampler Initials: JH

ROUTINE WATER (WATER)

BV Labs ID		WL2979		
Sampling Date				
COC Number		M046197		
	UNITS	QA/QC 4	RDL	QC Batch
Calculated Parameters				
Anion Sum	meq/L	1.0	N/A	9580945
Cation Sum	meq/L	0.95	N/A	9580945
Hardness (CaCO3)	mg/L	46	0.50	9580942
Ion Balance (% Difference)	%	3.5	N/A	9580944
Dissolved Nitrate (NO3)	mg/L	<0.044	0.044	9580946
Nitrate plus Nitrite (N)	mg/L	<0.014	0.014	9580947
Dissolved Nitrite (NO2)	mg/L	<0.033	0.033	9580946
Calculated Total Dissolved Solids	mg/L	50	10	9580949
Misc. Inorganics				
Conductivity	uS/cm	100	2.0	9581330
pH	pH	7.87	N/A	9581326
Anions				
Alkalinity (PP as CaCO3)	mg/L	<1.0	1.0	9581329
Alkalinity (Total as CaCO3)	mg/L	45	1.0	9581329
Bicarbonate (HCO3)	mg/L	55	1.0	9581329
Carbonate (CO3)	mg/L	<1.0	1.0	9581329
Hydroxide (OH)	mg/L	<1.0	1.0	9581329
Dissolved Chloride (Cl)	mg/L	1.3	1.0	9582093
Dissolved Sulphate (SO4)	mg/L	4.0	1.0	9582093
Nutrients				
Dissolved Nitrite (N)	mg/L	<0.010	0.010	9580545
Dissolved Nitrate (N)	mg/L	<0.010	0.010	9580545
Elements				
Dissolved Calcium (Ca)	mg/L	16	0.30	9580219
Dissolved Iron (Fe)	mg/L	<0.060	0.060	9580219
Dissolved Magnesium (Mg)	mg/L	1.5	0.20	9580219
Dissolved Manganese (Mn)	mg/L	<0.0040	0.0040	9580219
Dissolved Potassium (K)	mg/L	<0.30	0.30	9580219
Dissolved Sodium (Na)	mg/L	0.80	0.50	9580219

RDL = Reportable Detection Limit
N/A = Not Applicable

Bureau Veritas Laboratories Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

BV Labs Job #: B975084
Report Date: 2019/09/14

DILLON CONSULTING LTD.
Client Project #: 19-9543
Site Location: IQALUIT PROPOSED LANDFILL
Sampler Initials: JH

ROUTINE WATER & DISS. REGULATED METALS (WATER)

BV Labs ID		WL2967	WL2967			WL2968	WL2969		
Sampling Date		2019/09/06 09:00	2019/09/06 09:00			2019/09/06 08:00	2019/09/05 11:00		
COC Number		M086514	M086514			M086514	M086514		
	UNITS	W107	W107 Lab-Dup	RDL	QC Batch	W108	W109	RDL	QC Batch
Calculated Parameters									
Anion Sum	meq/L	41	N/A	N/A	9580945	1.4	2.6	N/A	9580945
Cation Sum	meq/L	40	N/A	N/A	9580945	1.4	2.3	N/A	9580945
Hardness (CaCO3)	mg/L	1900	N/A	0.50	9580942	64	110	0.50	9580942
Ion Balance (% Difference)	%	1.6	N/A	N/A	9580944	2.3	7.2	N/A	9580944
Dissolved Nitrate (NO3)	mg/L	0.080	N/A	0.044	9580946	0.29	<0.044	0.044	9580946
Nitrate plus Nitrite (N)	mg/L	0.17	N/A	0.014	9580947	0.064	<0.014	0.014	9580947
Dissolved Nitrite (NO2)	mg/L	0.50	N/A	0.033	9580946	<0.033	<0.033	0.033	9580946
Calculated Total Dissolved Solids	mg/L	2400	N/A	10	9580949	70	120	10	9580949
Misc. Inorganics									
Conductivity	uS/cm	3000	N/A	2.0	9581330	140	250	2.0	9582644
pH	pH	7.55	N/A	N/A	9581326	7.67	7.88	N/A	9582640
Low Level Elements									
Dissolved Cadmium (Cd)	ug/L	0.14	N/A	0.020	9580941	0.025	0.70	0.020	9580941
Anions									
Alkalinity (PP as CaCO3)	mg/L	<1.0	N/A	1.0	9581329	<1.0	<1.0	1.0	9582642
Alkalinity (Total as CaCO3)	mg/L	460	N/A	1.0	9581329	63	130	1.0	9582642
Bicarbonate (HCO3)	mg/L	570	N/A	1.0	9581329	77	160	1.0	9582642
Carbonate (CO3)	mg/L	<1.0	N/A	1.0	9581329	<1.0	<1.0	1.0	9582642
Hydroxide (OH)	mg/L	<1.0	N/A	1.0	9581329	<1.0	<1.0	1.0	9582642
Dissolved Chloride (Cl)	mg/L	80	N/A	1.0	9582093	2.0	2.3	1.0	9582093
Dissolved Sulphate (SO4)	mg/L	1400 (1)	N/A	10	9582093	4.5	<1.0	1.0	9582093
Nutrients									
Dissolved Nitrite (N)	mg/L	0.15	N/A	0.010	9580545	<0.010	<0.010	0.010	9580545
Dissolved Nitrate (N)	mg/L	0.018	N/A	0.010	9580545	0.064	<0.010	0.010	9580545
Elements									
Dissolved Aluminum (Al)	mg/L	0.0044	0.0047	0.0030	9581085	0.0083	0.015	0.0030	9581085
Dissolved Antimony (Sb)	mg/L	0.0023	0.0021	0.00060	9581085	<0.00060	0.00087	0.00060	9581085
Dissolved Arsenic (As)	mg/L	0.00036	0.00029	0.00020	9581085	<0.00020	<0.00020	0.00020	9581085
Dissolved Barium (Ba)	mg/L	0.059	N/A	0.010	9580219	<0.010	0.017	0.010	9580219

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.

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BV Labs Job #: B975084
Report Date: 2019/09/14

DILLON CONSULTING LTD.
Client Project #: 19-9543
Site Location: IQALUIT PROPOSED LANDFILL
Sampler Initials: JH

ROUTINE WATER & DISS. REGULATED METALS (WATER)

BV Labs ID		WL2967	WL2967			WL2968	WL2969		
Sampling Date		2019/09/06 09:00	2019/09/06 09:00			2019/09/06 08:00	2019/09/05 11:00		
COC Number		M086514	M086514			M086514	M086514		
	UNITS	W107	W107 Lab-Dup	RDL	QC Batch	W108	W109	RDL	QC Batch
Dissolved Beryllium (Be)	mg/L	<0.0010	<0.0010	0.0010	9581085	<0.0010	<0.0010	0.0010	9581085
Dissolved Boron (B)	mg/L	<0.020	N/A	0.020	9580219	<0.020	<0.020	0.020	9580219
Dissolved Calcium (Ca)	mg/L	260	N/A	0.30	9580219	21	40	0.30	9580219
Dissolved Chromium (Cr)	mg/L	<0.0010	<0.0010	0.0010	9581085	<0.0010	<0.0010	0.0010	9581085
Dissolved Cobalt (Co)	mg/L	0.011	0.011	0.00030	9581085	<0.00030	<0.00030	0.00030	9581085
Dissolved Copper (Cu)	mg/L	0.0047	0.0043	0.00020	9581085	0.0039	0.0074	0.00020	9581085
Dissolved Iron (Fe)	mg/L	0.63	N/A	0.060	9580219	<0.060	<0.060	0.060	9580219
Dissolved Lead (Pb)	mg/L	0.00023	<0.00020	0.00020	9581085	<0.00020	<0.00020	0.00020	9581085
Dissolved Lithium (Li)	mg/L	<0.020	N/A	0.020	9580219	<0.020	<0.020	0.020	9580219
Dissolved Magnesium (Mg)	mg/L	310	N/A	0.20	9580219	2.7	2.8	0.20	9580219
Dissolved Manganese (Mn)	mg/L	8.1	N/A	0.0040	9580219	0.0090	0.014	0.0040	9580219
Dissolved Molybdenum (Mo)	mg/L	0.0030	0.0030	0.00020	9581085	0.00050	0.00081	0.00020	9581085
Dissolved Nickel (Ni)	mg/L	0.0094	0.0097	0.00050	9581085	0.0048	0.0011	0.00050	9581085
Dissolved Phosphorus (P)	mg/L	<0.10	N/A	0.10	9580219	<0.10	<0.10	0.10	9580219
Dissolved Potassium (K)	mg/L	4.3	N/A	0.30	9580219	0.44	0.60	0.30	9580219
Dissolved Selenium (Se)	mg/L	<0.00020	<0.00020	0.00020	9581085	<0.00020	<0.00020	0.00020	9581085
Dissolved Silicon (Si)	mg/L	7.7	N/A	0.10	9580219	2.8	2.3	0.10	9580219
Dissolved Silver (Ag)	mg/L	<0.00010	<0.00010	0.00010	9581085	<0.00010	<0.00010	0.00010	9581085
Dissolved Sodium (Na)	mg/L	22	N/A	0.50	9580219	1.3	1.1	0.50	9580219
Dissolved Strontium (Sr)	mg/L	0.54	N/A	0.020	9580219	0.043	0.055	0.020	9580219
Dissolved Sulphur (S)	mg/L	470	N/A	0.20	9580219	1.5	0.53	0.20	9580219
Dissolved Thallium (Tl)	mg/L	<0.00020	<0.00020	0.00020	9581085	<0.00020	<0.00020	0.00020	9581085
Dissolved Tin (Sn)	mg/L	<0.0010	<0.0010	0.0010	9581085	<0.0010	<0.0010	0.0010	9581085
Dissolved Titanium (Ti)	mg/L	<0.0010	<0.0010	0.0010	9581085	<0.0010	<0.0010	0.0010	9581085
Dissolved Uranium (U)	mg/L	0.012	0.012	0.00010	9581085	<0.00010	0.00024	0.00010	9581085
Dissolved Vanadium (V)	mg/L	<0.0010	<0.0010	0.0010	9581085	<0.0010	<0.0010	0.0010	9581085
Dissolved Zinc (Zn)	mg/L	0.0072	0.0067	0.0030	9581085	0.0039	0.0043	0.0030	9581085

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

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BV Labs Job #: B975084
Report Date: 2019/09/14

DILLON CONSULTING LTD.
Client Project #: 19-9543
Site Location: IQALUIT PROPOSED LANDFILL
Sampler Initials: JH

ROUTINE WATER & DISS. REGULATED METALS (WATER)

BV Labs ID		WL2970		WL2971		WL2975		
Sampling Date		2019/09/05 14:00		2019/09/05 16:00				
COC Number		M086514		M086514		M086514		
	UNITS	W110	QC Batch	W111	QC Batch	QA/QC 1	RDL	QC Batch
Calculated Parameters								
Anion Sum	meq/L	0.91	9580945	1.3	9580945	0.0000	N/A	9580945
Cation Sum	meq/L	0.83	9580945	1.2	9580945	0.0030	N/A	9580945
Hardness (CaCO3)	mg/L	40	9580942	56	9580942	<0.50	0.50	9580942
Ion Balance (% Difference)	%	4.8	9580944	5.1	9580944	NC	N/A	9580944
Dissolved Nitrate (NO3)	mg/L	0.37	9580946	0.20	9580946	<0.044	0.044	9580946
Nitrate plus Nitrite (N)	mg/L	0.083	9580947	0.044	9580947	<0.014	0.014	9580947
Dissolved Nitrite (NO2)	mg/L	<0.033	9580946	<0.033	9580946	<0.033	0.033	9580946
Calculated Total Dissolved Solids	mg/L	45	9580949	63	9580949	<10	10	9580949
Misc. Inorganics								
Conductivity	uS/cm	89	9582644	130	9582644	<2.0	2.0	9581330
pH	pH	7.71	9582640	8.11	9582640	5.59	N/A	9581326
Low Level Elements								
Dissolved Cadmium (Cd)	ug/L	<0.020	9580941	0.030	9580941	<0.020	0.020	9580941
Anions								
Alkalinity (PP as CaCO3)	mg/L	<1.0	9582642	<1.0	9582642	<1.0	1.0	9581329
Alkalinity (Total as CaCO3)	mg/L	39	9582642	60	9582642	<1.0	1.0	9581329
Bicarbonate (HCO3)	mg/L	47	9582642	73	9582642	<1.0	1.0	9581329
Carbonate (CO3)	mg/L	<1.0	9582642	<1.0	9582642	<1.0	1.0	9581329
Hydroxide (OH)	mg/L	<1.0	9582642	<1.0	9582642	<1.0	1.0	9581329
Dissolved Chloride (Cl)	mg/L	1.9	9582093	1.3	9584401	<1.0	1.0	9584401
Dissolved Sulphate (SO4)	mg/L	3.8	9582093	3.3	9584401	<1.0	1.0	9584401
Nutrients								
Dissolved Nitrite (N)	mg/L	<0.010	9580545	<0.010	9580545	<0.010	0.010	9580545
Dissolved Nitrate (N)	mg/L	0.083	9580545	0.044	9580545	<0.010	0.010	9580545
Elements								
Dissolved Aluminum (Al)	mg/L	0.014	9581085	0.014	9581085	<0.0030	0.0030	9584531
Dissolved Antimony (Sb)	mg/L	<0.00060	9581085	<0.00060	9581085	<0.00060	0.00060	9584531
Dissolved Arsenic (As)	mg/L	<0.00020	9581085	<0.00020	9581085	<0.00020	0.00020	9584531
Dissolved Barium (Ba)	mg/L	<0.010	9580219	<0.010	9580219	<0.010	0.010	9580219
Dissolved Beryllium (Be)	mg/L	<0.0010	9581085	<0.0010	9581085	<0.0010	0.0010	9584531
Dissolved Boron (B)	mg/L	<0.020	9580219	<0.020	9580219	<0.020	0.020	9580219

RDL = Reportable Detection Limit
N/A = Not Applicable

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BV Labs Job #: B975084
Report Date: 2019/09/14

DILLON CONSULTING LTD.
Client Project #: 19-9543
Site Location: IQALUIT PROPOSED LANDFILL
Sampler Initials: JH

ROUTINE WATER & DISS. REGULATED METALS (WATER)

BV Labs ID		WL2970		WL2971		WL2975		
Sampling Date		2019/09/05 14:00		2019/09/05 16:00				
COC Number		M086514		M086514		M086514		
	UNITS	W110	QC Batch	W111	QC Batch	QA/QC 1	RDL	QC Batch
Dissolved Calcium (Ca)	mg/L	12	9580219	20	9580219	<0.30	0.30	9580219
Dissolved Chromium (Cr)	mg/L	<0.0010	9581085	<0.0010	9581085	<0.0010	0.0010	9584531
Dissolved Cobalt (Co)	mg/L	<0.00030	9581085	<0.00030	9581085	<0.00030	0.00030	9584531
Dissolved Copper (Cu)	mg/L	0.0039	9581085	0.0040	9581085	0.0016	0.00020	9584531
Dissolved Iron (Fe)	mg/L	<0.060	9580219	<0.060	9580219	<0.060	0.060	9580219
Dissolved Lead (Pb)	mg/L	<0.00020	9581085	<0.00020	9581085	<0.00020	0.00020	9584531
Dissolved Lithium (Li)	mg/L	<0.020	9580219	<0.020	9580219	<0.020	0.020	9580219
Dissolved Magnesium (Mg)	mg/L	2.3	9580219	1.4	9580219	<0.20	0.20	9580219
Dissolved Manganese (Mn)	mg/L	0.012	9580219	0.011	9580219	<0.0040	0.0040	9580219
Dissolved Molybdenum (Mo)	mg/L	0.00038	9581085	0.0013	9581085	<0.00020	0.00020	9584531
Dissolved Nickel (Ni)	mg/L	<0.00050	9581085	<0.00050	9581085	<0.00050	0.00050	9584531
Dissolved Phosphorus (P)	mg/L	<0.10	9580219	<0.10	9580219	<0.10	0.10	9580219
Dissolved Potassium (K)	mg/L	<0.30	9580219	0.37	9580219	<0.30	0.30	9580219
Dissolved Selenium (Se)	mg/L	<0.00020	9581085	<0.00020	9581085	<0.00020	0.00020	9584531
Dissolved Silicon (Si)	mg/L	2.1	9580219	3.4	9580219	<0.10	0.10	9580219
Dissolved Silver (Ag)	mg/L	<0.00010	9581085	<0.00010	9581085	<0.00010	0.00010	9584531
Dissolved Sodium (Na)	mg/L	0.83	9580219	1.1	9580219	<0.50	0.50	9580219
Dissolved Strontium (Sr)	mg/L	0.020	9580219	0.029	9580219	<0.020	0.020	9580219
Dissolved Sulphur (S)	mg/L	1.1	9580219	1.2	9580219	<0.20	0.20	9580219
Dissolved Thallium (Tl)	mg/L	<0.00020	9581085	<0.00020	9581085	<0.00020	0.00020	9584531
Dissolved Tin (Sn)	mg/L	<0.0010	9581085	<0.0010	9581085	<0.0010	0.0010	9584531
Dissolved Titanium (Ti)	mg/L	<0.0010	9581085	<0.0010	9581085	<0.0010	0.0010	9584531
Dissolved Uranium (U)	mg/L	<0.00010	9581085	0.00019	9581085	<0.00010	0.00010	9584531
Dissolved Vanadium (V)	mg/L	<0.0010	9581085	<0.0010	9581085	<0.0010	0.0010	9584531
Dissolved Zinc (Zn)	mg/L	0.0036	9581085	0.0032	9581085	<0.0030	0.0030	9584531
RDL = Reportable Detection Limit								

BV Labs Job #: B975084
Report Date: 2019/09/14

DILLON CONSULTING LTD.
Client Project #: 19-9543
Site Location: IQALUIT PROPOSED LANDFILL
Sampler Initials: JH

ROUTINE WATER & DISS. REGULATED METALS (WATER)

BV Labs ID		WL2976		WL2980		
Sampling Date						
COC Number		M086514		M046197		
	UNITS	QA/QC 2	QC Batch	TRIP BLANK	RDL	QC Batch
Calculated Parameters						
Anion Sum	meq/L	0.91	9580945	0.0000	N/A	9580945
Cation Sum	meq/L	0.84	9580945	0.0050	N/A	9580945
Hardness (CaCO3)	mg/L	40	9580942	<0.50	0.50	9580942
Ion Balance (% Difference)	%	4.1	9580944	NC	N/A	9580944
Dissolved Nitrate (NO3)	mg/L	0.36	9580946	<0.044	0.044	9580946
Nitrate plus Nitrite (N)	mg/L	0.082	9580947	<0.014	0.014	9580947
Dissolved Nitrite (NO2)	mg/L	<0.033	9580946	<0.033	0.033	9580946
Calculated Total Dissolved Solids	mg/L	44	9580949	<10	10	9580949
Misc. Inorganics						
Conductivity	uS/cm	87	9582644	<2.0	2.0	9581330
pH	pH	7.70	9582640	5.42	N/A	9581326
Low Level Elements						
Dissolved Cadmium (Cd)	ug/L	<0.020	9580941	<0.020	0.020	9580941
Anions						
Alkalinity (PP as CaCO3)	mg/L	<1.0	9582642	<1.0	1.0	9581329
Alkalinity (Total as CaCO3)	mg/L	39	9582642	<1.0	1.0	9581329
Bicarbonate (HCO3)	mg/L	48	9582642	<1.0	1.0	9581329
Carbonate (CO3)	mg/L	<1.0	9582642	<1.0	1.0	9581329
Hydroxide (OH)	mg/L	<1.0	9582642	<1.0	1.0	9581329
Dissolved Chloride (Cl)	mg/L	1.4	9582093	<1.0	1.0	9582093
Dissolved Sulphate (SO4)	mg/L	3.8	9582093	<1.0	1.0	9582093
Nutrients						
Dissolved Nitrite (N)	mg/L	<0.010	9580545	<0.010	0.010	9580545
Dissolved Nitrate (N)	mg/L	0.082	9580545	<0.010	0.010	9580545
Elements						
Dissolved Aluminum (Al)	mg/L	0.014	9581085	<0.0030	0.0030	9581085
Dissolved Antimony (Sb)	mg/L	<0.00060	9581085	<0.00060	0.00060	9581085
Dissolved Arsenic (As)	mg/L	<0.00020	9581085	<0.00020	0.00020	9581085
Dissolved Barium (Ba)	mg/L	<0.010	9580219	<0.010	0.010	9580219
Dissolved Beryllium (Be)	mg/L	<0.0010	9581085	<0.0010	0.0010	9581085
Dissolved Boron (B)	mg/L	<0.020	9580219	<0.020	0.020	9580219

RDL = Reportable Detection Limit
N/A = Not Applicable

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ROUTINE WATER & DISS. REGULATED METALS (WATER)

BV Labs ID		WL2976		WL2980		
Sampling Date						
COC Number		M086514		M046197		
	UNITS	QA/QC 2	QC Batch	TRIP BLANK	RDL	QC Batch
Dissolved Calcium (Ca)	mg/L	12	9580219	<0.30	0.30	9580219
Dissolved Chromium (Cr)	mg/L	<0.0010	9581085	<0.0010	0.0010	9581085
Dissolved Cobalt (Co)	mg/L	<0.00030	9581085	<0.00030	0.00030	9581085
Dissolved Copper (Cu)	mg/L	0.0011	9581085	<0.00020	0.00020	9581085
Dissolved Iron (Fe)	mg/L	<0.060	9580219	<0.060	0.060	9580219
Dissolved Lead (Pb)	mg/L	<0.00020	9581085	<0.00020	0.00020	9581085
Dissolved Lithium (Li)	mg/L	<0.020	9580219	<0.020	0.020	9580219
Dissolved Magnesium (Mg)	mg/L	2.3	9580219	<0.20	0.20	9580219
Dissolved Manganese (Mn)	mg/L	0.012	9580219	<0.0040	0.0040	9580219
Dissolved Molybdenum (Mo)	mg/L	0.00032	9581085	<0.00020	0.00020	9581085
Dissolved Nickel (Ni)	mg/L	<0.00050	9581085	<0.00050	0.00050	9581085
Dissolved Phosphorus (P)	mg/L	<0.10	9580219	<0.10	0.10	9580219
Dissolved Potassium (K)	mg/L	<0.30	9580219	<0.30	0.30	9580219
Dissolved Selenium (Se)	mg/L	<0.00020	9581085	<0.00020	0.00020	9581085
Dissolved Silicon (Si)	mg/L	2.1	9580219	<0.10	0.10	9580219
Dissolved Silver (Ag)	mg/L	<0.00010	9581085	<0.00010	0.00010	9581085
Dissolved Sodium (Na)	mg/L	0.84	9580219	<0.50	0.50	9580219
Dissolved Strontium (Sr)	mg/L	<0.020	9580219	<0.020	0.020	9580219
Dissolved Sulphur (S)	mg/L	1.1	9580219	<0.20	0.20	9580219
Dissolved Thallium (Tl)	mg/L	<0.00020	9581085	<0.00020	0.00020	9581085
Dissolved Tin (Sn)	mg/L	<0.0010	9581085	<0.0010	0.0010	9581085
Dissolved Titanium (Ti)	mg/L	0.0012	9581085	<0.0010	0.0010	9581085
Dissolved Uranium (U)	mg/L	<0.00010	9581085	<0.00010	0.00010	9581085
Dissolved Vanadium (V)	mg/L	<0.0010	9581085	<0.0010	0.0010	9581085
Dissolved Zinc (Zn)	mg/L	<0.0030	9581085	<0.0030	0.0030	9581085
RDL = Reportable Detection Limit						

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BV Labs Job #: B975084
Report Date: 2019/09/14

DILLON CONSULTING LTD.
Client Project #: 19-9543
Site Location: IQALUIT PROPOSED LANDFILL
Sampler Initials: JH

REGULATED METALS (CCME/AT1) - TOTAL

BV Labs ID		WL2967	WL2968	WL2969	WL2970		WL2971		
Sampling Date		2019/09/06 09:00	2019/09/06 08:00	2019/09/05 11:00	2019/09/05 14:00		2019/09/05 16:00		
COC Number		M086514	M086514	M086514	M086514		M086514		
	UNITS	W107	W108	W109	W110	RDL	W111	RDL	QC Batch
Low Level Elements									
Total Cadmium (Cd)	ug/L	0.46	0.045	3.3	0.054	0.020	1.8	0.40	9580827
Elements									
Total Aluminum (Al)	mg/L	21	5.8	16	3.9	0.0030	70	0.060	9582021
Total Antimony (Sb)	mg/L	0.0032	<0.00060	0.0020	<0.00060	0.00060	<0.012	0.012	9582021
Total Arsenic (As)	mg/L	0.0062	0.00071	0.0041	0.00073	0.00020	0.016	0.0040	9582021
Total Barium (Ba)	mg/L	0.28	0.045	0.20	0.035	0.010	0.84	0.010	9582032
Total Beryllium (Be)	mg/L	0.0011	<0.0010	<0.0010	<0.0010	0.0010	<0.020	0.020	9582021
Total Boron (B)	mg/L	0.021	<0.020	<0.020	<0.020	0.020	0.022	0.020	9582032
Total Calcium (Ca)	mg/L	310	21	47	13	0.30	96	0.30	9582032
Total Chromium (Cr)	mg/L	0.045	0.0066	0.028	0.0058	0.0010	0.11	0.020	9582021
Total Cobalt (Co)	mg/L	0.029	0.0027	0.017	0.0031	0.00030	0.092	0.0060	9582021
Total Copper (Cu)	mg/L	0.097	0.015	0.056	0.014	0.00020	0.36	0.0040	9582021
Total Iron (Fe)	mg/L	65	9.1	33	7.8	0.060	190	0.060	9582032
Total Lead (Pb)	mg/L	0.017	0.0025	0.014	0.0029	0.00020	0.069	0.0040	9582021
Total Lithium (Li)	mg/L	0.038	<0.020	0.020	<0.020	0.020	0.087	0.020	9582032
Total Magnesium (Mg)	mg/L	340	5.0	14	4.2	0.20	51	0.20	9582032
Total Manganese (Mn)	mg/L	7.4	0.12	0.91	0.18	0.0040	4.1	0.0040	9582032
Total Molybdenum (Mo)	mg/L	0.0051	0.00050	0.0013	0.00047	0.00020	<0.0040	0.0040	9582021
Total Nickel (Ni)	mg/L	0.047	0.014	0.031	0.0064	0.00050	0.13	0.010	9582021
Total Phosphorus (P)	mg/L	2.3	0.15	0.67	<0.10	0.10	5.1	0.10	9582032
Total Potassium (K)	mg/L	8.3	1.2	3.0	0.88	0.30	13	0.30	9582032
Total Selenium (Se)	mg/L	0.00089	<0.00020	0.00032	<0.00020	0.00020	<0.0040	0.0040	9582021
Total Silicon (Si)	mg/L	41	10	26	8.4	0.10	71	0.10	9582032
Total Silver (Ag)	mg/L	0.00058	<0.00010	0.00013	<0.00010	0.00010	<0.0020	0.0020	9582021
Total Sodium (Na)	mg/L	21	1.4	2.1	1.0	0.50	4.7	0.50	9582032
Total Strontium (Sr)	mg/L	0.62	0.049	0.085	0.026	0.020	0.20	0.020	9582032
Total Sulphur (S)	mg/L	460	1.5	1.0	1.2	0.20	1.9	0.20	9582032
Total Thallium (Tl)	mg/L	0.00027	<0.00020	0.00022	<0.00020	0.00020	<0.0040	0.0040	9582021
Total Tin (Sn)	mg/L	0.0013	<0.0010	<0.0010	<0.0010	0.0010	<0.020	0.020	9582021
Total Titanium (Ti)	mg/L	1.5	0.24	0.87	0.20	0.0010	3.9	0.020	9582021
Total Uranium (U)	mg/L	0.013	0.00023	0.00091	0.00014	0.00010	0.0044	0.0020	9582021

RDL = Reportable Detection Limit

BV Labs Job #: B975084
Report Date: 2019/09/14

DILLON CONSULTING LTD.
Client Project #: 19-9543
Site Location: IQALUIT PROPOSED LANDFILL
Sampler Initials: JH

REGULATED METALS (CCME/AT1) - TOTAL

BV Labs ID		WL2967	WL2968	WL2969	WL2970		WL2971		
Sampling Date		2019/09/06 09:00	2019/09/06 08:00	2019/09/05 11:00	2019/09/05 14:00		2019/09/05 16:00		
COC Number		M086514	M086514	M086514	M086514		M086514		
	UNITS	**W107**	**W108**	**W109**	**W110**	**RDL**	**W111**	**RDL**	**QC Batch**
Total Vanadium (V)	mg/L	0.058	0.0090	0.032	0.0070	0.0010	0.15	0.020	9582021
Total Zinc (Zn)	mg/L	0.27	0.044	0.12	0.031	0.0030	0.89	0.060	9582021
RDL = Reportable Detection Limit									

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BV Labs Job #: B975084
Report Date: 2019/09/14

DILLON CONSULTING LTD.
Client Project #: 19-9543
Site Location: IQALUIT PROPOSED LANDFILL
Sampler Initials: JH

REGULATED METALS (CCME/AT1) - TOTAL

BV Labs ID		WL2972	WL2973	WL2974	WL2974	WL2975	WL2976		
Sampling Date		2019/09/06 10:00	2019/09/06 11:00	2019/09/06 12:00	2019/09/06 12:00				
COC Number		M086514	M086514	M086514	M086514	M086514	M086514		
	UNITS	W100	W101	W102	W102 Lab-Dup	QA/QC 1	QA/QC 2	RDL	QC Batch
Low Level Elements									
Total Cadmium (Cd)	ug/L	<0.020	<0.020	<0.020	N/A	<0.020	0.056	0.020	9580827
Elements									
Total Aluminum (Al)	mg/L	0.029	0.0097	0.0063	0.011	0.0038	4.0	0.0030	9582021
Total Antimony (Sb)	mg/L	<0.00060	<0.00060	<0.00060	<0.00060	<0.00060	<0.00060	0.00060	9582021
Total Arsenic (As)	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00064	0.00020	9582021
Total Barium (Ba)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	0.036	0.010	9582032
Total Beryllium (Be)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	9582021
Total Boron (B)	mg/L	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	9582032
Total Calcium (Ca)	mg/L	8.4	25	15	15	<0.30	13	0.30	9582032
Total Chromium (Cr)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0062	0.0010	9582021
Total Cobalt (Co)	mg/L	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	0.0030	0.00030	9582021
Total Copper (Cu)	mg/L	0.00044	0.00064	0.00069	0.00074	0.00033	0.014	0.00020	9582021
Total Iron (Fe)	mg/L	<0.060	0.097	<0.060	<0.060	<0.060	7.8	0.060	9582032
Total Lead (Pb)	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.0030	0.00020	9582021
Total Lithium (Li)	mg/L	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	9582032
Total Magnesium (Mg)	mg/L	0.78	1.8	1.4	1.4	<0.20	4.2	0.20	9582032
Total Manganese (Mn)	mg/L	<0.0040	<0.0040	<0.0040	0.0044	<0.0040	0.18	0.0040	9582032
Total Molybdenum (Mo)	mg/L	<0.00020	0.00023	0.00023	0.00022	<0.00020	0.00048	0.00020	9582021
Total Nickel (Ni)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.0064	0.00050	9582021
Total Phosphorus (P)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	0.10	9582032
Total Potassium (K)	mg/L	<0.30	0.30	<0.30	<0.30	<0.30	0.87	0.30	9582032
Total Selenium (Se)	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	9582021
Total Silicon (Si)	mg/L	1.1	2.1	1.3	1.2	<0.10	8.3	0.10	9582032
Total Silver (Ag)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00010	9582021
Total Sodium (Na)	mg/L	0.59	1.2	0.75	0.73	<0.50	1.0	0.50	9582032
Total Strontium (Sr)	mg/L	<0.020	0.035	0.021	0.021	<0.020	0.026	0.020	9582032
Total Sulphur (S)	mg/L	0.85	2.7	1.3	1.3	<0.20	1.1	0.20	9582032
Total Thallium (Tl)	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	9582021
Total Tin (Sn)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	9582021
Total Titanium (Ti)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.19	0.0010	9582021

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

BV Labs Job #: B975084
Report Date: 2019/09/14

DILLON CONSULTING LTD.
Client Project #: 19-9543
Site Location: IQALUIT PROPOSED LANDFILL
Sampler Initials: JH

REGULATED METALS (CCME/AT1) - TOTAL

BV Labs ID		WL2972	WL2973	WL2974	WL2974	WL2975	WL2976		
Sampling Date		2019/09/06 10:00	2019/09/06 11:00	2019/09/06 12:00	2019/09/06 12:00				
COC Number		M086514	M086514	M086514	M086514	M086514	M086514		
	UNITS	W100	W101	W102	W102 Lab-Dup	QA/QC 1	QA/QC 2	RDL	QC Batch
Total Uranium (U)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00026	0.00010	9582021
Total Vanadium (V)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0067	0.0010	9582021
Total Zinc (Zn)	mg/L	<0.0030	<0.0030	<0.0030	0.0033	<0.0030	0.032	0.0030	9582021

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate

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BV Labs Job #: B975084
Report Date: 2019/09/14

DILLON CONSULTING LTD.
Client Project #: 19-9543
Site Location: IQALUIT PROPOSED LANDFILL
Sampler Initials: JH

REGULATED METALS (CCME/AT1) - TOTAL

BV Labs ID		WL2978	WL2979	WL2980		
Sampling Date						
COC Number		M046197	M046197	M046197		
	UNITS	QA/QC 3	QA/QC 4	TRIP BLANK	RDL	QC Batch
Low Level Elements						
Total Cadmium (Cd)	ug/L	<0.020	<0.020	<0.020	0.020	9580827
Elements						
Total Aluminum (Al)	mg/L	0.0041	0.0081	0.0031	0.0030	9582021
Total Antimony (Sb)	mg/L	<0.00060	<0.00060	<0.00060	0.00060	9582021
Total Arsenic (As)	mg/L	<0.00020	<0.00020	<0.00020	0.00020	9582021
Total Barium (Ba)	mg/L	<0.010	<0.010	<0.010	0.010	9582032
Total Beryllium (Be)	mg/L	<0.0010	<0.0010	<0.0010	0.0010	9582021
Total Boron (B)	mg/L	<0.020	<0.020	<0.020	0.020	9582032
Total Calcium (Ca)	mg/L	<0.30	15	<0.30	0.30	9582032
Total Chromium (Cr)	mg/L	<0.0010	<0.0010	<0.0010	0.0010	9582021
Total Cobalt (Co)	mg/L	<0.00030	<0.00030	<0.00030	0.00030	9582021
Total Copper (Cu)	mg/L	0.00023	0.00074	<0.00020	0.00020	9582021
Total Iron (Fe)	mg/L	<0.060	<0.060	<0.060	0.060	9582032
Total Lead (Pb)	mg/L	<0.00020	<0.00020	<0.00020	0.00020	9582021
Total Lithium (Li)	mg/L	<0.020	<0.020	<0.020	0.020	9582032
Total Magnesium (Mg)	mg/L	<0.20	1.4	<0.20	0.20	9582032
Total Manganese (Mn)	mg/L	<0.0040	<0.0040	<0.0040	0.0040	9582032
Total Molybdenum (Mo)	mg/L	<0.00020	0.00025	<0.00020	0.00020	9582021
Total Nickel (Ni)	mg/L	<0.00050	<0.00050	<0.00050	0.00050	9582021
Total Phosphorus (P)	mg/L	<0.10	<0.10	<0.10	0.10	9582032
Total Potassium (K)	mg/L	<0.30	<0.30	<0.30	0.30	9582032
Total Selenium (Se)	mg/L	<0.00020	<0.00020	<0.00020	0.00020	9582021
Total Silicon (Si)	mg/L	<0.10	1.3	<0.10	0.10	9582032
Total Silver (Ag)	mg/L	<0.00010	<0.00010	<0.00010	0.00010	9582021
Total Sodium (Na)	mg/L	<0.50	0.74	<0.50	0.50	9582032
Total Strontium (Sr)	mg/L	<0.020	0.021	<0.020	0.020	9582032
Total Sulphur (S)	mg/L	<0.20	1.3	<0.20	0.20	9582032
Total Thallium (Tl)	mg/L	<0.00020	<0.00020	<0.00020	0.00020	9582021
Total Tin (Sn)	mg/L	<0.0010	<0.0010	<0.0010	0.0010	9582021
Total Titanium (Ti)	mg/L	0.0012	<0.0010	<0.0010	0.0010	9582021
Total Uranium (U)	mg/L	<0.00010	<0.00010	<0.00010	0.00010	9582021
RDL = Reportable Detection Limit						

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REGULATED METALS (CCME/AT1) - TOTAL

BV Labs ID		WL2978	WL2979	WL2980		
Sampling Date						
COC Number		M046197	M046197	M046197		
	UNITS	QA/QC 3	QA/QC 4	TRIP BLANK	RDL	QC Batch
Total Vanadium (V)	mg/L	<0.0010	<0.0010	<0.0010	0.0010	9582021
Total Zinc (Zn)	mg/L	<0.0030	<0.0030	<0.0030	0.0030	9582021
RDL = Reportable Detection Limit						

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BV Labs Job #: B975084
Report Date: 2019/09/14

DILLON CONSULTING LTD.
Client Project #: 19-9543
Site Location: IQALUIT PROPOSED LANDFILL
Sampler Initials: JH

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		WL2967		WL2968		WL2969		WL2970		WL2971		
Sampling Date		2019/09/06 09:00		2019/09/06 08:00		2019/09/05 11:00		2019/09/05 14:00		2019/09/05 16:00		
COC Number		M086514		M086514		M086514		M086514		M086514		
	UNITS	W107	RDL	W108	RDL	W109	RDL	W110	RDL	W111	RDL	QC Batch
Nutrients												
Total Ammonia (N)	mg/L	0.26	0.015	0.023	0.015	0.016	0.015	0.019	0.015	0.030	0.015	9582091
Total Total Kjeldahl Nitrogen	mg/L	2.3 (1)	0.25	0.17	0.050	3.4 (1)	0.25	0.24	0.050	14 (1)	0.50	9585993

RDL = Reportable Detection Limit
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.

BV Labs ID		WL2971		WL2972	WL2972	WL2973	WL2974	WL2975		
Sampling Date		2019/09/05 16:00		2019/09/06 10:00	2019/09/06 10:00	2019/09/06 11:00	2019/09/06 12:00			
COC Number		M086514		M086514	M086514	M086514	M086514	M086514		
	UNITS	W111 Lab-Dup	RDL	W100	W100 Lab-Dup	W101	W102	QA/QC 1	RDL	QC Batch
Nutrients										
Total Ammonia (N)	mg/L	0.020	0.015	0.023	N/A	0.022	<0.015	<0.015	0.015	9582091
Total Total Kjeldahl Nitrogen	mg/L	N/A	0.50	0.13	0.11	0.30	0.10	<0.050	0.050	9585993

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

BV Labs ID		WL2976	WL2978	WL2978	WL2979	WL2980		
Sampling Date								
COC Number		M086514	M046197	M046197	M046197	M046197		
	UNITS	QA/QC 2	QA/QC 3	QA/QC 3 Lab-Dup	QA/QC 4	TRIP BLANK	RDL	QC Batch
Nutrients								
Total Ammonia (N)	mg/L	0.016	0.022	N/A	0.046	0.016	0.015	9582091
Total Total Kjeldahl Nitrogen	mg/L	0.19	<0.050	<0.050	0.10	<0.050	0.050	9585999

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

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GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	7.4°C

Sample WL2969 [W109] : Sample was analyzed past method specified hold time for Nitrogen (Nitrite - Nitrate) by IC. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.

Sample WL2970 [W110] : Sample was analyzed past method specified hold time for Nitrogen (Nitrite - Nitrate) by IC. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.

Sample WL2971 [W111] : Sample was analyzed past method specified hold time for Nitrogen (Nitrite - Nitrate) by IC. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.

Detection limits raised due to sample matrix. Parameters affected are total Al, Cr, Co, Cu, Pb, Sb, Mo, Ni, Se, Ag, As, Tl, Sn, Ti, U, V, Zn, Be, Cd.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
9580219	REL	Matrix Spike	Dissolved Barium (Ba)	2019/09/09		87	%	80 - 120
			Dissolved Boron (B)	2019/09/09		99	%	80 - 120
			Dissolved Calcium (Ca)	2019/09/09		NC	%	80 - 120
			Dissolved Iron (Fe)	2019/09/09		84	%	80 - 120
			Dissolved Lithium (Li)	2019/09/09		96	%	80 - 120
			Dissolved Magnesium (Mg)	2019/09/09		NC	%	80 - 120
			Dissolved Manganese (Mn)	2019/09/09		98	%	80 - 120
			Dissolved Phosphorus (P)	2019/09/09		104	%	80 - 120
			Dissolved Potassium (K)	2019/09/09		104	%	80 - 120
			Dissolved Silicon (Si)	2019/09/09		92	%	80 - 120
			Dissolved Sodium (Na)	2019/09/09		NC	%	80 - 120
			Dissolved Strontium (Sr)	2019/09/09		NC	%	80 - 120
			Dissolved Sulphur (S)	2019/09/09		NC	%	80 - 120
9580219	REL	Spiked Blank	Dissolved Barium (Ba)	2019/09/09		100	%	80 - 120
			Dissolved Boron (B)	2019/09/09		103	%	80 - 120
			Dissolved Calcium (Ca)	2019/09/09		99	%	80 - 120
			Dissolved Iron (Fe)	2019/09/09		105	%	80 - 120
			Dissolved Lithium (Li)	2019/09/09		100	%	80 - 120
			Dissolved Magnesium (Mg)	2019/09/09		98	%	80 - 120
			Dissolved Manganese (Mn)	2019/09/09		99	%	80 - 120
			Dissolved Phosphorus (P)	2019/09/09		101	%	80 - 120
			Dissolved Potassium (K)	2019/09/09		106	%	80 - 120
			Dissolved Silicon (Si)	2019/09/09		100	%	80 - 120
			Dissolved Sodium (Na)	2019/09/09		106	%	80 - 120
			Dissolved Strontium (Sr)	2019/09/09		96	%	80 - 120
			Dissolved Sulphur (S)	2019/09/09		103	%	80 - 120
9580219	REL	Method Blank	Dissolved Barium (Ba)	2019/09/09	<0.010		mg/L	
			Dissolved Boron (B)	2019/09/09	<0.020		mg/L	
			Dissolved Calcium (Ca)	2019/09/09	<0.30		mg/L	
			Dissolved Iron (Fe)	2019/09/09	<0.060		mg/L	
			Dissolved Lithium (Li)	2019/09/09	<0.020		mg/L	
			Dissolved Magnesium (Mg)	2019/09/09	<0.20		mg/L	
			Dissolved Manganese (Mn)	2019/09/09	<0.0040		mg/L	
			Dissolved Phosphorus (P)	2019/09/09	<0.10		mg/L	
			Dissolved Potassium (K)	2019/09/09	<0.30		mg/L	
			Dissolved Silicon (Si)	2019/09/09	<0.10		mg/L	
			Dissolved Sodium (Na)	2019/09/09	<0.50		mg/L	
			Dissolved Strontium (Sr)	2019/09/09	<0.020		mg/L	
			Dissolved Sulphur (S)	2019/09/09	<0.20		mg/L	
9580219	REL	RPD	Dissolved Calcium (Ca)	2019/09/09	0.51		%	20
			Dissolved Magnesium (Mg)	2019/09/09	0.027		%	20
			Dissolved Potassium (K)	2019/09/09	2.7		%	20
			Dissolved Sodium (Na)	2019/09/09	3.2		%	20
9580545	KD5	Matrix Spike	Dissolved Nitrite (N)	2019/09/09		102	%	80 - 120
			Dissolved Nitrate (N)	2019/09/09		103	%	80 - 120
9580545	KD5	Spiked Blank	Dissolved Nitrite (N)	2019/09/09		100	%	80 - 120
			Dissolved Nitrate (N)	2019/09/09		101	%	80 - 120
9580545	KD5	Method Blank	Dissolved Nitrite (N)	2019/09/09	<0.010		mg/L	
			Dissolved Nitrate (N)	2019/09/09	<0.010		mg/L	
9580545	KD5	RPD	Dissolved Nitrite (N)	2019/09/09	0.076		%	20
			Dissolved Nitrate (N)	2019/09/09	0.16		%	20
9581085	APY	Matrix Spike [WL2967-03]	Dissolved Aluminum (Al)	2019/09/10		105	%	80 - 120

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Antimony (Sb)	2019/09/10		100	%	80 - 120
			Dissolved Arsenic (As)	2019/09/10		100	%	80 - 120
			Dissolved Beryllium (Be)	2019/09/10		99	%	80 - 120
			Dissolved Chromium (Cr)	2019/09/10		100	%	80 - 120
			Dissolved Cobalt (Co)	2019/09/10		96	%	80 - 120
			Dissolved Copper (Cu)	2019/09/10		94	%	80 - 120
			Dissolved Lead (Pb)	2019/09/10		97	%	80 - 120
			Dissolved Molybdenum (Mo)	2019/09/10		107	%	80 - 120
			Dissolved Nickel (Ni)	2019/09/10		94	%	80 - 120
			Dissolved Selenium (Se)	2019/09/10		102	%	80 - 120
			Dissolved Silver (Ag)	2019/09/10		97	%	80 - 120
			Dissolved Thallium (Tl)	2019/09/10		98	%	80 - 120
			Dissolved Tin (Sn)	2019/09/10		105	%	80 - 120
			Dissolved Titanium (Ti)	2019/09/10		100	%	80 - 120
			Dissolved Uranium (U)	2019/09/10		98	%	80 - 120
			Dissolved Vanadium (V)	2019/09/10		104	%	80 - 120
			Dissolved Zinc (Zn)	2019/09/10		95	%	80 - 120
9581085	APY	Spiked Blank	Dissolved Aluminum (Al)	2019/09/10		100	%	80 - 120
			Dissolved Antimony (Sb)	2019/09/10		94	%	80 - 120
			Dissolved Arsenic (As)	2019/09/10		99	%	80 - 120
			Dissolved Beryllium (Be)	2019/09/10		92	%	80 - 120
			Dissolved Chromium (Cr)	2019/09/10		100	%	80 - 120
			Dissolved Cobalt (Co)	2019/09/10		99	%	80 - 120
			Dissolved Copper (Cu)	2019/09/10		101	%	80 - 120
			Dissolved Lead (Pb)	2019/09/10		99	%	80 - 120
			Dissolved Molybdenum (Mo)	2019/09/10		98	%	80 - 120
			Dissolved Nickel (Ni)	2019/09/10		100	%	80 - 120
			Dissolved Selenium (Se)	2019/09/10		97	%	80 - 120
			Dissolved Silver (Ag)	2019/09/10		96	%	80 - 120
			Dissolved Thallium (Tl)	2019/09/10		99	%	80 - 120
			Dissolved Tin (Sn)	2019/09/10		100	%	80 - 120
			Dissolved Titanium (Ti)	2019/09/10		101	%	80 - 120
			Dissolved Uranium (U)	2019/09/10		95	%	80 - 120
			Dissolved Vanadium (V)	2019/09/10		101	%	80 - 120
			Dissolved Zinc (Zn)	2019/09/10		102	%	80 - 120
9581085	APY	Method Blank	Dissolved Aluminum (Al)	2019/09/10	<0.0030		mg/L	
			Dissolved Antimony (Sb)	2019/09/10	<0.00060		mg/L	
			Dissolved Arsenic (As)	2019/09/10	<0.00020		mg/L	
			Dissolved Beryllium (Be)	2019/09/10	<0.0010		mg/L	
			Dissolved Chromium (Cr)	2019/09/10	<0.0010		mg/L	
			Dissolved Cobalt (Co)	2019/09/10	<0.00030		mg/L	
			Dissolved Copper (Cu)	2019/09/10	<0.00020		mg/L	
			Dissolved Lead (Pb)	2019/09/10	<0.00020		mg/L	
			Dissolved Molybdenum (Mo)	2019/09/10	<0.00020		mg/L	
			Dissolved Nickel (Ni)	2019/09/10	<0.00050		mg/L	
			Dissolved Selenium (Se)	2019/09/10	<0.00020		mg/L	
			Dissolved Silver (Ag)	2019/09/10	<0.00010		mg/L	
			Dissolved Thallium (Tl)	2019/09/10	<0.00020		mg/L	
			Dissolved Tin (Sn)	2019/09/10	<0.0010		mg/L	
			Dissolved Titanium (Ti)	2019/09/10	<0.0010		mg/L	
			Dissolved Uranium (U)	2019/09/10	<0.00010		mg/L	
			Dissolved Vanadium (V)	2019/09/10	<0.0010		mg/L	
			Dissolved Zinc (Zn)	2019/09/10	<0.0030		mg/L	

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
9581085	APY	RPD [WL2967-03]	Dissolved Aluminum (Al)	2019/09/10	6.7		%	20
			Dissolved Antimony (Sb)	2019/09/10	5.7		%	20
			Dissolved Arsenic (As)	2019/09/10	NC		%	20
			Dissolved Beryllium (Be)	2019/09/10	NC		%	20
			Dissolved Chromium (Cr)	2019/09/10	NC		%	20
			Dissolved Cobalt (Co)	2019/09/10	2.7		%	20
			Dissolved Copper (Cu)	2019/09/10	8.2		%	20
			Dissolved Lead (Pb)	2019/09/10	14		%	20
			Dissolved Molybdenum (Mo)	2019/09/10	0.47		%	20
			Dissolved Nickel (Ni)	2019/09/10	2.9		%	20
			Dissolved Selenium (Se)	2019/09/10	NC		%	20
			Dissolved Silver (Ag)	2019/09/10	NC		%	20
			Dissolved Thallium (Tl)	2019/09/10	NC		%	20
			Dissolved Tin (Sn)	2019/09/10	NC		%	20
			Dissolved Titanium (Ti)	2019/09/10	NC		%	20
			Dissolved Uranium (U)	2019/09/10	0.78		%	20
			Dissolved Vanadium (V)	2019/09/10	NC		%	20
			Dissolved Zinc (Zn)	2019/09/10	7.3		%	20
9581326	MA4	Spiked Blank	pH	2019/09/09		100	%	97 - 103
9581326	MA4	RPD	pH	2019/09/09	0.27		%	N/A
9581329	MA4	Spiked Blank	Alkalinity (Total as CaCO3)	2019/09/09		101	%	80 - 120
9581329	MA4	Method Blank	Alkalinity (PP as CaCO3)	2019/09/09	<1.0		mg/L	
			Alkalinity (Total as CaCO3)	2019/09/09	<1.0		mg/L	
			Bicarbonate (HCO3)	2019/09/09	<1.0		mg/L	
			Carbonate (CO3)	2019/09/09	<1.0		mg/L	
			Hydroxide (OH)	2019/09/09	<1.0		mg/L	
9581329	MA4	RPD	Alkalinity (PP as CaCO3)	2019/09/09	NC		%	20
			Alkalinity (Total as CaCO3)	2019/09/09	2.9		%	20
			Bicarbonate (HCO3)	2019/09/09	2.9		%	20
			Carbonate (CO3)	2019/09/09	NC		%	20
			Hydroxide (OH)	2019/09/09	NC		%	20
9581330	MA4	Spiked Blank	Conductivity	2019/09/09		100	%	90 - 110
9581330	MA4	Method Blank	Conductivity	2019/09/09	<2.0		uS/cm	
9581330	MA4	RPD	Conductivity	2019/09/09	0.30		%	10
9582021	ACY	Matrix Spike [WL2972-02]	Total Aluminum (Al)	2019/09/10		85	%	80 - 120
			Total Antimony (Sb)	2019/09/10		92	%	80 - 120
			Total Arsenic (As)	2019/09/10		93	%	80 - 120
			Total Beryllium (Be)	2019/09/10		97	%	80 - 120
			Total Chromium (Cr)	2019/09/10		96	%	80 - 120
			Total Cobalt (Co)	2019/09/10		96	%	80 - 120
			Total Copper (Cu)	2019/09/10		94	%	80 - 120
			Total Lead (Pb)	2019/09/10		95	%	80 - 120
			Total Molybdenum (Mo)	2019/09/10		97	%	80 - 120
			Total Nickel (Ni)	2019/09/10		96	%	80 - 120
			Total Selenium (Se)	2019/09/10		97	%	80 - 120
			Total Silver (Ag)	2019/09/10		94	%	80 - 120
			Total Thallium (Tl)	2019/09/10		102	%	80 - 120
			Total Tin (Sn)	2019/09/10		97	%	80 - 120
			Total Titanium (Ti)	2019/09/10		94	%	80 - 120
			Total Uranium (U)	2019/09/10		97	%	80 - 120
			Total Vanadium (V)	2019/09/10		96	%	80 - 120
			Total Zinc (Zn)	2019/09/10		93	%	80 - 120

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
9582021	ACY	Spiked Blank	Total Aluminum (Al)	2019/09/10		93	%	80 - 120
			Total Antimony (Sb)	2019/09/10		89	%	80 - 120
			Total Arsenic (As)	2019/09/10		92	%	80 - 120
			Total Beryllium (Be)	2019/09/10		94	%	80 - 120
			Total Chromium (Cr)	2019/09/10		94	%	80 - 120
			Total Cobalt (Co)	2019/09/10		94	%	80 - 120
			Total Copper (Cu)	2019/09/10		94	%	80 - 120
			Total Lead (Pb)	2019/09/10		95	%	80 - 120
			Total Molybdenum (Mo)	2019/09/10		94	%	80 - 120
			Total Nickel (Ni)	2019/09/10		94	%	80 - 120
			Total Selenium (Se)	2019/09/10		94	%	80 - 120
			Total Silver (Ag)	2019/09/10		92	%	80 - 120
			Total Thallium (Tl)	2019/09/10		102	%	80 - 120
			Total Tin (Sn)	2019/09/10		95	%	80 - 120
			Total Titanium (Ti)	2019/09/10		91	%	80 - 120
			Total Uranium (U)	2019/09/10		96	%	80 - 120
			Total Vanadium (V)	2019/09/10		94	%	80 - 120
			Total Zinc (Zn)	2019/09/10		92	%	80 - 120
9582021	ACY	Method Blank	Total Aluminum (Al)	2019/09/10	<0.0030		mg/L	
			Total Antimony (Sb)	2019/09/10	<0.00060		mg/L	
			Total Arsenic (As)	2019/09/10	<0.00020		mg/L	
			Total Beryllium (Be)	2019/09/10	<0.0010		mg/L	
			Total Chromium (Cr)	2019/09/10	<0.0010		mg/L	
			Total Cobalt (Co)	2019/09/10	<0.00030		mg/L	
			Total Copper (Cu)	2019/09/10	<0.00020		mg/L	
			Total Lead (Pb)	2019/09/10	<0.00020		mg/L	
			Total Molybdenum (Mo)	2019/09/10	<0.00020		mg/L	
			Total Nickel (Ni)	2019/09/10	<0.00050		mg/L	
			Total Selenium (Se)	2019/09/10	<0.00020		mg/L	
			Total Silver (Ag)	2019/09/10	<0.00010		mg/L	
			Total Thallium (Tl)	2019/09/10	<0.00020		mg/L	
			Total Tin (Sn)	2019/09/10	<0.0010		mg/L	
			Total Titanium (Ti)	2019/09/10	<0.0010		mg/L	
			Total Uranium (U)	2019/09/10	<0.00010		mg/L	
			Total Vanadium (V)	2019/09/10	<0.0010		mg/L	
			Total Zinc (Zn)	2019/09/10	<0.0030		mg/L	
9582021	ACY	RPD [WL2974-02]	Total Aluminum (Al)	2019/09/10	NC		%	20
			Total Antimony (Sb)	2019/09/10	NC		%	20
			Total Arsenic (As)	2019/09/10	NC		%	20
			Total Beryllium (Be)	2019/09/10	NC		%	20
			Total Chromium (Cr)	2019/09/10	NC		%	20
			Total Cobalt (Co)	2019/09/10	NC		%	20
			Total Copper (Cu)	2019/09/10	6.9		%	20
			Total Lead (Pb)	2019/09/10	NC		%	20
			Total Molybdenum (Mo)	2019/09/10	0.89		%	20
			Total Nickel (Ni)	2019/09/10	NC		%	20
			Total Selenium (Se)	2019/09/10	NC		%	20
			Total Silver (Ag)	2019/09/10	NC		%	20
			Total Thallium (Tl)	2019/09/10	NC		%	20
			Total Tin (Sn)	2019/09/10	NC		%	20
			Total Titanium (Ti)	2019/09/10	NC		%	20
			Total Uranium (U)	2019/09/10	NC		%	20
			Total Vanadium (V)	2019/09/10	NC		%	20

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Zinc (Zn)	2019/09/10	9.4		%	20
9582032	MSD	Matrix Spike [WL2973-02]	Total Barium (Ba)	2019/09/11		91	%	80 - 120
			Total Boron (B)	2019/09/11		93	%	80 - 120
			Total Calcium (Ca)	2019/09/11		86	%	80 - 120
			Total Iron (Fe)	2019/09/11		94	%	80 - 120
			Total Lithium (Li)	2019/09/11		94	%	80 - 120
			Total Magnesium (Mg)	2019/09/11		93	%	80 - 120
			Total Manganese (Mn)	2019/09/11		92	%	80 - 120
			Total Phosphorus (P)	2019/09/11		93	%	80 - 120
			Total Potassium (K)	2019/09/11		93	%	80 - 120
			Total Silicon (Si)	2019/09/11		97	%	80 - 120
			Total Sodium (Na)	2019/09/11		96	%	80 - 120
			Total Strontium (Sr)	2019/09/11		92	%	80 - 120
			Total Sulphur (S)	2019/09/11		96	%	80 - 120
9582032	MSD	Spiked Blank	Total Barium (Ba)	2019/09/11		89	%	80 - 120
			Total Boron (B)	2019/09/11		91	%	80 - 120
			Total Calcium (Ca)	2019/09/11		88	%	80 - 120
			Total Iron (Fe)	2019/09/11		97	%	80 - 120
			Total Lithium (Li)	2019/09/11		91	%	80 - 120
			Total Magnesium (Mg)	2019/09/11		92	%	80 - 120
			Total Manganese (Mn)	2019/09/11		91	%	80 - 120
			Total Phosphorus (P)	2019/09/11		91	%	80 - 120
			Total Potassium (K)	2019/09/11		91	%	80 - 120
			Total Silicon (Si)	2019/09/11		96	%	80 - 120
			Total Sodium (Na)	2019/09/11		94	%	80 - 120
			Total Strontium (Sr)	2019/09/11		90	%	80 - 120
			Total Sulphur (S)	2019/09/11		93	%	80 - 120
9582032	MSD	Method Blank	Total Barium (Ba)	2019/09/11	<0.010		mg/L	
			Total Boron (B)	2019/09/11	<0.020		mg/L	
			Total Calcium (Ca)	2019/09/11	<0.30		mg/L	
			Total Iron (Fe)	2019/09/11	<0.060		mg/L	
			Total Lithium (Li)	2019/09/11	<0.020		mg/L	
			Total Magnesium (Mg)	2019/09/11	<0.20		mg/L	
			Total Manganese (Mn)	2019/09/11	<0.0040		mg/L	
			Total Phosphorus (P)	2019/09/11	<0.10		mg/L	
			Total Potassium (K)	2019/09/11	<0.30		mg/L	
			Total Silicon (Si)	2019/09/11	<0.10		mg/L	
			Total Sodium (Na)	2019/09/11	<0.50		mg/L	
			Total Strontium (Sr)	2019/09/11	<0.020		mg/L	
			Total Sulphur (S)	2019/09/11	<0.20		mg/L	
9582032	MSD	RPD [WL2974-02]	Total Barium (Ba)	2019/09/11	NC		%	20
			Total Boron (B)	2019/09/11	NC		%	20
			Total Calcium (Ca)	2019/09/11	2.0		%	20
			Total Iron (Fe)	2019/09/11	NC		%	20
			Total Lithium (Li)	2019/09/11	NC		%	20
			Total Magnesium (Mg)	2019/09/11	2.5		%	20
			Total Manganese (Mn)	2019/09/11	10		%	20
			Total Phosphorus (P)	2019/09/11	NC		%	20
			Total Potassium (K)	2019/09/11	NC		%	20
			Total Silicon (Si)	2019/09/11	1.4		%	20
			Total Sodium (Na)	2019/09/11	2.8		%	20
			Total Strontium (Sr)	2019/09/11	2.3		%	20

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Sulphur (S)	2019/09/11	0.23		%	20
9582091	CH7	Matrix Spike [WL2971-04]	Total Ammonia (N)	2019/09/10		93	%	80 - 120
9582091	CH7	Spiked Blank	Total Ammonia (N)	2019/09/10		103	%	80 - 120
9582091	CH7	Method Blank	Total Ammonia (N)	2019/09/10	<0.015		mg/L	
9582091	CH7	RPD [WL2971-04]	Total Ammonia (N)	2019/09/10	NC		%	20
9582093	MRD	Matrix Spike	Dissolved Chloride (Cl)	2019/09/10		109	%	80 - 120
			Dissolved Sulphate (SO4)	2019/09/10		NC	%	80 - 120
9582093	MRD	Spiked Blank	Dissolved Chloride (Cl)	2019/09/10		111	%	80 - 120
			Dissolved Sulphate (SO4)	2019/09/10		99	%	80 - 120
9582093	MRD	Method Blank	Dissolved Chloride (Cl)	2019/09/10	<1.0		mg/L	
			Dissolved Sulphate (SO4)	2019/09/10	<1.0		mg/L	
9582093	MRD	RPD	Dissolved Chloride (Cl)	2019/09/10	0.020		%	20
			Dissolved Sulphate (SO4)	2019/09/10	1.5		%	20
9582633	MA4	Spiked Blank	pH	2019/09/10		100	%	97 - 103
9582633	MA4	RPD	pH	2019/09/10	0.048		%	N/A
9582636	MA4	Spiked Blank	Alkalinity (Total as CaCO3)	2019/09/10		101	%	80 - 120
9582636	MA4	Method Blank	Alkalinity (PP as CaCO3)	2019/09/10	<1.0		mg/L	
			Alkalinity (Total as CaCO3)	2019/09/10	<1.0		mg/L	
			Bicarbonate (HCO3)	2019/09/10	<1.0		mg/L	
			Carbonate (CO3)	2019/09/10	<1.0		mg/L	
			Hydroxide (OH)	2019/09/10	<1.0		mg/L	
9582636	MA4	RPD	Alkalinity (PP as CaCO3)	2019/09/10	NC		%	20
			Alkalinity (Total as CaCO3)	2019/09/10	0.99		%	20
			Bicarbonate (HCO3)	2019/09/10	0.99		%	20
			Carbonate (CO3)	2019/09/10	NC		%	20
			Hydroxide (OH)	2019/09/10	NC		%	20
9582640	MA4	Spiked Blank	pH	2019/09/10		100	%	97 - 103
9582640	MA4	RPD [WL2974-01]	pH	2019/09/10	0.99		%	N/A
9582642	MA4	Spiked Blank	Alkalinity (Total as CaCO3)	2019/09/10		100	%	80 - 120
9582642	MA4	Method Blank	Alkalinity (PP as CaCO3)	2019/09/10	<1.0		mg/L	
			Alkalinity (Total as CaCO3)	2019/09/10	<1.0		mg/L	
			Bicarbonate (HCO3)	2019/09/10	<1.0		mg/L	
			Carbonate (CO3)	2019/09/10	<1.0		mg/L	
			Hydroxide (OH)	2019/09/10	<1.0		mg/L	
9582642	MA4	RPD [WL2974-01]	Alkalinity (PP as CaCO3)	2019/09/10	NC		%	20
			Alkalinity (Total as CaCO3)	2019/09/10	1.0		%	20
			Bicarbonate (HCO3)	2019/09/10	1.0		%	20
			Carbonate (CO3)	2019/09/10	NC		%	20
			Hydroxide (OH)	2019/09/10	NC		%	20
9582644	MA4	Spiked Blank	Conductivity	2019/09/10		100	%	90 - 110
9582644	MA4	Method Blank	Conductivity	2019/09/10	<2.0		uS/cm	
9582644	MA4	RPD [WL2974-01]	Conductivity	2019/09/10	1.1		%	10
9583396	MA4	Spiked Blank	Conductivity	2019/09/11		100	%	90 - 110
9583396	MA4	Method Blank	Conductivity	2019/09/11	<2.0		uS/cm	
9583396	MA4	RPD	Conductivity	2019/09/11	1.3		%	10
9584401	CH7	Matrix Spike	Dissolved Chloride (Cl)	2019/09/11		104	%	80 - 120
			Dissolved Sulphate (SO4)	2019/09/11		NC	%	80 - 120
9584401	CH7	Spiked Blank	Dissolved Chloride (Cl)	2019/09/11		108	%	80 - 120
			Dissolved Sulphate (SO4)	2019/09/11		103	%	80 - 120
9584401	CH7	Method Blank	Dissolved Chloride (Cl)	2019/09/11	<1.0		mg/L	
			Dissolved Sulphate (SO4)	2019/09/11	<1.0		mg/L	
9584401	CH7	RPD	Dissolved Chloride (Cl)	2019/09/11	0.87		%	20

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Sulphate (SO4)	2019/09/11	0.92		%	20
9584531	JHS	Matrix Spike	Dissolved Aluminum (Al)	2019/09/13		98	%	80 - 120
			Dissolved Antimony (Sb)	2019/09/13		102	%	80 - 120
			Dissolved Arsenic (As)	2019/09/13		97	%	80 - 120
			Dissolved Beryllium (Be)	2019/09/13		99	%	80 - 120
			Dissolved Chromium (Cr)	2019/09/13		96	%	80 - 120
			Dissolved Cobalt (Co)	2019/09/13		94	%	80 - 120
			Dissolved Copper (Cu)	2019/09/13		94	%	80 - 120
			Dissolved Lead (Pb)	2019/09/13		94	%	80 - 120
			Dissolved Molybdenum (Mo)	2019/09/13		102	%	80 - 120
			Dissolved Nickel (Ni)	2019/09/13		94	%	80 - 120
			Dissolved Selenium (Se)	2019/09/13		93	%	80 - 120
			Dissolved Silver (Ag)	2019/09/13		95	%	80 - 120
			Dissolved Thallium (Tl)	2019/09/13		94	%	80 - 120
			Dissolved Tin (Sn)	2019/09/13		104	%	80 - 120
			Dissolved Titanium (Ti)	2019/09/13		108	%	80 - 120
			Dissolved Uranium (U)	2019/09/13		92	%	80 - 120
			Dissolved Vanadium (V)	2019/09/13		99	%	80 - 120
			Dissolved Zinc (Zn)	2019/09/13		99	%	80 - 120
9584531	JHS	Spiked Blank	Dissolved Aluminum (Al)	2019/09/13		103	%	80 - 120
			Dissolved Antimony (Sb)	2019/09/13		101	%	80 - 120
			Dissolved Arsenic (As)	2019/09/13		98	%	80 - 120
			Dissolved Beryllium (Be)	2019/09/13		99	%	80 - 120
			Dissolved Chromium (Cr)	2019/09/13		97	%	80 - 120
			Dissolved Cobalt (Co)	2019/09/13		96	%	80 - 120
			Dissolved Copper (Cu)	2019/09/13		99	%	80 - 120
			Dissolved Lead (Pb)	2019/09/13		97	%	80 - 120
			Dissolved Molybdenum (Mo)	2019/09/13		101	%	80 - 120
			Dissolved Nickel (Ni)	2019/09/13		96	%	80 - 120
			Dissolved Selenium (Se)	2019/09/13		92	%	80 - 120
			Dissolved Silver (Ag)	2019/09/13		97	%	80 - 120
			Dissolved Thallium (Tl)	2019/09/13		95	%	80 - 120
			Dissolved Tin (Sn)	2019/09/13		105	%	80 - 120
			Dissolved Titanium (Ti)	2019/09/13		113	%	80 - 120
			Dissolved Uranium (U)	2019/09/13		92	%	80 - 120
			Dissolved Vanadium (V)	2019/09/13		99	%	80 - 120
			Dissolved Zinc (Zn)	2019/09/13		100	%	80 - 120
9584531	JHS	Method Blank	Dissolved Aluminum (Al)	2019/09/13	<0.0030		mg/L	
			Dissolved Antimony (Sb)	2019/09/13	<0.00060		mg/L	
			Dissolved Arsenic (As)	2019/09/13	<0.00020		mg/L	
			Dissolved Beryllium (Be)	2019/09/13	<0.0010		mg/L	
			Dissolved Chromium (Cr)	2019/09/13	<0.0010		mg/L	
			Dissolved Cobalt (Co)	2019/09/13	<0.00030		mg/L	
			Dissolved Copper (Cu)	2019/09/13	<0.00020		mg/L	
			Dissolved Lead (Pb)	2019/09/13	<0.00020		mg/L	
			Dissolved Molybdenum (Mo)	2019/09/13	<0.00020		mg/L	
			Dissolved Nickel (Ni)	2019/09/13	<0.00050		mg/L	
			Dissolved Selenium (Se)	2019/09/13	<0.00020		mg/L	
			Dissolved Silver (Ag)	2019/09/13	<0.00010		mg/L	
			Dissolved Thallium (Tl)	2019/09/13	<0.00020		mg/L	
			Dissolved Tin (Sn)	2019/09/13	<0.0010		mg/L	
			Dissolved Titanium (Ti)	2019/09/13	<0.0010		mg/L	
			Dissolved Uranium (U)	2019/09/13	<0.00010		mg/L	

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Vanadium (V)	2019/09/13	<0.0010		mg/L	
			Dissolved Zinc (Zn)	2019/09/13	<0.0030		mg/L	
9584531	JHS	RPD	Dissolved Aluminum (Al)	2019/09/13	NC		%	20
			Dissolved Antimony (Sb)	2019/09/13	NC		%	20
			Dissolved Arsenic (As)	2019/09/13	NC		%	20
			Dissolved Beryllium (Be)	2019/09/13	NC		%	20
			Dissolved Chromium (Cr)	2019/09/13	1.2		%	20
			Dissolved Cobalt (Co)	2019/09/13	NC		%	20
			Dissolved Copper (Cu)	2019/09/13	NC		%	20
			Dissolved Lead (Pb)	2019/09/13	NC		%	20
			Dissolved Molybdenum (Mo)	2019/09/13	0.75		%	20
			Dissolved Nickel (Ni)	2019/09/13	NC		%	20
			Dissolved Selenium (Se)	2019/09/13	NC		%	20
			Dissolved Silver (Ag)	2019/09/13	NC		%	20
			Dissolved Thallium (Tl)	2019/09/13	NC		%	20
			Dissolved Tin (Sn)	2019/09/13	NC		%	20
			Dissolved Titanium (Ti)	2019/09/13	NC		%	20
			Dissolved Uranium (U)	2019/09/13	NC		%	20
			Dissolved Vanadium (V)	2019/09/13	NC		%	20
			Dissolved Zinc (Zn)	2019/09/13	NC		%	20
9585993	AL2	Matrix Spike [WL2972-04]	Total Total Kjeldahl Nitrogen	2019/09/13		99	%	80 - 120
9585993	AL2	QC Standard	Total Total Kjeldahl Nitrogen	2019/09/13		93	%	80 - 120
9585993	AL2	Spiked Blank	Total Total Kjeldahl Nitrogen	2019/09/13		98	%	80 - 120
9585993	AL2	Method Blank	Total Total Kjeldahl Nitrogen	2019/09/13	<0.050		mg/L	
9585993	AL2	RPD [WL2972-04]	Total Total Kjeldahl Nitrogen	2019/09/13	16		%	20
9585999	AL2	Matrix Spike [WL2978-04]	Total Total Kjeldahl Nitrogen	2019/09/13		98	%	80 - 120
9585999	AL2	QC Standard	Total Total Kjeldahl Nitrogen	2019/09/13		89	%	80 - 120
9585999	AL2	Spiked Blank	Total Total Kjeldahl Nitrogen	2019/09/13		101	%	80 - 120
9585999	AL2	Method Blank	Total Total Kjeldahl Nitrogen	2019/09/13	<0.050		mg/L	
9585999	AL2	RPD [WL2978-04]	Total Total Kjeldahl Nitrogen	2019/09/13	NC		%	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.

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).

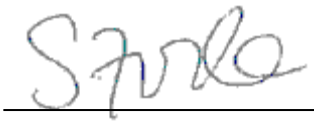
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BV Labs Job #: B975084
Report Date: 2019/09/14

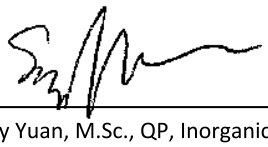
DILLON CONSULTING LTD.
Client Project #: 19-9543
Site Location: IQALUIT PROPOSED LANDFILL
Sampler Initials: JH

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Suwan Fock, B.Sc., QP, Inorganics Senior Analyst



Sandy Yuan, M.Sc., QP, Inorganics Supervisor

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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307 (2)

CHAIN OF CUSTODY RECORD

M 086514

Page ____ of ____

Invoice Information	Report Information (if differs from invoice)	Project Information	Turnaround Time (TAT) Required
Company: Dillon Consulting Ltd	Company:	Quotation #:	[X] 5 - 7 Days Regular (Most analyses)
Contact Name: Jacob Hoekstra / Keith Barnes	Contact Name:	P.O. #/ AFE#:	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 334 - 11th Avenue SE Suite 200, Calgary, Alberta, T2G 0X2	Address:	Project #: 19-9543	Rush TAT (Surcharges will be applied)
Phone: 867-445-6860 / 403.215.3885	Phone:	Site Location: Iqaluit Propsed landfill	[ ] Same Day [ ] 2 Days [ ] 1 Day [ ] 3-4 Days
Email: jacob.hoekstra@dillon.ca / kbarnes@dillon.ca	Email:	Site #:	Date Required:
Copies:	Copies:	Sampled By: Jacob Hoekstra	Rush Confirmation #:

Laboratory Use Only

	YES	NO	Cooler ID			
Seal Present	✓		Temp	0	0	2
Seal Intact	✓					
Cooling Media	✓					
	YES	NO	Cooler ID			
Seal Present	✓		Temp	1	1	0
Seal Intact	✓					
Cooling Media	✓					
	YES	NO	Cooler ID			
Seal Present			Temp			
Seal Intact						
Cooling Media						

Depot Reception

Analysis Requested

Regulatory Criteria: [ ] AT1 [X] CCME [ ] Drinking Water [ ] D50 (Drilling Waste) [ ] Saskatchewan [ ] Other:

Special Instructions

	Sample Identification	Depth (Unit)	Date Sampled (YYYY/MM/DD)	Time Sampled (HH:MM)	Matrix	# of containers	BTEX F1	VOC	BTEX F1-F2	BTEX F1-F4	Routine Water	Regulated Metals Tot	Diss	Mercury Total	Dissolved	Salinity 4	Sieve (75 micron)	Texture (% Sand, Silt, Clay)	Basic Class II Landfill	Ammonia - N (Total)	Total Kjeldahl Nitrogen	Elements by ICP - dissolved (F)	Elements by ICPMS - dissolved (F)	Cadmium - low level CCME (total)	Elements by ICP-(Total)	Elements by ICPMS(total)			HOLD - DO NOT ANALYZE
1	W107	N/A	Sept 6/19	9:00 a.m.	water	5					X									X	X	X	X	X	X	X			
2	W108		sept 6/19	8:00 a.m.							X											X	X						
3	W109		Sept 5/19	11:00 a.m.							X											X	X						
4	W110		Sept 5/19	2:00 p.m.							X											X	X						
5	W111		Sept 5/19	4:00 p.m.							X											X	X						
6	WS100		Sept 6/19	10:00 a.m.							X																		
7	WS101		Sept 6/19	11:00 a.m.							X																		
8	WS102		Sept 6/19	12:00 pm							X																		
9	QA/QC1										X											X	X						
10	QA/QC2	↓			↓	↓					X											X	X						
	Please indicate Filtered, Preserved or Both (F, P, F/P)																		P	P	F/P	F/P	P	P	P				

Received in Yellowknife
By: J. Mercado
7:45 PM
SEP 07 2019

Temp: 8.4 / 6.5 / 8.8
ICE - yes
CS - NO

Relinquished by: (Signature/ Print)	DATE (YYYY/MM/DD)	Time (HH:MM)	Received by: (Signature/ Print)	DATE (YYYY/MM/DD)	Time (HH:MM)	Maxxam Job #
Jacob Hoekstra	Sept 6/19	21:00	Test Yti	2019/09/08	1418	B975084

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AB FCD-00331/7

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Edmonton: 9331-48 St. T6B 2R4. Toll Free (800) 386-7247
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CHAIN OF CUSTODY RECORD

M 046197

Report Information

Company: Dillon Consulting Ltd.
Contact: Jacob Hoekstra / Keith Barnes
Phone: 867-445-6860 / 403-215-8885
Email: jacob.hoekstra@dillon.ca / kbarnes@dillon.ca
Sampled by: Jacob Hoekstra

Comments

Same as CoC

Project/LSD: 19-9543 / 19alit

Special Instructions

	Sample Identification	Depth (Unit)	Date Sampled (YYYY/MM/DD)	Time Sampled (HH:MM)	Matrix	# of containers	BTEX F1 ☐ VOC ☐	BTEX F1-F2	BTEX F1-F4	Routine Water	Regulated Metals Tot ☐ Diss ☐	Mercury Total ☐ Dissolved ☐	Salinity 4	Sieve (75 micron)	Texture (% Sand, Silt, Clay)	Basic Class II Landfill	Ammonia - N (Total)	Total Kjeldahl Nitrogen	Elements by ICP - Dissolved	Elements by ICPMS - Dissolved	Cadmium - low level (CCME) (Total)	Elements by ICP (Total)	Elements by ICPMS (Total)		HOLD - DO NOT ANALYZE
11	QA/QC 3	N/A			Water	5				X							X	X			✓	✓	X		
12	QA/QC 4	↓			↓	↓				X							X	X			✓	X	X		
13	Trip Blank	↓			↓					X							X	X	X	X	X	X	X		
14																									
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	Please indicate Filtered, Preserved or Both (F, P, F/P)																P	P	F/P	F/P	P	P	P		

Received in Yellowknife
By: J. Menendez
7:45 Am
SEP 07 2019
Temp: 3.9 / 3.8 / 2.6
ice - yes
cs - No

Relinquished by: (Signature/ Print)	DATE (YYYY/MM/DD)	Time (HH:MM)	Received by: (Signature/ Print)	DATE (YYYY/MM/DD)	Time (HH:MM)	Maxxam Job #
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Appendix B

Physical and Biological Assessment (Exp., 2018)

Physical and Biological Assessment

Proposed New Landfill Site, Iqaluit, NU

FINAL REPORT

Project Number:
OTT-00248813-A0

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1 Introduction

EXP Services Inc. (EXP) was retained by Colliers Project Leaders, on behalf of the City of Iqaluit (City), to complete an assessment of the biological and physical environment for the proposed new landfill that will be located approximately 7 km north of the City of Iqaluit, Nunavut.

The City of Iqaluit is proceeding with the design and construction of the new landfill, and geotechnical, environmental and biological information was required as part of the Nunavut Review Board (NIRB) application for the project. The study area for the new landfill site is approximately 64 hectares (hereafter referred to as 'Site') (**Figure 1 - Appendix A**). The new landfill will be approximately 22 hectares, however the exact location of the landfill within the Site has not been finalized.

The purpose of the assessment is to provide an overview and characterization of the physical and biological environment within and adjacent to the Site. The results of the assessment will assist with selecting the final location and design of the new landfill. The methods undertaken to complete the physical and biological assessment is discussed in the following section.

2 Methodology

2.1 Desktop Review

A desktop review was conducted to obtain and review existing background information about the physical and biological environment on and adjacent to the Site. The desktop review included online searches and review of existing documents, mapping, government websites and databases. The background information was used to help supplement the field investigations and was included in the results of the report. A complete list of the information sources used for the study is provided in Section 7.

A summary of key background information sources that were reviewed included the following:

- 2016 Draft Nunavut Land Use Plan
- DFO Aquatic Species at Risk Distribution Maps
- Government of Nunavut websites
- Natural Resources Canada websites
- Federal Government Species at Risk websites
- Various research and government technical papers
- Various Public Databases (eBird, eButterfly, etc.)

2.2 Agency Consultation

In addition to the desktop review, interviews were undertaken with staff from relevant government agencies and local organizations located in Iqaluit to collect biophysical information and Inuit traditional knowledge (Inuit Qaujimajatuqangit) for the Site and adjacent lands. The interviews took place in September 2018 during the period when the field investigations were being undertaken. Agencies and organizations that could not be interviewed in Iqaluit, were contacted afterword by phone or email to request physical, biological and cultural information for the Site. Information obtained from the consultations was included in the results of the report.

The relevant agencies and organizations that were interviewed and/or contacted included the following:

- Department of Environment, Government of Nunavut
- Fisheries and Oceans Canada (Northern Operations), Government of Canada
- Canadian Wildlife Services (Northern Region), Government of Canada

- Nunavut Wildlife Management Board
- Amarok Hunters and Trappers Association
- Nunavut Research Institute
- Climate Change Adaptation, Government of Nunavut
- Department of Culture and Heritage, Government of Nunavut
- Inuit Heritage Trust

2.3 Field Investigations

2.3.1 Biophysical Assessment

Field investigations were conducted to identify, map and inventory biological and physical features within the Site including land classification and vegetation; wildlife and wildlife habitat; landforms; aquatic features, surface hydrology; and signs of cultural land use and activities (e.g. hiking, camping, hunting, etc.).

Field investigations were completed by EXP field biologists on September 6, 10 and 11th of 2018. Incidental wildlife observations were also recorded during an additional site visit that was completed on September 7th to collect soil and water samples (see Section 2.3.2). All-terrain vehicles (ATVs) were used to access the Site from the City. The Site was traversed to inventory and map physical and biological features. Observations for wildlife were completed at the beginning of and throughout the day from vantage points assisted with use of binoculars and while traversing the Site. All wildlife tracks and sign (e.g. scat, tracks, burrows, body parts, etc.) were also recorded. Plant identification and nomenclature was primarily based on the Common Pants of Nunavut (Mallory et al. 2012) and Flora of the Canadian Arctic Archipelago (Aiken et al., 2007). Species rarity was based on the federal SARA list (Government of Canada, 2018).

There is currently no formal ecological land classification (ELC) system develop for Baffin Island to assist in classifying land cover and vegetation communities on the Site. An ELC system was developed for the Kivalliq region in Nunavut located northwest of Hudson Bay (Campbell et al., 2012). The Kivalliq ELC system encompasses the northeastern district of Keewatin, which is approximately 200 km west of Baffin Island (500 km west of Iqaluit). The Keewatin District and south Baffin Island both fall within the Northern Arctic Terrestrial Ecozone as defined by Natural Resources Canada (Campbell et al., 2012). The ELC classes and terminology used for the Keewatin district in the Kivalliq ELC system were generally adopted and used as a reference to assist with providing some level of classification for the land cover types and vegetation communities on the Site. Consequently, the ELC classes provided in this report are subject to change if a more accurate and representative ELC system or other land classification methodology is developed for south Baffin Island.

The project schedule did not allow field surveys to be undertaken during ideal seasonal periods to adequately assess some biological features such as wildlife breeding, spawning, etc. Fish surveys were not completed for the Site. Information obtained from the desktop review and agency consultations was relied upon as much as possible to provide information about these features, however, some data limitations may still apply based on the availability of existing information.

2.3.2 Environmental Sampling

Sampling for surficial soils, surface water and sediment was undertaken as part the physical environment assessment. The environmental sampling was completed to assess and establish baseline soil, surface water and sediment quality conditions for the Site. Sampling took place on September 7th, 2018 by EXP field personnel. A total of nine (9) soil, eight (8) surface water, and six (6) sediment samples were collected across the Site (**Figure 2 - Appendix A**). Sediment samples were taken in the same location as the surface water samples for data comparison purposes. Sample locations were chosen based on site coverage, presence of permanent surface waterbodies and accessibility / availability of sample material.

Shallow boreholes were excavated using a clean stainless steel hand shovel to collect soil samples from an average depth of 0.3 metres below ground surface (mbs). Soil sample characteristics including colour,

grain size, moisture content and texture were noted. The boreholes were backfilled upon completion. Surface water grab samples were collected from just below the surface of permanent waterbodies (stream and pond) on the Site. Permanent waterbodies were determined by reviewing historical aerial imagery (Google Earth Pro) of the Site and pre-selecting features that were visibly apparent during different seasons and years. Presence of the features were checked in the field during the field sampling. Some surface water samples were taken from areas of pooled water to provide adequate coverage of the Site that were not initially visible as a permanent waterbody in the aerial imagery. Sediment samples were collected from the edge of streams and ponds at an average depth of approximately 0.2m using a stainless steel shovel. The sediment sample was collected after the surface water sampling at each sample site in order to not skew the analytical results of surface water samples.

Dedicated nitrile gloves (i.e. one pair per sample) were used during sample handling. Soil and sediment sampling equipment (i.e. stainless steel shovel) was rinsed with distilled water between sample locations. Samples collected for analysis of selected chemical parameters were placed directly into pre-cleaned, laboratory-supplied sample jars and bottles. All samples were placed in clean ice-packed coolers prior to and during transportation to the subcontract laboratory (Maxxam Analytics, Ottawa, Ontario). Maxxam is an accredited laboratory under the Standards Council of Canada / Canadian Association of Environmental Analytical Laboratories (Accredited Laboratory No. 97 and No. A3200, respectively) in accordance with ISO / IEC 17025:2005 - "General Requirements for the Competence of Testing and Calibration Laboratories". The samples were transported and submitted under Chain of Custody documentation. A summary of the environmental samples that were submitted for laboratory analysis is provided in **Table 1**.

Table 1: Summary of Environmental Samples Submitted for Chemical Analyses

Soil Sample ID	Depth (m)	Rationale for Submission	Analysis
S-1	0.3	To establish a baseline for inorganic chemistry along with typical contaminants of concern that may impact the land resulting from any future land use changes.	Metals and Inorganics, PHC, VOC, PAH.
S-2	0.3		
S-3	0.3		
S-4	0.3		
S-5	0.3		
S-6	0.3		
S-7	0.3		
S-8	0.3		
S-9	0.3		
Sediment Sample ID	**Depth (m)**	**Rationale for Submission**	**Analysis**
SED-3	0.2	To establish a baseline for inorganic chemistry.	Metals and Inorganics
SED-4	0.2		
SED-6	0.2		
SED-7	0.2		
SED-9	0.2		
SED-10	0.2		
Surface Water Sample ID	**Water Depth (m)**	**Rationale for Submission**	**Analysis**
SW-1	0.25	To establish a baseline for inorganic chemistry.	Metals and Inorganics
SW-3	0.20		
SW-4	0.30		
SW-5	0.25		
SW-6	0.23		
SW-7	0.28		
SW-9	0.21		
SW-10	0.60		

3 Findings

3.1 Physical Environment

3.1.1 Designated and Protected Areas

Mapping from the Draft Nunavut Land Use Plan (NLUP) (NPC, 2016) showed four designated and protected areas that either overlap with or that are in proximity to the Site (**Figure 3 - Appendix A**).

A Proposed Transportation Corridor, identified as a terrestrial Valued Socio-Economic Component (VSEC), passes through the entire Site. The corridor extends from Iqaluit and continues to another VSEC designated as an area of High Mineral Potential approximately 100 km northeast of the City. According to the Draft NLUP proposed transportation corridors are defined as those for which an application to construct has been submitted but has not been approved.

The Sylvia Grinnell Territorial Park is located approximately 2 km west of the Site and is designated a Protected Area. The intent of Protected Areas is to support environmental protection and/or cultural priorities, including wildlife conservation, protection and management.

A large area encompassing Frobisher Bay and connecting inland freshwaters is designated a Char Area of Abundance and is identified as a marine VSEC. These are areas identified by Fisheries and Oceans Canada (DFO) where Arctic Char are commonly found. Char are anadromous species, therefore these areas include both marine areas and adjacent freshwater rivers and streams. Arctic Char are known to migrate up the Sylvie Grinnell River to spawn within the river and connecting inland lakes. The Site falls within the Char Area of Abundance, as shown in the map inset in **Figure 3 - Appendix A**.

The Nunavut Waters Regulations (SOR/2013-69) established 65 Water Management Areas (WMAs), which correspond to major watersheds within Nunavut. The Site falls within the Frobisher Bay WMA (WMA 53). The WMA encompasses an area that extends 100's of kilometres beyond the Site boundary. The Government of Canada, Government of Nunavut, and the Nunavut Water Board have mandated responsibilities for the management, conservation and use of freshwater in Nunavut. According to the Draft NLUP, land use management within WMAs is expected to be an important component of future generations because of the inter-connectivity between land and water throughout the Nunavut Settlement Area.

No other designated or protected areas were identified from the background information within or in proximity to the Site.

3.1.2 Landscape Features

The Site predominantly is comprised of rolling hills intersected by minor stream valleys and shallow ponds. Some bedrock outcrops (**Photo 1 - Appendix B**) and small glacio-fluvial terraces (**Photo 2 - Appendix B**) are present in the south central and northeast part of the Site respectively. Boulder fields (**Photo 3 - Appendix B**) mainly occur in the northwest and central portion of the Site.

Bedrock outcrops on the Site range in height from a couple to several meters high. The terraces are approximately 1m in height and predominantly consist of fine to course gravel and sand materials. The rocks in the boulder fields are rounded to sub-angular and range from 0.3 - 4m in diameter. The location of the main bedrock outcrops, glacio-fluvial terraces and boulder fields are shown in **Figure 4 - Appendix A**.

There are no other prominent glacial landforms (e.g. Eskers) or unique landscape features on the Site. The features on the Site are typical of what is generally found throughout the tundra landscape in the surrounding area.

3.1.3 Cultural Heritage and Activities

There are no culturally designated or significant heritage features currently identified within the Site. No existing records for archaeological, paleontological or place name records occur on the Site (S. Perry, pers. comm., Department of Culture and Heritage, September 2018). The land and waters within and adjacent

to the Site are however used for outdoor recreational and traditional activities. The location of known recreational uses and other cultural features are shown in **Figure 5 - Appendix A.**

Based on a current ski trail map published by the Aniirajak Ski and Adventure Club in Iqaluit, winter ski trail routes cross the west and east half of the Site. The unnamed lake immediately west of the Site is used for fishing and camping by locals (T. Tufts, pers. comm., September 2018). An ATV trail that crosses the west side of the Site is the main trail used by locals to access hunting and fishing areas north of the Site (K. Lowe, pers. comm., September 2018). The Site is reportedly used by locals for berry picking, dog walking, picnicking and camping. Campers sometimes collect raw untreated drinking water from the headwaters of Carney Creek (J. Shirley, pers. comm., September 2018). A campfire site and backpackers were observed on and in proximity to the Site during the field investigations.

3.1.4 Surface Hydrology

The Site falls within the Frobisher Bay watershed which comprises of several river and stream catchment areas. The Site falls within the catchment area of Carney Creek (also known as Airport Creek). The catchment area for the upper sections of the creek interpreted from aerial imagery and topographic mapping is shown in **Figure 6 - Appendix A.** Drainage on the Site is generally from the north to south. Surface water features observed on the Site are shown in **Figure 7 - Appendix A.**

A number of streams cross the Site that discharge into a pond and small lake southeast of the Site. The outflow from the pond and lake drains southwest and eventually merges before draining into Carney Creek approximately 200m west of the Site. Carney Creek flows south into Iqaluit and discharges into the Koojesse Inlet of Frobisher Bay.

The streams on site ranged in width from a 1-2m (wider in areas where pooling occurred) and contained surface water depths ranging from 25 - 35cm at the time of the field investigations. The streams on site are fed by surface runoff and subsurface drainage / groundwater seepage from the surrounding slopes.

3.1.5 Soil and Water Conditions

3.1.5.1 Field Observations

Soil characteristics at each sample location were relatively uniform consisting of dry-moist loose brown organic silty soil with trace sand intermixed with some gravel. Soils were contained within pockets of cobble. Surface water was clear with no noticeable odour. Water depths at surface water features sampled ranged from 20 - 60cm **(Table 1)**. All but two of the surface water features sampled contained dark fine silty organic sediments.

Soil, surface water and sediment sample lab analysis results were compared with standard environmental quality guidelines and criteria to asses for chemical exceedances. A discussion of the sample test results and exceedances is provided in the following subsections.

3.1.5.2 Soil Chemistry Exceedances

A total of nine (9) shallow soil samples were collected across the Site and submitted for laboratory analyses for metals and inorganics, PHC, VOC and PAH, to establish a baseline across the Site.

Analytical soil results were compared to the Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health for industrial land use and residential land use in coarse grained conditions (CCME, 2007). Soil results were also compared with Tier 1 Industrial criteria with coarse grained soil, surface soil (<1.5 m) in the Environmental Guideline for Contaminated Site Remediation (Government of Nunavut, 2014). Additionally, the Canada-wide Standards for Hydrocarbons in Soil for commercial/industrial land uses and coarse grain conditions was used to compare results of PHCs and BTEX in soils (CCME, 2008).

The soil analytical results are summarized in **Tables 1 - 4** in **Appendix C**. Soil sample locations are shown in **Figure 2 - Appendix B**. The Certificates of Analysis are provided in **Appendix D**. Soil exceedances for seven (7) of the nine (9) samples collected is summarized below in **Table 2**.

Table 2: Summary of Soil Exceedances

Sample ID	CCME Residential and Industrial	S-1	S-2	S-3	S-6	S-7	S-8	S-9
Sampling Date		Sep. 7/18	Sep. 7/18	Sep. 7/18	Sep. 7/18	Sep. 7/18	Sep. 7/18	Sep. 7/18
Sample Depth (m)		0.3	0.3	0.3	0.3	0.3	0.3	0.3
Inorganics								
Available (CaCl2) pH	6 to 8	5.61	5.2	5.69	4.07	4.38	4.49	4.16

3.1.5.3 Surface Water Chemistry Exceedances

A total of eight (8) surface water samples were collected across the Site and submitted for laboratory analyses for metals and inorganics. Analytical surface water results were compared to the Water Quality Guidelines for the Protection of Aquatic Life - Freshwater, Long Term (CCME, 2018).

The surface water analytical results are summarized in **Table 5** in **Appendix C**. Surface water sample locations are shown in **Figure 2 - Appendix B**. The Certificates of Analysis are provided in **Appendix D**. Surface water exceedances for two (2) of the eight (8) samples collected is summarized below in **Table 3**.

Table 3: Summary of Surface Water Exceedances

Sample ID	CCME Freshwater	SW-1	SW-7
Sampling Date		Sep. 7/18	Sep. 7/18
Metals			
Dissolved Zinc (Zn)	7	13.9	10

3.1.5.4 Sediment Chemistry Exceedances

A total of six (6) sediment samples were collected across the Site and submitted for laboratory analyses for metals and inorganics. Sediment samples from sample locations SED-1 and SED-5 were unattainable due to absence of bottom sediments in the surface water feature. Analytical sediment results were compared to the Sediment Quality Guidelines for the Protection of Aquatic Life (Interim Sediment Quality Guidelines - ISQGs) - Freshwater as well as Probable Effects Levels (PELs) (CCME, 2001).

The sediment analytical results are summarized on **Table 6** in **Appendix C**. Sediment sample locations are shown in **Figure 2 - Appendix B**. The Certificates of Analysis are provided in **Appendix D**. Sediment exceedances for one (1) of the six (6) samples collected is summarized below in **Table 4**.

Table 4: Summary of Sediment Exceedances

Sample ID	CCME Sediment ISQG Freshwater	SED-3
Sampling Date		Sep. 7/18
Sample Depth (m)		0.2
Metals		
Copper (Cu)	35.7	48

3.1.6 Climate Conditions

3.1.6.1 Current Climate

Based on historic climate data for Iqaluit from 1981-2010 (Environment Canada, 2018), average monthly temperatures are below freezing for eight months of the year (**Table 5**). Mean annual temperature is -9°C with a mean summer (June - August) temperature of 6°C and winter (December - March) temperature of

-25°C. Extreme historic daily high and low temperatures have been recorded at 26°C in July (2003) and -46°C in February (1967) respectively. Iqaluit averages just over 16 mm of rainfall and 19cm of snowfall annually. Extreme historic daily rainfall and snowfall depths have been recorded at 53mm in July (1968) and 32cm in February (1981) respectively. Average annual wind speed is 16 km/h with dominant winds from the northwest to the southeast across south Baffin Island. Maximum wind gusts have been recorded at 156 km/h in March (1960).

Table 5: Monthly Average Temperature, Precipitation and Wind Speed for Iqaluit (1981-2010)*

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Daily Temp. (°C)	-26.9	-27.5	-23.2	-14.2	-4.4	3.6	8.2	7.1	2.6	-3.7	-12.0	-21.3
Rainfall (mm)	0.0	0.0	0.0	0.2	3.1	23.8	51.9	68.6	42.2	6.8	0.6	0.0
Snowfall (cm)	21.7	21.0	21.6	31.5	27.6	9.3	0.0	0.9	13.2	29.4	29.7	23.4
Wind Speed (km/h)	15.9	15.3	14.9	16.2	17.1	14.9	12.6	13.5	15.4	17.6	18.6	16.3

*Based on weather data from Environment Canada Iqaluit Station A (63°45'N, 68° 33' W, elevation 33.5 m)

3.1.6.2 Future Climate Trends

The Arctic region has experienced changes in snow and sea ice conditions and weather variability in recent years. Inuit from Iqaluit have reported a range of changes in local climate and environmental conditions (NRC, 2006), which includes:

- Snowfall amounts and accumulation are declining, and changes in the characteristics of snow have been observed;
- Permanent snow patches, which are an important source of drinking water for hunters and travellers, are disappearing;
- Wind is increasingly variable and unpredictable; and,
- Sea ice is thinner, forms later, and melts earlier and faster in spring.

Climate change projection models show an increase in mean annual and seasonal temperature in the region. Projections for temperature and precipitation in the periods of 2010-2039 and 2040-2069 are referenced from the Climate Change Adaptation Action Plan report for Iqaluit (Lewis et al., 2010). The projections in the plan are based on 1961-1990 average annual temperature and precipitation values (baseline climate) recorded from the Environment Canada Iqaluit A weather station (**Table 6**).

Table 6: Monthly Average Temperature and Precipitation for Iqaluit (1961-1990)*

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Daily Temp. (°C)	-31.9	-33.6	-33.1	-25.1	-11.6	-1	3.4	1	-9.7	-19.5	-27	-29.5
Precipitation (mm)	7.8	5.2	6.8	9.4	9.9	12.7	25	23.8	24.3	13.2	8.8	7.4

*Based on weather data from Environment Canada Iqaluit Station A (63°45'N, 68° 33' W, elevation 33.5 m)

Based on Lewis et al. (2010), the median projection for temperature in the 2010-2039 period is an annual increase of 1.8° Celsius, with a lower and upper range of 1.3 - 2.4° Celsius over baseline climate. The greatest seasonal increase in temperature during this period is projected for winter. The median projection for temperature in the 2040-2069 period is an annual increase of 3.1° Celsius, with a lower and upper range of 2.5 - 4.3° Celsius over baseline climate. The greatest seasonal increase in temperature for this period is also projected for winter.

The median projection for precipitation in the 2010-2039 period is an annual increase of 6%, with a lower and upper range of 0 - 9% over baseline climate. Winter is projected to have the greater median increase in precipitation than all other seasons. No precipitation projection for the 2040-2069 period was provided in the plan report.

3.2 Biological Environment

3.2.1 Vegetation

A total of twenty-three (23) plant species were inventoried on the Site (**Appendix E**). None of the plant species are protected under the federal Species At Risk Act (SARA). Dominant and sub-dominant plant species that were inventoried from the Site included Arctic Willow, Net-vein Willow, Bog Bilberry, Arctic Bell Heather and Reindeer Lichen.

The five (5) main land classes identified on the Site included Heath Upland, Heath Upland / Rock Complex, Graminoid / Heath Tundra, Boulder / Gravel, and Rock (**Figure 8 - Appendix A**). The Site predominantly comprised of Heath Upland, Heath Upland / Rock Complex and Boulder / Gravel, with inclusions of Graminoid / Heath Tundra and Rock. Small land class inclusions less than 0.5 hectares were not mapped (refer to **Figure 7 - Appendix A** for water classified features). Photos 4 - 8 in **Appendix B** taken from the Site are representative of the different land classes identified on the Site.

The Heath Upland class occurs on well drained soils with typically rocky substrates (e.g. sand, gravel, cobble, boulders). The main plant functional groups in this class are low-growing ericaceous shrubs and lichens with smaller amounts of moss, graminoids (e.g. grasses) and erect shrubs. The Heath Upland / Rock Complex is similar to the Heath Upland class with the difference being that the former has more rocky components (typically boulders). Dominant plant species in these two classes on site included Arctic Willow, Bog Bilberry, Arctic Bell Heather, Grass species and Reindeer Lichen.

The Graminoid / Heath Tundra land class in a transitional class between the graminoid and heath tundra classes. This class occurs on moderately moist (mesic) soils with peat and moss peat substrates along moist-wet hillsides with seepage-like features and adjacent to streams on the Site. Dominant plants included various sedge and moss species, Net-vein Willow and Marsh Labrador Tea.

In the Boulder/ Gravel class, the main land cover components are boulder, gravel and cobble with interspersions of lichens and ericaceous shrubs. Dominant vegetation species occurring in these areas included Crowberry, Marsh Labrador Tea, Arctic Willow, and grasses.

The Rock class includes areas of exposed bedrock and rock outcrops. The main rock outcrops on the Site are shown in **Figure 8 - Appendix A**. Vegetation in this class on site was sparse and limited to mainly lichens, grasses and moss species.

3.2.2 Wildlife

A total of eleven (11) wildlife species were inventoried on and adjacent to the Site during the field investigations (**Appendix E**). Observations included: 3 mammals; 5 birds and 3 insects. None of the wildlife species are protected under SARA. The time of year and duration of the field investigations combined with the vastness and availability of habitat in the region, likely limited the number of recorded wildlife observations for the Site. Based on communication with Environment Canada (C. Smith and K. Lowe, pers. comm., September 2018) and species range maps, other wildlife known to occur in the area at certain times of the year include: Wolf, Arctic Hare, Canada Geese, Snow Goose (migration), Snow Buntings, Lapland Longspur, Semipalmated Plover, Horned Lark, Snowy Owl, Polar Bear (occasional) and duck species.

Fish surveys were outside the scope of work for the study. There were no incidental observations of fish within the waterbodies on Site during the surface water sampling and biophysical field investigations.

3.2.3 Wildlife Habitat

3.2.3.1 Terrestrial

The Site contained a number of active Lemming burrows and fresh scat mainly in the Graminoid / Heath and Heath Upland areas on site where sufficient moisture and food sources (e.g. grass, sedge, moss, willow) and rock cover were present (**Photo 9 - Appendix B**). Lemming is an important food for a number of predators such as ermines, foxes, owls, falcons, and jaegers. Because Lemmings are an important prey species, their population cycles greatly influence the life of other species that depend on them as a food source.

Signs of fox were identified on and within the Site, however the species of fox (i.e. Red Fox or Arctic Fox) could not be determined. A fox den was identified northwest of the Site and scat was identified in the east half of the Site. Lemmings present on the Site would provide suitable prey for fox.

No live Caribou were inventoried on the Site during the field investigations, however old skeletal remains of Barren-ground Caribou were occasionally found throughout most of the Site (**Photo 10 - Appendix B**). Barren-ground Caribou populations are currently not protected under the SARA, but are considered Threatened by COSEWIC. Based on aerial population surveys for Barren-ground Caribou conducted in 2012, 518 individuals were counted for South Baffin Island (Jenkins et al., 2012). Another population study in 2014, counted 102 individuals observed in the Meta Incognita Peninsula, which is an area that encompasses Frobisher Bay (Giroux et al., 2014). In this latter study, caribou telemetry data from 1987 to 1994 for south Baffin Island was analyzed for Caribou seasonal movements and distribution. The results showed that during this period, Caribou late summer and fall migration, rut and winter range use overlapped with the Site. It should be noted however that there has not been any sightings of Caribou around Iqaluit for over a decade (C. Smith and K. Lowe, pers. comm., September 2018). Barren-ground Caribou populations undergo natural fluctuations of low and high abundance; a 60 to 80-year cycle on Baffin Island has been proposed by Caribou researchers (COSEWIC, 2016). The presence of suitable forage (shrubs, grasses and sedges, lichen, mushrooms) and aged Caribou skeletal remains on the Site, supports that the Site was historically used by Caribou and provides suitable habitat for this species.

A falcon was observed from a distance flying from west to east over the Site The body markings were not evident and the species of falcon could not be confirmed. However, based on species range as well as body size and shape, it is suspected to be Peregrine Falcon. Peregrines nest on ledges of cliffs and rock outcrops (typically >6m in height). The rock outcrops near the east boundary of the Site may provide suitable nesting habitat for this species. The field investigations were undertaken outside of the bird breeding season in Nunavut and Peregrine breeding or nesting activity on or adjacent to the Site was not confirmed.

3.2.3.2 Aquatic

The small elongated lake immediately west of the Site reportedly provides habitat for Arctic Char (T. Tufts, pers. comm., September 2018). Red-throated Loon, which feeds on marine and freshwater fish, was observed in the lake on two separate occasions, further indicating fish species are present in the lake.

Arctic Char are anadromous fish species, which means that they are born in freshwater, then migrate to the ocean as juveniles where they grow into adults before migrating back into freshwater to spawn. Carney Creek connects the lake west of the Site to Frobisher Bay. The stream that collects surface water drainage from the Site enters Carney Creek just south of the lake (**Figure 6 - Appendix A**). The waterbodies on the Site are unlikely to be accessible and used by Char as a result of the steep east valley slope associated with Carney Creek. The valley slope and shallow flows down the slope potentially creates a barrier to fish passage. The surface water on the Site does however contribute to the headwaters of Carney Creek.

3.2.4 Species of Concern

Species of concern include species that are listed in Schedule 1 of SARA as either Endangered, Threatened or Special Concern including the critical habitat or residences of these species. Special Concern means species that may become threatened or endangered because of a combination of biological characteristics and identified threats.

No species of concern were positively identified on or adjacent to the Site during the field investigations. However, the potential presence of species of concern, and other species worth mentioning due to their importance as a valued ecosystem and/or socio-economic component, are discussed below. Additional information regarding these species is previously discussed in Section 3.2.3.

A single falcon, believed to be Peregrine Falcon, was observed flying over the Site. Peregrine Falcon (*Falco peregrinus tundrius*) is listed as Special Concern. The rock outcrops (e.g. >6m) in proximity to the east boundary of the Site may provide suitable nesting habitat for this bird of prey.

Barren-ground Caribou are not currently listed in Schedule 1 of SARA but are considered Threatened by COSEWIC. Caribou populations have declined drastically in recent years and although this species has undergone population fluctuations, current numbers have not rebounded to historical highs (COSEWIC. 2016). Caribou is an important food source for Inuit and Grey Wolf. Based on previous population studies, the presence of caribou skeletal remains, and the availability of suitable forage indicates that the Site and surrounding lands have the potential to provide seasonal habitat use for this species.

Frobisher Bay and the surrounding connected inland waters are identified as an area of abundance for Arctic Char. Arctic Char is an important food and economic source for the local Inuit. Arctic Char potentially occurs in the elongated lake immediately west of the Site. Carney Creek connects the lake to Frobisher Bay. The surface waters from the Site are a headwater source for Carney Creek.

4 Conclusions and Recommendations

Based on the results from the physical and biological environment assessment, the following conclusions and recommendations are provided:

Physical Environment

- The Site falls within the area of two (2) VSECs - Proposed Transportation Corridor and Char Area of Abundance. The Site also falls within the Frobisher Bay WMA (WMA 53). The new landfill will need to have regard for the VSECs and WMA.
- There are no prominent glacial landforms (e.g. Eskers) or unique landscape features on the Site.
- There are no culturally designated or significant heritage features on the Site. There are however some passive recreational and traditional uses on and adjacent to the Site. The new landfill should have regard for potential impacts to these cultural amenities.
- Surface water on the Site collects and drains into a stream that flows into Carney Creek west of the Site. Surface waters on the Site contribute to the headwaters of Carney Creek.
- Sampling of soils, surface water and sediment on the Site revealed the following:
    - Seven (7) of the nine (9) soil samples submitted for chemical analysis (S1, S2, S3, S6, S7, S8 and S9) resulted in pH values lower then the CCME guidelines for industrial and residential land use. The soil pH is indicative of the physiological nature of the Site.
    - One (1) of the six (6) sediment samples (SED-3) exceeded the CCME guidelines for copper. The other inorganic and metal parameters tested, for all other sediment samples, were below CCME guidelines. Given the remoteness of the Site, the copper found in SED-3 is likely naturally occurring.
    - Two (2) of the eight (8) surface water samples (SW-1 and SW-7) exceeded the CCME guidelines for zinc. The other inorganic and metal parameters tested, for all other surface water samples, were below CCME guidelines. Given the remoteness of the Site, the zinc found in SW-1 and SW-7 is likely naturally occurring.
- Future climate trends for Baffin Island show a steady increase in temperature and precipitation. The median projection for temperature in the 2010-2039 period and 2040-2069 period is an annual increase of 1.8° and 3.1° Celsius over 1961-1990 baseline climate conditions respectively. The

median projection for precipitation in the 2010-2039 period is an annual increase of 6% over baseline climate. Winter is projected to have the greater median increase in temperature and precipitation than all other seasons.

Biological Environment

- No confirmed species at risk were recorded on or adjacent to the Site from the desktop review or during the field investigations.
- The Site provides habitat for Lemming, which is a main prey source and plays an important ecological role that influences arctic predator populations such as Arctic Fox, Ermine and Snowy Owl. The Site is expected to provide habitat for other wildlife, however the timing of field investigations did not permit a detailed inventory of possible wildlife species.
- The rock outcrops (e.g. >6m) in proximity to the east boundary of the Site map provide suitable nesting habitat for Peregrine Falcon, which is listed as Special Concern in Schedule 1 of SARA. Breeding bird surveys for Peregrine and other arctic birds should be undertaken.
- The Site contains signs of past use by Caribou, suitable forage and falls within potential migration, rut and winter range habitat for Barren-ground Caribou. It is noted, however, that Caribou herds have not been sighted in the Iqaluit region for decades. Barren-ground populations fluctuate but have not rebound to historic record highs. Potential loss and impacts to Caribou habitat should be considered for the new landfill.
- The lake immediately west of the Site reportedly contains Artic Char and other fish species. Any potential leachate from the new landfill should be directed away from the lake.
- Surface water on the Site drains into Carney Creek, which flows into Frobisher Bay. Frobisher Bay and connecting inland waters have been identified as important habitat for Arctic Char, which is a VSEC. Potential toxic leachate impacts from the new landfill on Arctic Char and its habitat should be considered.
- Potential impacts from wind-blown plastic debris from the new landfill (including during waste transfer) should be assessed and mitigated to prevent plastics from entering the food chain and impairing terrestrial and marine ecosystems and VSEC's.

5 General Limitations

Information in this report is considered to be privileged and confidential and has been prepared exclusively for the **City of Iqaluit.** The information is based on baseline data designed to provide ecological information to support the client in proceeding forward with their proposed development. The conclusions and recommendations presented within this report reflect Site conditions existing at the time of the study. Should changes occur that potentially impact the condition of the Site, the conclusions presented by EXP may need to be re-evaluated.

6 Closure

We trust this report is satisfactory for your purposes. Should you have any questions, please do not hesitate to contact this office.

Yours truly,

EXP Services Inc.

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Biologist
Environmental Division

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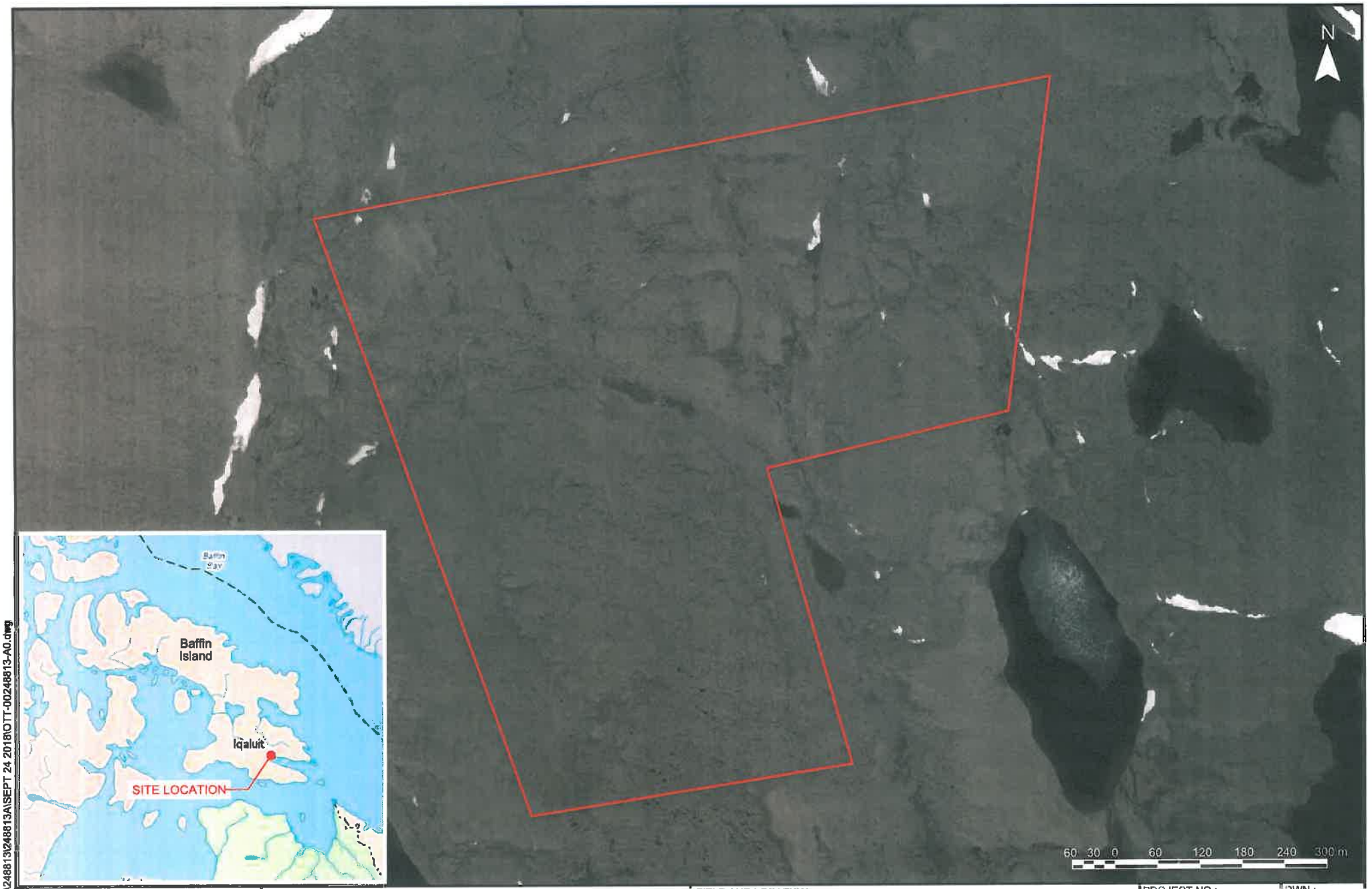
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Appendix A: Figures



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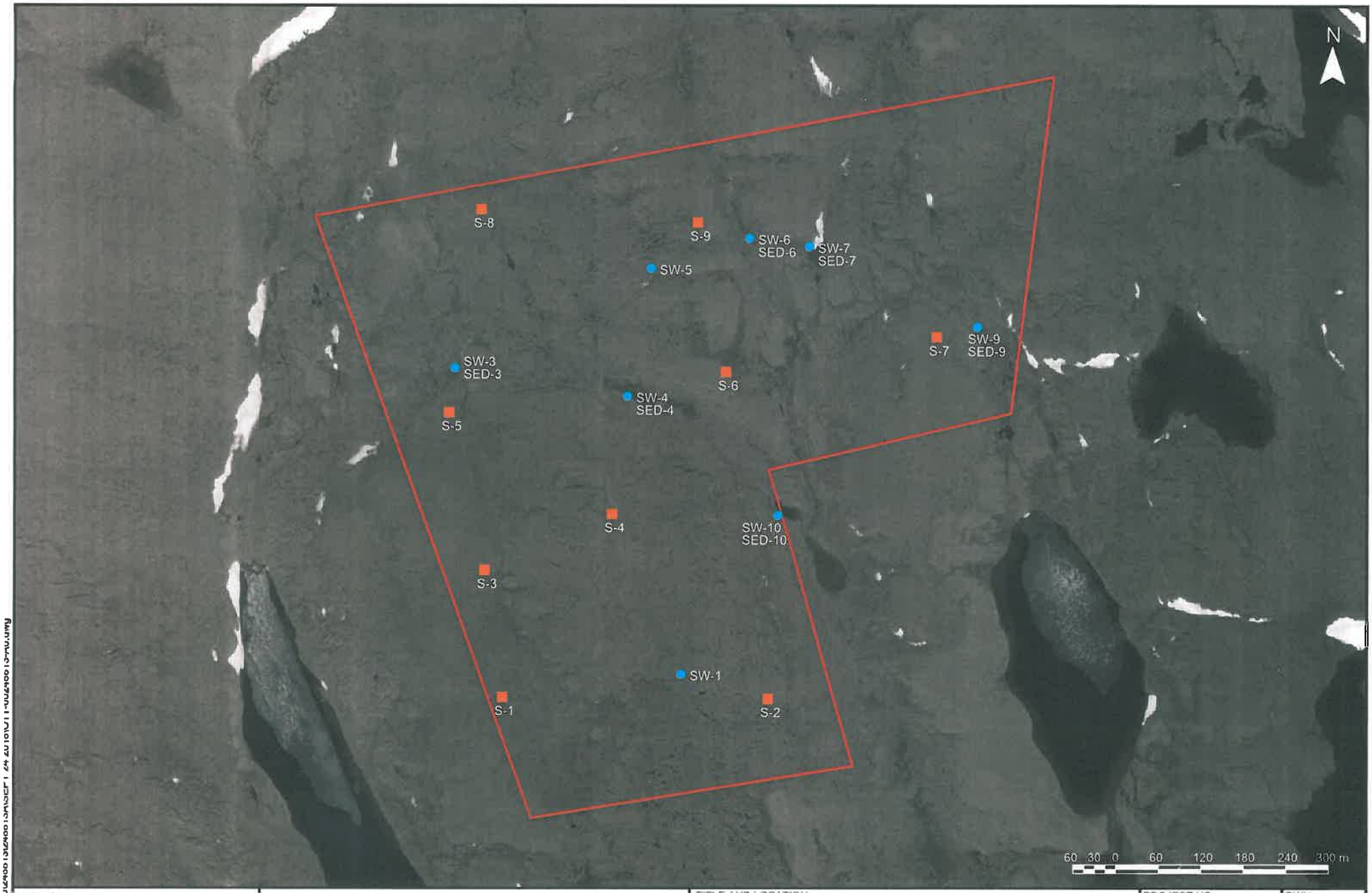
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IQALUIT, NUNAVUT

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SCALE: AS NOTED	CK: LM
DATE: OCTOBER 2018	FIG. NO.: 1

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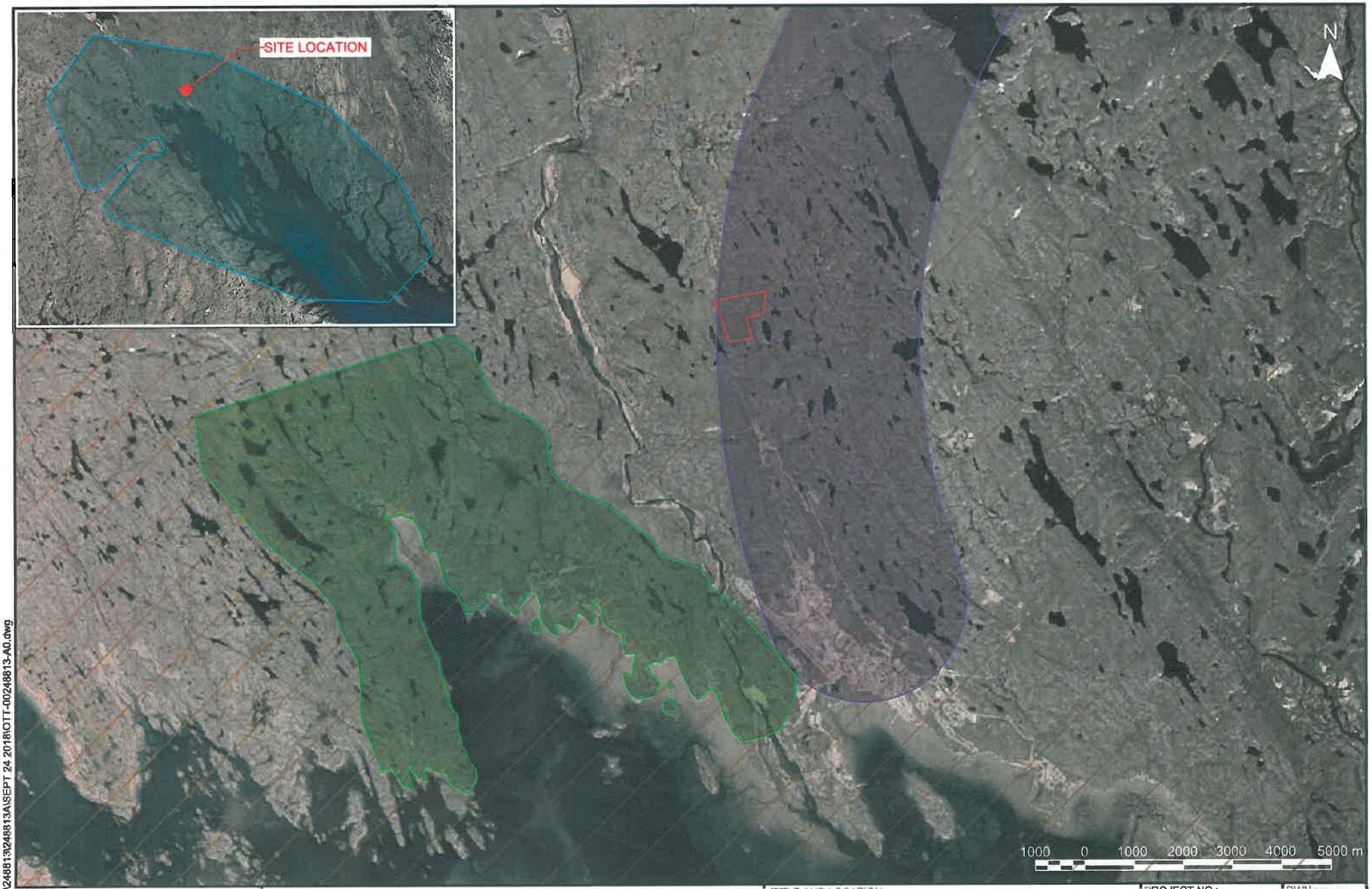
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- SOIL SAMPLE
- SURFACE WATER AND SEDIMENT SAMPLE

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PHYSICAL AND BIOLOGICAL ASSESSMENT
IQALUIT, NUNAVUT

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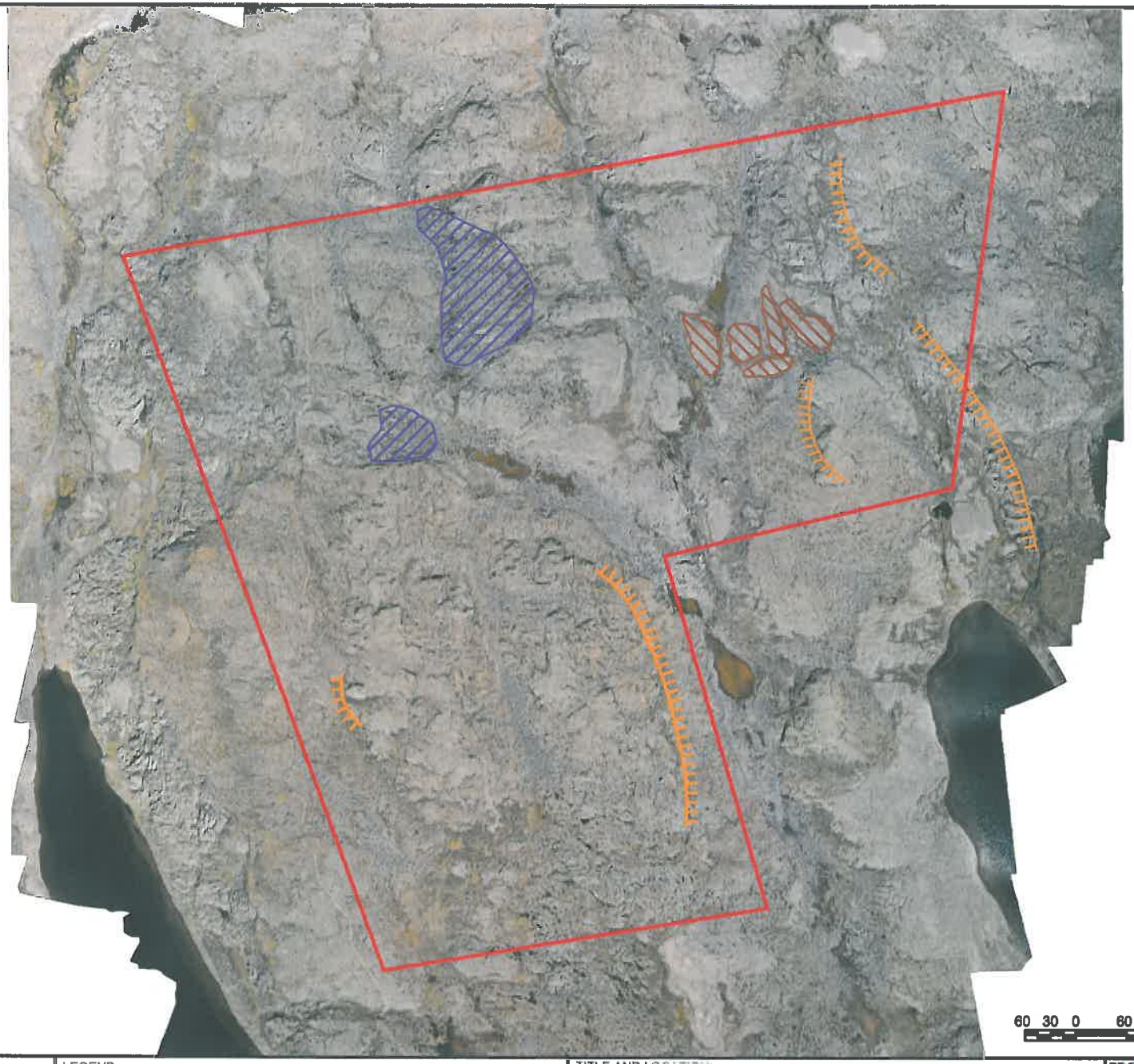
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- SYLVIA GRINNELL TERRITORIAL PARK
- PROPOSED TRANSPORTATION CORRIDOR
- CHAR AREAS OF ABUNDANCE
- WATER MANAGEMENT AREA

TITLE AND LOCATION:

DESIGNATED AND PROTECTED AREAS
PHYSICAL AND BIOLOGICAL ASSESSMENT
IQALUIT, NUNAVUT

PROJECT NO.:	DWN.:
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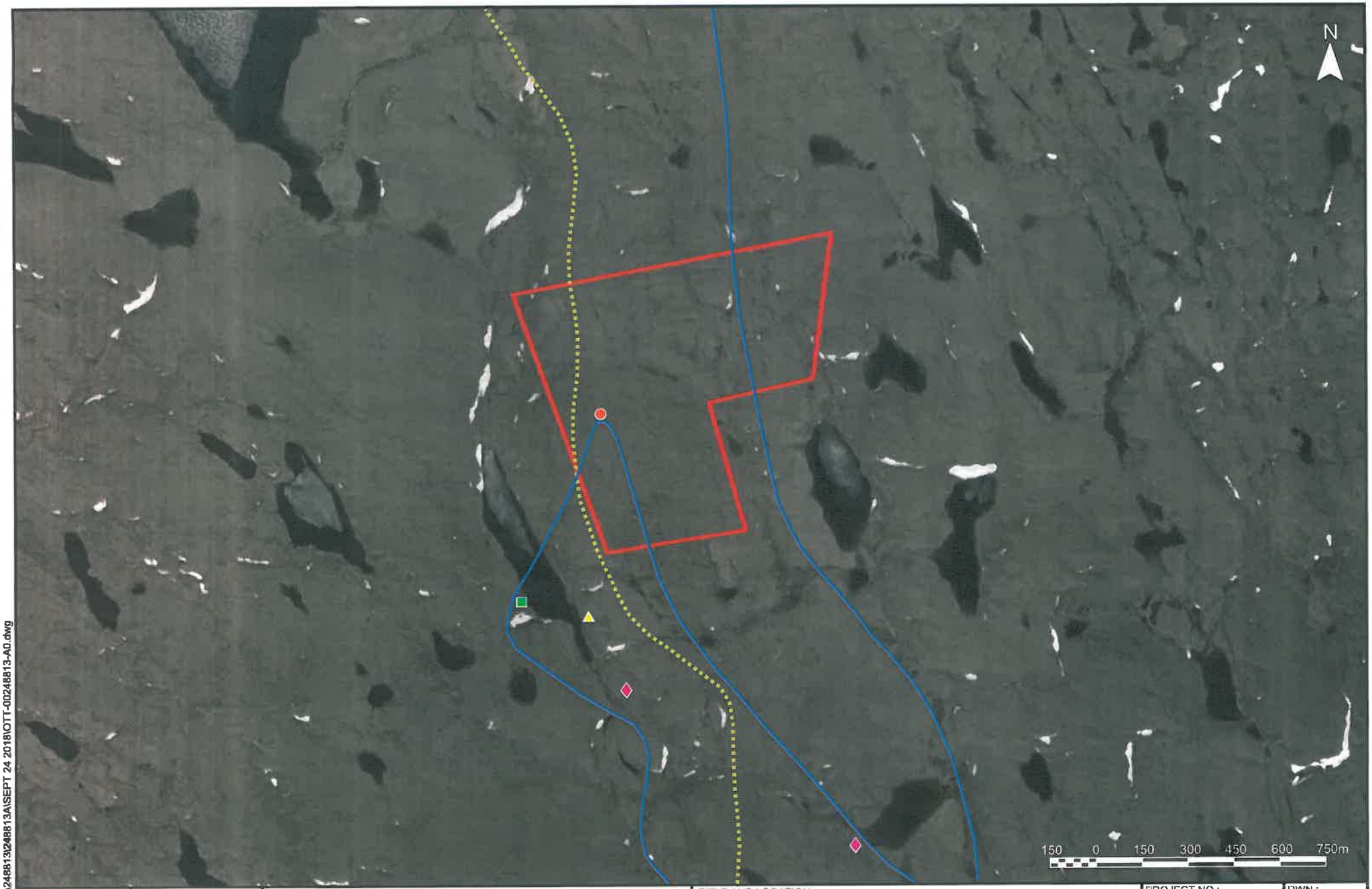
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- BEDROCK OUTCROP
- BOULDER FIELD
- GLACIOFLUVIAL TERRACE

TITLE AND LOCATION:

LANDSCAPE FEATURES

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LEGEND:

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- ATV TRAIL
- SKI TRAIL
- CABIN
- CAMPSITE
- HIKERS / CAMPERS
- FIREPIT

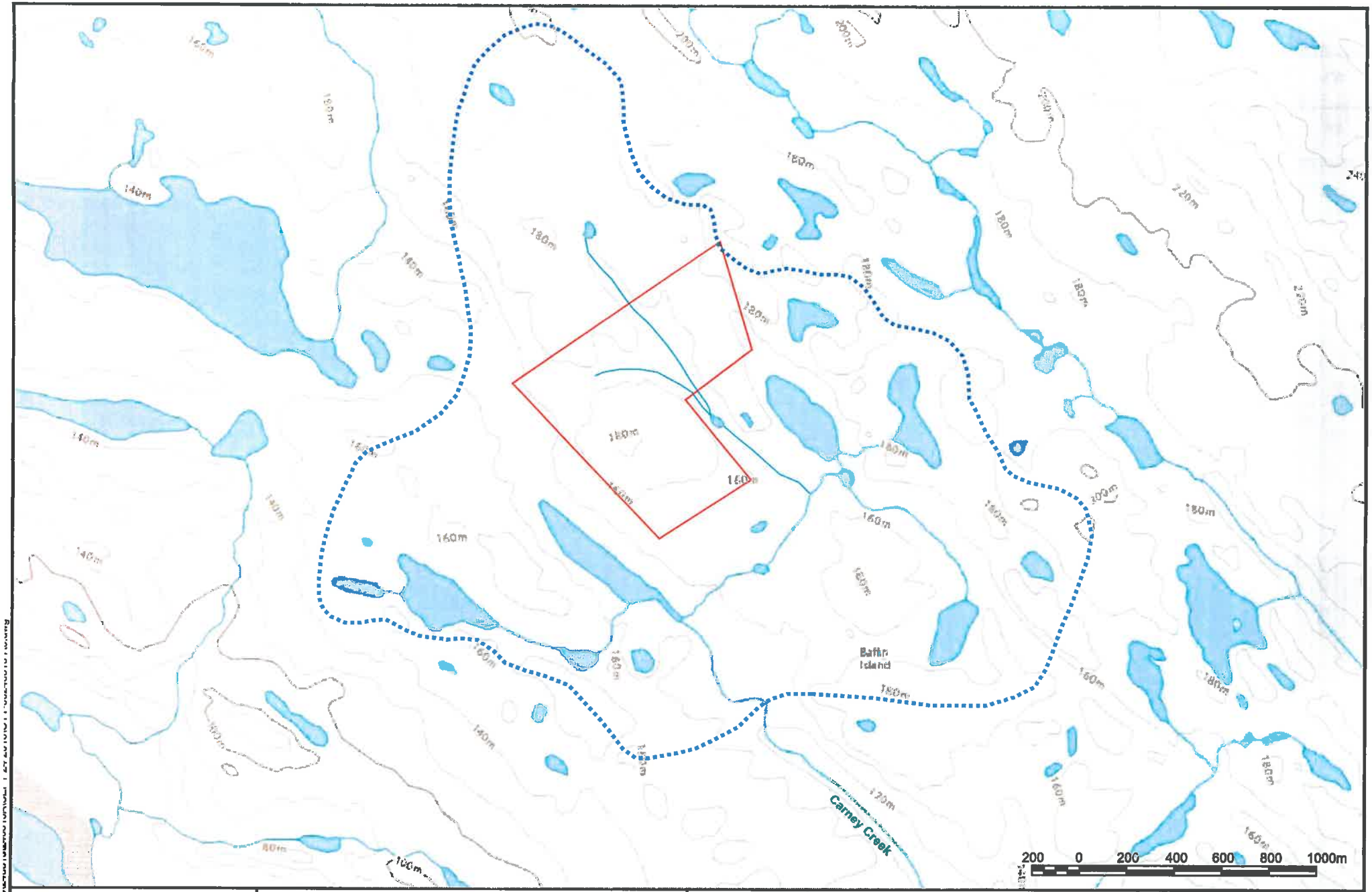
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PHYSICAL AND BIOLOGICAL ASSESSMENT
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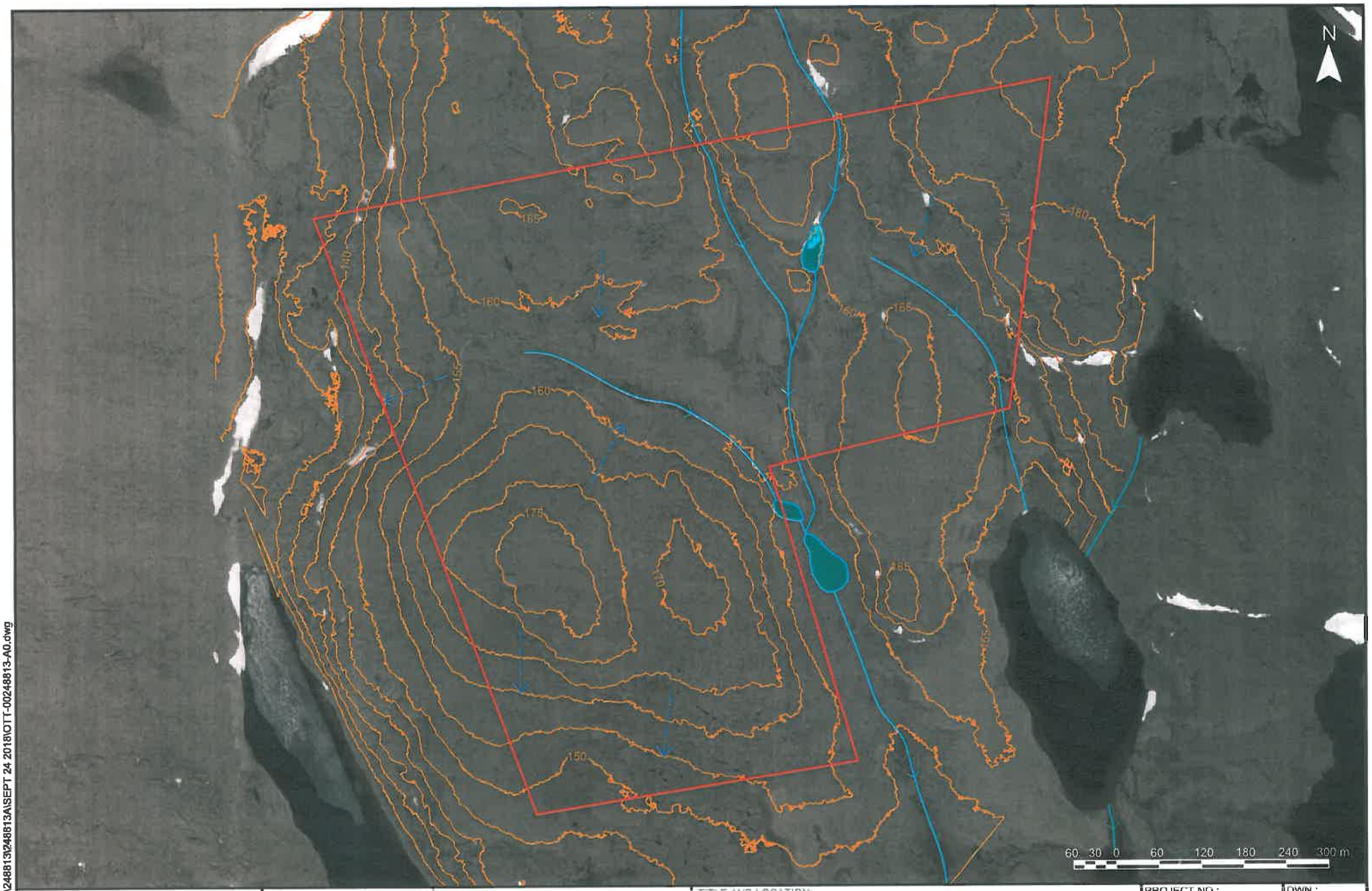
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LEGEND:

- SITE BOUNDARY
- 155 CONTOUR LINE (5m)
- STREAM
- POND
- SEEPAGE / SUBSURFACE FLOW

TITLE AND LOCATION:

SURFACE HYDROLOGY

PHYSICAL AND BIOLOGICAL ASSESSMENT
IQALUIT, NUNAVUT

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LEGEND:

- SITE BOUNDARY
- HEATH UPLAND
- HEATH UPLAND / ROCK COMPLEX
- GRAMINOID / HEATH TUNDRA
- BOULDER / GRAVEL
- ROCK

TITLE AND LOCATION:

ECOLOGICAL LAND CLASSIFICATION

PHYSICAL AND BIOLOGICAL ASSESSMENT
IQALUIT, NUNAVUT

PROJECT NO.:	DWN.:
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Appendix B: Site Photographs



Photo 1 – Bedrock outcrop (Sept. 2018)



Photo 2 – Boulder field (Sept. 2018)



Photo 3 – Glacio-fluvial terrace (Sept. 2018)



Photo 4 – Heath Upland (Sept. 2018)



Photo 5 – Heath Upland / Rock Complex (Sept. 2018)



Photo 6 – Graminoid Heath Tundra (Sept. 2018)



Photo 7 – Boulder / Gravel (Sept. 2018)



Photo 8 – Rock (Sept. 2018)



Photo 9 – Lemming burrow and scat (Sept. 2018)



Photo 10 – Caribou skull (Sept. 2018)

Appendix C: Analytical Results

Table 1 - Inorganics and Metals in Soil
New Landfill, Iqaluit, NU
OTT-00248813-A0

(units are µg/g, unless otherwise stated)

Sample ID	CCME Residential[1]	CCME Industrial [2]	GN DOE Table A3.1 Industrial[3]	S-1	S-2	S-3	S-4	S-5
Sampling Date (mm/dd/yyyy)				9/7/2018	9/7/2018	9/7/2018	9/7/2018	9/7/2018
Sample Depth (m)				0.3	0.3	0.3	0.3	0.3
Inorganics								
Sodium Adsorption Ratio	5	12	NV	0.53	0.51	0.5	0.41	0.36
Conductivity	2	4	NV	0.029	0.028	0.031	0.047	0.069
Fluoride (F-)	400	2000	NV	<5	<5	<5	<5	<5
Hot Water Ext. Boron (B)	NV	NV	NV	0.13	0.089	0.13	0.19	0.23
Available (CaCl2) pH	6 to 8	6 to 8	NV	5.61	5.2	5.69	6.27	6.16
WAD Cyanide (Free)	0.9	8	NV	0.02	0.02	0.03	0.02	0.04
Metals								
Chromium (VI)	0.4	1.4	1.4	<0.2	<0.2	<0.2	<0.2	<0.2
Antimony (Sb)	20	40	NV	<0.20	<0.20	<0.20	<0.20	<0.20
Arsenic (As)	12	12	12	<1.0	<1.0	<1.0	1.3	<1.0
Barium (Ba)	500	2000	2000	35	43	66	60	72
Beryllium (Be)	4	8	8	0.27	0.28	0.34	0.36	0.35
Boron (B)	NV	NV	NV	<5.0	<5.0	<5.0	<5.0	<5.0
Cadmium (Cd)	10	22	22	<0.10	<0.10	<0.10	<0.10	0.22
Chromium (Cr)	64	87	87	29	55	30	35	21
Cobalt (Co)	50	300	300	6.1	7.7	7.9	8.3	8.2
Copper (Cu)	63	91	91	6.7	9.4	10	18	21
Lead (Pb)	140	600	600	4	4.7	5.2	5.3	6.4
Molybdenum (Mo)	10	40	40	0.68	0.61	0.57	0.64	0.56
Nickel (Ni)	45	89	50	9.6	20	12	14	14
Selenium (Se)	3	2.9	2.9	<0.50	<0.50	<0.50	<0.50	<0.50
Silver (Ag)	20	40	NV	<0.20	<0.20	<0.20	<0.20	<0.20
Thallium (Tl)	1	1	1	<0.050	0.052	0.069	0.07	0.096
Tin (Sn)	50	300	NV	<1.0	<1.0	<1.0	<1.0	<1.0
Uranium (U)	23	300	300	0.62	0.59	0.58	0.73	1.4
Vanadium (V)	130	130	130	52	53	55	55	30
Zinc (Zn)	250	410	360	34	42	41	56	58
Mercury (Hg)	6.6	50	50	<0.050	<0.050	<0.050	<0.050	<0.050

NOTES:

[1] CCME (Residential, Coarse) — *Canadian Soil Quality Guidelines for the Protection of the Environmental and Human Health, September 2007* - Canadian Council of Ministers of the Environment for industrial land use & coarse grained conditions.

[2] CCME (Industrial, Coarse) — *Canadian Soil Quality Guidelines for the Protection of the Environmental and Human Health, September 2007* - Canadian Council of Ministers of the Environment for industrial land use & coarse grained conditions.

[3] GN DOE (Industrial, Coarse) — Department of Environment Government of Nunavut, *Environmental Guideline for Contaminated Site Remediation, revised December 2014, Tier 1 industrial criteria with coarse grained soil, surface soil (<1.5 m).*

Shaded — Concentration exceeds CCME SQG for Residential Land Use with Coarse Grained Soils

Bold — Concentration exceeds CCME SQG for Commercial/Industrial Land Use with Coarse Grained Soils

Italics — Concentration exceeds GN DOE Commercial/Industrial Land Use with Coarse Grained Soils

ND — Not Detected (Below Detection Limit)

NV — No Value

Data Check — MD

Criteria Check — MD

Comparison Check

Table 1 - Inorganics and Metals in Soil (Cont'd)
New Landfill, Iqaluit, NU
OTT-00248813-A0

(units are µg/g, unless otherwise stated)

Sample ID	CCME Residential[1]	CCME Industrial [2]	GN DOE Table A3.1 Industrial[3]	S-6	S-7	S-8	S-9
Sampling Date (mm/dd/yyyy)				9/7/2018	9/7/2018	9/7/2018	9/7/2018
Sample Depth (m)				0.3	0.3	0.3	0.3
Inorganics							
Sodium Adsorption Ratio	5	12	NV	1.8	1.6	1.3	1.5
Conductivity	2	4	NV	0.01	0.014	0.017	0.017
Fluoride (F-)	400	2000	NV	<5	<5	<5	<5
Hot Water Ext. Boron (B)	NV	NV	NV	<0.050	0.062	<0.050	0.056
Available (CaCl2) pH	6 to 8	6 to 8	NV	4.07	4.38	4.49	4.16
WAD Cyanide (Free)	0.9	8	NV	0.03	0.02	0.07	0.03
Metals							
Chromium (VI)	0.4	1.4	1.4	<0.2	<0.2	<0.2	<0.2
Antimony (Sb)	20	40	NV	<0.20	<0.20	<0.20	<0.20
Arsenic (As)	12	12	12	<1.0	<1.0	2.7	<1.0
Barium (Ba)	500	2000	2000	30	23	51	25
Beryllium (Be)	4	8	8	<0.20	<0.20	0.4	<0.20
Boron (B)	NV	NV	NV	<5.0	<5.0	<5.0	<5.0
Cadmium (Cd)	10	22	22	<0.10	<0.10	<0.10	<0.10
Chromium (Cr)	64	87	87	24	22	33	25
Cobalt (Co)	50	300	300	7.6	5.8	8.2	5.5
Copper (Cu)	63	91	91	8.6	6.5	11	7.2
Lead (Pb)	140	600	600	4.2	2.6	5.3	4.3
Molybdenum (Mo)	10	40	40	1.2	0.8	0.95	1.3
Nickel (Ni)	45	89	50	7	6.3	16	6.1
Selenium (Se)	3	2.9	2.9	<0.50	<0.50	<0.50	<0.50
Silver (Ag)	20	40	NV	<0.20	<0.20	<0.20	<0.20
Thallium (Tl)	1	1	1	0.052	<0.050	0.061	<0.050
Tin (Sn)	50	300	NV	<1.0	<1.0	<1.0	<1.0
Uranium (U)	23	300	300	0.33	0.24	0.59	0.42
Vanadium (V)	130	130	130	58	56	52	56
Zinc (Zn)	250	410	360	36	23	37	28
Mercury (Hg)	6.6	50	50	<0.050	<0.050	<0.050	<0.050

NOTES:

[1] CCME (Residential, Coarse) — *Canadian Soil Quality Guidelines for the Protection of the Environmental and Human Health, September 2007* - Canadian Council of Ministers of the Environment for industrial land use & coarse grained conditions.

[2] CCME (Industrial, Coarse) — *Canadian Soil Quality Guidelines for the Protection of the Environmental and Human Health, September 2007* - Canadian Council of Ministers of the Environment for industrial land use & coarse grained conditions.

[3] GN DOE (Industrial, Coarse) — *criteria with coarse grained soil, surface soil (<1.5 m).*

Shaded — Concentration exceeds CCME SQG for Residential Land Use with Coarse Grained Soils

Bold — Concentration exceeds CCME SQG for Commercial/Industrial Land Use with Coarse Grained Soils

Italics — Concentration exceeds GN DOE Commercial/Industrial Land Use with Coarse Grained Soils

ND — Not Detected (Below Detection Limit)

NV — No Value

Data Check — MD

Criteria Check — MD

Comparison Check

Table 2 - Petroleum Hydrocarbons (PHCs) and BTEX in Soil
New Landfill, Iqaluit, NU
OTT-00248813-A0

(units are µg/g, unless otherwise stated)

Sample ID	CWS for PHC[1]	CCME Residential[2]	CCME Industrial[3]	S-1	S-2	S-3	S-4	S-5
Sampling Date (mm/dd/yyyy)				9/7/2018	9/7/2018	9/7/2018	9/7/2018	9/7/2018
Sample Depth (m)				0.3	0.3	0.3	0.3	0.3
BTEX								
Benzene	NV	0.03	0.03	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060
Ethylbenzene	NV	0.082	0.082	<0.010	<0.010	<0.010	<0.010	<0.010
Toluene	NV	0.37	0.37	<0.020	<0.020	<0.020	<0.020	<0.020
Xylenes	NV	11	11	<0.020	<0.020	<0.020	<0.020	<0.020
Hydrocarbons								
F1 PHCs (C6-C10)	320	NV	NV	<10	<10	<10	<10	<10
F2 PHCs (C10-C16)	260	NV	NV	<10	<10	<10	<10	<10
F3 PHCs (C16-C34)	1700	NV	NV	<50	<50	<50	<50	<50
F4 PHCs (C34-C50)	3300	NV	NV	<50	<50	<50	<50	<50

NOTES:

[1] CWS for PHC (Commercial/Industrial, Coarse) — *Canada-wide Standards for Hydrocarbons in Soil, January 2008,* for commercial/industrial land uses & coarse grain conditions

[2]CCME (Residential, Coarse) — *Canadian Soil Quality Guidelines for the Protection of the Environmental and Human Health, September 2007* - Canadian Council of Ministers of the Environment for industrial land use & coarse grained conditions.

[3]CCME (Commercial/Industrial, Coarse) — *Canadian Soil Quality Guidelines for the Protection of the Environmental and Human Health, September 2007* - Canadian Council of Ministers of the Environment for industrial land uses & coarse grained conditions

Bold — Analytical result exceeds applicable Industrial land use CWS criteria

Shaded — Analytical result exceeds applicable Industrial land use CCME criteria

ND — Not Detected (Below Detection Limit)

NV — No Value

NA — Not Analyzed

Data Check — MD

Criteria Check — MD

Comparison Check

Table 2 - Petroleum Hydrocarbons (PHCs) and BTEX in Soil (Cont'd)
New Landfill, Iqaluit, NU
OTT-00248813-A0

(units are µg/g, unless otherwise stated)

Sample ID	CWS for PHC[1]	CCME Residential[2]	CCME Industrial[3]	S-6	S-7	S-8	S-9
Sampling Date (mm/dd/yyyy)				9/7/2018	9/7/2018	9/7/2018	9/7/2018
Sample Depth (m)				0.3	0.3	0.3	0.3
BTEX							
Benzene	NV	0.03	0.03	<0.0060	<0.0060	<0.0060	<0.0060
Ethylbenzene	NV	0.082	0.082	<0.010	<0.010	<0.010	<0.010
Toluene	NV	0.37	0.37	<0.020	<0.020	<0.020	<0.020
Xylenes	NV	11	11	<0.020	<0.020	<0.020	<0.020
Hydrocarbons							
F1 PHCs (C6-C10)	320	NV	NV	<10	<10	<10	<10
F2 PHCs (C10-C16)	260	NV	NV	<10	<10	<10	<10
F3 PHCs (C16-C34)	1700	NV	NV	<50	<50	<50	<50
F4 PHCs (C34-C50)	3300	NV	NV	<50	<50	<50	<50

NOTES:

[1] CWS for PHC (Commercial/Industrial, Coarse) — *Canada-wide Standards for Hydrocarbons in Soil, January 2008,* for commercial/industrial land uses & coarse grain conditions

[2]CCME (Residential, Coarse) — *Canadian Soil Quality Guidelines for the Protection of the Environmental and Human Health, September 2007* - Canadian Council of Ministers of the Environment for industrial land use & coarse grained conditions.

[3]CCME (Commercial/Industrial, Coarse) — *Canadian Soil Quality Guidelines for the Protection of the Environmental and Human Health, September 2007* - Canadian Council of Ministers of the Environment for industrial land uses & coarse grained conditions

Bold — Analytical result exceeds applicable Industrial land use CWS criteria

Shaded — Analytical result exceeds applicable Industrial land use CCME criteria

ND — Not Detected (Below Detection Limit)

NV — No Value

NA — Not Analyzed

Data Check — MD

Criteria Check — MD

Comparison Check

Table 3 - Volatile Organic Compounds (VOCs) in Soil
New Landfill, Iqaluit, NU
OTT-00248813-A0

(units are µg/g, unless otherwise stated)

Sample ID	CCME Residential[1]	CCME Industrial[2]	S-1	S-2	S-3	S-4	S-5
Sampling Date			9/7/2018	9/7/2018	9/7/2018	9/7/2018	9/7/2018
Sample Depth (m)			0.3	0.3	0.3	0.3	0.3
1,3-Dichloropropene (cis+trans)	NV	NV	<0.050	<0.050	<0.050	<0.050	<0.050
Acetone (2-Propanone)	NV	NV	<0.50	<0.50	<0.50	<0.50	<0.50
Benzene	0.03	0.03	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060
Bromodichloromethane	NV	NV	<0.050	<0.050	<0.050	<0.050	<0.050
Bromoform	NV	NV	<0.050	<0.050	<0.050	<0.050	<0.050
Bromomethane	NV	NV	<0.050	<0.050	<0.050	<0.050	<0.050
Carbon Tetrachloride	5	50	<0.050	<0.050	<0.050	<0.050	<0.050
Chlorobenzene	NV	NV	<0.050	<0.050	<0.050	<0.050	<0.050
Chloroform	5	50	<0.050	<0.050	<0.050	<0.050	<0.050
Dibromochloromethane	NV	NV	<0.050	<0.050	<0.050	<0.050	<0.050
1,2-Dichlorobenzene	1	10	<0.050	<0.050	<0.050	<0.050	<0.050
1,3-Dichlorobenzene	1	10	<0.050	<0.050	<0.050	<0.050	<0.050
1,4-Dichlorobenzene	1	10	<0.050	<0.050	<0.050	<0.050	<0.050
Dichlorodifluoromethane (FREON 12)	NV	NV	<0.050	<0.050	<0.050	<0.050	<0.050
1,1-Dichloroethane	5	50	<0.050	<0.050	<0.050	<0.050	<0.050
1,2-Dichloroethane	5	50	<0.050	<0.050	<0.050	<0.050	<0.050
1,1-Dichloroethylene	5	50	<0.050	<0.050	<0.050	<0.050	<0.050
cis-1,2-Dichloroethylene	NV	50	<0.050	<0.050	<0.050	<0.050	<0.050
trans-1,2-Dichloroethylene	NV	50	<0.050	<0.050	<0.050	<0.050	<0.050
1,2-Dichloropropane	5	50	<0.050	<0.050	<0.050	<0.050	<0.050
cis-1,3-Dichloropropene	5	50	<0.030	<0.030	<0.030	<0.030	<0.030
trans-1,3-Dichloropropene	NV	50	<0.040	<0.040	<0.040	<0.040	<0.040
Ethylbenzene	0.082	0.082	<0.010	<0.010	<0.010	<0.010	<0.010
Ethylene Dibromide	NV	NV	<0.050	<0.050	<0.050	<0.050	<0.050
Hexane	0.49	6.5	<0.050	<0.050	<0.050	<0.050	<0.050
Methylene Chloride(Dichloromethane)	5	50	<0.050	<0.050	<0.050	<0.050	<0.050
Methyl Isobutyl Ketone	NV	NV	<0.50	<0.50	<0.50	<0.50	<0.50
Methyl Ethyl Ketone (2-Butanone)	NV	NV	<0.50	<0.50	<0.50	<0.50	<0.50
Methyl t-butyl ether (MTBE)	NV	NV	<0.050	<0.050	<0.050	<0.050	<0.050
Styrene	5	50	<0.050	<0.050	<0.050	<0.050	<0.050
1,1,1,2-Tetrachloroethane	NV	NV	<0.050	<0.050	<0.050	<0.050	<0.050
1,1,2,2-Tetrachloroethane	5	50	<0.050	<0.050	<0.050	<0.050	<0.050
Tetrachloroethylene	0.2	0.6	<0.050	<0.050	<0.050	<0.050	<0.050
Toluene	0.37	0.37	<0.020	<0.020	<0.020	<0.020	<0.020
1,1,1-Trichloroethane	5	50	<0.050	<0.050	<0.050	<0.050	<0.050
1,1,2-Trichloroethane	5	50	<0.050	<0.050	<0.050	<0.050	<0.050
Trichloroethylene	0.01	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Vinyl Chloride	NV	NV	<0.020	<0.020	<0.020	<0.020	<0.020
p+m-Xylene	NV	NV	<0.020	<0.020	<0.020	<0.020	<0.020
o-Xylene	NV	NV	<0.020	<0.020	<0.020	<0.020	<0.020
Total Xylenes	11	11	<0.020	<0.020	<0.020	<0.020	<0.020
Trichlorofluoromethane (FREON 11)	NV	NV	<0.050	<0.050	<0.050	<0.050	<0.050

NOTES:

[1] CCME (Residential, Coarse) — *Canadian Soil Quality Guidelines for the Protection of the Environmental and Human Health, September 2007* - Canadian Council of Ministers of the Environment for industrial land use & coarse grained conditions.

[2] CCME (Industrial, Coarse) — *Canadian Soil Quality Guidelines for the Protection of the Environmental and Human Health, September 2007* - Canadian Council of Ministers of the Environment for industrial land use & coarse grained conditions.

Shaded — Concentration exceeds CCME SQG for Residential Land Use with Coarse Grained Soils

Bold — Concentration exceeds CCME SQG for Commercial/Industrial Land Use with Coarse Grained Soils

ND — Not Detected (Below Detection Limit)

NV — No Value

Data Check — MD

Criteria Check — MD

Comparison Check

Table 3 - Volatile Organic Compounds (VOCs) in Soil (Cont'd)
New Landfill, Iqaluit, NU
OTT-00248813-A0

(units are µg/g, unless otherwise stated)

Sample ID	CCME Residential[1]	CCME Industrial[2]	S-6	S-7	S-8	S-9
Sampling Date			9/7/2018	9/7/2018	9/7/2018	9/7/2018
Sample Depth (m)			0.3	0.3	0.3	0.3
1,3-Dichloropropene (cis+trans)	NV	NV	<0.050	<0.050	<0.050	<0.050
Acetone (2-Propanone)	NV	NV	<0.50	<0.50	<0.50	<0.50
Benzene	0.03	0.03	<0.0060	<0.0060	<0.0060	<0.0060
Bromodichloromethane	NV	NV	<0.050	<0.050	<0.050	<0.050
Bromoform	NV	NV	<0.050	<0.050	<0.050	<0.050
Bromomethane	NV	NV	<0.050	<0.050	<0.050	<0.050
Carbon Tetrachloride	5	50	<0.050	<0.050	<0.050	<0.050
Chlorobenzene	NV	NV	<0.050	<0.050	<0.050	<0.050
Chloroform	5	50	<0.050	<0.050	<0.050	<0.050
Dibromochloromethane	NV	NV	<0.050	<0.050	<0.050	<0.050
1,2-Dichlorobenzene	1	10	<0.050	<0.050	<0.050	<0.050
1,3-Dichlorobenzene	1	10	<0.050	<0.050	<0.050	<0.050
1,4-Dichlorobenzene	1	10	<0.050	<0.050	<0.050	<0.050
Dichlorodifluoromethane (FREON 12)	NV	NV	<0.050	<0.050	<0.050	<0.050
1,1-Dichloroethane	5	50	<0.050	<0.050	<0.050	<0.050
1,2-Dichloroethane	5	50	<0.050	<0.050	<0.050	<0.050
1,1-Dichloroethylene	5	50	<0.050	<0.050	<0.050	<0.050
cis-1,2-Dichloroethylene	NV	50	<0.050	<0.050	<0.050	<0.050
trans-1,2-Dichloroethylene	NV	50	<0.050	<0.050	<0.050	<0.050
1,2-Dichloropropane	5	50	<0.050	<0.050	<0.050	<0.050
cis-1,3-Dichloropropene	5	50	<0.030	<0.030	<0.030	<0.030
trans-1,3-Dichloropropene	NV	50	<0.040	<0.040	<0.040	<0.040
Ethylbenzene	0.082	0.082	<0.010	<0.010	<0.010	<0.010
Ethylene Dibromide	NV	NV	<0.050	<0.050	<0.050	<0.050
Hexane	0.49	6.5	0.096	<0.050	<0.050	<0.050
Methylene Chloride(Dichloromethane)	5	50	<0.050	<0.050	<0.050	<0.050
Methyl Isobutyl Ketone	NV	NV	<0.50	<0.50	<0.50	<0.50
Methyl Ethyl Ketone (2-Butanone)	NV	NV	<0.50	<0.50	<0.50	<0.50
Methyl t-butyl ether (MTBE)	NV	NV	<0.050	<0.050	<0.050	<0.050
Styrene	5	50	<0.050	<0.050	<0.050	<0.050
1,1,1,2-Tetrachloroethane	NV	NV	<0.050	<0.050	<0.050	<0.050
1,1,2,2-Tetrachloroethane	5	50	<0.050	<0.050	<0.050	<0.050
Tetrachloroethylene	0.2	0.6	<0.050	<0.050	<0.050	<0.050
Toluene	0.37	0.37	<0.020	<0.020	<0.020	<0.020
1,1,1-Trichloroethane	5	50	<0.050	<0.050	<0.050	<0.050
1,1,2-Trichloroethane	5	50	<0.050	<0.050	<0.050	<0.050
Trichloroethylene	0.01	0.01	<0.010	<0.010	<0.010	<0.010
Vinyl Chloride	NV	NV	<0.020	<0.020	<0.020	<0.020
p+m-Xylene	NV	NV	<0.020	<0.020	<0.020	<0.020
o-Xylene	NV	NV	<0.020	<0.020	<0.020	<0.020
Total Xylenes	11	11	<0.020	<0.020	<0.020	<0.020
Trichlorofluoromethane (FREON 11)	NV	NV	<0.050	<0.050	<0.050	<0.050

NOTES:

[1] CCME (Residential, Coarse) — *Canadian Soil Quality Guidelines for the Protection of the Environmental and Human Health, September 2007* - Canadian Council of Ministers of the Environment for industrial land use & coarse grained conditions.

[2] CCME (Industrial, Coarse) — *Canadian Soil Quality Guidelines for the Protection of the Environmental and Human Health, September 2007* - Canadian Council of Ministers of the Environment for industrial land use & coarse grained conditions.

Shaded — Concentration exceeds CCME SQG for Residential Land Use with Coarse Grained Soils
Bold — Concentration exceeds CCME SQG for Commercial/Industrial Land Use with Coarse Grained Soils
ND — Not Detected (Below Detection Limit)
NV — No Value
Data Check — MD
Criteria Check — MD
Comparison Check

Table 4 - Polycyclic Aromatic Hydrocarbons (PAHs) in Soil
New Landfill, Iqaluit, NU
OTT-00248813-A0

(units are µg/g, unless otherwise stated)

Sample ID	CCME Residential[1]	CCME Industrial[2]	S-1	S-2	S-3	S-4	S-5
Sampling Date			9/7/2018	9/7/2018	9/7/2018	9/7/2018	9/7/2018
Sample Depth (m)			0.3	0.3	0.3	0.3	0.3
Index of Additive Cancer Risk -IACR	NV	NV	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	NV	NV	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Benzo(a)pyrene Total Potency Equiv.	NV	NV	<0.0071	<0.0071	<0.0071	<0.0071	<0.0071
Acenaphthylene	NV	NV	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Acridine	NV	NV	<0.010	<0.010	<0.010	<0.010	<0.010
Anthracene	2.5	32	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
Benzo(a)anthracene	1	10	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Benzo(b/j)fluoranthene	1	10	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Benzo(k)fluoranthene	1	10	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Benzo(g,h,i)perylene	NV	NV	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Benzo(c)phenanthrene	NV	NV	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Benzo(a)pyrene	20	72	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Benzo(e)pyrene	NV	NV	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Chrysene	NV	NV	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Dibenz(a,h)anthracene	1	10	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Fluoranthene	50	180	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Fluorene	NV	NV	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Indeno(1,2,3-cd)pyrene	1	10	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
1-Methylnaphthalene	NV	NV	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
2-Methylnaphthalene	NV	NV	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Naphthalene	0.013	0.13	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Phenanthrene	0.046	0.046	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Perylene	NV	NV	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Pyrene	10	100	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Quinoline	NV	NV	<0.010	<0.010	<0.010	<0.010	0.025

NOTES:

[1] CCME (Residential, Coarse) — *Canadian Soil Quality Guidelines for the Protection of the Environmental and Human Health, September 2007* - Canadian Council of Ministers of the Environment for industrial land use & coarse grained conditions.

[2] CCME (Industrial, Coarse) — *Canadian Soil Quality Guidelines for the Protection of the Environmental and Human Health, September 2007* - Canadian Council of Ministers of the Environment for industrial land use & coarse grained conditions.

Shaded — Concentration exceeds CCME SQG for Residential Land Use with Coarse Grained Soils

Bold — Concentration exceeds CCME SQG for Commercial/Industrial Land Use with Coarse Grained Soils

ND — Not Detected (Below Detection Limit)

NV — No Value

Data Check — MD

Criteria Check — MD

Comparison Check

Table 4 - Polycyclic Aromatic Hydrocarbons (PAHs) in Soil (Cont'd)
New Landfill, Iqaluit, NU
OTT-00248813-A0

(units are µg/g, unless otherwise stated)

Sample ID	CCME Residential[1]	CCME Industrial[2]	S-6	S-7	S-8	S-9
Sampling Date			9/7/2018	9/7/2018	9/7/2018	9/7/2018
Sample Depth (m)			0.3	0.3	0.3	0.3
Index of Additive Cancer Risk -IACR	NV	NV	<0.1	<0.1	<0.1	<0.1
Acenaphthene	NV	NV	<0.0050	<0.0050	<0.0050	<0.0050
Benzo(a)pyrene Total Potency Equiv.	NV	NV	<0.0071	<0.0071	<0.0071	<0.0071
Acenaphthylene	NV	NV	<0.0050	<0.0050	<0.0050	<0.0050
Acridine	NV	NV	<0.010	<0.010	<0.010	<0.010
Anthracene	2.5	32	<0.0040	<0.0040	<0.0040	<0.0040
Benzo(a)anthracene	1	10	<0.0050	<0.0050	<0.0050	<0.0050
Benzo(b/j)fluoranthene	1	10	<0.0050	<0.0050	<0.0050	<0.0050
Benzo(k)fluoranthene	1	10	<0.0050	<0.0050	<0.0050	<0.0050
Benzo(g,h,i)perylene	NV	NV	<0.0050	<0.0050	<0.0050	<0.0050
Benzo(c)phenanthrene	NV	NV	<0.0050	<0.0050	<0.0050	<0.0050
Benzo(a)pyrene	20	72	<0.0050	<0.0050	<0.0050	<0.0050
Benzo(e)pyrene	NV	NV	<0.0050	<0.0050	<0.0050	<0.0050
Chrysene	NV	NV	<0.0050	<0.0050	<0.0050	<0.0050
Dibenz(a,h)anthracene	1	10	<0.0050	<0.0050	<0.0050	<0.0050
Fluoranthene	50	180	<0.0050	<0.0050	<0.0050	<0.0050
Fluorene	NV	NV	<0.0050	<0.0050	<0.0050	<0.0050
Indeno(1,2,3-cd)pyrene	1	10	<0.0050	<0.0050	<0.0050	<0.0050
1-Methylnaphthalene	NV	NV	<0.0050	<0.0050	<0.0050	<0.0050
2-Methylnaphthalene	NV	NV	<0.0050	<0.0050	<0.0050	<0.0050
Naphthalene	0.013	0.13	<0.0050	<0.0050	<0.0050	<0.0050
Phenanthrene	0.046	0.046	<0.0050	<0.0050	<0.0050	<0.0050
Perylene	NV	NV	<0.0050	<0.0050	<0.0050	<0.0050
Pyrene	10	100	<0.0050	<0.0050	<0.0050	<0.0050
Quinoline	NV	NV	0.021	<0.010	<0.010	<0.010

NOTES:

[1] CCME (Residential, Coarse) — *Canadian Soil Quality Guidelines for the Protection of the Environmental and Human Health, September 2007* - Canadian Council of Ministers of the Environment for industrial land use & coarse grained conditions.

[2] CCME (Industrial, Coarse) — *Canadian Soil Quality Guidelines for the Protection of the Environmental and Human Health, September 2007* - Canadian Council of Ministers of the Environment for industrial land use & coarse grained conditions.

Shaded — Concentration exceeds CCME SQG for Residential Land Use with Coarse Grained Soils

Bold — Concentration exceeds CCME SQG for Commercial/Industrial Land Use with Coarse Grained Soils

ND — Not Detected (Below Detection Limit)

NV — No Value

Data Check — MD

Criteria Check — MD

Comparison Check

Table 5 - Inorganics and Metals in Surface Water
New Landfill, Iqaluit, NU
OTT-00248813-A0

(units are µg/g, unless otherwise stated)

Sample ID	CCME Freshwater[1]	SW-1	SW-3	SW-4	SW-5	SW-6
Sampling Date		9/7/2018	9/7/2018	9/7/2018	9/7/2018	9/7/2018
Inorganics						
Fluoride (F-)	0.12 (mg/L)	<0.10	<0.10	<0.10	<0.10	<0.10
pH	6.5 to 9.0	8.05	7.84	7.89	7.57	7.86
Dissolved Sulphate (SO4)	NV	<1.0	<1.0	<1.0	<1.0	2.6
Dissolved Chloride (Cl-)	120 (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
Nitrite (N)	0.06 (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
Nitrate (N)	3 (mg/L)	<0.10	<0.10	<0.10	<0.10	<0.10
Nitrate + Nitrite (N)	NV	<0.10	<0.10	<0.10	<0.10	<0.10
Total Ammonia-N	0.017 (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
WAD Cyanide (Free)	0.005 (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Mercury (Hg)	0.026	<0.01	<0.01	<0.01	<0.01	<0.01
Sulphide (as H2S)	NV	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Total Sulphide	NV	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019
Dissolved Hardness (CaCO3)	NV	68.8	56.8	50.5	22.8	39.4
Metals						
Dissolved Aluminum (Al)	100	17.2	9.1	7.6	17.2	7.8
Dissolved Antimony (Sb)	NV	<0.50	<0.50	<0.50	<0.50	<0.50
Dissolved Arsenic (As)	5	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Barium (Ba)	NV	7.2	1.7	2.9	2	3.1
Dissolved Beryllium (Be)	NV	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Bismuth (Bi)	NV	<1.0	<1.0	<1.0	<1.0	<1.0
Dissolved Boron (B)	1500	<50	<50	<50	<50	<50
Dissolved Cadmium (Cd)	0.04	<0.010	<0.010	<0.010	<0.010	<0.010
Dissolved Chromium (Cr)	NV	<1.0	<1.0	<1.0	<1.0	<1.0
Dissolved Cobalt (Co)	NV	<0.20	<0.20	<0.20	<0.20	<0.20
Dissolved Copper (Cu)	2	0.75	1.12	0.78	1.05	0.93
Dissolved Iron (Fe)	300	8.1	<5.0	7.9	8.6	<5.0
Dissolved Lead (Pb)	1	<0.20	<0.20	<0.20	<0.20	<0.20
Dissolved Lithium (Li)	NV	<2.0	<2.0	<2.0	<2.0	<2.0
Dissolved Manganese (Mn)	NV	<1.0	<1.0	<1.0	<1.0	<1.0
Dissolved Mercury (Hg)	0.026	<0.050	<0.050	<0.050	<0.050	<0.050
Dissolved Molybdenum (Mo)	73	<1.0	<1.0	<1.0	<1.0	<1.0
Dissolved Nickel (Ni)	25	<1.0	<1.0	<1.0	<1.0	<1.0
Dissolved Selenium (Se)	1	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Silicon (Si)	NV	1960	2210	1860	1880	1860
Dissolved Silver (Ag)	0.25	<0.020	<0.020	<0.020	<0.020	<0.020
Dissolved Strontium (Sr)	NV	35.2	26	24.3	11.5	19.6
Dissolved Thallium (Tl)	0.8	<0.010	<0.010	<0.010	<0.010	<0.010
Dissolved Tin (Sn)	NV	<5.0	<5.0	<5.0	<5.0	<5.0
Dissolved Titanium (Ti)	NV	<5.0	<5.0	<5.0	<5.0	<5.0
Dissolved Uranium (U)	15	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Vanadium (V)	NV	<5.0	<5.0	<5.0	<5.0	<5.0
Dissolved Zinc (Zn)	7	<5.0	[redacted]	<5.0	<5.0	<5.0
Dissolved Zirconium (Zr)	NV	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Calcium (Ca)	NV	24.4	19.3	17.3	7.56	13.5
Dissolved Magnesium (Mg)	NV	1.88	2.07	1.77	0.937	1.38
Dissolved Potassium (K)	NV	0.248	0.201	0.17	0.199	0.154
Dissolved Sodium (Na)	NV	0.943	1.8	0.799	0.797	0.764
Dissolved Sulphur (S)	NV	<3.0	<3.0	<3.0	6.1	<3.0

NOTES:

[1] CCME Freshwater	*CCME Water Quality Guidelines for the Protection of Aquatic Life, Freshwater, Longterm* (Accessed Online, October 2018).
[redacted]	Concentration exceeds CCME Freshwater Guidlines.
ND	Not Detected (Below Detection Limit)
NV	no value
NA	not analyzed
Data Check	MD
Criteria Check	MD
Comparison Check	

Table 5 - Inorganics and Metals in Surface Water (Cont'd)
New Landfill, Iqaluit, NU
OTT-00248813-A0

(units are µg/g, unless otherwise stated)

Sample ID	CCME Freshwater[1]	SW-7	SW-9	SW-10
Sampling Date		9/7/2018	9/7/2018	9/7/2018
Inorganics				
Fluoride (F-)	0.12 (mg/L)	<0.10	<0.10	<0.10
pH	6.5 to 9.0	7.88	7.52	7.88
Dissolved Sulphate (SO4)	NV	2.4	<1.0	1.4
Dissolved Chloride (Cl-)	120 (mg/L)	<1.0	<1.0	<1.0
Nitrite (N)	0.06 (mg/L)	<0.010	<0.010	<0.010
Nitrate (N)	3 (mg/L)	<0.10	<0.10	<0.10
Nitrate + Nitrite (N)	NV	<0.10	<0.10	<0.10
Total Ammonia-N	0.017 (mg/L)	<0.050	<0.050	<0.050
WAD Cyanide (Free)	0.005 (mg/L)	<0.0010	<0.0010	<0.0010
Mercury (Hg)	0.026	<0.01	<0.01	<0.01
Sulphide (as H2S)	NV	<0.0020	<0.0020	<0.0020
Total Sulphide	NV	<0.0019	<0.0019	<0.0019
Dissolved Hardness (CaCO3)	NV	32.3	24.1	42.8
Metals				
Dissolved Aluminum (Al)	100	9.4	14.9	8.7
Dissolved Antimony (Sb)	NV	<0.50	<0.50	<0.50
Dissolved Arsenic (As)	5	<0.10	<0.10	<0.10
Dissolved Barium (Ba)	NV	2.2	2.1	2.7
Dissolved Beryllium (Be)	NV	<0.10	<0.10	<0.10
Dissolved Bismuth (Bi)	NV	<1.0	<1.0	<1.0
Dissolved Boron (B)	1500	<50	<50	<50
Dissolved Cadmium (Cd)	0.04	<0.010	<0.010	<0.010
Dissolved Chromium (Cr)	NV	<1.0	<1.0	<1.0
Dissolved Cobalt (Co)	NV	<0.20	<0.20	<0.20
Dissolved Copper (Cu)	2	0.95	0.93	0.96
Dissolved Iron (Fe)	300	5.2	<5.0	<5.0
Dissolved Lead (Pb)	1	<0.20	<0.20	<0.20
Dissolved Lithium (Li)	NV	<2.0	<2.0	<2.0
Dissolved Manganese (Mn)	NV	<1.0	<1.0	<1.0
Dissolved Mercury (Hg)	0.026	<0.050	<0.050	<0.050
Dissolved Molybdenum (Mo)	73	<1.0	<1.0	<1.0
Dissolved Nickel (Ni)	25	<1.0	<1.0	<1.0
Dissolved Selenium (Se)	1	<0.10	<0.10	<0.10
Dissolved Silicon (Si)	NV	2070	2110	1750
Dissolved Silver (Ag)	0.25	<0.020	<0.020	<0.020
Dissolved Strontium (Sr)	NV	17	14.4	21.5
Dissolved Thallium (Tl)	0.8	<0.010	<0.010	<0.010
Dissolved Tin (Sn)	NV	<5.0	<5.0	<5.0
Dissolved Titanium (Ti)	NV	<5.0	<5.0	<5.0
Dissolved Uranium (U)	15	<0.10	<0.10	<0.10
Dissolved Vanadium (V)	NV	<5.0	<5.0	<5.0
Dissolved Zinc (Zn)	7	[redacted]	<5.0	<5.0
Dissolved Zirconium (Zr)	NV	<0.10	<0.10	<0.10
Dissolved Calcium (Ca)	NV	10.8	7.71	14.6
Dissolved Magnesium (Mg)	NV	1.32	1.17	1.53
Dissolved Potassium (K)	NV	0.146	0.123	0.179
Dissolved Sodium (Na)	NV	0.784	0.727	0.874
Dissolved Sulphur (S)	NV	<3.0	<3.0	<3.0

NOTES:

NOTES:

[1] CCME Freshwater — *CCME Water Quality Guidelines for the Protection of Aquatic Life, Freshwater, Long Term* (Accessed Online, October 2018).

[redacted] Concentration exceeds CCME Freshwater Guidlines.

ND Not Detected (Below Detection Limit)

NV no value

NA not analyzed

Data Check MD

Criteria Check MD

Comparison Check

Table 6 - Inorganics and Metals in Sediment
New Landfill, Iqaluit, NU
OTT-00248813-A0

(units are µg/g, unless otherwise stated)

Sample ID	CCME Sediment ISQG Freshwater [1]	CCME Sediment PEL Freshwater [2]	SED-3	SED-4	SED-6	SED-7	SED-9	SED-10
Sampling Date (mm/dd/yyyy)			9/7/2018	9/7/2018	9/7/2018	9/7/2018	9/7/2018	9/7/2018
Sample Depth (m)			0.2	0.2	0.2	0.2	0.2	0.2
Inorganics								
Sodium Adsorption Ratio	NV	NV	0.36	0.63	0.61	0.74	0.63	0.31
Conductivity	NV	NV	0.056	0.025	0.028	0.019	0.02	0.1
Fluoride (F-)	NV	NV	<5	<5	<5	<5	<5	<5
Hot Water Ext. Boron (B)	NV	NV	0.39	0.17	0.1	0.066	0.15	0.38
Available (CaCl2) pH	NV	NV	6.73	6.71	6.49	6.74	5.9	5.83
WAD Cyanide (Free)	NV	NV	0.1	<0.01	0.05	<0.01	0.05	<0.04
Metals								
Chromium (VI)	NV	NV						
Antimony (Sb)	NV	NV	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Arsenic (As)	5.9	17	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Barium (Ba)	NV	NV	57	22	15	23	17	19
Beryllium (Be)	NV	NV	0.57	<0.20	0.26	0.22	0.23	0.23
Boron (B)	NV	NV	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Cadmium (Cd)	0.6	3.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Chromium (Cr)	37.3	90	28	25	20	24	22	17
Cobalt (Co)	NV	NV	6	3.7	4.1	5.5	3.2	2.6
Copper (Cu)	35.7	197	48	9.2	19	8.5	15	25
Lead (Pb)	35	91.3	7.2	3.1	2.9	3.2	3.5	3.2
Molybdenum (Mo)	NV	NV	0.7	0.62	<0.50	0.5	1.4	0.86
Nickel (Ni)	NV	NV	15	7.6	9.6	9.9	7.4	7.6
Selenium (Se)	NV	NV	0.73	<0.50	<0.50	<0.50	<0.50	<0.50
Silver (Ag)	NV	NV	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Thallium (Tl)	NV	NV	0.073	<0.050	<0.050	<0.050	<0.050	<0.050
Tin (Sn)	NV	NV	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Uranium (U)	NV	NV	1.5	0.5	1.3	0.58	1	1.1
Vanadium (V)	NV	NV	37	43	18	43	41	26
Zinc (Zn)	123	315	76	51	29	39	46	36
Mercury (Hg)	0.17	0.486	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050

NOTES:

[1] CCME - ISQG	*CCME Sediment Quality Guidelines (Freshwater) for the Protection of Aquatic Life (Interim Sediment Quality Guidelines - ISQGs), Freshwater*
[2] CCME - PEL	*CCME Sediment Quality Guidelines (Freshwater) for the Protection of Aquatic Life - Probable Effects Levels (PELs) ,Freshwater*
Shaded	Concentration exceeds CCME - ISQG
Bold	Concentration exceeds CCME - PEL
ND	Not Detected (Below Detection Limit)
NV	No Value
Data Check	MD
Criteria Check	MD
Comparison Check	

Appendix D: Certificates of Analysis

Certificate of Analysis: Soil

Maxxam
A Bureau Veritas Group Company

Success Through Science®

Your Project #: Campobello job# B8N5673

Attention: Alisha Williamson
MAXXAM ANALYTICS
CAMPOBELLO
6740 CAMPOBELLO ROAD
MISSISSAUGA, ON
CANADA L5N 2L8

Report Date: 2018/09/17
Report #: R2620368
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B877742
Received: 2018/09/11, 18:01

Sample Matrix: Soil
Samples Received: 9

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Moisture	9	N/A	2018/09/14	AB SOP-00002	CCME PHC-CWS m
Index of Additive Cancer Risk	9	N/A	2018/09/17	AB SOP-00003	Auto Calc
Benzo[a]pyrene Equivalency	9	N/A	2018/09/17	AB SOP-00003	Auto Calc
PAH in Soil by GC/MS	6	2018/09/13	2018/09/17	AB SOP-00036 / AB SOP-00003	EPA 3540C/8270E m
PAH in Soil by GC/MS	3	2018/09/14	2018/09/17	AB SOP-00036 / AB SOP-00003	EPA 3540C/8270E m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

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

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam 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 Maxxam, unless otherwise agreed in writing. Maxxam 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 Maxxam, 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.

Your Project #: Campobello job# B8N5673

Attention: Alisha Williamson
MAXXAM ANALYTICS
CAMPOBELLO
6740 CAMPOBELLO ROAD
MISSISSAUGA, ON
CANADA L5N 2L8

Report Date: 2018/09/17
Report #: R2620368
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B877742
Received: 2018/09/11, 18:01

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Omran Desouki, Junior Project Manager
Email: ODesouki@maxxam.ca
Phone# (403) 291-3077

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This report has been generated and distributed using a secure automated process.
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B877742
Report Date: 2018/09/17

MAXXAM ANALYTICS
Client Project #: Campobello job# B8N5673

PHYSICAL TESTING (SOIL)

Maxxam ID		UG9878		UG9879		UG9880		UG9881	UG9882		
Sampling Date		2018/09/07		2018/09/07		2018/09/07		2018/09/07	2018/09/07		
	UNITS	S-1	QC Batch	S-2	QC Batch	S-3	QC Batch	S-4	S-5	RDL	QC Batch
Physical Properties											
Moisture	%	13	9142403	13	9142390	18	9142403	14	46	0.30	9142390
RDL = Reportable Detection Limit											

Maxxam ID		UG9883		UG9884	UG9885	UG9886		
Sampling Date		2018/09/07		2018/09/07	2018/09/07	2018/09/07		
	UNITS	S-6	QC Batch	S-7	S-8	S-9	RDL	QC Batch
Physical Properties								
Moisture	%	9.1	9142390	12	12	8.0	0.30	9142403
RDL = Reportable Detection Limit								

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Maxxam Job #: B877742
Report Date: 2018/09/17

MAXXAM ANALYTICS
Client Project #: Campobello job# B8N5673

SEMIVOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		UG9878	UG9879	UG9880	UG9881	UG9882	UG9883		
Sampling Date		2018/09/07	2018/09/07	2018/09/07	2018/09/07	2018/09/07	2018/09/07		
	UNITS	S-1	S-2	S-3	S-4	S-5	S-6	RDL	QC Batch
Polycyclic Aromatics									
Index of Additive Cancer Risk(IACR)	N/A	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	9141779
Acenaphthene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	9142294
Benzo[a]pyrene equivalency	mg/kg	<0.0071	<0.0071	<0.0071	<0.0071	<0.0071	<0.0071	0.0071	9141783
Acenaphthylene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	9142294
Acridine	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	9142294
Anthracene	mg/kg	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	0.0040	9142294
Benzo(a)anthracene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	9142294
Benzo(b&j)fluoranthene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	9142294
Benzo(k)fluoranthene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	9142294
Benzo(g,h,i)perylene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	9142294
Benzo(c)phenanthrene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	9142294
Benzo(a)pyrene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	9142294
Benzo[e]pyrene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	9142294
Chrysene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	9142294
Dibenz(a,h)anthracene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	9142294
Fluoranthene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	9142294
Fluorene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	9142294
Indeno(1,2,3-cd)pyrene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	9142294
1-Methylnaphthalene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	9142294
2-Methylnaphthalene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	9142294
Naphthalene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	9142294
Phenanthrene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	9142294
Perylene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	9142294
Pyrene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	9142294
Quinoline	mg/kg	<0.010	<0.010	<0.010	<0.010	0.025	0.021	0.010	9142294
Surrogate Recovery (%)									
D10-ANTHRACENE (sur.)	%	95	109	104	103	91	109		9142294
D8-ACENAPHTHYLENE (sur.)	%	85	96	92	95	85	93		9142294
D8-NAPHTHALENE (sur.)	%	80	89	87	90	81	87		9142294
TERPHENYL-D14 (sur.)	%	87	100	96	96	87	98		9142294
RDL = Reportable Detection Limit									

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Maxxam Job #: B877742
Report Date: 2018/09/17

MAXXAM ANALYTICS
Client Project #: Campobello job# B8N5673

SEMIVOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		UG9884	UG9885	UG9886		
Sampling Date		2018/09/07	2018/09/07	2018/09/07		
	UNITS	S-7	S-8	S-9	RDL	QC Batch
Polycyclic Aromatics						
Index of Additive Cancer Risk(IACR)	N/A	<0.10	<0.10	<0.10	0.10	9141779
Acenaphthene	mg/kg	<0.0050	<0.0050	<0.0050	0.0050	9143234
Benzo[a]pyrene equivalency	mg/kg	<0.0071	<0.0071	<0.0071	0.0071	9141783
Acenaphthylene	mg/kg	<0.0050	<0.0050	<0.0050	0.0050	9143234
Acridine	mg/kg	<0.010	<0.010	<0.010	0.010	9143234
Anthracene	mg/kg	<0.0040	<0.0040	<0.0040	0.0040	9143234
Benzo(a)anthracene	mg/kg	<0.0050	<0.0050	<0.0050	0.0050	9143234
Benzo(b&j)fluoranthene	mg/kg	<0.0050	<0.0050	<0.0050	0.0050	9143234
Benzo(k)fluoranthene	mg/kg	<0.0050	<0.0050	<0.0050	0.0050	9143234
Benzo(g,h,i)perylene	mg/kg	<0.0050	<0.0050	<0.0050	0.0050	9143234
Benzo(c)phenanthrene	mg/kg	<0.0050	<0.0050	<0.0050	0.0050	9143234
Benzo(a)pyrene	mg/kg	<0.0050	<0.0050	<0.0050	0.0050	9143234
Benzo[e]pyrene	mg/kg	<0.0050	<0.0050	<0.0050	0.0050	9143234
Chrysene	mg/kg	<0.0050	<0.0050	<0.0050	0.0050	9143234
Dibenz(a,h)anthracene	mg/kg	<0.0050	<0.0050	<0.0050	0.0050	9143234
Fluoranthene	mg/kg	<0.0050	<0.0050	<0.0050	0.0050	9143234
Fluorene	mg/kg	<0.0050	<0.0050	<0.0050	0.0050	9143234
Indeno(1,2,3-cd)pyrene	mg/kg	<0.0050	<0.0050	<0.0050	0.0050	9143234
1-Methylnaphthalene	mg/kg	<0.0050	<0.0050	<0.0050	0.0050	9143234
2-Methylnaphthalene	mg/kg	<0.0050	<0.0050	<0.0050	0.0050	9143234
Naphthalene	mg/kg	<0.0050	<0.0050	<0.0050	0.0050	9143234
Phenanthrene	mg/kg	<0.0050	<0.0050	<0.0050	0.0050	9143234
Perylene	mg/kg	<0.0050	<0.0050	<0.0050	0.0050	9143234
Pyrene	mg/kg	<0.0050	<0.0050	<0.0050	0.0050	9143234
Quinoline	mg/kg	<0.010	<0.010	<0.010	0.010	9143234
Surrogate Recovery (%)						
D10-ANTHRACENE (sur.)	%	100	99	96		9143234
D8-ACENAPHTHYLENE (sur.)	%	97	95	93		9143234
D8-NAPHTHALENE (sur.)	%	84	83	80		9143234
TERPHENYL-D14 (sur.)	%	100	99	96		9143234
RDL = Reportable Detection Limit						

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Maxxam Job #: B877742
Report Date: 2018/09/17

MAXXAM ANALYTICS
Client Project #: Campobello job# B8N5673

TEST SUMMARY

Maxxam ID: UG9878
Sample ID: S-1
Matrix: Soil

Collected: 2018/09/07
Shipped:
Received: 2018/09/11

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	9142403	N/A	2018/09/14	Naresh Salhan
Index of Additive Cancer Risk	GC/MSD	9141779	N/A	2018/09/17	Report Automation Engine
Benzo[a]pyrene Equivalency	GC/MSD	9141783	N/A	2018/09/17	Report Automation Engine
PAH in Soil by GC/MS	GC/MS	9142294	2018/09/13	2018/09/17	Jingyuan Song

Maxxam ID: UG9879
Sample ID: S-2
Matrix: Soil

Collected: 2018/09/07
Shipped:
Received: 2018/09/11

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	9142390	N/A	2018/09/14	Naresh Salhan
Index of Additive Cancer Risk	GC/MSD	9141779	N/A	2018/09/17	Automated Statchk
Benzo[a]pyrene Equivalency	GC/MSD	9141783	N/A	2018/09/17	Report Automation Engine
PAH in Soil by GC/MS	GC/MS	9142294	2018/09/13	2018/09/17	Jingyuan Song

Maxxam ID: UG9880
Sample ID: S-3
Matrix: Soil

Collected: 2018/09/07
Shipped:
Received: 2018/09/11

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	9142403	N/A	2018/09/14	Naresh Salhan
Index of Additive Cancer Risk	GC/MSD	9141779	N/A	2018/09/17	Automated Statchk
Benzo[a]pyrene Equivalency	GC/MSD	9141783	N/A	2018/09/17	Automated Statchk
PAH in Soil by GC/MS	GC/MS	9142294	2018/09/13	2018/09/17	Jingyuan Song

Maxxam ID: UG9881
Sample ID: S-4
Matrix: Soil

Collected: 2018/09/07
Shipped:
Received: 2018/09/11

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	9142390	N/A	2018/09/14	Naresh Salhan
Index of Additive Cancer Risk	GC/MSD	9141779	N/A	2018/09/17	Report Automation Engine
Benzo[a]pyrene Equivalency	GC/MSD	9141783	N/A	2018/09/17	Report Automation Engine
PAH in Soil by GC/MS	GC/MS	9142294	2018/09/13	2018/09/17	Jingyuan Song

Maxxam ID: UG9882
Sample ID: S-5
Matrix: Soil

Collected: 2018/09/07
Shipped:
Received: 2018/09/11

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	9142390	N/A	2018/09/14	Naresh Salhan
Index of Additive Cancer Risk	GC/MSD	9141779	N/A	2018/09/17	Report Automation Engine
Benzo[a]pyrene Equivalency	GC/MSD	9141783	N/A	2018/09/17	Automated Statchk
PAH in Soil by GC/MS	GC/MS	9142294	2018/09/13	2018/09/17	Jingyuan Song

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Maxxam Job #: B877742
Report Date: 2018/09/17

MAXXAM ANALYTICS
Client Project #: Campobello job# B8N5673

TEST SUMMARY

Maxxam ID: UG9883
Sample ID: S-6
Matrix: Soil

Collected: 2018/09/07
Shipped:
Received: 2018/09/11

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	9142390	N/A	2018/09/14	Naresh Salhan
Index of Additive Cancer Risk	GC/MSD	9141779	N/A	2018/09/17	Report Automation Engine
Benzo[a]pyrene Equivalency	GC/MSD	9141783	N/A	2018/09/17	Report Automation Engine
PAH in Soil by GC/MS	GC/MS	9142294	2018/09/13	2018/09/17	Jingyuan Song

Maxxam ID: UG9884
Sample ID: S-7
Matrix: Soil

Collected: 2018/09/07
Shipped:
Received: 2018/09/11

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	9142403	N/A	2018/09/14	Naresh Salhan
Index of Additive Cancer Risk	GC/MSD	9141779	N/A	2018/09/17	Report Automation Engine
Benzo[a]pyrene Equivalency	GC/MSD	9141783	N/A	2018/09/17	Report Automation Engine
PAH in Soil by GC/MS	GC/MS	9143234	2018/09/14	2018/09/17	Jingyuan Song

Maxxam ID: UG9885
Sample ID: S-8
Matrix: Soil

Collected: 2018/09/07
Shipped:
Received: 2018/09/11

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	9142403	N/A	2018/09/14	Naresh Salhan
Index of Additive Cancer Risk	GC/MSD	9141779	N/A	2018/09/17	Automated Statchk
Benzo[a]pyrene Equivalency	GC/MSD	9141783	N/A	2018/09/17	Report Automation Engine
PAH in Soil by GC/MS	GC/MS	9143234	2018/09/14	2018/09/17	Jingyuan Song

Maxxam ID: UG9886
Sample ID: S-9
Matrix: Soil

Collected: 2018/09/07
Shipped:
Received: 2018/09/11

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	9142403	N/A	2018/09/14	Naresh Salhan
Index of Additive Cancer Risk	GC/MSD	9141779	N/A	2018/09/17	Report Automation Engine
Benzo[a]pyrene Equivalency	GC/MSD	9141783	N/A	2018/09/17	Report Automation Engine
PAH in Soil by GC/MS	GC/MS	9143234	2018/09/14	2018/09/17	Jingyuan Song

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Maxxam Job #: B877742
Report Date: 2018/09/17

MAXXAM ANALYTICS
Client Project #: Campobello job# B8N5673

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	4.3°C

Results relate only to the items tested.

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Maxxam Job #: B877742
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QUALITY ASSURANCE REPORT

MAXXAM ANALYTICS
Client Project #: Campobello job# B8N5673

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9142294	D10-ANTHRACENE (sur.)	2018/09/16	102	50 - 130	101	50 - 130	104	%		
9142294	D8-ACENAPHTHYLENE (sur.)	2018/09/16	94	50 - 130	88	50 - 130	88	%		
9142294	D8-NAPHTHALENE (sur.)	2018/09/16	87	50 - 130	84	50 - 130	86	%		
9142294	TERPHENYL-D14 (sur.)	2018/09/16	98	50 - 130	98	50 - 130	98	%		
9143234	D10-ANTHRACENE (sur.)	2018/09/16	85	50 - 130	94	50 - 130	99	%		
9143234	D8-ACENAPHTHYLENE (sur.)	2018/09/16	82	50 - 130	91	50 - 130	96	%		
9143234	D8-NAPHTHALENE (sur.)	2018/09/16	73	50 - 130	81	50 - 130	84	%		
9143234	TERPHENYL-D14 (sur.)	2018/09/16	87	50 - 130	95	50 - 130	98	%		
9142294	1-Methylnaphthalene	2018/09/17	95	50 - 130	85	50 - 130	<0.0050	mg/kg	NC (2)	50
9142294	2-Methylnaphthalene	2018/09/17	91	50 - 130	80	50 - 130	<0.0050	mg/kg	NC (2)	50
9142294	Acenaphthene	2018/09/17	96	50 - 130	88	50 - 130	<0.0050	mg/kg	NC (2)	50
9142294	Acenaphthylene	2018/09/17	94	50 - 130	86	50 - 130	<0.0050	mg/kg	47 (2)	50
9142294	Acridine	2018/09/17	60	50 - 130	71	50 - 130	<0.010	mg/kg	127 (1,2)	50
9142294	Anthracene	2018/09/17	67	50 - 130	90	50 - 130	<0.0040	mg/kg	165 (1,2)	50
9142294	Benzo(a)anthracene	2018/09/17	44 (1)	50 - 130	95	50 - 130	<0.0050	mg/kg	161 (1,2)	50
9142294	Benzo(a)pyrene	2018/09/17	52	50 - 130	98	50 - 130	<0.0050	mg/kg	147 (1,2)	50
9142294	Benzo(b&j)fluoranthene	2018/09/17	71	50 - 130	89	50 - 130	<0.0050	mg/kg	146 (1,2)	50
9142294	Benzo(c)phenanthrene	2018/09/17	101	50 - 130	94	50 - 130	<0.0050	mg/kg	156 (1,2)	50
9142294	Benzo(g,h,i)perylene	2018/09/17	74	50 - 130	90	50 - 130	<0.0050	mg/kg	121 (1,2)	50
9142294	Benzo(k)fluoranthene	2018/09/17	92	50 - 130	108	50 - 130	<0.0050	mg/kg	150 (1,2)	50
9142294	Benzo[e]pyrene	2018/09/17	67	50 - 130	88	50 - 130	<0.0050	mg/kg	126 (1,2)	50
9142294	Chrysene	2018/09/17	63	50 - 130	102	50 - 130	<0.0050	mg/kg	159 (1,2)	50
9142294	Dibenz(a,h)anthracene	2018/09/17	103	50 - 130	96	50 - 130	<0.0050	mg/kg	127 (1,2)	50
9142294	Fluoranthene	2018/09/17	NC	50 - 130	101	50 - 130	<0.0050	mg/kg	167 (1,2)	50
9142294	Fluorene	2018/09/17	98	50 - 130	92	50 - 130	<0.0050	mg/kg	151 (1,2)	50
9142294	Indeno(1,2,3-cd)pyrene	2018/09/17	67	50 - 130	79	50 - 130	<0.0050	mg/kg	128 (1,2)	50
9142294	Naphthalene	2018/09/17	89	50 - 130	80	50 - 130	<0.0050	mg/kg	NC (2)	50
9142294	Perylene	2018/09/17	90	50 - 130	89	50 - 130	<0.0050	mg/kg	126 (1,2)	50
9142294	Phenanthrene	2018/09/17	94	50 - 130	91	50 - 130	<0.0050	mg/kg	92 (1,2)	50
9142294	Pyrene	2018/09/17	NC	50 - 130	98	50 - 130	<0.0050	mg/kg	159 (1,2)	50
9142294	Quinoline	2018/09/17	109	50 - 130	101	50 - 130	<0.010	mg/kg	NC (2)	50
9142390	Moisture	2018/09/14					<0.30	%	1.8 (2)	20

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QUALITY ASSURANCE REPORT(CONT'D)

MAXXAM ANALYTICS
Client Project #: Campobello job# B8N5673

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9142403	Moisture	2018/09/14					<0.30	%	6.1 (2)	20
9143234	1-Methylnaphthalene	2018/09/16	80	50 - 130	87	50 - 130	<0.0050	mg/kg	NC (2)	50
9143234	2-Methylnaphthalene	2018/09/16	74	50 - 130	82	50 - 130	<0.0050	mg/kg	NC (2)	50
9143234	Acenaphthene	2018/09/16	84	50 - 130	93	50 - 130	<0.0050	mg/kg	NC (2)	50
9143234	Acenaphthylene	2018/09/16	83	50 - 130	92	50 - 130	<0.0050	mg/kg	NC (2)	50
9143234	Acridine	2018/09/16	61	50 - 130	67	50 - 130	<0.010	mg/kg	NC (2)	50
9143234	Anthracene	2018/09/16	82	50 - 130	89	50 - 130	<0.0040	mg/kg	NC (2)	50
9143234	Benzo(a)anthracene	2018/09/16	101	50 - 130	112	50 - 130	<0.0050	mg/kg	NC (2)	50
9143234	Benzo(a)pyrene	2018/09/16	95	50 - 130	102	50 - 130	<0.0050	mg/kg	NC (2)	50
9143234	Benzo(b&j)fluoranthene	2018/09/16	92	50 - 130	100	50 - 130	<0.0050	mg/kg	NC (2)	50
9143234	Benzo(c)phenanthrene	2018/09/16	89	50 - 130	99	50 - 130	<0.0050	mg/kg	NC (2)	50
9143234	Benzo(g,h,i)perylene	2018/09/16	85	50 - 130	100	50 - 130	<0.0050	mg/kg	20 (2)	50
9143234	Benzo(k)fluoranthene	2018/09/16	95	50 - 130	106	50 - 130	<0.0050	mg/kg	NC (2)	50
9143234	Benzo[e]pyrene	2018/09/16	94	50 - 130	104	50 - 130	<0.0050	mg/kg	NC (2)	50
9143234	Chrysene	2018/09/16	93	50 - 130	101	50 - 130	<0.0050	mg/kg	NC (2)	50
9143234	Dibenz(a,h)anthracene	2018/09/16	99	50 - 130	112	50 - 130	<0.0050	mg/kg	NC (2)	50
9143234	Fluoranthene	2018/09/16	96	50 - 130	106	50 - 130	<0.0050	mg/kg	NC (2)	50
9143234	Fluorene	2018/09/16	90	50 - 130	100	50 - 130	<0.0050	mg/kg	NC (2)	50
9143234	Indeno(1,2,3-cd)pyrene	2018/09/16	103	50 - 130	117	50 - 130	<0.0050	mg/kg	NC (2)	50
9143234	Naphthalene	2018/09/16	72	50 - 130	80	50 - 130	<0.0050	mg/kg	NC (2)	50
9143234	Perylene	2018/09/16	79	50 - 130	91	50 - 130	<0.0050	mg/kg	22 (2)	50
9143234	Phenanthrene	2018/09/16	82	50 - 130	91	50 - 130	<0.0050	mg/kg	NC (2)	50
9143234	Pyrene	2018/09/16	90	50 - 130	100	50 - 130	<0.0050	mg/kg	NC (2)	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
9143234	Quinoline	2018/09/16	110	50 - 130	108	50 - 130	<0.010	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 (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 or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

(2) Duplicate Parent ID

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Maxxam Job #: B877742
Report Date: 2018/09/17

MAXXAM ANALYTICS
Client Project #: Campobello job# B8N5673

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Dennis Ngondu, B.Sc., P.Chem., QP, Supervisor, Organics

Michael Sheppard, B.Sc., P. Biol., QP, Senior Scientific Specialist, Organics

Jingyuan Song, QP, Organics – Senior Analyst

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Maxxam
A Bureau Veritas Group Company

Your Project #: OTT-00248813-AO
Site Location: IQALUIT-NEW LANDFILL
Your C.O.C. #: 681097-08-01

Attention: Robert Renaud

exp Services Inc
Ottawa Branch
100-2650 Queensview Drive
Ottawa, ON
CANADA K2B 8H6

Report Date: 2018/10/11
Report #: R5436414
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B8N5673
Received: 2018/09/10, 13:00

Sample Matrix: Soil
Samples Received: 9

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Hot Water Extractable Boron (1)	9	2018/09/12	2018/09/12	CAM SOP-00408	R153 Ana. Prot. 2011
1,3-Dichloropropene Sum (1)	9	N/A	2018/09/14		EPA 8260C m
Free (WAD) Cyanide (1)	9	2018/09/13	2018/09/14	CAM SOP-00457	OMOE E3015 m
Conductivity (1)	9	2018/09/14	2018/09/14	CAM SOP-00414	OMOE E3530 v1 m
Hexavalent Chromium in Soil by IC (1, 3)	9	2018/09/13	2018/09/17	CAM SOP-00436	EPA 3060/7199 m
Petroleum Hydrocarbons F2-F4 in Soil (1, 4)	9	2018/09/12	2018/09/12	CAM SOP-00316	CCME CWS m
Soluble Fluoride analysis in Soil (1)	9	2018/09/14	2018/09/14	CAM SOP-00449	SM 23 4500 F C m
Strong Acid Leachable Metals by ICPMS (1)	9	2018/09/12	2018/09/12	CAM SOP-00447	EPA 6020B m
Moisture (Subcontracted) (2, 5)	9	N/A	2018/09/14		
CCME Index of Additive Cancer Risk (2, 6)	9	2018/09/11	2018/09/17		CCME PHC-CWS
B[a]P Total Potency Equivalent (2)	9	N/A	2018/09/17		CCME
PAH in Soil by GC/MS (2)	6	2018/09/13	2018/09/17	AB SOP-00036/AB SOP-00003	EPA 3540C/8270E m
PAH in Soil by GC/MS (2)	3	2018/09/14	2018/09/17	AB SOP-00036/AB SOP-00003	EPA 3540C/8270E m
Moisture (1)	9	N/A	2018/09/12	CAM SOP-00445	Carter 2nd ed 51.2 m
pH CaCl2 EXTRACT (1)	9	2018/09/13	2018/09/13	CAM SOP-00413	EPA 9045 D m
Sodium Adsorption Ratio (SAR) (1)	9	N/A	2018/09/14	CAM SOP-00102	EPA 6010C
Volatile Organic Compounds and F1 PHCs (1)	9	N/A	2018/09/14	CAM SOP-00230	EPA 8260 m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

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

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report.

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Your Project #: OTT-00248813-AO
Site Location: IQALUIT-NEW LANDFILL
Your C.O.C. #: 681097-08-01

Attention: Robert Renaud

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CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B8N5673
Received: 2018/09/10, 13:00

Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing. Maxxam 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 Maxxam, 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 Maxxam Analytics Mississauga
(2) This test was performed by Campo to Calgary - Offsite
(3) Soils are reported on a dry weight basis unless otherwise specified.
(4) All CCME PHC results met required criteria unless otherwise stated in the report. The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following "Alberta Environment's Interpretation of the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil Validation of Performance-Based Alternative Methods September 2003". Documentation is available upon request. Modifications from Reference Method for the Canada-wide Standard for Petroleum Hydrocarbons in Soil-Tier 1 Method: F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction.
(5) Offsite analysis requires that subcontracted moisture be reported.
(6) Total PAHs include only those PAHs specified in the sewer use by-by-law.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Alisha Williamson, Project Manager
Email: AWilliamson@maxxam.ca
Phone# (613) 274-0573

==========

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Maxxam Job #: B8N5673
Report Date: 2018/10/11

exp Services Inc
Client Project #: OTT-00248813-AO
Site Location: IQALUIT-NEW LANDFILL
Sampler Initials: LM

RESULTS OF ANALYSES OF SOIL

Maxxam ID		HSF639			HSF640			HSF640		
Sampling Date		2018/09/07			2018/09/07			2018/09/07		
COC Number		681097-08-01			681097-08-01			681097-08-01		
	UNITS	S-1	RDL	QC Batch	S-2	RDL	QC Batch	S-2 Lab-Dup	RDL	QC Batch
Calculated Parameters										
Sodium Adsorption Ratio	N/A	0.53		5725186	0.51		5725186			
Inorganics										
Conductivity	mS/cm	0.029	0.002	5729481	0.028	0.002	5729481			
Fluoride (F-)	ug/g	<5	5	5729698	<5	5	5729698	<5	5	5729698
Moisture	%	17	1.0	5727388	15	1.0	5727388			
Available (CaCl2) pH	pH	5.61		5727391	5.20		5727391			
WAD Cyanide (Free)	ug/g	0.02	0.02	5729058	0.02	0.01	5729058			
Physical Testing										
Moisture-Subcontracted	%	13	0.30	5735773	13	0.30	5736083			

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

Maxxam ID		HSF641		HSF642	HSF643	HSF644		
Sampling Date		2018/09/07		2018/09/07	2018/09/07	2018/09/07		
COC Number		681097-08-01		681097-08-01	681097-08-01	681097-08-01		
	UNITS	S-3	QC Batch	S-4	S-5	S-6	RDL	QC Batch
Calculated Parameters								
Sodium Adsorption Ratio	N/A	0.50	5725186	0.41	0.36	1.8		5725186
Inorganics								
Conductivity	mS/cm	0.031	5729481	0.047	0.069	0.010	0.002	5729481
Fluoride (F-)	ug/g	<5	5729698	<5	<5	<5	5	5729698
Moisture	%	16	5727388	15	28	7.3	1.0	5727388
Available (CaCl2) pH	pH	5.69	5727391	6.27	6.16	4.07		5727391
WAD Cyanide (Free)	ug/g	0.03	5729058	0.02	0.04	0.03	0.01	5729058
Physical Testing								
Moisture-Subcontracted	%	18	5735773	14	46	9.1	0.30	5736083

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B8N5673
Report Date: 2018/10/11

exp Services Inc
Client Project #: OTT-00248813-AO
Site Location: IQALUIT-NEW LANDFILL
Sampler Initials: LM

RESULTS OF ANALYSES OF SOIL

Maxxam ID		HSF645			HSF645			HSF646	HSF647		
Sampling Date		2018/09/07			2018/09/07			2018/09/07	2018/09/07		
COC Number		681097-08-01			681097-08-01			681097-08-01	681097-08-01		
	UNITS	S-7	RDL	QC Batch	S-7 Lab-Dup	RDL	QC Batch	S-8	S-9	RDL	QC Batch
Calculated Parameters											
Sodium Adsorption Ratio	N/A	1.6		5725186				1.3	1.5		5725186
Inorganics											
Conductivity	mS/cm	0.014	0.002	5729481				0.017	0.017	0.002	5729481
Fluoride (F-)	ug/g	<5	5	5729698				<5	<5	5	5729698
Moisture	%	10	1.0	5727388				9.8	11	1.0	5727388
Available (CaCl2) pH	pH	4.38		5727391				4.49	4.16		5727391
WAD Cyanide (Free)	ug/g	0.02	0.02	5729058	0.02	0.02	5729058	0.07	0.03	0.02	5729058
Physical Testing											
Moisture-Subcontracted	%	12	0.30	5735773				12	8.0	0.30	5735773

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

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Maxxam Job #: B8N5673
Report Date: 2018/10/11

exp Services Inc
Client Project #: OTT-00248813-AO
Site Location: IQALUIT-NEW LANDFILL
Sampler Initials: LM

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		HSF639			HSF639			HSF640		
Sampling Date		2018/09/07			2018/09/07			2018/09/07		
COC Number		681097-08-01			681097-08-01			681097-08-01		
	UNITS	S-1	RDL	QC Batch	S-1 Lab-Dup	RDL	QC Batch	S-2	RDL	QC Batch
Inorganics										
Chromium (VI)	ug/g	<0.2	0.2	5729456	<0.2	0.2	5729456	<0.2	0.2	5729456
Metals										
Hot Water Ext. Boron (B)	ug/g	0.13	0.050	5727027				0.089	0.050	5727027
Acid Extractable Antimony (Sb)	ug/g	<0.20	0.20	5727411				<0.20	0.20	5727411
Acid Extractable Arsenic (As)	ug/g	<1.0	1.0	5727411				<1.0	1.0	5727411
Acid Extractable Barium (Ba)	ug/g	35	0.50	5727411				43	0.50	5727411
Acid Extractable Beryllium (Be)	ug/g	0.27	0.20	5727411				0.28	0.20	5727411
Acid Extractable Boron (B)	ug/g	<5.0	5.0	5727411				<5.0	5.0	5727411
Acid Extractable Cadmium (Cd)	ug/g	<0.10	0.10	5727411				<0.10	0.10	5727411
Acid Extractable Chromium (Cr)	ug/g	29	1.0	5727411				55	1.0	5727411
Acid Extractable Cobalt (Co)	ug/g	6.1	0.10	5727411				7.7	0.10	5727411
Acid Extractable Copper (Cu)	ug/g	6.7	0.50	5727411				9.4	0.50	5727411
Acid Extractable Lead (Pb)	ug/g	4.0	1.0	5727411				4.7	1.0	5727411
Acid Extractable Molybdenum (Mo)	ug/g	0.68	0.50	5727411				0.61	0.50	5727411
Acid Extractable Nickel (Ni)	ug/g	9.6	0.50	5727411				20	0.50	5727411
Acid Extractable Selenium (Se)	ug/g	<0.50	0.50	5727411				<0.50	0.50	5727411
Acid Extractable Silver (Ag)	ug/g	<0.20	0.20	5727411				<0.20	0.20	5727411
Acid Extractable Thallium (Tl)	ug/g	<0.050	0.050	5727411				0.052	0.050	5727411
Acid Extractable Tin (Sn)	ug/g	<1.0	1.0	5727411				<1.0	1.0	5727411
Acid Extractable Uranium (U)	ug/g	0.62	0.050	5727411				0.59	0.050	5727411
Acid Extractable Vanadium (V)	ug/g	52	5.0	5727411				53	5.0	5727411
Acid Extractable Zinc (Zn)	ug/g	34	5.0	5727411				42	5.0	5727411
Acid Extractable Mercury (Hg)	ug/g	<0.050	0.050	5727411				<0.050	0.050	5727411

RDL = Reportable Detection Limit
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Maxxam Job #: B8N5673
Report Date: 2018/10/11

exp Services Inc
Client Project #: OTT-00248813-AO
Site Location: IQALUIT-NEW LANDFILL
Sampler Initials: LM

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		HSF641	HSF642		HSF643		HSF644		
Sampling Date		2018/09/07	2018/09/07		2018/09/07		2018/09/07		
COC Number		681097-08-01	681097-08-01		681097-08-01		681097-08-01		
	UNITS	S-3	S-4	QC Batch	S-5	QC Batch	S-6	RDL	QC Batch
Inorganics									
Chromium (VI)	ug/g	<0.2	<0.2	5729456	<0.2	5729456	<0.2	0.2	5729456
Metals									
Hot Water Ext. Boron (B)	ug/g	0.13	0.19	5727027	0.23	5726811	<0.050	0.050	5727027
Acid Extractable Antimony (Sb)	ug/g	<0.20	<0.20	5727411	<0.20	5727411	<0.20	0.20	5727411
Acid Extractable Arsenic (As)	ug/g	<1.0	1.3	5727411	<1.0	5727411	<1.0	1.0	5727411
Acid Extractable Barium (Ba)	ug/g	66	60	5727411	72	5727411	30	0.50	5727411
Acid Extractable Beryllium (Be)	ug/g	0.34	0.36	5727411	0.35	5727411	<0.20	0.20	5727411
Acid Extractable Boron (B)	ug/g	<5.0	<5.0	5727411	<5.0	5727411	<5.0	5.0	5727411
Acid Extractable Cadmium (Cd)	ug/g	<0.10	<0.10	5727411	0.22	5727411	<0.10	0.10	5727411
Acid Extractable Chromium (Cr)	ug/g	30	35	5727411	21	5727411	24	1.0	5727411
Acid Extractable Cobalt (Co)	ug/g	7.9	8.3	5727411	8.2	5727411	7.6	0.10	5727411
Acid Extractable Copper (Cu)	ug/g	10	18	5727411	21	5727411	8.6	0.50	5727411
Acid Extractable Lead (Pb)	ug/g	5.2	5.3	5727411	6.4	5727411	4.2	1.0	5727411
Acid Extractable Molybdenum (Mo)	ug/g	0.57	0.64	5727411	0.56	5727411	1.2	0.50	5727411
Acid Extractable Nickel (Ni)	ug/g	12	14	5727411	14	5727411	7.0	0.50	5727411
Acid Extractable Selenium (Se)	ug/g	<0.50	<0.50	5727411	<0.50	5727411	<0.50	0.50	5727411
Acid Extractable Silver (Ag)	ug/g	<0.20	<0.20	5727411	<0.20	5727411	<0.20	0.20	5727411
Acid Extractable Thallium (Tl)	ug/g	0.069	0.070	5727411	0.096	5727411	0.052	0.050	5727411
Acid Extractable Tin (Sn)	ug/g	<1.0	<1.0	5727411	<1.0	5727411	<1.0	1.0	5727411
Acid Extractable Uranium (U)	ug/g	0.58	0.73	5727411	1.4	5727411	0.33	0.050	5727411
Acid Extractable Vanadium (V)	ug/g	55	55	5727411	30	5727411	58	5.0	5727411
Acid Extractable Zinc (Zn)	ug/g	41	56	5727411	58	5727411	36	5.0	5727411
Acid Extractable Mercury (Hg)	ug/g	<0.050	<0.050	5727411	<0.050	5727411	<0.050	0.050	5727411

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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A Bureau Veritas Group Company

Maxxam Job #: B8N5673
Report Date: 2018/10/11

exp Services Inc
Client Project #: OTT-00248813-AO
Site Location: IQALUIT-NEW LANDFILL
Sampler Initials: LM

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		HSF645		HSF646	HSF647		
Sampling Date		2018/09/07		2018/09/07	2018/09/07		
COC Number		681097-08-01		681097-08-01	681097-08-01		
	UNITS	S-7	QC Batch	S-8	S-9	RDL	QC Batch
Inorganics							
Chromium (VI)	ug/g	<0.2	5729456	<0.2	<0.2	0.2	5729456
Metals							
Hot Water Ext. Boron (B)	ug/g	0.062	5727027	<0.050	0.056	0.050	5726811
Acid Extractable Antimony (Sb)	ug/g	<0.20	5727411	<0.20	<0.20	0.20	5727411
Acid Extractable Arsenic (As)	ug/g	<1.0	5727411	2.7	<1.0	1.0	5727411
Acid Extractable Barium (Ba)	ug/g	23	5727411	51	25	0.50	5727411
Acid Extractable Beryllium (Be)	ug/g	<0.20	5727411	0.40	<0.20	0.20	5727411
Acid Extractable Boron (B)	ug/g	<5.0	5727411	<5.0	<5.0	5.0	5727411
Acid Extractable Cadmium (Cd)	ug/g	<0.10	5727411	<0.10	<0.10	0.10	5727411
Acid Extractable Chromium (Cr)	ug/g	22	5727411	33	25	1.0	5727411
Acid Extractable Cobalt (Co)	ug/g	5.8	5727411	8.2	5.5	0.10	5727411
Acid Extractable Copper (Cu)	ug/g	6.5	5727411	11	7.2	0.50	5727411
Acid Extractable Lead (Pb)	ug/g	2.6	5727411	5.3	4.3	1.0	5727411
Acid Extractable Molybdenum (Mo)	ug/g	0.80	5727411	0.95	1.3	0.50	5727411
Acid Extractable Nickel (Ni)	ug/g	6.3	5727411	16	6.1	0.50	5727411
Acid Extractable Selenium (Se)	ug/g	<0.50	5727411	<0.50	<0.50	0.50	5727411
Acid Extractable Silver (Ag)	ug/g	<0.20	5727411	<0.20	<0.20	0.20	5727411
Acid Extractable Thallium (Tl)	ug/g	<0.050	5727411	0.061	<0.050	0.050	5727411
Acid Extractable Tin (Sn)	ug/g	<1.0	5727411	<1.0	<1.0	1.0	5727411
Acid Extractable Uranium (U)	ug/g	0.24	5727411	0.59	0.42	0.050	5727411
Acid Extractable Vanadium (V)	ug/g	56	5727411	52	56	5.0	5727411
Acid Extractable Zinc (Zn)	ug/g	23	5727411	37	28	5.0	5727411
Acid Extractable Mercury (Hg)	ug/g	<0.050	5727411	<0.050	<0.050	0.050	5727411

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Maxxam Job #: B8N5673
Report Date: 2018/10/11

exp Services Inc
Client Project #: OTT-00248813-AO
Site Location: IQALUIT-NEW LANDFILL
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SEMI-VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		HSF639	HSF640	HSF641	HSF642	HSF643		
Sampling Date		2018/09/07	2018/09/07	2018/09/07	2018/09/07	2018/09/07		
COC Number		681097-08-01	681097-08-01	681097-08-01	681097-08-01	681097-08-01		
	UNITS	S-1	S-2	S-3	S-4	S-5	RDL	QC Batch
Calculated Parameters								
Index of Additive Cancer Risk -IACR	N/A	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	5736080
Polyaromatic Hydrocarbons								
Acenaphthene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	5736082
Benzo(a)pyrene Total Potency Equiv.	mg/kg	<0.0071	<0.0071	<0.0071	<0.0071	<0.0071	0.0071	5736081
Acenaphthylene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	5736082
Acridine	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	5736082
Anthracene	mg/kg	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	0.0040	5736082
Benzo(a)anthracene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	5736082
Benzo(b/j)fluoranthene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	5736082
Benzo(k)fluoranthene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	5736082
Benzo(g,h,i)perylene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	5736082
Benzo(c)phenanthrene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	5736082
Benzo(a)pyrene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	5736082
Benzo(e)pyrene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	5736082
Chrysene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	5736082
Dibenz(a,h)anthracene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	5736082
Fluoranthene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	5736082
Fluorene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	5736082
Indeno(1,2,3-cd)pyrene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	5736082
1-Methylnaphthalene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	5736082
2-Methylnaphthalene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	5736082
Naphthalene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	5736082
Phenanthrene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	5736082
Perylene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	5736082
Pyrene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	5736082
Quinoline	mg/kg	<0.010	<0.010	<0.010	<0.010	0.025	0.010	5736082
Surrogate Recovery (%)								
D10-Anthracene	%	95	109	104	103	91		5736082
D14-Terphenyl	%	87	100	96	96	87		5736082
D8-Acenaphthylene	%	85	96	92	95	85		5736082
D8-Naphthalene	%	80	89	87	90	81		5736082

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Analytics International Corporation o/a Maxxam Analytics 32 Colonnade Rd, Unit #1000, Nepean, ON K2E 7J6 Phone: 613 274-0573 Fax: 613 274-0574 Website: www.maxxam.ca

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A Bureau Veritas Group Company

Maxxam Job #: B8N5673
Report Date: 2018/10/11

exp Services Inc
Client Project #: OTT-00248813-AO
Site Location: IQALUIT-NEW LANDFILL
Sampler Initials: LM

SEMI-VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		HSF644		HSF645	HSF646	HSF647		
Sampling Date		2018/09/07		2018/09/07	2018/09/07	2018/09/07		
COC Number		681097-08-01		681097-08-01	681097-08-01	681097-08-01		
	UNITS	S-6	QC Batch	S-7	S-8	S-9	RDL	QC Batch
Calculated Parameters								
Index of Additive Cancer Risk -IACR	N/A	<0.1	5736080	<0.1	<0.1	<0.1	0.1	5736080
Polyaromatic Hydrocarbons								
Acenaphthene	mg/kg	<0.0050	5736082	<0.0050	<0.0050	<0.0050	0.0050	5735776
Benzo(a)pyrene Total Potency Equiv.	mg/kg	<0.0071	5736081	<0.0071	<0.0071	<0.0071	0.0071	5736081
Acenaphthylene	mg/kg	<0.0050	5736082	<0.0050	<0.0050	<0.0050	0.0050	5735776
Acridine	mg/kg	<0.010	5736082	<0.010	<0.010	<0.010	0.010	5735776
Anthracene	mg/kg	<0.0040	5736082	<0.0040	<0.0040	<0.0040	0.0040	5735776
Benzo(a)anthracene	mg/kg	<0.0050	5736082	<0.0050	<0.0050	<0.0050	0.0050	5735776
Benzo(b/j)fluoranthene	mg/kg	<0.0050	5736082	<0.0050	<0.0050	<0.0050	0.0050	5735776
Benzo(k)fluoranthene	mg/kg	<0.0050	5736082	<0.0050	<0.0050	<0.0050	0.0050	5735776
Benzo(g,h,i)perylene	mg/kg	<0.0050	5736082	<0.0050	<0.0050	<0.0050	0.0050	5735776
Benzo(c)phenanthrene	mg/kg	<0.0050	5736082	<0.0050	<0.0050	<0.0050	0.0050	5735776
Benzo(a)pyrene	mg/kg	<0.0050	5736082	<0.0050	<0.0050	<0.0050	0.0050	5735776
Benzo(e)pyrene	mg/kg	<0.0050	5736082	<0.0050	<0.0050	<0.0050	0.0050	5735776
Chrysene	mg/kg	<0.0050	5736082	<0.0050	<0.0050	<0.0050	0.0050	5735776
Dibenz(a,h)anthracene	mg/kg	<0.0050	5736082	<0.0050	<0.0050	<0.0050	0.0050	5735776
Fluoranthene	mg/kg	<0.0050	5736082	<0.0050	<0.0050	<0.0050	0.0050	5735776
Fluorene	mg/kg	<0.0050	5736082	<0.0050	<0.0050	<0.0050	0.0050	5735776
Indeno(1,2,3-cd)pyrene	mg/kg	<0.0050	5736082	<0.0050	<0.0050	<0.0050	0.0050	5735776
1-Methylnaphthalene	mg/kg	<0.0050	5736082	<0.0050	<0.0050	<0.0050	0.0050	5735776
2-Methylnaphthalene	mg/kg	<0.0050	5736082	<0.0050	<0.0050	<0.0050	0.0050	5735776
Naphthalene	mg/kg	<0.0050	5736082	<0.0050	<0.0050	<0.0050	0.0050	5735776
Phenanthrene	mg/kg	<0.0050	5736082	<0.0050	<0.0050	<0.0050	0.0050	5735776
Perylene	mg/kg	<0.0050	5736082	<0.0050	<0.0050	<0.0050	0.0050	5735776
Pyrene	mg/kg	<0.0050	5736082	<0.0050	<0.0050	<0.0050	0.0050	5735776
Quinoline	mg/kg	0.021	5736082	<0.010	<0.010	<0.010	0.010	5735776
Surrogate Recovery (%)								
D10-Anthracene	%	109	5736082	100	99	96		5735776
D14-Terphenyl	%	98	5736082	100	99	96		5735776
D8-Acenaphthylene	%	93	5736082	97	95	93		5735776
D8-Naphthalene	%	87	5736082	84	83	80		5735776

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B8N5673
Report Date: 2018/10/11

exp Services Inc
Client Project #: OTT-00248813-AO
Site Location: IQALUIT-NEW LANDFILL
Sampler Initials: LM

VOLATILE ORGANICS BY GC/MS (SOIL)

Maxxam ID		HSF639			HSF639			HSF640		
Sampling Date		2018/09/07			2018/09/07			2018/09/07		
COC Number		681097-08-01			681097-08-01			681097-08-01		
	UNITS	S-1	RDL	QC Batch	S-1 Lab-Dup	RDL	QC Batch	S-2	RDL	QC Batch
Calculated Parameters										
1,3-Dichloropropene (cis+trans)	ug/g	<0.050	0.050	5725099				<0.050	0.050	5725099
Volatile Organics										
Acetone (2-Propanone)	ug/g	<0.50	0.50	5727553	<0.50	0.50	5727553	<0.50	0.50	5727553
Benzene	ug/g	<0.0060	0.0060	5727553	<0.0060	0.0060	5727553	<0.0060	0.0060	5727553
Bromodichloromethane	ug/g	<0.050	0.050	5727553	<0.050	0.050	5727553	<0.050	0.050	5727553
Bromoform	ug/g	<0.050	0.050	5727553	<0.050	0.050	5727553	<0.050	0.050	5727553
Bromomethane	ug/g	<0.050	0.050	5727553	<0.050	0.050	5727553	<0.050	0.050	5727553
Carbon Tetrachloride	ug/g	<0.050	0.050	5727553	<0.050	0.050	5727553	<0.050	0.050	5727553
Chlorobenzene	ug/g	<0.050	0.050	5727553	<0.050	0.050	5727553	<0.050	0.050	5727553
Chloroform	ug/g	<0.050	0.050	5727553	<0.050	0.050	5727553	<0.050	0.050	5727553
Dibromochloromethane	ug/g	<0.050	0.050	5727553	<0.050	0.050	5727553	<0.050	0.050	5727553
1,2-Dichlorobenzene	ug/g	<0.050	0.050	5727553	<0.050	0.050	5727553	<0.050	0.050	5727553
1,3-Dichlorobenzene	ug/g	<0.050	0.050	5727553	<0.050	0.050	5727553	<0.050	0.050	5727553
1,4-Dichlorobenzene	ug/g	<0.050	0.050	5727553	<0.050	0.050	5727553	<0.050	0.050	5727553
Dichlorodifluoromethane (FREON 12)	ug/g	<0.050	0.050	5727553	<0.050	0.050	5727553	<0.050	0.050	5727553
1,1-Dichloroethane	ug/g	<0.050	0.050	5727553	<0.050	0.050	5727553	<0.050	0.050	5727553
1,2-Dichloroethane	ug/g	<0.050	0.050	5727553	<0.050	0.050	5727553	<0.050	0.050	5727553
1,1-Dichloroethylene	ug/g	<0.050	0.050	5727553	<0.050	0.050	5727553	<0.050	0.050	5727553
cis-1,2-Dichloroethylene	ug/g	<0.050	0.050	5727553	<0.050	0.050	5727553	<0.050	0.050	5727553
trans-1,2-Dichloroethylene	ug/g	<0.050	0.050	5727553	<0.050	0.050	5727553	<0.050	0.050	5727553
1,2-Dichloropropane	ug/g	<0.050	0.050	5727553	<0.050	0.050	5727553	<0.050	0.050	5727553
cis-1,3-Dichloropropene	ug/g	<0.030	0.030	5727553	<0.030	0.030	5727553	<0.030	0.030	5727553
trans-1,3-Dichloropropene	ug/g	<0.040	0.040	5727553	<0.040	0.040	5727553	<0.040	0.040	5727553
Ethylbenzene	ug/g	<0.010	0.010	5727553	<0.010	0.010	5727553	<0.010	0.010	5727553
Ethylene Dibromide	ug/g	<0.050	0.050	5727553	<0.050	0.050	5727553	<0.050	0.050	5727553
Hexane	ug/g	<0.050	0.050	5727553	<0.050	0.050	5727553	<0.050	0.050	5727553
Methylene Chloride(Dichloromethane)	ug/g	<0.050	0.050	5727553	<0.050	0.050	5727553	<0.050	0.050	5727553
Methyl Isobutyl Ketone	ug/g	<0.50	0.50	5727553	<0.50	0.50	5727553	<0.50	0.50	5727553
Methyl Ethyl Ketone (2-Butanone)	ug/g	<0.50	0.50	5727553	<0.50	0.50	5727553	<0.50	0.50	5727553
Methyl t-butyl ether (MTBE)	ug/g	<0.050	0.050	5727553	<0.050	0.050	5727553	<0.050	0.050	5727553
Styrene	ug/g	<0.050	0.050	5727553	<0.050	0.050	5727553	<0.050	0.050	5727553
1,1,1,2-Tetrachloroethane	ug/g	<0.050	0.050	5727553	<0.050	0.050	5727553	<0.050	0.050	5727553
1,1,2,2-Tetrachloroethane	ug/g	<0.050	0.050	5727553	<0.050	0.050	5727553	<0.050	0.050	5727553

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

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Maxxam Job #: B8N5673
Report Date: 2018/10/11

exp Services Inc
Client Project #: OTT-00248813-AO
Site Location: IQALUIT-NEW LANDFILL
Sampler Initials: LM

VOLATILE ORGANICS BY GC/MS (SOIL)

Maxxam ID		HSF639			HSF639			HSF640		
Sampling Date		2018/09/07			2018/09/07			2018/09/07		
COC Number		681097-08-01			681097-08-01			681097-08-01		
	UNITS	S-1	RDL	QC Batch	S-1 Lab-Dup	RDL	QC Batch	S-2	RDL	QC Batch
Tetrachloroethylene	ug/g	<0.050	0.050	5727553	<0.050	0.050	5727553	<0.050	0.050	5727553
Toluene	ug/g	<0.020	0.020	5727553	<0.020	0.020	5727553	<0.020	0.020	5727553
1,1,1-Trichloroethane	ug/g	<0.050	0.050	5727553	<0.050	0.050	5727553	<0.050	0.050	5727553
1,1,2-Trichloroethane	ug/g	<0.050	0.050	5727553	<0.050	0.050	5727553	<0.050	0.050	5727553
Trichloroethylene	ug/g	<0.010	0.010	5727553	<0.010	0.010	5727553	<0.010	0.010	5727553
Vinyl Chloride	ug/g	<0.020	0.020	5727553	<0.020	0.020	5727553	<0.020	0.020	5727553
p+m-Xylene	ug/g	<0.020	0.020	5727553	<0.020	0.020	5727553	<0.020	0.020	5727553
o-Xylene	ug/g	<0.020	0.020	5727553	<0.020	0.020	5727553	<0.020	0.020	5727553
Total Xylenes	ug/g	<0.020	0.020	5727553	<0.020	0.020	5727553	<0.020	0.020	5727553
Trichlorofluoromethane (FREON 11)	ug/g	<0.050	0.050	5727553	<0.050	0.050	5727553	<0.050	0.050	5727553
F1 (C6-C10)	ug/g	<10	10	5727553	<10	10	5727553	<10	10	5727553
F1 (C6-C10) - BTEX	ug/g	<10	10	5727553	<10	10	5727553	<10	10	5727553
Surrogate Recovery (%)										
4-Bromofluorobenzene	%	84		5727553	82		5727553	85		5727553
D10-o-Xylene	%	104		5727553	102		5727553	99		5727553
D4-1,2-Dichloroethane	%	113		5727553	113		5727553	112		5727553
D8-Toluene	%	90		5727553	90		5727553	91		5727553

RDL = Reportable Detection Limit
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Lab-Dup = Laboratory Initiated Duplicate

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Maxxam Job #: B8N5673
Report Date: 2018/10/11

exp Services Inc
Client Project #: OTT-00248813-AO
Site Location: IQALUIT-NEW LANDFILL
Sampler Initials: LM

VOLATILE ORGANICS BY GC/MS (SOIL)

Maxxam ID		HSF641	HSF642	HSF643	HSF644	HSF645		
Sampling Date		2018/09/07	2018/09/07	2018/09/07	2018/09/07	2018/09/07		
COC Number		681097-08-01	681097-08-01	681097-08-01	681097-08-01	681097-08-01		
	UNITS	S-3	S-4	S-5	S-6	S-7	RDL	QC Batch
Calculated Parameters								
1,3-Dichloropropene (cis+trans)	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5725099
Volatile Organics								
Acetone (2-Propanone)	ug/g	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	5727553
Benzene	ug/g	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	0.0060	5727553
Bromodichloromethane	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5727553
Bromoform	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5727553
Bromomethane	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5727553
Carbon Tetrachloride	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5727553
Chlorobenzene	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5727553
Chloroform	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5727553
Dibromochloromethane	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5727553
1,2-Dichlorobenzene	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5727553
1,3-Dichlorobenzene	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5727553
1,4-Dichlorobenzene	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5727553
Dichlorodifluoromethane (FREON 12)	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5727553
1,1-Dichloroethane	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5727553
1,2-Dichloroethane	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5727553
1,1-Dichloroethylene	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5727553
cis-1,2-Dichloroethylene	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5727553
trans-1,2-Dichloroethylene	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5727553
1,2-Dichloropropane	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5727553
cis-1,3-Dichloropropene	ug/g	<0.030	<0.030	<0.030	<0.030	<0.030	0.030	5727553
trans-1,3-Dichloropropene	ug/g	<0.040	<0.040	<0.040	<0.040	<0.040	0.040	5727553
Ethylbenzene	ug/g	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	5727553
Ethylene Dibromide	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5727553
Hexane	ug/g	<0.050	<0.050	<0.050	0.096	<0.050	0.050	5727553
Methylene Chloride(Dichloromethane)	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5727553
Methyl Isobutyl Ketone	ug/g	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	5727553
Methyl Ethyl Ketone (2-Butanone)	ug/g	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	5727553
Methyl t-butyl ether (MTBE)	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5727553
Styrene	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5727553
1,1,1,2-Tetrachloroethane	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5727553
1,1,2,2-Tetrachloroethane	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5727553
Tetrachloroethylene	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5727553

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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exp Services Inc
Client Project #: OTT-00248813-AO
Site Location: IQALUIT-NEW LANDFILL
Sampler Initials: LM

VOLATILE ORGANICS BY GC/MS (SOIL)

Maxxam ID		HSF641	HSF642	HSF643	HSF644	HSF645		
Sampling Date		2018/09/07	2018/09/07	2018/09/07	2018/09/07	2018/09/07		
COC Number		681097-08-01	681097-08-01	681097-08-01	681097-08-01	681097-08-01		
	UNITS	S-3	S-4	S-5	S-6	S-7	RDL	QC Batch
Toluene	ug/g	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	5727553
1,1,1-Trichloroethane	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5727553
1,1,2-Trichloroethane	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5727553
Trichloroethylene	ug/g	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	5727553
Vinyl Chloride	ug/g	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	5727553
p+m-Xylene	ug/g	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	5727553
o-Xylene	ug/g	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	5727553
Total Xylenes	ug/g	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	5727553
Trichlorofluoromethane (FREON 11)	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5727553
F1 (C6-C10)	ug/g	<10	<10	<10	<10	<10	10	5727553
F1 (C6-C10) - BTEX	ug/g	<10	<10	<10	<10	<10	10	5727553
Surrogate Recovery (%)								
4-Bromofluorobenzene	%	84	85	83	83	82		5727553
D10-o-Xylene	%	104	99	101	102	100		5727553
D4-1,2-Dichloroethane	%	115	113	115	115	114		5727553
D8-Toluene	%	90	90	89	90	90		5727553

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B8N5673
Report Date: 2018/10/11

exp Services Inc
Client Project #: OTT-00248813-AO
Site Location: IQALUIT-NEW LANDFILL
Sampler Initials: LM

VOLATILE ORGANICS BY GC/MS (SOIL)

Maxxam ID		HSF646	HSF647		
Sampling Date		2018/09/07	2018/09/07		
COC Number		681097-08-01	681097-08-01		
	UNITS	S-8	S-9	RDL	QC Batch
Calculated Parameters					
1,3-Dichloropropene (cis+trans)	ug/g	<0.050	<0.050	0.050	5725099
Volatile Organics					
Acetone (2-Propanone)	ug/g	<0.50	<0.50	0.50	5727553
Benzene	ug/g	<0.0060	<0.0060	0.0060	5727553
Bromodichloromethane	ug/g	<0.050	<0.050	0.050	5727553
Bromoform	ug/g	<0.050	<0.050	0.050	5727553
Bromomethane	ug/g	<0.050	<0.050	0.050	5727553
Carbon Tetrachloride	ug/g	<0.050	<0.050	0.050	5727553
Chlorobenzene	ug/g	<0.050	<0.050	0.050	5727553
Chloroform	ug/g	<0.050	<0.050	0.050	5727553
Dibromochloromethane	ug/g	<0.050	<0.050	0.050	5727553
1,2-Dichlorobenzene	ug/g	<0.050	<0.050	0.050	5727553
1,3-Dichlorobenzene	ug/g	<0.050	<0.050	0.050	5727553
1,4-Dichlorobenzene	ug/g	<0.050	<0.050	0.050	5727553
Dichlorodifluoromethane (FREON 12)	ug/g	<0.050	<0.050	0.050	5727553
1,1-Dichloroethane	ug/g	<0.050	<0.050	0.050	5727553
1,2-Dichloroethane	ug/g	<0.050	<0.050	0.050	5727553
1,1-Dichloroethylene	ug/g	<0.050	<0.050	0.050	5727553
cis-1,2-Dichloroethylene	ug/g	<0.050	<0.050	0.050	5727553
trans-1,2-Dichloroethylene	ug/g	<0.050	<0.050	0.050	5727553
1,2-Dichloropropane	ug/g	<0.050	<0.050	0.050	5727553
cis-1,3-Dichloropropene	ug/g	<0.030	<0.030	0.030	5727553
trans-1,3-Dichloropropene	ug/g	<0.040	<0.040	0.040	5727553
Ethylbenzene	ug/g	<0.010	<0.010	0.010	5727553
Ethylene Dibromide	ug/g	<0.050	<0.050	0.050	5727553
Hexane	ug/g	<0.050	<0.050	0.050	5727553
Methylene Chloride(Dichloromethane)	ug/g	<0.050	<0.050	0.050	5727553
Methyl Isobutyl Ketone	ug/g	<0.50	<0.50	0.50	5727553
Methyl Ethyl Ketone (2-Butanone)	ug/g	<0.50	<0.50	0.50	5727553
Methyl t-butyl ether (MTBE)	ug/g	<0.050	<0.050	0.050	5727553
Styrene	ug/g	<0.050	<0.050	0.050	5727553
1,1,1,2-Tetrachloroethane	ug/g	<0.050	<0.050	0.050	5727553
1,1,2,2-Tetrachloroethane	ug/g	<0.050	<0.050	0.050	5727553
Tetrachloroethylene	ug/g	<0.050	<0.050	0.050	5727553

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QC Batch = Quality Control Batch

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exp Services Inc
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Site Location: IQALUIT-NEW LANDFILL
Sampler Initials: LM

VOLATILE ORGANICS BY GC/MS (SOIL)

Maxxam ID		HSF646	HSF647		
Sampling Date		2018/09/07	2018/09/07		
COC Number		681097-08-01	681097-08-01		
	UNITS	S-8	S-9	RDL	QC Batch
Toluene	ug/g	<0.020	<0.020	0.020	5727553
1,1,1-Trichloroethane	ug/g	<0.050	<0.050	0.050	5727553
1,1,2-Trichloroethane	ug/g	<0.050	<0.050	0.050	5727553
Trichloroethylene	ug/g	<0.010	<0.010	0.010	5727553
Vinyl Chloride	ug/g	<0.020	<0.020	0.020	5727553
p+m-Xylene	ug/g	<0.020	<0.020	0.020	5727553
o-Xylene	ug/g	<0.020	<0.020	0.020	5727553
Total Xylenes	ug/g	<0.020	<0.020	0.020	5727553
Trichlorofluoromethane (FREON 11)	ug/g	<0.050	<0.050	0.050	5727553
F1 (C6-C10)	ug/g	<10	<10	10	5727553
F1 (C6-C10) - BTEX	ug/g	<10	<10	10	5727553
Surrogate Recovery (%)					
4-Bromofluorobenzene	%	84	84		5727553
D10-o-Xylene	%	116	98		5727553
D4-1,2-Dichloroethane	%	114	114		5727553
D8-Toluene	%	90	89		5727553

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Sampler Initials: LM

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		HSF639	HSF640	HSF641	HSF642	HSF643	HSF644		
Sampling Date		2018/09/07	2018/09/07	2018/09/07	2018/09/07	2018/09/07	2018/09/07		
COC Number		681097-08-01	681097-08-01	681097-08-01	681097-08-01	681097-08-01	681097-08-01		
	UNITS	S-1	S-2	S-3	S-4	S-5	S-6	RDL	QC Batch
F2-F4 Hydrocarbons									
F2 (C10-C16 Hydrocarbons)	ug/g	<10	<10	<10	<10	<10	<10	10	5726446
F3 (C16-C34 Hydrocarbons)	ug/g	<50	<50	<50	<50	<50	<50	50	5726446
F4 (C34-C50 Hydrocarbons)	ug/g	<50	<50	<50	<50	<50	<50	50	5726446
Reached Baseline at C50	ug/g	Yes	Yes	Yes	Yes	Yes	Yes		5726446
Surrogate Recovery (%)									
o-Terphenyl	%	93	87	89	91	92	93		5726446

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		HSF645	HSF646	HSF647		
Sampling Date		2018/09/07	2018/09/07	2018/09/07		
COC Number		681097-08-01	681097-08-01	681097-08-01		
	UNITS	S-7	S-8	S-9	RDL	QC Batch
F2-F4 Hydrocarbons						
F2 (C10-C16 Hydrocarbons)	ug/g	<10	<10	<10	10	5726446
F3 (C16-C34 Hydrocarbons)	ug/g	<50	<50	<50	50	5726446
F4 (C34-C50 Hydrocarbons)	ug/g	<50	<50	<50	50	5726446
Reached Baseline at C50	ug/g	Yes	Yes	Yes		5726446
Surrogate Recovery (%)						
o-Terphenyl	%	90	90	85		5726446

RDL = Reportable Detection Limit
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Sampler Initials: LM

TEST SUMMARY

Maxxam ID: HSF639
Sample ID: S-1
Matrix: Soil

Collected: 2018/09/07
Shipped:
Received: 2018/09/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	5727027	2018/09/12	2018/09/12	Suban Kanapathippllai
1,3-Dichloropropene Sum	CALC	5725099	N/A	2018/09/14	Automated Statchk
Free (WAD) Cyanide	TECH	5729058	2018/09/13	2018/09/14	Louise Harding
Conductivity	AT	5729481	2018/09/14	2018/09/14	Neil Dassanayake
Hexavalent Chromium in Soil by IC	IC/SPEC	5729456	2018/09/13	2018/09/17	Rupinder Sihota
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5726446	2018/09/12	2018/09/12	Anna Stuglik Rolland
Soluble Fluoride analysis in Soil	ISE	5729698	2018/09/14	2018/09/14	Surinder Rai
Strong Acid Leachable Metals by ICPMS	ICP/MS	5727411	2018/09/12	2018/09/12	Daniel Teclu
Moisture (Subcontracted)	BAL	5735773	N/A	2018/09/14	Naresh Salhan
CCME Index of Additive Cancer Risk	CALC	5736080	2018/09/17	2018/09/17	Report Automation Engine
B[a]P Total Potency Equivalent	GC/MS	5736081	N/A	2018/09/17	Report Automation Engine
PAH in Soil by GC/MS	GC/MS	5736082	2018/09/13	2018/09/17	Jingyuan Song
Moisture	BAL	5727388	N/A	2018/09/12	Prgya Panchal
pH CaCl2 EXTRACT	AT	5727391	2018/09/13	2018/09/13	Gnana Thomas
Sodium Adsorption Ratio (SAR)	CALC/MET	5725186	N/A	2018/09/14	Automated Statchk
Volatile Organic Compounds and F1 PHCs	GC/MS	5727553	N/A	2018/09/14	Denis Reid

Maxxam ID: HSF639 Dup
Sample ID: S-1
Matrix: Soil

Collected: 2018/09/07
Shipped:
Received: 2018/09/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hexavalent Chromium in Soil by IC	IC/SPEC	5729456	2018/09/13	2018/09/17	Rupinder Sihota
Volatile Organic Compounds and F1 PHCs	GC/MS	5727553	N/A	2018/09/14	Denis Reid

Maxxam ID: HSF640
Sample ID: S-2
Matrix: Soil

Collected: 2018/09/07
Shipped:
Received: 2018/09/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	5727027	2018/09/12	2018/09/12	Suban Kanapathippllai
1,3-Dichloropropene Sum	CALC	5725099	N/A	2018/09/14	Automated Statchk
Free (WAD) Cyanide	TECH	5729058	2018/09/13	2018/09/14	Louise Harding
Conductivity	AT	5729481	2018/09/14	2018/09/14	Neil Dassanayake
Hexavalent Chromium in Soil by IC	IC/SPEC	5729456	2018/09/13	2018/09/17	Rupinder Sihota
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5726446	2018/09/12	2018/09/12	Anna Stuglik Rolland
Soluble Fluoride analysis in Soil	ISE	5729698	2018/09/14	2018/09/14	Surinder Rai
Strong Acid Leachable Metals by ICPMS	ICP/MS	5727411	2018/09/12	2018/09/12	Daniel Teclu
Moisture (Subcontracted)	BAL	5736083	N/A	2018/09/14	Naresh Salhan
CCME Index of Additive Cancer Risk	CALC	5736080	2018/09/17	2018/09/17	Automated Statchk
B[a]P Total Potency Equivalent	GC/MS	5736081	N/A	2018/09/17	Report Automation Engine
PAH in Soil by GC/MS	GC/MS	5736082	2018/09/13	2018/09/17	Jingyuan Song
Moisture	BAL	5727388	N/A	2018/09/12	Prgya Panchal
pH CaCl2 EXTRACT	AT	5727391	2018/09/13	2018/09/13	Gnana Thomas

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Report Date: 2018/10/11

exp Services Inc
Client Project #: OTT-00248813-AO
Site Location: IQALUIT-NEW LANDFILL
Sampler Initials: LM

TEST SUMMARY

Maxxam ID: HSF640
Sample ID: S-2
Matrix: Soil

Collected: 2018/09/07
Shipped:
Received: 2018/09/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Sodium Adsorption Ratio (SAR)	CALC/MET	5725186	N/A	2018/09/14	Automated Statchk
Volatile Organic Compounds and F1 PHCs	GC/MS	5727553	N/A	2018/09/14	Denis Reid

Maxxam ID: HSF640 Dup
Sample ID: S-2
Matrix: Soil

Collected: 2018/09/07
Shipped:
Received: 2018/09/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Soluble Fluoride analysis in Soil	ISE	5729698	2018/09/14	2018/09/14	Surinder Rai

Maxxam ID: HSF641
Sample ID: S-3
Matrix: Soil

Collected: 2018/09/07
Shipped:
Received: 2018/09/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	5727027	2018/09/12	2018/09/12	Suban Kanapathippllai
1,3-Dichloropropene Sum	CALC	5725099	N/A	2018/09/14	Automated Statchk
Free (WAD) Cyanide	TECH	5729058	2018/09/13	2018/09/14	Louise Harding
Conductivity	AT	5729481	2018/09/14	2018/09/14	Neil Dassanayake
Hexavalent Chromium in Soil by IC	IC/SPEC	5729456	2018/09/13	2018/09/17	Rupinder Sihota
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5726446	2018/09/12	2018/09/12	Anna Stuglik Rolland
Soluble Fluoride analysis in Soil	ISE	5729698	2018/09/14	2018/09/14	Surinder Rai
Strong Acid Leachable Metals by ICPMS	ICP/MS	5727411	2018/09/12	2018/09/12	Daniel Teclu
Moisture (Subcontracted)	BAL	5735773	N/A	2018/09/14	Naresh Salhan
CCME Index of Additive Cancer Risk	CALC	5736080	2018/09/17	2018/09/17	Automated Statchk
B[a]P Total Potency Equivalent	GC/MS	5736081	N/A	2018/09/17	Automated Statchk
PAH in Soil by GC/MS	GC/MS	5736082	2018/09/13	2018/09/17	Jingyuan Song
Moisture	BAL	5727388	N/A	2018/09/12	Prgya Panchal
pH CaCl2 EXTRACT	AT	5727391	2018/09/13	2018/09/13	Gnana Thomas
Sodium Adsorption Ratio (SAR)	CALC/MET	5725186	N/A	2018/09/14	Automated Statchk
Volatile Organic Compounds and F1 PHCs	GC/MS	5727553	N/A	2018/09/14	Denis Reid

Maxxam ID: HSF642
Sample ID: S-4
Matrix: Soil

Collected: 2018/09/07
Shipped:
Received: 2018/09/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	5727027	2018/09/12	2018/09/12	Suban Kanapathippllai
1,3-Dichloropropene Sum	CALC	5725099	N/A	2018/09/14	Automated Statchk
Free (WAD) Cyanide	TECH	5729058	2018/09/13	2018/09/14	Louise Harding
Conductivity	AT	5729481	2018/09/14	2018/09/14	Neil Dassanayake
Hexavalent Chromium in Soil by IC	IC/SPEC	5729456	2018/09/13	2018/09/17	Rupinder Sihota
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5726446	2018/09/12	2018/09/12	Anna Stuglik Rolland
Soluble Fluoride analysis in Soil	ISE	5729698	2018/09/14	2018/09/14	Surinder Rai

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exp Services Inc
Client Project #: OTT-00248813-AO
Site Location: IQALUIT-NEW LANDFILL
Sampler Initials: LM

TEST SUMMARY

Maxxam ID: HSF642
Sample ID: S-4
Matrix: Soil

Collected: 2018/09/07
Shipped:
Received: 2018/09/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Strong Acid Leachable Metals by ICPMS	ICP/MS	5727411	2018/09/12	2018/09/12	Daniel Teclu
Moisture (Subcontracted)	BAL	5736083	N/A	2018/09/14	Naresh Salhan
CCME Index of Additive Cancer Risk	CALC	5736080	2018/09/17	2018/09/17	Report Automation Engine
B[a]P Total Potency Equivalent	GC/MS	5736081	N/A	2018/09/17	Report Automation Engine
PAH in Soil by GC/MS	GC/MS	5736082	2018/09/13	2018/09/17	Jingyuan Song
Moisture	BAL	5727388	N/A	2018/09/12	Prgya Panchal
pH CaCl2 EXTRACT	AT	5727391	2018/09/13	2018/09/13	Gnana Thomas
Sodium Adsorption Ratio (SAR)	CALC/MET	5725186	N/A	2018/09/14	Automated Statchk
Volatile Organic Compounds and F1 PHCs	GC/MS	5727553	N/A	2018/09/14	Denis Reid

Maxxam ID: HSF643
Sample ID: S-5
Matrix: Soil

Collected: 2018/09/07
Shipped:
Received: 2018/09/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	5726811	2018/09/12	2018/09/12	Suban Kanapathippllai
1,3-Dichloropropene Sum	CALC	5725099	N/A	2018/09/14	Automated Statchk
Free (WAD) Cyanide	TECH	5729058	2018/09/13	2018/09/14	Louise Harding
Conductivity	AT	5729481	2018/09/14	2018/09/14	Neil Dassanayake
Hexavalent Chromium in Soil by IC	IC/SPEC	5729456	2018/09/13	2018/09/17	Rupinder Sihota
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5726446	2018/09/12	2018/09/12	Anna Stuglik Rolland
Solubie Fluoride analysis in Soil	ISE	5729698	2018/09/14	2018/09/14	Surinder Rai
Strong Acid Leachable Metals by ICPMS	ICP/MS	5727411	2018/09/12	2018/09/12	Daniel Teclu
Moisture (Subcontracted)	BAL	5736083	N/A	2018/09/14	Naresh Salhan
CCME Index of Additive Cancer Risk	CALC	5736080	2018/09/17	2018/09/17	Report Automation Engine
B[a]P Total Potency Equivalent	GC/MS	5736081	N/A	2018/09/17	Automated Statchk
PAH in Soil by GC/MS	GC/MS	5736082	2018/09/13	2018/09/17	Jingyuan Song
Moisture	BAL	5727388	N/A	2018/09/12	Prgya Panchal
pH CaCl2 EXTRACT	AT	5727391	2018/09/13	2018/09/13	Gnana Thomas
Sodium Adsorption Ratio (SAR)	CALC/MET	5725186	N/A	2018/09/14	Automated Statchk
Volatile Organic Compounds and F1 PHCs	GC/MS	5727553	N/A	2018/09/14	Denis Reid

Maxxam ID: HSF644
Sample ID: S-6
Matrix: Soil

Collected: 2018/09/07
Shipped:
Received: 2018/09/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	5727027	2018/09/12	2018/09/12	Suban Kanapathippllai
1,3-Dichloropropene Sum	CALC	5725099	N/A	2018/09/14	Automated Statchk
Free (WAD) Cyanide	TECH	5729058	2018/09/13	2018/09/14	Louise Harding
Conductivity	AT	5729481	2018/09/14	2018/09/14	Neil Dassanayake
Hexavalent Chromium in Soil by IC	IC/SPEC	5729456	2018/09/13	2018/09/17	Rupinder Sihota
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5726446	2018/09/12	2018/09/12	Anna Stuglik Rolland
Soluble Fluoride analysis in Soil	ISE	5729698	2018/09/14	2018/09/14	Surinder Rai

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Client Project #: OTT-00248813-AO
Site Location: IQALUIT-NEW LANDFILL
Sampler Initials: LM

TEST SUMMARY

Maxxam ID: HSF644
Sample ID: S-6
Matrix: Soil

Collected: 2018/09/07
Shipped:
Received: 2018/09/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Strong Acid Leachable Metals by ICPMS	ICP/MS	5727411	2018/09/12	2018/09/12	Daniel Teclu
Moisture (Subcontracted)	BAL	5736083	N/A	2018/09/14	Naresh Salhan
CCME Index of Additive Cancer Risk	CALC	5736080	2018/09/17	2018/09/17	Report Automation Engine
B[a]P Total Potency Equivalent	GC/MS	5736081	N/A	2018/09/17	Report Automation Engine
PAH in Soil by GC/MS	GC/MS	5736082	2018/09/13	2018/09/17	Jingyuan Song
Moisture	BAL	5727388	N/A	2018/09/12	Prgya Panchal
pH CaCl2 EXTRACT	AT	5727391	2018/09/13	2018/09/13	Gnana Thomas
Sodium Adsorption Ratio (SAR)	CALC/MET	5725186	N/A	2018/09/14	Automated Statchk
Volatile Organic Compounds and F1 PHCs	GC/MS	5727553	N/A	2018/09/14	Denis Reid

Maxxam ID: HSF645
Sample ID: S-7
Matrix: Soil

Collected: 2018/09/07
Shipped:
Received: 2018/09/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	5727027	2018/09/12	2018/09/12	Suban Kanapathippllai
1,3-Dichloropropene Sum	CALC	5725099	N/A	2018/09/14	Automated Statchk
Free (WAD) Cyanide	TECH	5729058	2018/09/13	2018/09/14	Louise Harding
Conductivity	AT	5729481	2018/09/14	2018/09/14	Neil Dassanayake
Hexavalent Chromium in Soil by IC	IC/SPEC	5729456	2018/09/13	2018/09/17	Rupinder Sihota
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5726446	2018/09/12	2018/09/12	Anna Stuglik Rolland
Soluble Fluoride analysis in Soil	ISE	5729698	2018/09/14	2018/09/14	Surinder Rai
Strong Acid Leachable Metals by ICPMS	ICP/MS	5727411	2018/09/12	2018/09/12	Daniel Teclu
Moisture (Subcontracted)	BAL	5735773	N/A	2018/09/14	Naresh Salhan
CCME Index of Additive Cancer Risk	CALC	5736080	2018/09/17	2018/09/17	Report Automation Engine
B[a]P Total Potency Equivalent	GC/MS	5736081	N/A	2018/09/17	Report Automation Engine
PAH in Soil by GC/MS	GC/MS	5735776	2018/09/14	2018/09/17	Jingyuan Song
Moisture	BAL	5727388	N/A	2018/09/12	Prgya Panchal
pH CaCl2 EXTRACT	AT	5727391	2018/09/13	2018/09/13	Gnana Thomas
Sodium Adsorption Ratio (SAR)	CALC/MET	5725186	N/A	2018/09/14	Automated Statchk
Volatile Organic Compounds and F1 PHCs	GC/MS	5727553	N/A	2018/09/14	Denis Reid

Maxxam ID: HSF645 Dup
Sample ID: S-7
Matrix: Soil

Collected: 2018/09/07
Shipped:
Received: 2018/09/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Free (WAD) Cyanide	TECH	5729058	2018/09/13	2018/09/14	Louise Harding

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Maxxam Job #: B8N5673
Report Date: 2018/10/11

exp Services Inc
Client Project #: OTT-00248813-AO
Site Location: IQALUIT-NEW LANDFILL
Sampler Initials: LM

TEST SUMMARY

Maxxam ID: HSF646
Sample ID: S-8
Matrix: Soil

Collected: 2018/09/07
Shipped:
Received: 2018/09/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	5726811	2018/09/12	2018/09/12	Suban Kanapathippllai
1,3-Dichloropropene Sum	CALC	5725099	N/A	2018/09/14	Automated Statchk
Free (WAD) Cyanide	TECH	5729058	2018/09/13	2018/09/14	Louise Harding
Conductivity	AT	5729481	2018/09/14	2018/09/14	Neil Dassanayake
Hexavalent Chromium in Soil by IC	IC/SPEC	5729456	2018/09/13	2018/09/17	Rupinder Sihota
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5726446	2018/09/12	2018/09/12	Anna Stuglik Rolland
Soluble Fluoride analysis in Soil	ISE	5729698	2018/09/14	2018/09/14	Surinder Rai
Strong Acid Leachable Metals by ICPMS	ICP/MS	5727411	2018/09/12	2018/09/12	Daniel Teclu
Moisture (Subcontracted)	BAL	5735773	N/A	2018/09/14	Naresh Salhan
CCME Index of Additive Cancer Risk	CALC	5736080	2018/09/17	2018/09/17	Automated Statchk
B[a]P Total Potency Equivalent	GC/MS	5736081	N/A	2018/09/17	Report Automation Engine
PAH in Soil by GC/MS	GC/MS	5735776	2018/09/14	2018/09/17	Jingyuan Song
Moisture	BAL	5727388	N/A	2018/09/12	Prgya Panchal
pH CaCl2 EXTRACT	AT	5727391	2018/09/13	2018/09/13	Gnana Thomas
Sodium Adsorption Ratio (SAR)	CALC/MET	5725186	N/A	2018/09/14	Automated Statchk
Volatile Organic Compounds and F1 PHCs	GC/MS	5727553	N/A	2018/09/14	Denis Reid

Maxxam ID: HSF647
Sample ID: S-9
Matrix: Soil

Collected: 2018/09/07
Shipped:
Received: 2018/09/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	5726811	2018/09/12	2018/09/12	Suban Kanapathippllai
1,3-Dichloropropene Sum	CALC	5725099	N/A	2018/09/14	Automated Statchk
Free (WAD) Cyanide	TECH	5729058	2018/09/13	2018/09/14	Louise Harding
Conductivity	AT	5729481	2018/09/14	2018/09/14	Neil Dassanayake
Hexavalent Chromium in Soil by IC	IC/SPEC	5729456	2018/09/13	2018/09/17	Rupinder Sihota
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5726446	2018/09/12	2018/09/12	Anna Stuglik Rolland
Soluble Fluoride analysis in Soil	ISE	5729698	2018/09/14	2018/09/14	Surinder Rai
Strong Acid Leachable Metals by ICPMS	ICP/MS	5727411	2018/09/12	2018/09/12	Daniel Teclu
Moisture (Subcontracted)	BAL	5735773	N/A	2018/09/14	Naresh Salhan
CCME Index of Additive Cancer Risk	CALC	5736080	2018/09/17	2018/09/17	Report Automation Engine
B[a]P Total Potency Equivalent	GC/MS	5736081	N/A	2018/09/17	Report Automation Engine
PAH in Soil by GC/MS	GC/MS	5735776	2018/09/14	2018/09/17	Jingyuan Song
Moisture	BAL	5727388	N/A	2018/09/12	Prgya Panchal
pH CaCl2 EXTRACT	AT	5727391	2018/09/13	2018/09/13	Gnana Thomas
Sodium Adsorption Ratio (SAR)	CALC/MET	5725186	N/A	2018/09/14	Automated Statchk
Volatile Organic Compounds and F1 PHCs	GC/MS	5727553	N/A	2018/09/14	Denis Reid

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exp Services Inc
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Site Location: IQALUIT-NEW LANDFILL
Sampler Initials: LM

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	4.7°C

Revised Report (2018/10/11): Report resent to client.

Sample HSF639 [S-1] : SAR Analysis: Sodium was not detected. To report SAR the sodium detection limit was used in the calculation. This value represents a maximum ratio.

Sample HSF640 [S-2] : SAR Analysis: Sodium was not detected. To report SAR the sodium detection limit was used in the calculation. This value represents a maximum ratio.

Sample HSF641 [S-3] : SAR Analysis: Sodium was not detected. To report SAR the sodium detection limit was used in the calculation. This value represents a maximum ratio.

Sample HSF642 [S-4] : SAR Analysis: Sodium was not detected. To report SAR the sodium detection limit was used in the calculation. This value represents a maximum ratio.

Sample HSF643 [S-5] : SAR Analysis: Sodium was not detected. To report SAR the sodium detection limit was used in the calculation. This value represents a maximum ratio.

Sample HSF644 [S-6] : SAR Analysis: Sodium was not detected. To report SAR the sodium detection limit was used in the calculation. This value represents a maximum ratio.

Sample HSF645 [S-7] : SAR Analysis: Sodium was not detected. To report SAR the sodium detection limit was used in the calculation. This value represents a maximum ratio.

Sample HSF646 [S-8] : SAR Analysis: Sodium was not detected. To report SAR the sodium detection limit was used in the calculation. This value represents a maximum ratio.

Sample HSF647 [S-9] : SAR Analysis: Sodium was not detected. To report SAR the sodium detection limit was used in the calculation. This value represents a maximum ratio.

Results relate only to the items tested.

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Maxxam Job #: B8N5673
Report Date: 2018/10/11

QUALITY ASSURANCE REPORT

exp Services Inc
Client Project #: OTT-00248813-AO
Site Location: IQALUIT-NEW LANDFILL
Sampler Initials: LM

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5726446	o-Terphenyl	2018/09/12	100	60 - 130	96	60 - 130	94	%		
5727553	4-Bromofluorobenzene	2018/09/13	101	60 - 140	101	60 - 140	85	%		
5727553	D10-o-Xylene	2018/09/13	116	60 - 130	106	60 - 130	96	%		
5727553	D4-1,2-Dichloroethane	2018/09/13	105	60 - 140	106	60 - 140	112	%		
5727553	D8-Toluene	2018/09/13	107	60 - 140	107	60 - 140	91	%		
5735776	D10-Anthracene	2018/09/16	85	50 - 130	94	50 - 130	99	%		
5735776	D14-Terphenyl	2018/09/16	87	50 - 130	95	50 - 130	98	%		
5735776	D8-Acenaphthylene	2018/09/16	82	50 - 130	91	50 - 130	96	%		
5735776	D8-Naphthalene	2018/09/16	73	50 - 130	81	50 - 130	84	%		
5736082	D10-Anthracene	2018/09/16	102	50 - 130	101	50 - 130	104	%		
5736082	D14-Terphenyl	2018/09/16	98	50 - 130	98	50 - 130	98	%		
5736082	D8-Acenaphthylene	2018/09/16	94	50 - 130	88	50 - 130	88	%		
5736082	D8-Naphthalene	2018/09/16	87	50 - 130	84	50 - 130	86	%		
5726446	F2 (C10-C16 Hydrocarbons)	2018/09/12	102	50 - 130	97	80 - 120	<10	ug/g	NC	30
5726446	F3 (C16-C34 Hydrocarbons)	2018/09/12	97	50 - 130	94	80 - 120	<50	ug/g	NC	30
5726446	F4 (C34-C50 Hydrocarbons)	2018/09/12	98	50 - 130	90	80 - 120	<50	ug/g	NC	30
5726811	Hot Water Ext. Boron (B)	2018/09/12	102	75 - 125	102	75 - 125	<0.050	ug/g	NC	40
5727027	Hot Water Ext. Boron (B)	2018/09/12	100	75 - 125	100	75 - 125	<0.050	ug/g	8.9	40
5727388	Moisture	2018/09/12							15	20
5727391	Available (CaCl2) pH	2018/09/13			100	97 - 103			0.0013	N/A
5727411	Acid Extractable Antimony (Sb)	2018/09/12	88	75 - 125	102	80 - 120	<0.20	ug/g	23	30
5727411	Acid Extractable Arsenic (As)	2018/09/12	97	75 - 125	103	80 - 120	<1.0	ug/g	4.5	30
5727411	Acid Extractable Barium (Ba)	2018/09/12	NC	75 - 125	103	80 - 120	<0.50	ug/g	4.0	30
5727411	Acid Extractable Beryllium (Be)	2018/09/12	98	75 - 125	100	80 - 120	<0.20	ug/g	8.8	30
5727411	Acid Extractable Boron (B)	2018/09/12	96	75 - 125	99	80 - 120	<5.0	ug/g	NC	30
5727411	Acid Extractable Cadmium (Cd)	2018/09/12	98	75 - 125	100	80 - 120	<0.10	ug/g	28	30
5727411	Acid Extractable Chromium (Cr)	2018/09/12	98	75 - 125	101	80 - 120	<1.0	ug/g	1.6	30
5727411	Acid Extractable Cobalt (Co)	2018/09/12	95	75 - 125	104	80 - 120	<0.10	ug/g	3.6	30
5727411	Acid Extractable Copper (Cu)	2018/09/12	94	75 - 125	102	80 - 120	<0.50	ug/g	3.8	30
5727411	Acid Extractable Lead (Pb)	2018/09/12	105	75 - 125	107	80 - 120	<1.0	ug/g	4.0	30
5727411	Acid Extractable Mercury (Hg)	2018/09/12	92	75 - 125	100	80 - 120	<0.050	ug/g	18	30

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Maxxam Job #: B8N5673
Report Date: 2018/10/11

QUALITY ASSURANCE REPORT(CONT'D)

exp Services Inc
Client Project #: OTT-00248813-AO
Site Location: IQALUIT-NEW LANDFILL
Sampler Initials: LM

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5727411	Acid Extractable Molybdenum (Mo)	2018/09/12	96	75 - 125	103	80 - 120	<0.50	ug/g	NC	30
5727411	Acid Extractable Nickel (Ni)	2018/09/12	98	75 - 125	105	80 - 120	<0.50	ug/g	1.0	30
5727411	Acid Extractable Selenium (Se)	2018/09/12	99	75 - 125	104	80 - 120	<0.50	ug/g	NC	30
5727411	Acid Extractable Silver (Ag)	2018/09/12	96	75 - 125	98	80 - 120	<0.20	ug/g	NC	30
5727411	Acid Extractable Thallium (Tl)	2018/09/12	100	75 - 125	107	80 - 120	<0.050	ug/g	25	30
5727411	Acid Extractable Tin (Sn)	2018/09/12	98	75 - 125	96	80 - 120	<1.0	ug/g		
5727411	Acid Extractable Uranium (U)	2018/09/12	104	75 - 125	109	80 - 120	<0.050	ug/g	3.6	30
5727411	Acid Extractable Vanadium (V)	2018/09/12	NC	75 - 125	100	80 - 120	<5.0	ug/g	0.73	30
5727411	Acid Extractable Zinc (Zn)	2018/09/12	NC	75 - 125	111	80 - 120	<5.0	ug/g	0.44	30
5727553	1,1,1,2-Tetrachloroethane	2018/09/14	98	60 - 140	95	60 - 130	<0.050	ug/g	NC	50
5727553	1,1,1-Trichloroethane	2018/09/14	94	60 - 140	92	60 - 130	<0.050	ug/g	NC	50
5727553	1,1,2,2-Tetrachloroethane	2018/09/14	97	60 - 140	96	60 - 130	<0.050	ug/g	NC	50
5727553	1,1,2-Trichloroethane	2018/09/14	100	60 - 140	98	60 - 130	<0.050	ug/g	NC	50
5727553	1,1-Dichloroethane	2018/09/14	97	60 - 140	94	60 - 130	<0.050	ug/g	NC	50
5727553	1,1-Dichloroethylene	2018/09/14	93	60 - 140	90	60 - 130	<0.050	ug/g	NC	50
5727553	1,2-Dichlorobenzene	2018/09/14	92	60 - 140	89	60 - 130	<0.050	ug/g	NC	50
5727553	1,2-Dichloroethane	2018/09/14	97	60 - 140	95	60 - 130	<0.050	ug/g	NC	50
5727553	1,2-Dichloropropane	2018/09/14	93	60 - 140	90	60 - 130	<0.050	ug/g	NC	50
5727553	1,3-Dichlorobenzene	2018/09/14	95	60 - 140	92	60 - 130	<0.050	ug/g	NC	50
5727553	1,4-Dichlorobenzene	2018/09/14	89	60 - 140	86	60 - 130	<0.050	ug/g	NC	50
5727553	Acetone (2-Propanone)	2018/09/14	86	60 - 140	90	60 - 140	<0.50	ug/g	NC	50
5727553	Benzene	2018/09/14	90	60 - 140	87	60 - 130	<0.0060	ug/g	NC	50
5727553	Bromodichloromethane	2018/09/14	94	60 - 140	92	60 - 130	<0.050	ug/g	NC	50
5727553	Bromoform	2018/09/14	95	60 - 140	93	60 - 130	<0.050	ug/g	NC	50
5727553	Bromomethane	2018/09/14	95	60 - 140	89	60 - 140	<0.050	ug/g	NC	50
5727553	Carbon Tetrachloride	2018/09/14	95	60 - 140	92	60 - 130	<0.050	ug/g	NC	50
5727553	Chlorobenzene	2018/09/14	92	60 - 140	89	60 - 130	<0.050	ug/g	NC	50
5727553	Chloroform	2018/09/14	96	60 - 140	93	60 - 130	<0.050	ug/g	NC	50
5727553	cis-1,2-Dichloroethylene	2018/09/14	92	60 - 140	90	60 - 130	<0.050	ug/g	NC	50
5727553	cis-1,3-Dichloropropene	2018/09/14	82	60 - 140	77	60 - 130	<0.030	ug/g	NC	50
5727553	Dibromochloromethane	2018/09/14	97	60 - 140	95	60 - 130	<0.050	ug/g	NC	50

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Maxxam Job #: B8N5673
Report Date: 2018/10/11

QUALITY ASSURANCE REPORT(CONT'D)

exp Services Inc
Client Project #: OTT-00248813-AO
Site Location: IQALUIT-NEW LANDFILL
Sampler Initials: LM

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5727553	Dichlorodifluoromethane (FREON 12)	2018/09/14	107	60 - 140	105	60 - 140	<0.050	ug/g	NC	50
5727553	Ethylbenzene	2018/09/14	89	60 - 140	85	60 - 130	<0.010	ug/g	NC	50
5727553	Ethylene Dibromide	2018/09/14	98	60 - 140	95	60 - 130	<0.050	ug/g	NC	50
5727553	F1 (C6-C10) - BTEX	2018/09/14					<10	ug/g	NC	30
5727553	F1 (C6-C10)	2018/09/14	96	60 - 140	95	80 - 120	<10	ug/g	NC	30
5727553	Hexane	2018/09/14	97	60 - 140	93	60 - 130	<0.050	ug/g	NC	50
5727553	Methyl Ethyl Ketone (2-Butanone)	2018/09/14	84	60 - 140	87	60 - 140	<0.50	ug/g	NC	50
5727553	Methyl Isobutyl Ketone	2018/09/14	85	60 - 140	84	60 - 130	<0.50	ug/g	NC	50
5727553	Methyl t-butyl ether (MTBE)	2018/09/14	89	60 - 140	88	60 - 130	<0.050	ug/g	NC	50
5727553	Methylene Chloride(Dichloromethane)	2018/09/14	91	60 - 140	88	60 - 130	<0.050	ug/g	NC	50
5727553	o-Xylene	2018/09/14	92	60 - 140	90	60 - 130	<0.020	ug/g	NC	50
5727553	p+m-Xylene	2018/09/14	90	60 - 140	87	60 - 130	<0.020	ug/g	NC	50
5727553	Styrene	2018/09/14	96	60 - 140	93	60 - 130	<0.050	ug/g	NC	50
5727553	Tetrachloroethylene	2018/09/14	93	60 - 140	91	60 - 130	<0.050	ug/g	NC	50
5727553	Toluene	2018/09/14	93	60 - 140	89	60 - 130	<0.020	ug/g	NC	50
5727553	Total Xylenes	2018/09/14					<0.020	ug/g	NC	50
5727553	trans-1,2-Dichloroethylene	2018/09/14	92	60 - 140	90	60 - 130	<0.050	ug/g	NC	50
5727553	trans-1,3-Dichloropropene	2018/09/14	94	60 - 140	86	60 - 130	<0.040	ug/g	NC	50
5727553	Trichloroethylene	2018/09/14	90	60 - 140	87	60 - 130	<0.010	ug/g	NC	50
5727553	Trichlorofluoromethane (FREON 11)	2018/09/14	97	60 - 140	94	60 - 130	<0.050	ug/g	NC	50
5727553	Vinyl Chloride	2018/09/14	97	60 - 140	94	60 - 130	<0.020	ug/g	NC	50
5729058	WAD Cyanide (Free)	2018/09/14	94	75 - 125	98	80 - 120	<0.01	ug/g	8.6	35
5729456	Chromium (VI)	2018/09/17	NC (1)	70 - 130	93	80 - 120	<0.2	ug/g	NC	35
5729481	Conductivity	2018/09/14			103	90 - 110	<0.002	mS/cm	9.6	10
5729698	Fluoride (F-)	2018/09/14	64 (2)	80 - 120	98	80 - 120	<5	ug/g	NC	25
5735773	Moisture-Subcontracted	2018/09/14					<0.30	%		
5735776	1-Methylnaphthalene	2018/09/16	80	50 - 130	87	50 - 130	<0.0050	mg/kg		
5735776	2-Methylnaphthalene	2018/09/16	74	50 - 130	82	50 - 130	<0.0050	mg/kg		
5735776	Acenaphthene	2018/09/16	84	50 - 130	93	50 - 130	<0.0050	mg/kg		
5735776	Acenaphthylene	2018/09/16	83	50 - 130	92	50 - 130	<0.0050	mg/kg		
5735776	Acridine	2018/09/16	61	50 - 130	67	50 - 130	<0.010	mg/kg		

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Maxxam Job #: B8N5673
Report Date: 2018/10/11

QUALITY ASSURANCE REPORT(CONT'D)

exp Services Inc
Client Project #: OTT-00248813-AO
Site Location: IQALUIT-NEW LANDFILL
Sampler Initials: LM

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5735776	Anthracene	2018/09/16	82	50 - 130	89	50 - 130	<0.0040	mg/kg		
5735776	Benzo(a)anthracene	2018/09/16	101	50 - 130	112	50 - 130	<0.0050	mg/kg		
5735776	Benzo(a)pyrene	2018/09/16	95	50 - 130	102	50 - 130	<0.0050	mg/kg		
5735776	Benzo(b/j)fluoranthene	2018/09/16	92	50 - 130	100	50 - 130	<0.0050	mg/kg		
5735776	Benzo(c)phenanthrene	2018/09/16	89	50 - 130	99	50 - 130	<0.0050	mg/kg		
5735776	Benzo(e)pyrene	2018/09/16	94	50 - 130	104	50 - 130	<0.0050	mg/kg		
5735776	Benzo(g,h,i)perylene	2018/09/16	85	50 - 130	100	50 - 130	<0.0050	mg/kg		
5735776	Benzo(k)fluoranthene	2018/09/16	95	50 - 130	106	50 - 130	<0.0050	mg/kg		
5735776	Chrysene	2018/09/16	93	50 - 130	101	50 - 130	<0.0050	mg/kg		
5735776	Dibenz(a,h)anthracene	2018/09/16	99	50 - 130	112	50 - 130	<0.0050	mg/kg		
5735776	Fluoranthene	2018/09/16	96	50 - 130	106	50 - 130	<0.0050	mg/kg		
5735776	Fluorene	2018/09/16	90	50 - 130	100	50 - 130	<0.0050	mg/kg		
5735776	Indeno(1,2,3-cd)pyrene	2018/09/16	103	50 - 130	117	50 - 130	<0.0050	mg/kg		
5735776	Naphthalene	2018/09/16	72	50 - 130	80	50 - 130	<0.0050	mg/kg		
5735776	Perylene	2018/09/16	79	50 - 130	91	50 - 130	<0.0050	mg/kg		
5735776	Phenanthrene	2018/09/16	82	50 - 130	91	50 - 130	<0.0050	mg/kg		
5735776	Pyrene	2018/09/16	90	50 - 130	100	50 - 130	<0.0050	mg/kg		
5735776	Quinoline	2018/09/16	110	50 - 130	108	50 - 130	<0.010	mg/kg		
5736082	1-Methylnaphthalene	2018/09/16	95	50 - 130	85	50 - 130	<0.0050	mg/kg		
5736082	2-Methylnaphthalene	2018/09/16	91	50 - 130	80	50 - 130	<0.0050	mg/kg		
5736082	Acenaphthene	2018/09/16	96	50 - 130	88	50 - 130	<0.0050	mg/kg		
5736082	Acenaphthylene	2018/09/16	94	50 - 130	86	50 - 130	<0.0050	mg/kg		
5736082	Acridine	2018/09/16	60	50 - 130	71	50 - 130	<0.010	mg/kg		
5736082	Anthracene	2018/09/16	67	50 - 130	90	50 - 130	<0.0040	mg/kg		
5736082	Benzo(a)anthracene	2018/09/16	44 (2)	50 - 130	95	50 - 130	<0.0050	mg/kg		
5736082	Benzo(a)pyrene	2018/09/16	52	50 - 130	98	50 - 130	<0.0050	mg/kg		
5736082	Benzo(b/j)fluoranthene	2018/09/16	71	50 - 130	89	50 - 130	<0.0050	mg/kg		
5736082	Benzo(c)phenanthrene	2018/09/16	101	50 - 130	94	50 - 130	<0.0050	mg/kg		
5736082	Benzo(e)pyrene	2018/09/16	67	50 - 130	88	50 - 130	<0.0050	mg/kg		
5736082	Benzo(g,h,i)perylene	2018/09/16	74	50 - 130	90	50 - 130	<0.0050	mg/kg		
5736082	Benzo(k)fluoranthene	2018/09/16	92	50 - 130	108	50 - 130	<0.0050	mg/kg		

Maxxam Analytics International Corporation o/a Maxxam Analytics 32 Colonnade Rd, Unit #1000, Nepean, ON K2E 7J6 Phone: 613 274-0573 Fax: 613 274-0574 Website: www.maxxam.ca

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A Bureau Veritas Group Company

Maxxam Job #: B8N5673
Report Date: 2018/10/11

QUALITY ASSURANCE REPORT(CONT'D)

exp Services Inc
Client Project #: OTT-00248813-AO
Site Location: IQALUIT-NEW LANDFILL
Sampler Initials: LM

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5736082	Chrysene	2018/09/16	63	50 - 130	102	50 - 130	<0.0050	mg/kg		
5736082	Dibenz(a,h)anthracene	2018/09/16	103	50 - 130	96	50 - 130	<0.0050	mg/kg		
5736082	Fluoranthene	2018/09/16	NC	50 - 130	101	50 - 130	<0.0050	mg/kg		
5736082	Fluorene	2018/09/16	98	50 - 130	92	50 - 130	<0.0050	mg/kg		
5736082	Indeno(1,2,3-cd)pyrene	2018/09/16	67	50 - 130	79	50 - 130	<0.0050	mg/kg		
5736082	Naphthalene	2018/09/16	89	50 - 130	80	50 - 130	<0.0050	mg/kg		
5736082	Perylene	2018/09/16	90	50 - 130	89	50 - 130	<0.0050	mg/kg		
5736082	Phenanthrene	2018/09/16	94	50 - 130	91	50 - 130	<0.0050	mg/kg		
5736082	Pyrene	2018/09/16	NC	50 - 130	98	50 - 130	<0.0050	mg/kg		
5736082	Quinoline	2018/09/16	109	50 - 130	101	50 - 130	<0.010	mg/kg		
5736083	Moisture-Subcontracted	2018/09/14					<0.30	%		

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) The matrix spike recovery was below the lower control limit. This may be due in part to the reducing environment of the sample. The matrix spike was reanalyzed to confirm result.

(2) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

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Maxxam
A Bureau Veritas Group Company

Maxxam Job #: B8N5673
Report Date: 2018/10/11

exp Services Inc
Client Project #: OTT-00248813-AO
Site Location: IQALUIT-NEW LANDFILL
Sampler Initials: LM

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Brad Newman, Scientific Service Specialist

Cristina Carriere, Scientific Service Specialist

Dennis Ngondu, B.Sc., P.Chem., QP, Supervisor, Organics

Jingyuan Song, QP, Organics – Senior Analyst

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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Maxxam Analytics International Corporation o/a Maxxam Analytics
6740 Campobello Road, Mississauga, Ontario, Canada L5N 2L8 Tel:(905) 817-5700 Toll-free 800-563-6266 Fax:(905) 817-5777 www.maxxam.ca

CHAIN OF CUSTODY RECORD

Page 1 of 1

INVOICE TO:

Company Name: #17498 exp Services Inc
Attention: Accounts Payable
Address: 100-2650 Queensview Drive, Ottawa ON K2B 9H6
Tel: (613) 688-1899 Fax: (613) 225-7337
Email: accounting.ottawa@exp.com; Karen.Burke@exp.com;

REPORT TO:

Company Name:
Attention: Rob Renaud / Les Misch
Address:
Tel: Fax:
Email: Robert.Renaud@exp.com / Les.Misch

PROJECT INFORMATION

Quotation #: B83935
PO #:
Project: OTT-00246813-A0
Project Name: Iqaluit New Landfill
Site #:
Sampled By: L. Misch

Laboratory Use Only:

Maxxam Job #:
Bottle Order #: B81097
COC #: C#581097-08-01
Project Manager: Alisha Williamson

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011): ☐ Table 1 ☐ Res/Park ☐ Medium/Fine ☐ Table 2 ☐ Ind/Comm ☐ Coarse ☐ Table 3 ☐ Agri/Other ☐ For RSC ☐ Table ___

Other Regulations: ☒ CCME ☐ Sanitary Sewer Bylaw ☐ Reg 558 ☐ Storm Sewer Bylaw ☐ MISA ☐ Municipality ☐ PWQO ☒ Other Government of Nunavut

Special Instructions:

Include Criteria on Certificate of Analysis (Y/N)? ___

TURNAROUND TIME (TAT) REQUIRED:

Regular (Standard) TAT: ☒
(will be applied if Rush TAT is not specified)
Standard TAT = 5-7 Working days for most tests
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details

Job Specific Rush TAT (if applies to entire submission)
Date Required: ___ Time Required: ___
Rush Confirmation Number: ___ (call lab for #)

ANALYSIS REQUESTED (PLEASE BE SPECIFIC):

	Sample Barcode Label	Sample Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): Metals / Hg / Cr VI	CCME Soil Inorganics Package + Hg + Metals	CCME Petroleum Hydrocarbons (PHC) + BTEX	CCME PHCs (F1-F4)	CCME Groundwater Inorganics Package	Petroleum Hydro. CCME F1-F4 & BTEX in Water	CCME PHCs in Water	VOC				# of Bottles	Comments
1		S-1	2018/09/07		SOIL		X	X	X				X				6	10-Sep-18 13:00
2		S-2	2018/09/07		SOIL													Alisha Williamson
3		S-3	2018/09/07		SOIL													B8N5673
4		S-4	2018/09/07		SOIL													FCN ENV-1214
5		S-5	2018/09/07		SOIL													
6		S-6	2018/09/07		SOIL													
7		S-7	2018/09/07		SOIL													
8		S-8	2018/09/07		SOIL													
9		S-9	2018/09/07		SOIL													
10																		OK Chc

RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Les Misch	18/09/05	7:30	[illegible]	2018/09/10	13:00	
			[illegible]	2018/09/11	08:00	

Laboratory Use Only

Time Sensitive	Temperature (°C) on Rece	Custody Seal	Yes	No
	5.1, 4	Present	✓	
		Intact	✓	

* 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

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT HTTP://MAXXAM.CA/WP-CONTENT/UPLOADS/ONTARIO-COC.PDF

Refer to ACT12

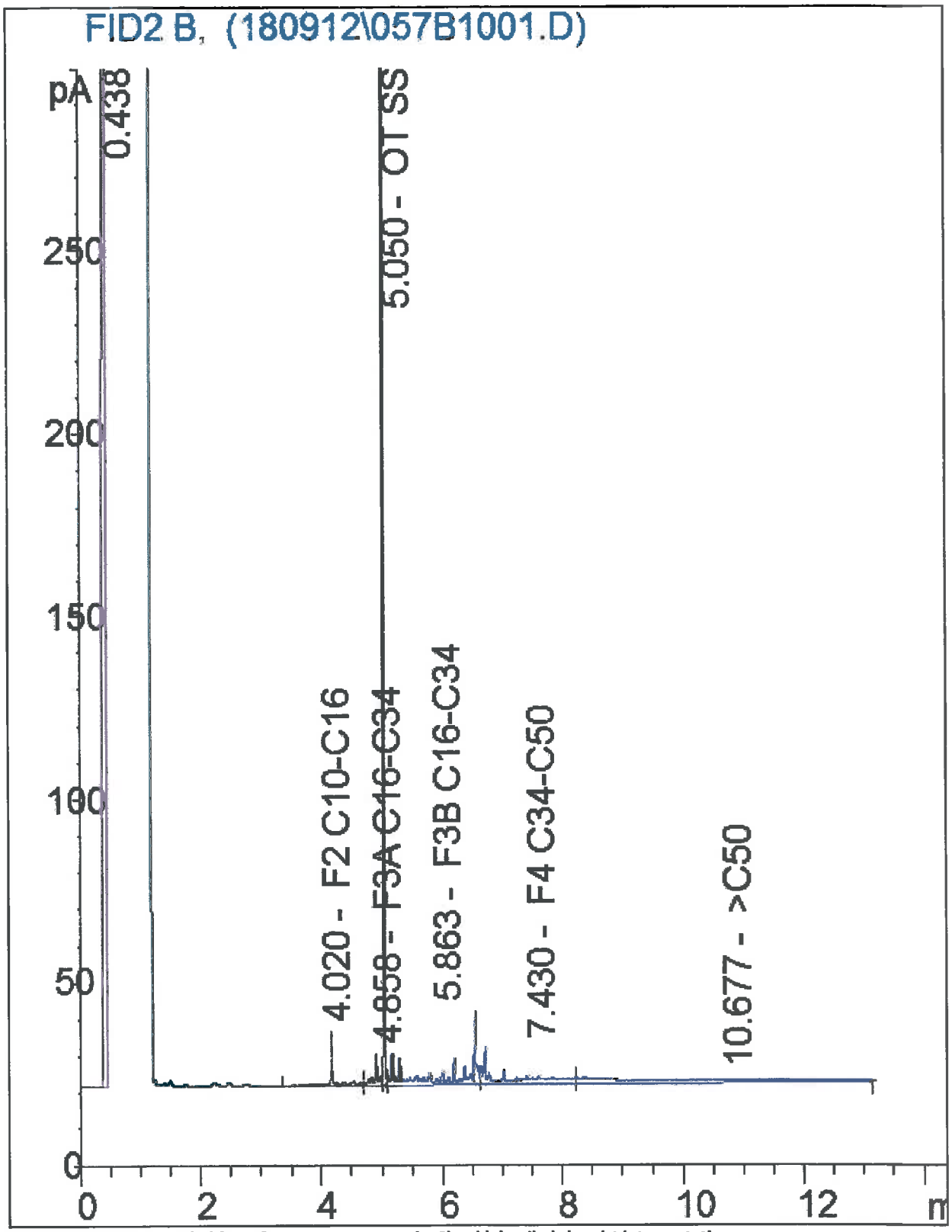
SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

White: Maxxa Yellow: Client

Maxxam Job #: B8N5673
Report Date: 2018/10/11
Maxxam Sample: HSF639

exp Services Inc
Client Project #: OTT-00248813-AO
Project name: IQALUIT-NEW LANDFILL
Client ID: S-1

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

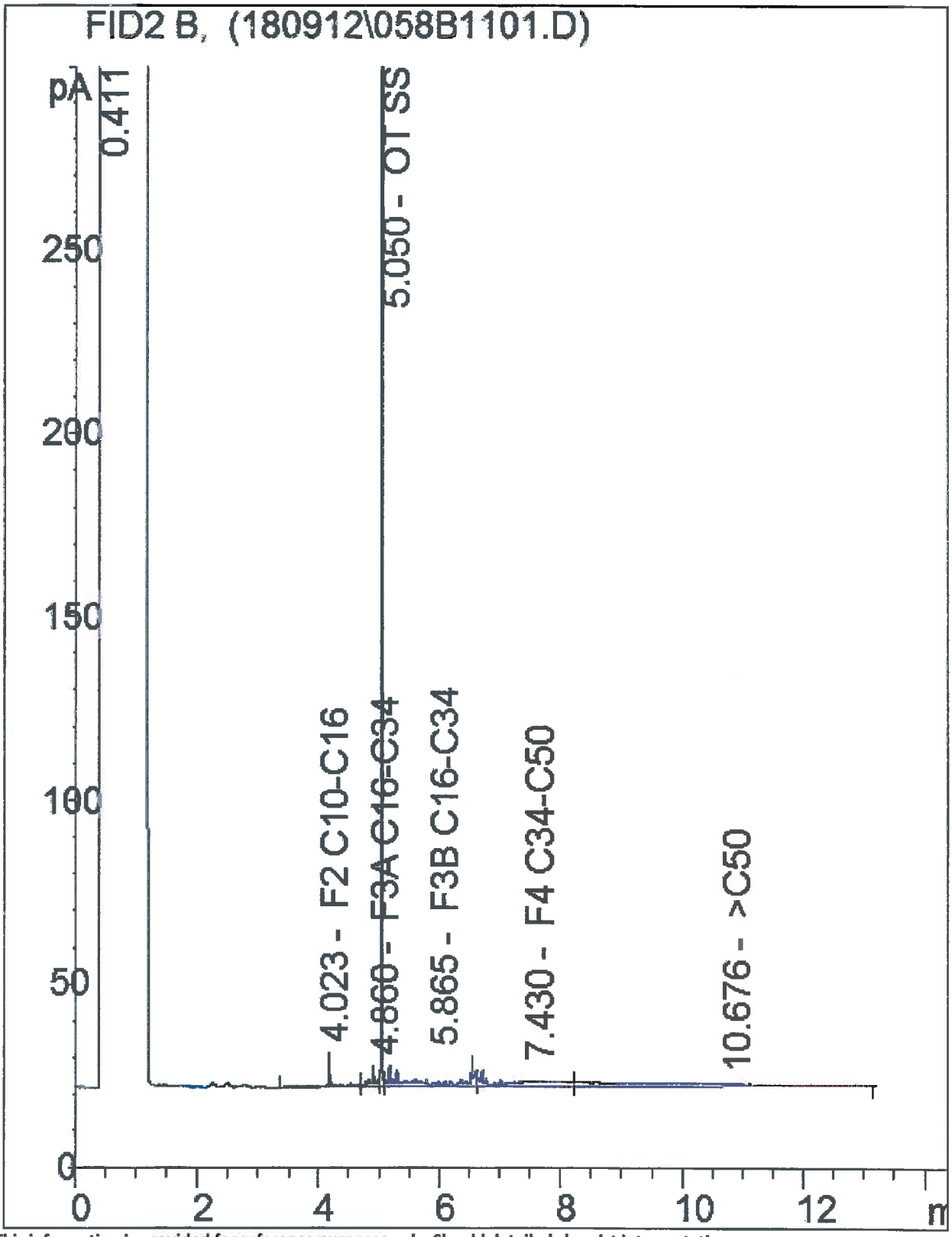


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B8N5673
Report Date: 2018/10/11
Maxxam Sample: HSF640

exp Services Inc
Client Project #: OTT-00248813-AO
Project name: IQALUIT-NEW LANDFILL
Client ID: S-2

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

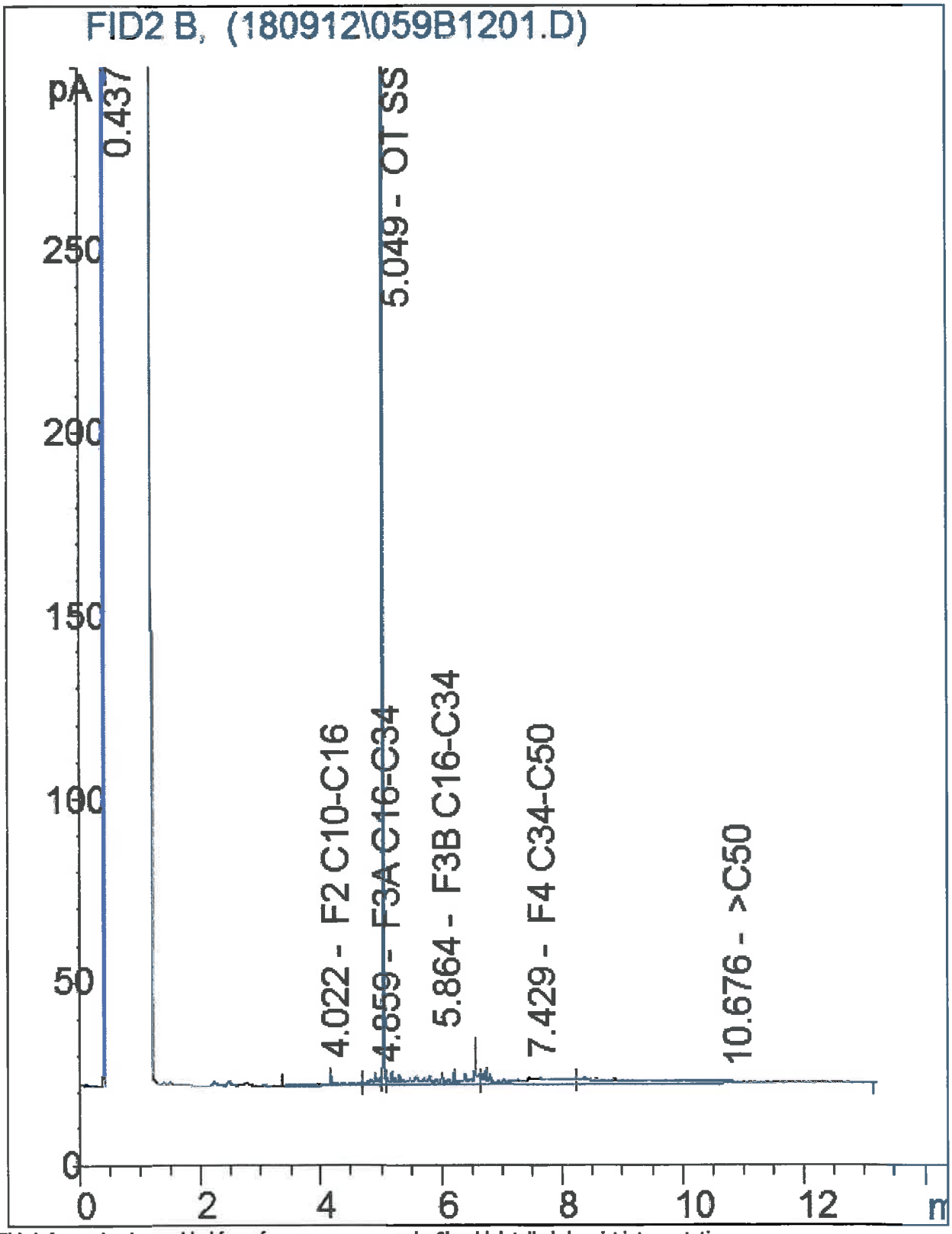


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B8N5673
Report Date: 2018/10/11
Maxxam Sample: HSF641

exp Services Inc
Client Project #: OTT-00248813-AO
Project name: IQALUIT-NEW LANDFILL
Client ID: S-3

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

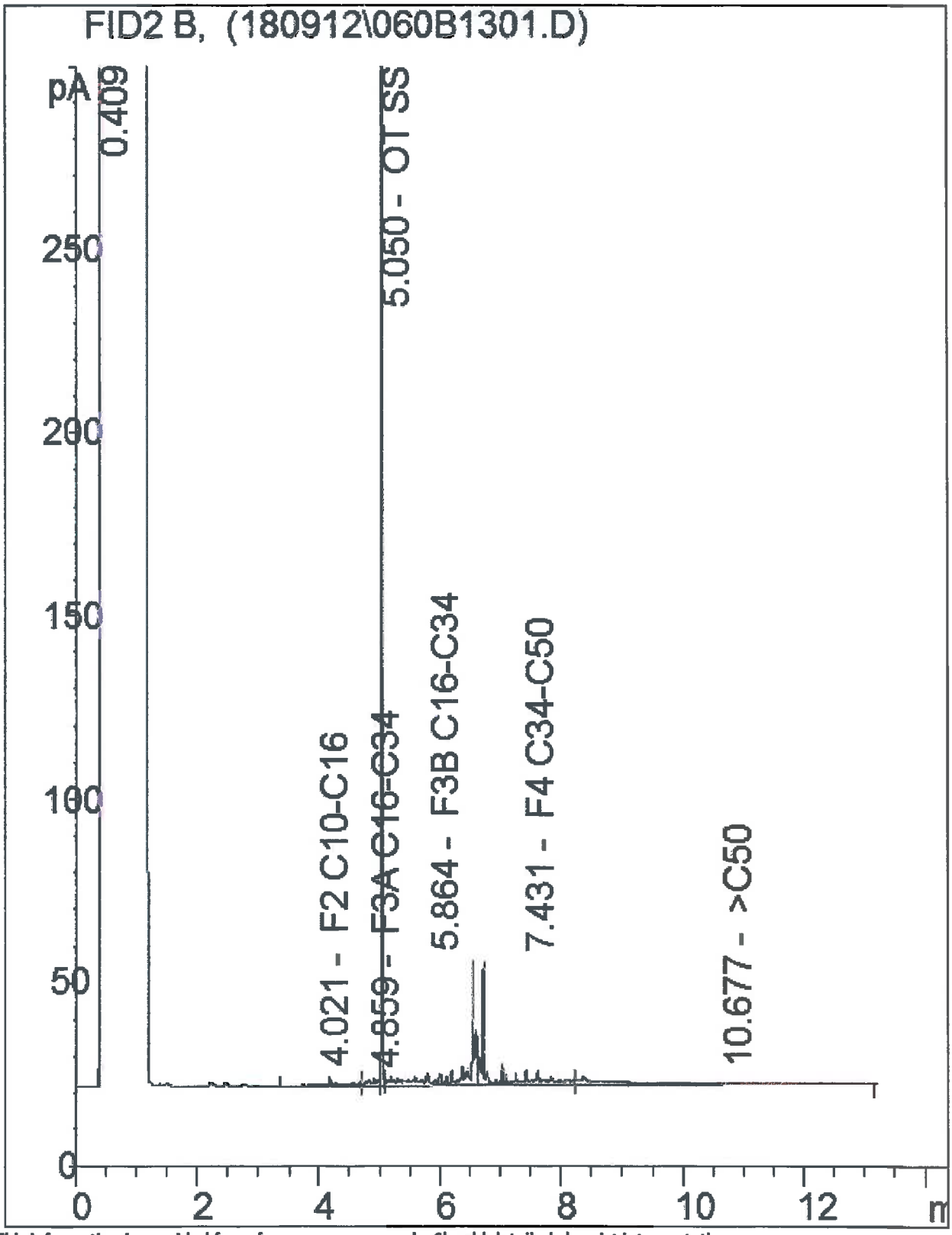


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B8N5673
Report Date: 2018/10/11
Maxxam Sample: HSF642

exp Services Inc
Client Project #: OTT-00248813-AO
Project name: IQALUIT-NEW LANDFILL
Client ID: S-4

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

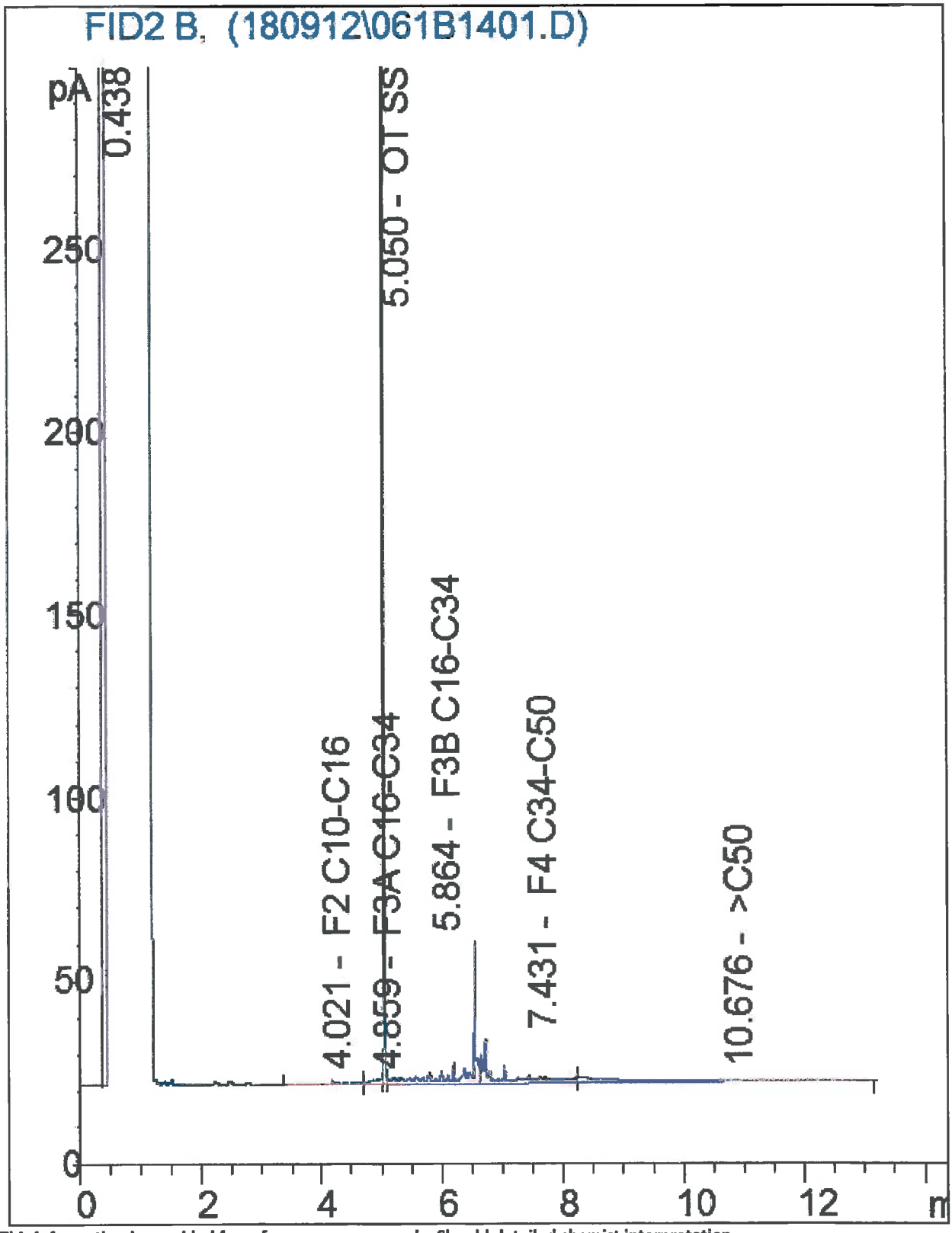


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B8N5673
Report Date: 2018/10/11
Maxxam Sample: HSF643

exp Services Inc
Client Project #: OTT-00248813-AO
Project name: IQALUIT-NEW LANDFILL
Client ID: S-5

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

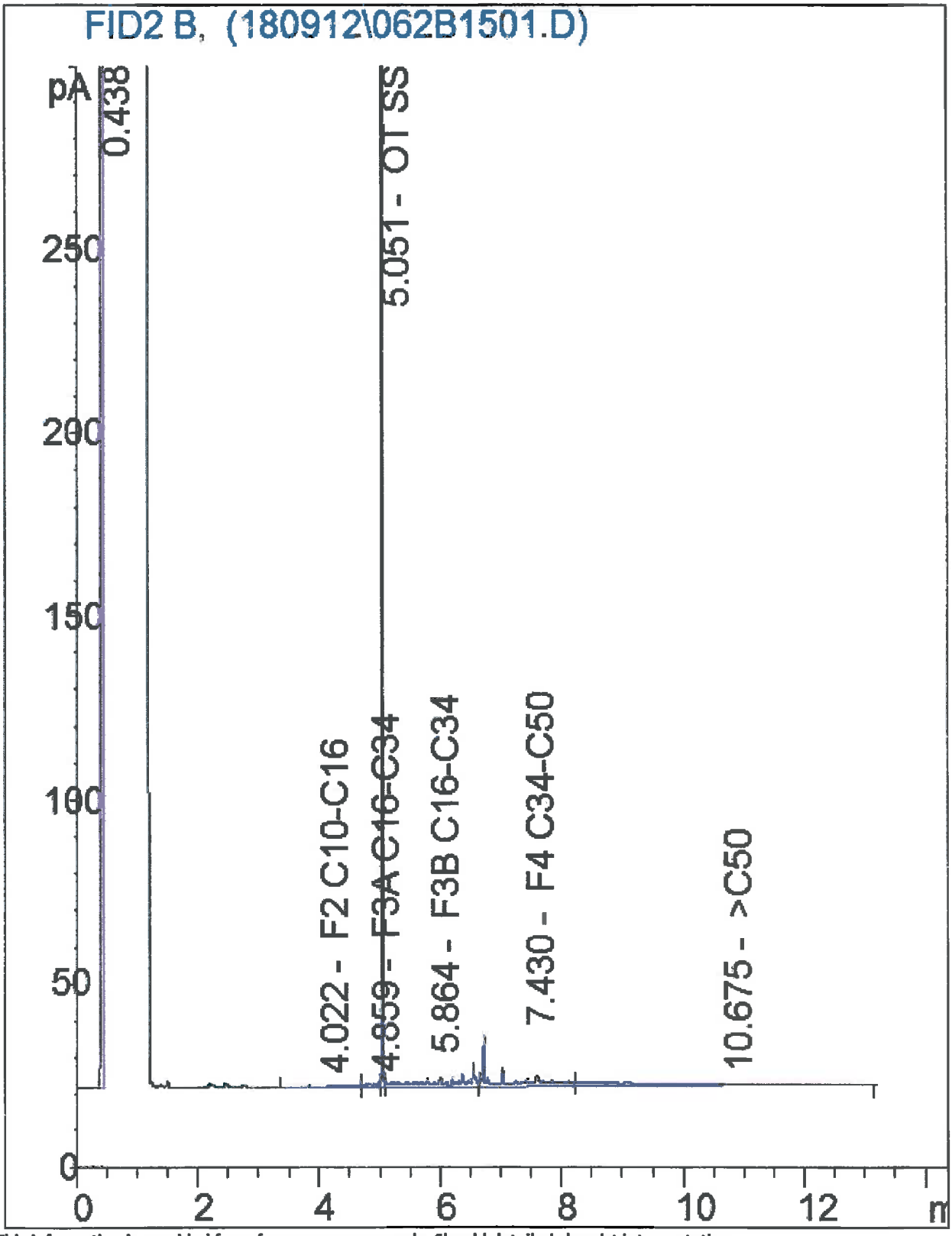


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B8N5673
Report Date: 2018/10/11
Maxxam Sample: HSF644

exp Services Inc
Client Project #: OTT-00248813-AO
Project name: IQALUIT-NEW LANDFILL
Client ID: S-6

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

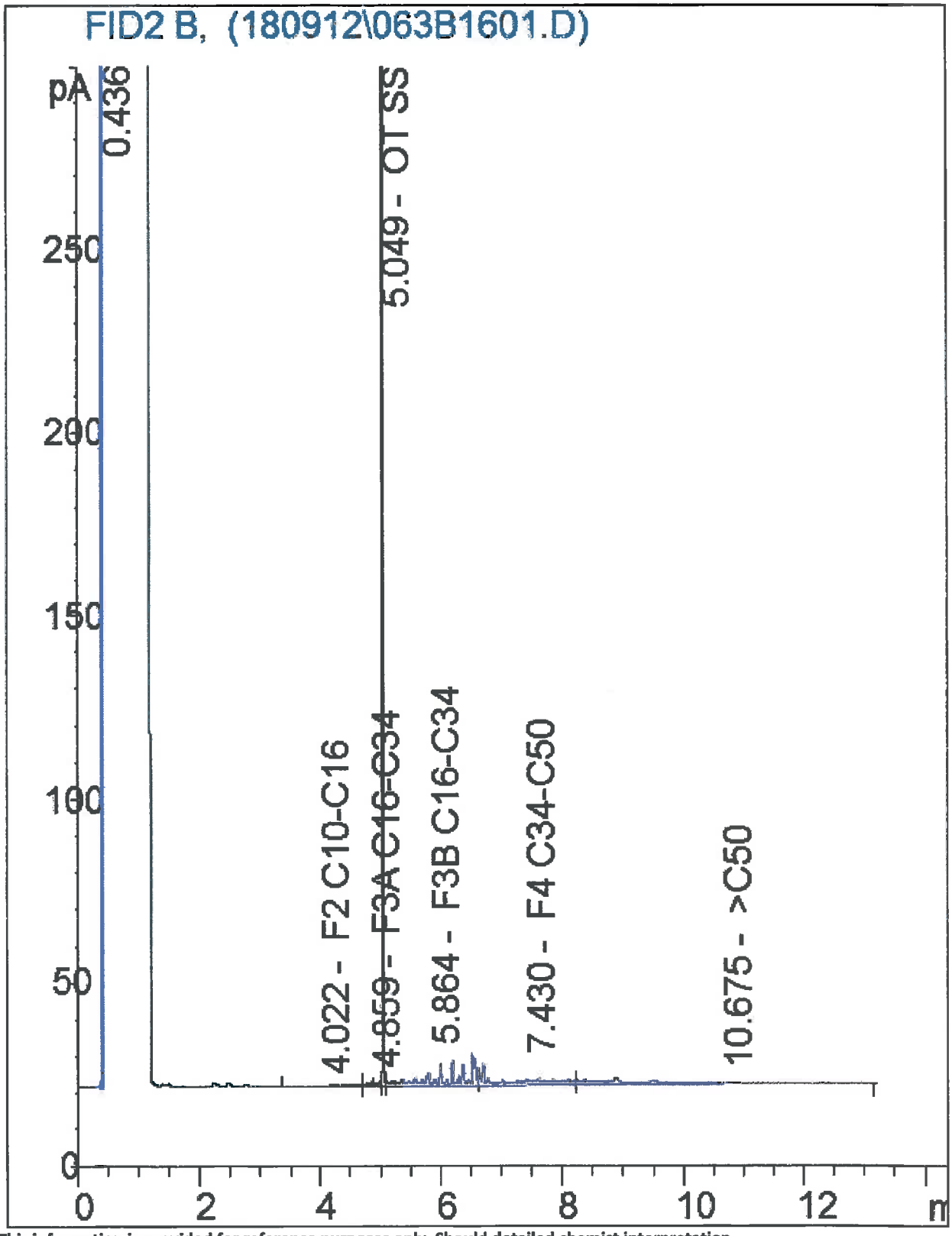


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B8N5673
Report Date: 2018/10/11
Maxxam Sample: HSF645

exp Services Inc
Client Project #: OTT-00248813-AO
Project name: IQALUIT-NEW LANDFILL
Client ID: S-7

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

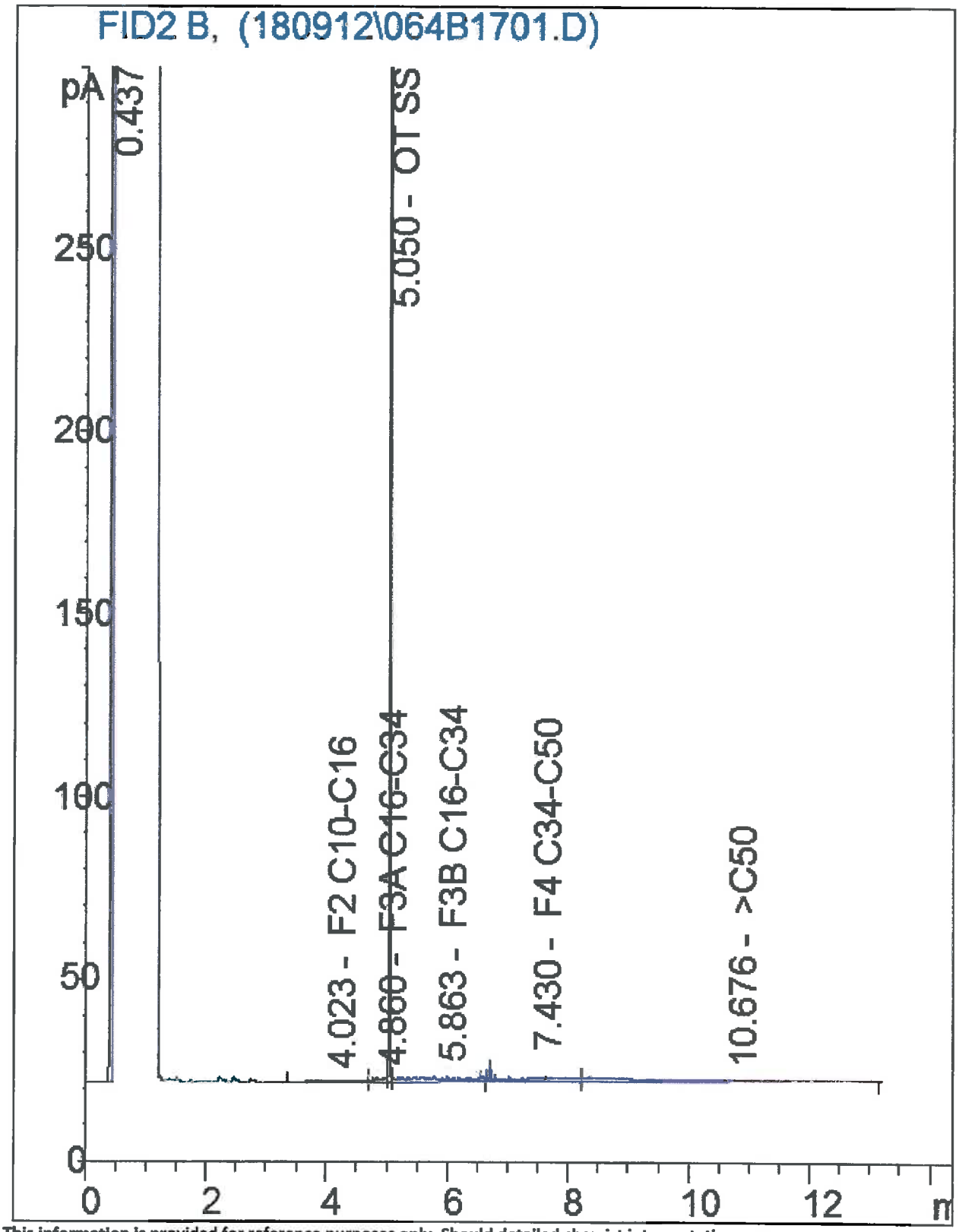


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B8N5673
Report Date: 2018/10/11
Maxxam Sample: HSF646

exp Services Inc
Client Project #: OTT-00248813-AO
Project name: IQALUIT-NEW LANDFILL
Client ID: S-8

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

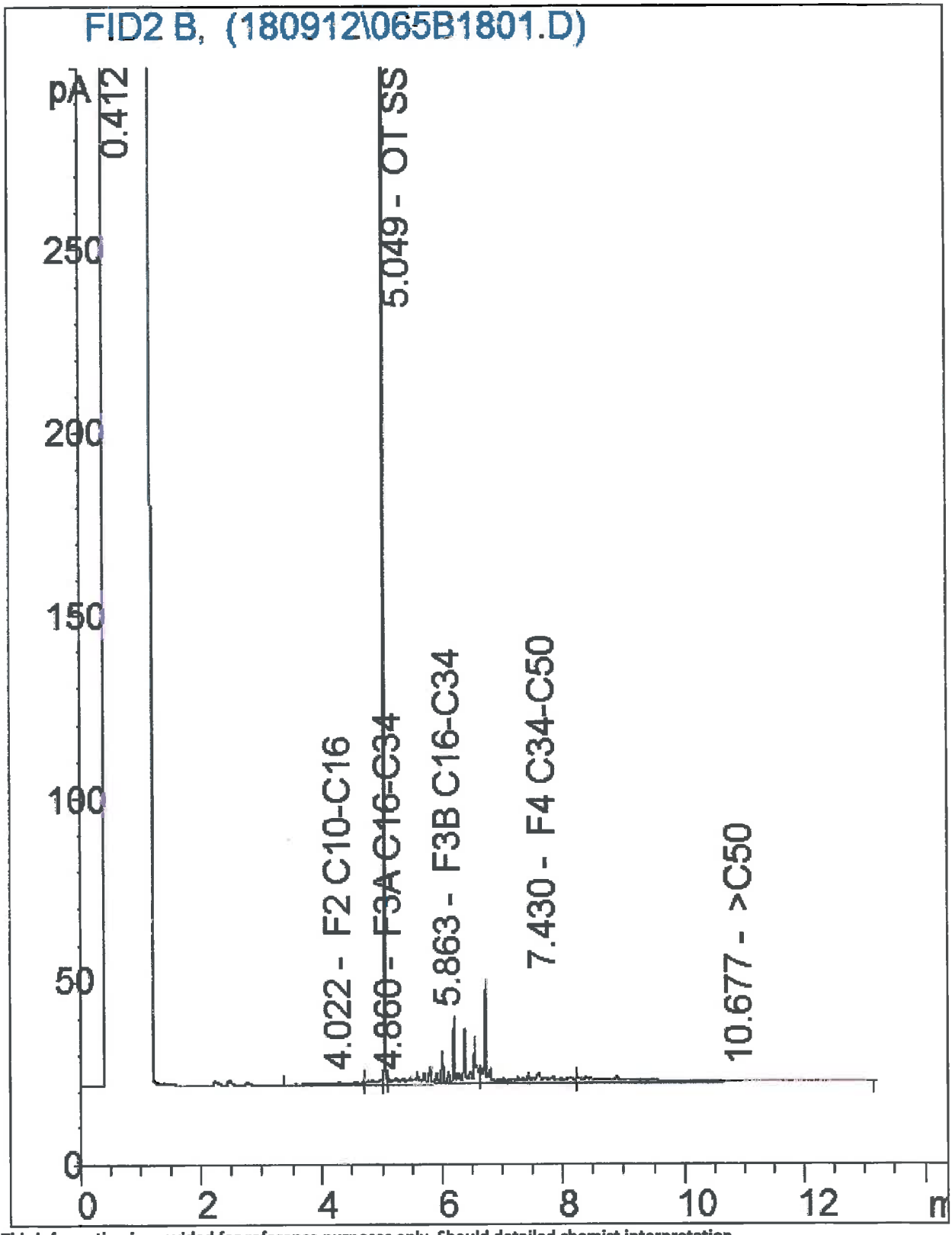


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B8N5673
Report Date: 2018/10/11
Maxxam Sample: HSF647

exp Services Inc
Client Project #: OTT-00248813-AO
Project name: IQALUIT-NEW LANDFILL
Client ID: S-9

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram



Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Certificate of Analysis: Surface Water

Maxxam
A Bureau Veritas Group Company

Your Project #: OTT-0248813-AO
Site Location: IQALUIT-NEW LANDFILL
Your C.O.C. #: 681097-07-01

Attention: Robert Renaud

exp Services Inc
Ottawa Branch
100-2650 Queensview Drive
Ottawa, ON
CANADA K2B 8H6

Report Date: 2018/09/19
Report #: R5405244
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8N5764
Received: 2018/09/10, 13:00

Sample Matrix: Water
Samples Received: 8

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Chloride by Automated Colourimetry (1)	8	N/A	2018/09/13	CAM SOP-00463	EPA 325.2 m
Free (WAD) Cyanide (1)	8	N/A	2018/09/12	CAM SOP-00457	OMOE E3015 m
Fluoride (1)	8	2018/09/12	2018/09/13	CAM SOP-00449	SM 23 4500-F C m
Mercury (low level) (1)	4	2018/09/12	2018/09/13	CAM SOP-00453	EPA 7470 m
Mercury (low level) (1)	4	2018/09/13	2018/09/13	CAM SOP-00453	EPA 7470 m
Sulphide (as H2S) (2)	8	N/A	2018/09/14	AB WI-00065	Auto Calc.
Hardness (calculated as CaCO3) (3)	8	N/A	2018/09/18	BBY WI-00033	Auto Calc
Na, K, Ca, Mg, S by CRC ICPMS (diss.) (3)	8	N/A	2018/09/18	BBY7SOP-00002	EPA 6020B R2 m
Elements by CRC ICPMS (dissolved) (3)	8	N/A	2018/09/18	BBY7SOP-00002	EPA 6020B R2 m
Filter and HNO3 Preserve for Metals (3)	8	N/A	2018/09/14	BBY7 WI-00004	BCMOE Regs 08/14
Sulphide (2)	8	N/A	2018/09/14	AB SOP-00080	SM 22 4500 S2-A D F
Total Ammonia-N (1)	8	N/A	2018/09/13	CAM SOP-00441	EPA GS I-2522-90 m
Nitrate (NO3) and Nitrite (NO2) in Water (1, 4)	8	N/A	2018/09/13	CAM SOP-00440	SM 23 4500-NO3I/NO2B
pH (1)	8	N/A	2018/09/13	CAM SOP-00413	SM 4500H+ B m
Sulphate by Automated Colourimetry (1)	8	N/A	2018/09/13	CAM SOP-00464	EPA 375.4 m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

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

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam 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 Maxxam, unless otherwise agreed in writing. Maxxam is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Maxxam Analytics International Corporation o/a Maxxam Analytics 32 Colonnade Rd, Unit #1000, Nepean, ON K2E 7J6 Phone: 613 274-0573 Fax: 613 274-0574 Website: www.maxxam.ca

Maxxam
A Bureau Veritas Group Company

Your Project #: OTT-0248813-AO
Site Location: IQALUIT-NEW LANDFILL
Your C.O.C. #: 681097-07-01

Attention: Robert Renaud

exp Services Inc
Ottawa Branch
100-2650 Queensview Drive
Ottawa, ON
CANADA K2B 8H6

Report Date: 2018/09/19
Report #: R5405244
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8N5764
Received: 2018/09/10, 13:00

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 Maxxam, 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 Maxxam Analytics Mississauga
(2) This test was performed by Campo to Calgary - Offsite
(3) This test was performed by Campo to Burnaby - Offsite
(4) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Alisha Williamson, Project Manager
Email: AWilliamson@maxxam.ca
Phone# (613) 274-0573

==========

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Maxxam
A Bureau Veritas Group Company

Maxxam Job #: B8N5764
Report Date: 2018/09/19

exp Services Inc
Client Project #: OTT-0248813-AO
Site Location: IQALUIT-NEW LANDFILL
Sampler Initials: LM

RESULTS OF ANALYSES OF WATER

Maxxam ID		HSG078			HSG078			HSG079		
Sampling Date		2018/09/07			2018/09/07			2018/09/07		
COC Number		681097-07-01			681097-07-01			681097-07-01		
	UNITS	SW-1	RDL	QC Batch	SW-1 Lab-Dup	RDL	QC Batch	SW-3	RDL	QC Batch
CONVENTIONALS										
Total Sulphide	mg/L	<0.0019	0.0019	5734150	<0.0019	0.0019	5734150	<0.0019	0.0019	5734150
Calculated Parameters										
Filter and HNO3 Preservation	N/A	LAB		5738708				LAB		5738708
Dissolved Hardness (CaCO3)	mg/L	68.8	0.50	5730834				56.8	0.50	5730834
Sulphide (as H2S)	mg/L	<0.0020	0.0020	5737429				<0.0020	0.0020	5737429
Inorganics										
Total Ammonia-N	mg/L	<0.050	0.050	5727120				<0.050	0.050	5727120
Fluoride (F-)	mg/L	<0.10	0.10	5727078				<0.10	0.10	5727078
pH	pH	8.05		5727082				7.84		5727082
Dissolved Sulphate (SO4)	mg/L	<1.0	1.0	5727421				<1.0	1.0	5727421
WAD Cyanide (Free)	mg/L	<0.0010	0.0010	5726642				<0.0010	0.0010	5726642
Dissolved Chloride (Cl-)	mg/L	<1.0	1.0	5727413				<1.0	1.0	5727413
Nitrite (N)	mg/L	<0.010	0.010	5727418				<0.010	0.010	5727418
Nitrate (N)	mg/L	<0.10	0.10	5727418				<0.10	0.10	5727418
Nitrate + Nitrite (N)	mg/L	<0.10	0.10	5727418				<0.10	0.10	5727418
Metals										
Dissolved Aluminum (Al)	ug/L	17.2	3.0	5738707				9.1	3.0	5738707
Dissolved Antimony (Sb)	ug/L	<0.50	0.50	5738707				<0.50	0.50	5738707
Dissolved Arsenic (As)	ug/L	<0.10	0.10	5738707				<0.10	0.10	5738707
Dissolved Barium (Ba)	ug/L	7.2	1.0	5738707				1.7	1.0	5738707
Dissolved Beryllium (Be)	ug/L	<0.10	0.10	5738707				<0.10	0.10	5738707
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	5738707				<1.0	1.0	5738707
Dissolved Boron (B)	ug/L	<50	50	5738707				<50	50	5738707
Dissolved Cadmium (Cd)	ug/L	<0.010	0.010	5738707				<0.010	0.010	5738707
Dissolved Chromium (Cr)	ug/L	<1.0	1.0	5738707				<1.0	1.0	5738707
Dissolved Cobalt (Co)	ug/L	<0.20	0.20	5738707				<0.20	0.20	5738707
Dissolved Copper (Cu)	ug/L	0.75	0.20	5738707				1.12	0.20	5738707
Dissolved Iron (Fe)	ug/L	8.1	5.0	5738707				<5.0	5.0	5738707
Dissolved Lead (Pb)	ug/L	<0.20	0.20	5738707				<0.20	0.20	5738707
Dissolved Lithium (Li)	ug/L	<2.0	2.0	5738707				<2.0	2.0	5738707
Dissolved Manganese (Mn)	ug/L	<1.0	1.0	5738707				<1.0	1.0	5738707
Dissolved Mercury (Hg)	ug/L	<0.050	0.050	5738707				<0.050	0.050	5738707
Dissolved Molybdenum (Mo)	ug/L	<1.0	1.0	5738707				<1.0	1.0	5738707

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

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Maxxam Job #: B8N5764
Report Date: 2018/09/19

exp Services Inc
Client Project #: OTT-0248813-AO
Site Location: IQALUIT-NEW LANDFILL
Sampler Initials: LM

RESULTS OF ANALYSES OF WATER

Maxxam ID		HSG078			HSG078			HSG079		
Sampling Date		2018/09/07			2018/09/07			2018/09/07		
COC Number		681097-07-01			681097-07-01			681097-07-01		
	UNITS	SW-1	RDL	QC Batch	SW-1 Lab-Dup	RDL	QC Batch	SW-3	RDL	QC Batch
Dissolved Nickel (Ni)	ug/L	<1.0	1.0	5738707				<1.0	1.0	5738707
Dissolved Selenium (Se)	ug/L	<0.10	0.10	5738707				<0.10	0.10	5738707
Dissolved Silicon (Si)	ug/L	1960	100	5738707				2210	100	5738707
Dissolved Silver (Ag)	ug/L	<0.020	0.020	5738707				<0.020	0.020	5738707
Dissolved Strontium (Sr)	ug/L	35.2	1.0	5738707				26.0	1.0	5738707
Dissolved Thallium (Tl)	ug/L	<0.010	0.010	5738707				<0.010	0.010	5738707
Dissolved Tin (Sn)	ug/L	<5.0	5.0	5738707				<5.0	5.0	5738707
Dissolved Titanium (Ti)	ug/L	<5.0	5.0	5738707				<5.0	5.0	5738707
Dissolved Uranium (U)	ug/L	<0.10	0.10	5738707				<0.10	0.10	5738707
Dissolved Vanadium (V)	ug/L	<5.0	5.0	5738707				<5.0	5.0	5738707
Dissolved Zinc (Zn)	ug/L	<5.0	5.0	5738707				13.9	5.0	5738707
Dissolved Zirconium (Zr)	ug/L	<0.10	0.10	5738707				<0.10	0.10	5738707
Dissolved Calcium (Ca)	mg/L	24.4	0.050	5730835				19.3	0.050	5730835
Dissolved Magnesium (Mg)	mg/L	1.88	0.050	5730835				2.07	0.050	5730835
Dissolved Potassium (K)	mg/L	0.248	0.050	5730835				0.201	0.050	5730835
Dissolved Sodium (Na)	mg/L	0.943	0.050	5730835				1.80	0.050	5730835
Dissolved Sulphur (S)	mg/L	<3.0	3.0	5730835				<3.0	3.0	5730835

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Maxxam Job #: B8N5764
Report Date: 2018/09/19

exp Services Inc
Client Project #: OTT-0248813-AO
Site Location: IQALUIT-NEW LANDFILL
Sampler Initials: LM

RESULTS OF ANALYSES OF WATER

Maxxam ID		HSG080			HSG080			HSG081		
Sampling Date		2018/09/07			2018/09/07			2018/09/07		
COC Number		681097-07-01			681097-07-01			681097-07-01		
	UNITS	SW-4	RDL	QC Batch	SW-4 Lab-Dup	RDL	QC Batch	SW-5	RDL	QC Batch
CONVENTIONALS										
Total Sulphide	mg/L	<0.0019	0.0019	5734150				<0.0019	0.0019	5734150
Calculated Parameters										
Filter and HNO3 Preservation	N/A	LAB		5738708				LAB		5738708
Dissolved Hardness (CaCO3)	mg/L	50.5	0.50	5730834				22.8	0.50	5730834
Sulphide (as H2S)	mg/L	<0.0020	0.0020	5737429				<0.0020	0.0020	5737429
Inorganics										
Total Ammonia-N	mg/L	<0.050	0.050	5727120				<0.050	0.050	5727120
Fluoride (F-)	mg/L	<0.10	0.10	5727078				<0.10	0.10	5727078
pH	pH	7.89		5727082				7.57		5727082
Dissolved Sulphate (SO4)	mg/L	<1.0	1.0	5727421				<1.0	1.0	5727421
WAD Cyanide (Free)	mg/L	<0.0010	0.0010	5726642				<0.0010	0.0010	5726642
Dissolved Chloride (Cl-)	mg/L	<1.0	1.0	5727413				<1.0	1.0	5727413
Nitrite (N)	mg/L	<0.010	0.010	5727418	<0.010	0.010	5727418	<0.010	0.010	5727418
Nitrate (N)	mg/L	<0.10	0.10	5727418	<0.10	0.10	5727418	<0.10	0.10	5727418
Nitrate + Nitrite (N)	mg/L	<0.10	0.10	5727418	<0.10	0.10	5727418	<0.10	0.10	5727418
Metals										
Dissolved Aluminum (Al)	ug/L	7.6	3.0	5738707				17.2	3.0	5738707
Dissolved Antimony (Sb)	ug/L	<0.50	0.50	5738707				<0.50	0.50	5738707
Dissolved Arsenic (As)	ug/L	<0.10	0.10	5738707				<0.10	0.10	5738707
Dissolved Barium (Ba)	ug/L	2.9	1.0	5738707				2.0	1.0	5738707
Dissolved Beryllium (Be)	ug/L	<0.10	0.10	5738707				<0.10	0.10	5738707
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	5738707				<1.0	1.0	5738707
Dissolved Boron (B)	ug/L	<50	50	5738707				<50	50	5738707
Dissolved Cadmium (Cd)	ug/L	<0.010	0.010	5738707				<0.010	0.010	5738707
Dissolved Chromium (Cr)	ug/L	<1.0	1.0	5738707				<1.0	1.0	5738707
Dissolved Cobalt (Co)	ug/L	<0.20	0.20	5738707				<0.20	0.20	5738707
Dissolved Copper (Cu)	ug/L	0.78	0.20	5738707				1.05	0.20	5738707
Dissolved Iron (Fe)	ug/L	7.9	5.0	5738707				8.6	5.0	5738707
Dissolved Lead (Pb)	ug/L	<0.20	0.20	5738707				<0.20	0.20	5738707
Dissolved Lithium (Li)	ug/L	<2.0	2.0	5738707				<2.0	2.0	5738707
Dissolved Manganese (Mn)	ug/L	<1.0	1.0	5738707				<1.0	1.0	5738707
Dissolved Mercury (Hg)	ug/L	<0.050	0.050	5738707				<0.050	0.050	5738707
Dissolved Molybdenum (Mo)	ug/L	<1.0	1.0	5738707				<1.0	1.0	5738707

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Maxxam Job #: B8N5764
Report Date: 2018/09/19

exp Services Inc
Client Project #: OTT-0248813-AO
Site Location: IQALUIT-NEW LANDFILL
Sampler Initials: LM

RESULTS OF ANALYSES OF WATER

Maxxam ID		HSG080			HSG080			HSG081		
Sampling Date		2018/09/07			2018/09/07			2018/09/07		
COC Number		681097-07-01			681097-07-01			681097-07-01		
	UNITS	SW-4	RDL	QC Batch	SW-4 Lab-Dup	RDL	QC Batch	SW-5	RDL	QC Batch
Dissolved Nickel (Ni)	ug/L	<1.0	1.0	5738707				<1.0	1.0	5738707
Dissolved Selenium (Se)	ug/L	<0.10	0.10	5738707				<0.10	0.10	5738707
Dissolved Silicon (Si)	ug/L	1860	100	5738707				1880	100	5738707
Dissolved Silver (Ag)	ug/L	<0.020	0.020	5738707				<0.020	0.020	5738707
Dissolved Strontium (Sr)	ug/L	24.3	1.0	5738707				11.5	1.0	5738707
Dissolved Thallium (Tl)	ug/L	<0.010	0.010	5738707				<0.010	0.010	5738707
Dissolved Tin (Sn)	ug/L	<5.0	5.0	5738707				<5.0	5.0	5738707
Dissolved Titanium (Ti)	ug/L	<5.0	5.0	5738707				<5.0	5.0	5738707
Dissolved Uranium (U)	ug/L	<0.10	0.10	5738707				<0.10	0.10	5738707
Dissolved Vanadium (V)	ug/L	<5.0	5.0	5738707				<5.0	5.0	5738707
Dissolved Zinc (Zn)	ug/L	<5.0	5.0	5738707				<5.0	5.0	5738707
Dissolved Zirconium (Zr)	ug/L	<0.10	0.10	5738707				<0.10	0.10	5738707
Dissolved Calcium (Ca)	mg/L	17.3	0.050	5730835				7.56	0.050	5730835
Dissolved Magnesium (Mg)	mg/L	1.77	0.050	5730835				0.937	0.050	5730835
Dissolved Potassium (K)	mg/L	0.170	0.050	5730835				0.199	0.050	5730835
Dissolved Sodium (Na)	mg/L	0.799	0.050	5730835				0.797	0.050	5730835
Dissolved Sulphur (S)	mg/L	<3.0	3.0	5730835				6.1	3.0	5730835

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Maxxam Job #: B8N5764
Report Date: 2018/09/19

exp Services Inc
Client Project #: OTT-0248813-AO
Site Location: IQALUIT-NEW LANDFILL
Sampler Initials: LM

RESULTS OF ANALYSES OF WATER

Maxxam ID		HSG082		HSG083		HSG084		
Sampling Date		2018/09/07		2018/09/07		2018/09/07		
COC Number		681097-07-01		681097-07-01		681097-07-01		
	UNITS	SW-6	QC Batch	SW-7	QC Batch	SW-9	RDL	QC Batch
CONVENTIONALS								
Total Sulphide	mg/L	<0.0019	5734150	<0.0019	5734150	<0.0019	0.0019	5734150
Calculated Parameters								
Filter and HNO3 Preservation	N/A	LAB	5738708	LAB	5738708	LAB		5738708
Dissolved Hardness (CaCO3)	mg/L	39.4	5730834	32.3	5730834	24.1	0.50	5730834
Sulphide (as H2S)	mg/L	<0.0020	5734147	<0.0020	5734147	<0.0020	0.0020	5734147
Inorganics								
Total Ammonia-N	mg/L	<0.050	5727120	<0.050	5727120	<0.050	0.050	5727120
Fluoride (F-)	mg/L	<0.10	5727078	<0.10	5727841	<0.10	0.10	5727078
pH	pH	7.86	5727082	7.88	5727848	7.52		5727082
Dissolved Sulphate (SO4)	mg/L	2.6	5727421	2.4	5727421	<1.0	1.0	5727421
WAD Cyanide (Free)	mg/L	<0.0010	5726642	<0.0010	5726642	<0.0010	0.0010	5726642
Dissolved Chloride (Cl-)	mg/L	<1.0	5727413	<1.0	5727413	<1.0	1.0	5727413
Nitrite (N)	mg/L	<0.010	5727072	<0.010	5727072	<0.010	0.010	5727418
Nitrate (N)	mg/L	<0.10	5727072	<0.10	5727072	<0.10	0.10	5727418
Nitrate + Nitrite (N)	mg/L	<0.10	5727072	<0.10	5727072	<0.10	0.10	5727418
Metals								
Dissolved Aluminum (Al)	ug/L	7.8	5738707	9.4	5738707	14.9	3.0	5738707
Dissolved Antimony (Sb)	ug/L	<0.50	5738707	<0.50	5738707	<0.50	0.50	5738707
Dissolved Arsenic (As)	ug/L	<0.10	5738707	<0.10	5738707	<0.10	0.10	5738707
Dissolved Barium (Ba)	ug/L	3.1	5738707	2.2	5738707	2.1	1.0	5738707
Dissolved Beryllium (Be)	ug/L	<0.10	5738707	<0.10	5738707	<0.10	0.10	5738707
Dissolved Bismuth (Bi)	ug/L	<1.0	5738707	<1.0	5738707	<1.0	1.0	5738707
Dissolved Boron (B)	ug/L	<50	5738707	<50	5738707	<50	50	5738707
Dissolved Cadmium (Cd)	ug/L	<0.010	5738707	<0.010	5738707	<0.010	0.010	5738707
Dissolved Chromium (Cr)	ug/L	<1.0	5738707	<1.0	5738707	<1.0	1.0	5738707
Dissolved Cobalt (Co)	ug/L	<0.20	5738707	<0.20	5738707	<0.20	0.20	5738707
Dissolved Copper (Cu)	ug/L	0.93	5738707	0.95	5738707	0.93	0.20	5738707
Dissolved Iron (Fe)	ug/L	<5.0	5738707	5.2	5738707	<5.0	5.0	5738707
Dissolved Lead (Pb)	ug/L	<0.20	5738707	<0.20	5738707	<0.20	0.20	5738707
Dissolved Lithium (Li)	ug/L	<2.0	5738707	<2.0	5738707	<2.0	2.0	5738707
Dissolved Manganese (Mn)	ug/L	<1.0	5738707	<1.0	5738707	<1.0	1.0	5738707
Dissolved Mercury (Hg)	ug/L	<0.050	5738707	<0.050	5738707	<0.050	0.050	5738707
Dissolved Molybdenum (Mo)	ug/L	<1.0	5738707	<1.0	5738707	<1.0	1.0	5738707
Dissolved Nickel (Ni)	ug/L	<1.0	5738707	<1.0	5738707	<1.0	1.0	5738707

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Maxxam Job #: B8N5764
Report Date: 2018/09/19

exp Services Inc
Client Project #: OTT-0248813-AO
Site Location: IQALUIT-NEW LANDFILL
Sampler Initials: LM

RESULTS OF ANALYSES OF WATER

Maxxam ID		HSG082		HSG083		HSG084		
Sampling Date		2018/09/07		2018/09/07		2018/09/07		
COC Number		681097-07-01		681097-07-01		681097-07-01		
	UNITS	SW-6	QC Batch	SW-7	QC Batch	SW-9	RDL	QC Batch
Dissolved Selenium (Se)	ug/L	<0.10	5738707	<0.10	5738707	<0.10	0.10	5738707
Dissolved Silicon (Si)	ug/L	1860	5738707	2070	5738707	2110	100	5738707
Dissolved Silver (Ag)	ug/L	<0.020	5738707	<0.020	5738707	<0.020	0.020	5738707
Dissolved Strontium (Sr)	ug/L	19.6	5738707	17.0	5738707	14.4	1.0	5738707
Dissolved Thallium (Tl)	ug/L	<0.010	5738707	<0.010	5738707	<0.010	0.010	5738707
Dissolved Tin (Sn)	ug/L	<5.0	5738707	<5.0	5738707	<5.0	5.0	5738707
Dissolved Titanium (Ti)	ug/L	<5.0	5738707	<5.0	5738707	<5.0	5.0	5738707
Dissolved Uranium (U)	ug/L	<0.10	5738707	<0.10	5738707	<0.10	0.10	5738707
Dissolved Vanadium (V)	ug/L	<5.0	5738707	<5.0	5738707	<5.0	5.0	5738707
Dissolved Zinc (Zn)	ug/L	<5.0	5738707	10.0	5738707	<5.0	5.0	5738707
Dissolved Zirconium (Zr)	ug/L	<0.10	5738707	<0.10	5738707	<0.10	0.10	5738707
Dissolved Calcium (Ca)	mg/L	13.5	5730835	10.8	5730835	7.71	0.050	5730835
Dissolved Magnesium (Mg)	mg/L	1.38	5730835	1.32	5730835	1.17	0.050	5730835
Dissolved Potassium (K)	mg/L	0.154	5730835	0.146	5730835	0.123	0.050	5730835
Dissolved Sodium (Na)	mg/L	0.764	5730835	0.784	5730835	0.727	0.050	5730835
Dissolved Sulphur (S)	mg/L	<3.0	5730835	<3.0	5730835	<3.0	3.0	5730835

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Maxxam Job #: B8N5764
Report Date: 2018/09/19

exp Services Inc
Client Project #: OTT-0248813-AO
Site Location: IQALUIT-NEW LANDFILL
Sampler Initials: LM

RESULTS OF ANALYSES OF WATER

Maxxam ID		HSG084			HSG085		
Sampling Date		2018/09/07			2018/09/07		
COC Number		681097-07-01			681097-07-01		
	UNITS	SW-9 Lab-Dup	RDL	QC Batch	SW-10	RDL	QC Batch
CONVENTIONALS							
Total Sulphide	mg/L				<0.0019	0.0019	5734150
Calculated Parameters							
Filter and HNO3 Preservation	N/A				LAB		5738708
Dissolved Hardness (CaCO3)	mg/L				42.8	0.50	5730834
Sulphide (as H2S)	mg/L				<0.0020	0.0020	5734147
Inorganics							
Total Ammonia-N	mg/L	<0.050	0.050	5727120	<0.050	0.050	5727120
Fluoride (F-)	mg/L				<0.10	0.10	5727078
pH	pH				7.88		5727082
Dissolved Sulphate (SO4)	mg/L				1.4	1.0	5727421
WAD Cyanide (Free)	mg/L				<0.0010	0.0010	5726642
Dissolved Chloride (Cl-)	mg/L				<1.0	1.0	5727413
Nitrite (N)	mg/L				<0.010	0.010	5727418
Nitrate (N)	mg/L				<0.10	0.10	5727418
Nitrate + Nitrite (N)	mg/L				<0.10	0.10	5727418
Metals							
Dissolved Aluminum (Al)	ug/L				8.7	3.0	5738707
Dissolved Antimony (Sb)	ug/L				<0.50	0.50	5738707
Dissolved Arsenic (As)	ug/L				<0.10	0.10	5738707
Dissolved Barium (Ba)	ug/L				2.7	1.0	5738707
Dissolved Beryllium (Be)	ug/L				<0.10	0.10	5738707
Dissolved Bismuth (Bi)	ug/L				<1.0	1.0	5738707
Dissolved Boron (B)	ug/L				<50	50	5738707
Dissolved Cadmium (Cd)	ug/L				<0.010	0.010	5738707
Dissolved Chromium (Cr)	ug/L				<1.0	1.0	5738707
Dissolved Cobalt (Co)	ug/L				<0.20	0.20	5738707
Dissolved Copper (Cu)	ug/L				0.96	0.20	5738707
Dissolved Iron (Fe)	ug/L				<5.0	5.0	5738707
Dissolved Lead (Pb)	ug/L				<0.20	0.20	5738707
Dissolved Lithium (Li)	ug/L				<2.0	2.0	5738707
Dissolved Manganese (Mn)	ug/L				<1.0	1.0	5738707
Dissolved Mercury (Hg)	ug/L				<0.050	0.050	5738707
Dissolved Molybdenum (Mo)	ug/L				<1.0	1.0	5738707

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

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Maxxam Job #: B8N5764
Report Date: 2018/09/19

exp Services Inc
Client Project #: OTT-0248813-AO
Site Location: IQALUIT-NEW LANDFILL
Sampler Initials: LM

RESULTS OF ANALYSES OF WATER

Maxxam ID		HSG084			HSG085		
Sampling Date		2018/09/07			2018/09/07		
COC Number		681097-07-01			681097-07-01		
	UNITS	SW-9 Lab-Dup	RDL	QC Batch	SW-10	RDL	QC Batch
Dissolved Nickel (Ni)	ug/L				<1.0	1.0	5738707
Dissolved Selenium (Se)	ug/L				<0.10	0.10	5738707
Dissolved Silicon (Si)	ug/L				1750	100	5738707
Dissolved Silver (Ag)	ug/L				<0.020	0.020	5738707
Dissolved Strontium (Sr)	ug/L				21.5	1.0	5738707
Dissolved Thallium (Tl)	ug/L				<0.010	0.010	5738707
Dissolved Tin (Sn)	ug/L				<5.0	5.0	5738707
Dissolved Titanium (Ti)	ug/L				<5.0	5.0	5738707
Dissolved Uranium (U)	ug/L				<0.10	0.10	5738707
Dissolved Vanadium (V)	ug/L				<5.0	5.0	5738707
Dissolved Zinc (Zn)	ug/L				<5.0	5.0	5738707
Dissolved Zirconium (Zr)	ug/L				<0.10	0.10	5738707
Dissolved Calcium (Ca)	mg/L				14.6	0.050	5730835
Dissolved Magnesium (Mg)	mg/L				1.53	0.050	5730835
Dissolved Potassium (K)	mg/L				0.179	0.050	5730835
Dissolved Sodium (Na)	mg/L				0.874	0.050	5730835
Dissolved Sulphur (S)	mg/L				<3.0	3.0	5730835

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

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ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		HSG078	HSG079		HSG080		HSG081		
Sampling Date		2018/09/07	2018/09/07		2018/09/07		2018/09/07		
COC Number		681097-07-01	681097-07-01		681097-07-01		681097-07-01		
	UNITS	SW-1	SW-3	QC Batch	SW-4	QC Batch	SW-5	RDL	QC Batch
Metals									
Mercury (Hg)	ug/L	<0.01	<0.01	5728876	<0.01	5727337	<0.01	0.01	5728876

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		HSG082	HSG083	HSG083	HSG084		HSG085		
Sampling Date		2018/09/07	2018/09/07	2018/09/07	2018/09/07		2018/09/07		
COC Number		681097-07-01	681097-07-01	681097-07-01	681097-07-01		681097-07-01		
	UNITS	SW-6	SW-7	SW-7 Lab-Dup	SW-9	QC Batch	SW-10	RDL	QC Batch
Metals									
Mercury (Hg)	ug/L	<0.01	<0.01	<0.01	<0.01	5727337	<0.01	0.01	5728876

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

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Sampler Initials: LM

TEST SUMMARY

Maxxam ID: HSG078
Sample ID: SW-1
Matrix: Water

Collected: 2018/09/07
Shipped:
Received: 2018/09/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride by Automated Colourimetry	KONE	5727413	N/A	2018/09/13	Alina Dobreanu
Free (WAD) Cyanide	SKAL/CN	5726642	N/A	2018/09/12	Xuanhong Qiu
Fluoride	ISE	5727078	2018/09/12	2018/09/13	Surinder Rai
Mercury (low level)	CV/AA	5728876	2018/09/13	2018/09/13	Ron Morrison
Sulphide (as H2S)	CALC	5737429	N/A	2018/09/14	Automated Statchk
Hardness (calculated as CaCO3)	CALC	5730834	N/A	2018/09/18	Andy Lu
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	ICP	5730835	N/A	2018/09/18	Andy Lu
Elements by CRC ICPMS (dissolved)	ICP/MS	5738707	N/A	2018/09/18	Adnan Dzebic
Filter and HNO3 Preserve for Metals	ICP	5738708	N/A	2018/09/14	Glenn Lampong
Sulphide	SPEC	5734150	N/A	2018/09/14	Xiaman (Savannah) Li
Total Ammonia-N	LACH/NH4	5727120	N/A	2018/09/13	Parminder Sangha
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	5727418	N/A	2018/09/13	Chandra Nandlal
pH	AT	5727082	N/A	2018/09/13	Surinder Rai
Sulphate by Automated Colourimetry	KONE	5727421	N/A	2018/09/13	Alina Dobreanu

Maxxam ID: HSG078 Dup
Sample ID: SW-1
Matrix: Water

Collected: 2018/09/07
Shipped:
Received: 2018/09/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Sulphide	SPEC	5734150	N/A	2018/09/14	Xiaman (Savannah) Li

Maxxam ID: HSG079
Sample ID: SW-3
Matrix: Water

Collected: 2018/09/07
Shipped:
Received: 2018/09/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride by Automated Colourimetry	KONE	5727413	N/A	2018/09/13	Alina Dobreanu
Free (WAD) Cyanide	SKAL/CN	5726642	N/A	2018/09/12	Xuanhong Qiu
Fluoride	ISE	5727078	2018/09/12	2018/09/13	Surinder Rai
Mercury (low level)	CV/AA	5728876	2018/09/13	2018/09/13	Ron Morrison
Sulphide (as H2S)	CALC	5737429	N/A	2018/09/14	Automated Statchk
Hardness (calculated as CaCO3)	CALC	5730834	N/A	2018/09/18	Andy Lu
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	ICP	5730835	N/A	2018/09/18	Andy Lu
Elements by CRC ICPMS (dissolved)	ICP/MS	5738707	N/A	2018/09/18	Adnan Dzebic
Filter and HNO3 Preserve for Metals	ICP	5738708	N/A	2018/09/14	Glenn Lampong
Sulphide	SPEC	5734150	N/A	2018/09/14	Xiaman (Savannah) Li
Total Ammonia-N	LACH/NH4	5727120	N/A	2018/09/13	Parminder Sangha
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	5727418	N/A	2018/09/13	Chandra Nandlal
pH	AT	5727082	N/A	2018/09/13	Surinder Rai
Sulphate by Automated Colourimetry	KONE	5727421	N/A	2018/09/13	Alina Dobreanu

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exp Services Inc
Client Project #: OTT-0248813-AO
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TEST SUMMARY

Maxxam ID: HSG080
Sample ID: SW-4
Matrix: Water

Collected: 2018/09/07
Shipped:
Received: 2018/09/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride by Automated Colourimetry	KONE	5727413	N/A	2018/09/13	Alina Dobreanu
Free (WAD) Cyanide	SKAL/CN	5726642	N/A	2018/09/12	Xuanhong Qiu
Fluoride	ISE	5727078	2018/09/12	2018/09/13	Surinder Rai
Mercury (low level)	CV/AA	5727337	2018/09/12	2018/09/13	Ron Morrison
Sulphide (as H2S)	CALC	5737429	N/A	2018/09/14	Report Automation Engine
Hardness (calculated as CaCO3)	CALC	5730834	N/A	2018/09/18	Andy Lu
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	ICP	5730835	N/A	2018/09/18	Andy Lu
Elements by CRC ICPMS (dissolved)	ICP/MS	5738707	N/A	2018/09/18	Adnan Dzebic
Filter and HNO3 Preserve for Metals	ICP	5738708	N/A	2018/09/14	Glenn Lampong
Sulphide	SPEC	5734150	N/A	2018/09/14	Xiaman (Savannah) Li
Total Ammonia-N	LACH/NH4	5727120	N/A	2018/09/13	Parminder Sangha
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	5727418	N/A	2018/09/13	Chandra Nandlal
pH	AT	5727082	N/A	2018/09/13	Surinder Rai
Sulphate by Automated Colourimetry	KONE	5727421	N/A	2018/09/13	Alina Dobreanu

Maxxam ID: HSG080 Dup
Sample ID: SW-4
Matrix: Water

Collected: 2018/09/07
Shipped:
Received: 2018/09/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	5727418	N/A	2018/09/13	Chandra Nandlal

Maxxam ID: HSG081
Sample ID: SW-5
Matrix: Water

Collected: 2018/09/07
Shipped:
Received: 2018/09/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride by Automated Colourimetry	KONE	5727413	N/A	2018/09/13	Alina Dobreanu
Free (WAD) Cyanide	SKAL/CN	5726642	N/A	2018/09/12	Xuanhong Qiu
Fluoride	ISE	5727078	2018/09/12	2018/09/13	Surinder Rai
Mercury (low level)	CV/AA	5728876	2018/09/13	2018/09/13	Ron Morrison
Sulphide (as H2S)	CALC	5737429	N/A	2018/09/14	Automated Statchk
Hardness (calculated as CaCO3)	CALC	5730834	N/A	2018/09/18	Andy Lu
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	ICP	5730835	N/A	2018/09/18	Andy Lu
Elements by CRC ICPMS (dissolved)	ICP/MS	5738707	N/A	2018/09/18	Adnan Dzebic
Filter and HNO3 Preserve for Metals	ICP	5738708	N/A	2018/09/14	Glenn Lampong
Sulphide	SPEC	5734150	N/A	2018/09/14	Xiaman (Savannah) Li
Total Ammonia-N	LACH/NH4	5727120	N/A	2018/09/13	Parminder Sangha
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	5727418	N/A	2018/09/13	Chandra Nandlal
pH	AT	5727082	N/A	2018/09/13	Surinder Rai
Sulphate by Automated Colourimetry	KONE	5727421	N/A	2018/09/13	Alina Dobreanu

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Maxxam Job #: B8N5764
Report Date: 2018/09/19

exp Services Inc
Client Project #: OTT-0248813-AO
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Sampler Initials: LM

TEST SUMMARY

Maxxam ID: HSG082
Sample ID: SW-6
Matrix: Water

Collected: 2018/09/07
Shipped:
Received: 2018/09/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride by Automated Colourimetry	KONE	5727413	N/A	2018/09/13	Alina Dobreanu
Free (WAD) Cyanide	SKAL/CN	5726642	N/A	2018/09/12	Xuanhong Qiu
Fluoride	ISE	5727078	2018/09/12	2018/09/13	Surinder Rai
Mercury (low level)	CV/AA	5727337	2018/09/12	2018/09/13	Ron Morrison
Sulphide (as H2S)	CALC	5734147	N/A	2018/09/14	Automated Statchk
Hardness (calculated as CaCO3)	CALC	5730834	N/A	2018/09/18	Andy Lu
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	ICP	5730835	N/A	2018/09/18	Andy Lu
Elements by CRC ICPMS (dissolved)	ICP/MS	5738707	N/A	2018/09/18	Adnan Dzebic
Filter and HNO3 Preserve for Metals	ICP	5738708	N/A	2018/09/14	Glenn Lampong
Sulphide	SPEC	5734150	N/A	2018/09/14	Xiaman (Savannah) Li
Total Ammonia-N	LACH/NH4	5727120	N/A	2018/09/13	Parminder Sangha
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	5727072	N/A	2018/09/13	Chandra Nandlal
pH	AT	5727082	N/A	2018/09/13	Surinder Rai
Sulphate by Automated Colourimetry	KONE	5727421	N/A	2018/09/13	Alina Dobreanu

Maxxam ID: HSG083
Sample ID: SW-7
Matrix: Water

Collected: 2018/09/07
Shipped:
Received: 2018/09/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride by Automated Colourimetry	KONE	5727413	N/A	2018/09/13	Alina Dobreanu
Free (WAD) Cyanide	SKAL/CN	5726642	N/A	2018/09/12	Xuanhong Qiu
Fluoride	ISE	5727841	2018/09/12	2018/09/13	Surinder Rai
Mercury (low level)	CV/AA	5727337	2018/09/12	2018/09/13	Ron Morrison
Sulphide (as H2S)	CALC	5734147	N/A	2018/09/14	Automated Statchk
Hardness (calculated as CaCO3)	CALC	5730834	N/A	2018/09/18	Andy Lu
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	ICP	5730835	N/A	2018/09/18	Andy Lu
Elements by CRC ICPMS (dissolved)	ICP/MS	5738707	N/A	2018/09/18	Adnan Dzebic
Filter and HNO3 Preserve for Metals	ICP	5738708	N/A	2018/09/14	Glenn Lampong
Sulphide	SPEC	5734150	N/A	2018/09/14	Xiaman (Savannah) Li
Total Ammonia-N	LACH/NH4	5727120	N/A	2018/09/13	Parminder Sangha
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	5727072	N/A	2018/09/13	Chandra Nandlal
pH	AT	5727848	N/A	2018/09/13	Surinder Rai
Sulphate by Automated Colourimetry	KONE	5727421	N/A	2018/09/13	Alina Dobreanu

Maxxam ID: HSG083 Dup
Sample ID: SW-7
Matrix: Water

Collected: 2018/09/07
Shipped:
Received: 2018/09/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Mercury (low level)	CV/AA	5727337	2018/09/12	2018/09/13	Ron Morrison

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Sampler Initials: LM

TEST SUMMARY

Maxxam ID: HSG084
Sample ID: SW-9
Matrix: Water

Collected: 2018/09/07
Shipped:
Received: 2018/09/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride by Automated Colourimetry	KONE	5727413	N/A	2018/09/13	Alina Dobreanu
Free (WAD) Cyanide	SKAL/CN	5726642	N/A	2018/09/12	Xuanhong Qiu
Fluoride	ISE	5727078	2018/09/12	2018/09/13	Surinder Rai
Mercury (low level)	CV/AA	5727337	2018/09/12	2018/09/13	Ron Morrison
Sulphide (as H2S)	CALC	5734147	N/A	2018/09/14	Automated Statchk
Hardness (calculated as CaCO3)	CALC	5730834	N/A	2018/09/18	Andy Lu
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	ICP	5730835	N/A	2018/09/18	Andy Lu
Elements by CRC ICPMS (dissolved)	ICP/MS	5738707	N/A	2018/09/18	Adnan Dzebic
Filter and HNO3 Preserve for Metals	ICP	5738708	N/A	2018/09/14	Glenn Lampong
Sulphide	SPEC	5734150	N/A	2018/09/14	Xiaman (Savannah) Li
Total Ammonia-N	LACH/NH4	5727120	N/A	2018/09/13	Parminder Sangha
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	5727418	N/A	2018/09/13	Chandra Nandlal
pH	AT	5727082	N/A	2018/09/13	Surinder Rai
Sulphate by Automated Colourimetry	KONE	5727421	N/A	2018/09/13	Alina Dobreanu

Maxxam ID: HSG084 Dup
Sample ID: SW-9
Matrix: Water

Collected: 2018/09/07
Shipped:
Received: 2018/09/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Ammonia-N	LACH/NH4	5727120	N/A	2018/09/13	Parminder Sangha

Maxxam ID: HSG085
Sample ID: SW-10
Matrix: Water

Collected: 2018/09/07
Shipped:
Received: 2018/09/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride by Automated Colourimetry	KONE	5727413	N/A	2018/09/13	Alina Dobreanu
Free (WAD) Cyanide	SKAL/CN	5726642	N/A	2018/09/12	Xuanhong Qiu
Fluoride	ISE	5727078	2018/09/12	2018/09/13	Surinder Rai
Mercury (low level)	CV/AA	5728876	2018/09/13	2018/09/13	Ron Morrison
Sulphide (as H2S)	CALC	5734147	N/A	2018/09/14	Report Automation Engine
Hardness (calculated as CaCO3)	CALC	5730834	N/A	2018/09/18	Andy Lu
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	ICP	5730835	N/A	2018/09/18	Andy Lu
Elements by CRC ICPMS (dissolved)	ICP/MS	5738707	N/A	2018/09/18	Adnan Dzebic
Filter and HNO3 Preserve for Metals	ICP	5738708	N/A	2018/09/14	Glenn Lampong
Sulphide	SPEC	5734150	N/A	2018/09/14	Xiaman (Savannah) Li
Total Ammonia-N	LACH/NH4	5727120	N/A	2018/09/13	Parminder Sangha
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	5727418	N/A	2018/09/13	Chandra Nandlal
pH	AT	5727082	N/A	2018/09/13	Surinder Rai
Sulphate by Automated Colourimetry	KONE	5727421	N/A	2018/09/13	Alina Dobreanu

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GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	4.7°C

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

exp Services Inc
Client Project #: OTT-0248813-AO
Site Location: IQALUIT-NEW LANDFILL
Sampler Initials: LM

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5726642	WAD Cyanide (Free)	2018/09/12	106	80 - 120	98	80 - 120	<0.0010	mg/L	0	20
5727072	Nitrate (N)	2018/09/13	106	80 - 120	102	80 - 120	<0.10	mg/L	8.7	20
5727072	Nitrite (N)	2018/09/13	106	80 - 120	106	80 - 120	<0.010	mg/L	NC	20
5727078	Fluoride (F-)	2018/09/13	100	80 - 120	101	80 - 120	<0.10	mg/L	NC	20
5727082	pH	2018/09/13			102	98 - 103			2.5	N/A
5727120	Total Ammonia-N	2018/09/13	97	75 - 125	97	80 - 120	<0.050	mg/L	NC	20
5727337	Mercury (Hg)	2018/09/13	99	75 - 125	99	80 - 120	<0.01	ug/L	NC	20
5727413	Dissolved Chloride (Cl-)	2018/09/13	NC	80 - 120	104	80 - 120	<1.0	mg/L	0.80	20
5727418	Nitrate (N)	2018/09/13	101	80 - 120	102	80 - 120	<0.10	mg/L	NC	20
5727418	Nitrite (N)	2018/09/13	102	80 - 120	104	80 - 120	<0.010	mg/L	NC	20
5727421	Dissolved Sulphate (SO4)	2018/09/13	NC	75 - 125	97	80 - 120	<1.0	mg/L	0.58	20
5727841	Fluoride (F-)	2018/09/13	97	80 - 120	99	80 - 120	<0.10	mg/L	6.7	20
5727848	pH	2018/09/13			102	98 - 103			0.24	N/A
5728876	Mercury (Hg)	2018/09/13	96	75 - 125	95	80 - 120	<0.01	ug/L	NC	20
5734150	Total Sulphide	2018/09/14			117	80 - 120	<0.0019	mg/L	NC	20
5738707	Dissolved Aluminum (Al)	2018/09/18	101	80 - 120	109	80 - 120	<3.0	ug/L		
5738707	Dissolved Antimony (Sb)	2018/09/18	NC	80 - 120	103	80 - 120	<0.50	ug/L		
5738707	Dissolved Arsenic (As)	2018/09/18	104	80 - 120	108	80 - 120	<0.10	ug/L		
5738707	Dissolved Barium (Ba)	2018/09/18	91	80 - 120	104	80 - 120	<1.0	ug/L		
5738707	Dissolved Beryllium (Be)	2018/09/18	98	80 - 120	108	80 - 120	<0.10	ug/L		
5738707	Dissolved Bismuth (Bi)	2018/09/18	93	80 - 120	102	80 - 120	<1.0	ug/L		
5738707	Dissolved Boron (B)	2018/09/18	98	80 - 120	108	80 - 120	<50	ug/L		
5738707	Dissolved Cadmium (Cd)	2018/09/18	95	80 - 120	103	80 - 120	<0.010	ug/L		
5738707	Dissolved Chromium (Cr)	2018/09/18	97	80 - 120	104	80 - 120	<1.0	ug/L		
5738707	Dissolved Cobalt (Co)	2018/09/18	94	80 - 120	101	80 - 120	<0.20	ug/L		
5738707	Dissolved Copper (Cu)	2018/09/18	91	80 - 120	100	80 - 120	<0.20	ug/L		
5738707	Dissolved Iron (Fe)	2018/09/18	100	80 - 120	107	80 - 120	<5.0	ug/L		
5738707	Dissolved Lead (Pb)	2018/09/18	95	80 - 120	102	80 - 120	<0.20	ug/L		
5738707	Dissolved Lithium (Li)	2018/09/18	96	80 - 120	106	80 - 120	<2.0	ug/L		
5738707	Dissolved Manganese (Mn)	2018/09/18	91	80 - 120	104	80 - 120	<1.0	ug/L		
5738707	Dissolved Mercury (Hg)	2018/09/18	94	80 - 120	98	80 - 120	<0.050	ug/L		

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QUALITY ASSURANCE REPORT(CONT'D)

exp Services Inc
Client Project #: OTT-0248813-AO
Site Location: IQALUIT-NEW LANDFILL
Sampler Initials: LM

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5738707	Dissolved Molybdenum (Mo)	2018/09/18	NC	80 - 120	105	80 - 120	<1.0	ug/L		
5738707	Dissolved Nickel (Ni)	2018/09/18	95	80 - 120	103	80 - 120	<1.0	ug/L		
5738707	Dissolved Selenium (Se)	2018/09/18	102	80 - 120	104	80 - 120	<0.10	ug/L		
5738707	Dissolved Silicon (Si)	2018/09/18	98	80 - 120	100	80 - 120	<100	ug/L		
5738707	Dissolved Silver (Ag)	2018/09/18	92	80 - 120	102	80 - 120	<0.020	ug/L		
5738707	Dissolved Strontium (Sr)	2018/09/18	NC	80 - 120	106	80 - 120	<1.0	ug/L		
5738707	Dissolved Thallium (Tl)	2018/09/18	94	80 - 120	102	80 - 120	<0.010	ug/L		
5738707	Dissolved Tin (Sn)	2018/09/18	96	80 - 120	104	80 - 120	<5.0	ug/L		
5738707	Dissolved Titanium (Ti)	2018/09/18	98	80 - 120	105	80 - 120	<5.0	ug/L		
5738707	Dissolved Uranium (U)	2018/09/18	101	80 - 120	106	80 - 120	<0.10	ug/L		
5738707	Dissolved Vanadium (V)	2018/09/18	100	80 - 120	105	80 - 120	<5.0	ug/L		
5738707	Dissolved Zinc (Zn)	2018/09/18	NC	80 - 120	101	80 - 120	<5.0	ug/L		
5738707	Dissolved Zirconium (Zr)	2018/09/18	101	80 - 120	107	80 - 120	<0.10	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.

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).

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Maxxam Job #: B8N5764
Report Date: 2018/09/19

exp Services Inc
Client Project #: OTT-0248813-AO
Site Location: IQALUIT-NEW LANDFILL
Sampler Initials: LM

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

Brad Newman, Scientific Service Specialist

Ghayasuddin Khan, M.Sc., P.Chem., QP, Scientific Specialist, Inorganics

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Maxxam Analytics International Corporation o/a Maxxam Analytics
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel:(905) 817-5700 Toll-free:800-563-6266 Fax:(905) 817-5777 www.maxxam.ca

CHAIN OF CUSTODY RECORD

Page 1 of 1

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:		Laboratory Use Only:	
Company Name:	#17498 exp Services Inc	Company Name:	Exp Services	Quotation #:	B83935	Maxxam Job #:	Bottle Order #:
Attention:	Accounts Payable	Attention:	Rob Renaud	P.O. #:			631097
Address:	100-2650 Queensview Drive Ottawa ON K2B 8H6	Address:		Project:	OTT-02488813-A0	COC #:	Project Manager:
Tel:	(613) 688-1899 Fax: (613) 225-7337	Tel:	Fax:	Project Name:	Iqaluit - New Landfill	C#631097-07-01	Alisha Williamson
Email:	accounting.ottawa@exp.com; Karen.Burke@exp.com;	Email:	Robert.Renaud@exp.com / Les Misch	Site #:			
				Sampled By:	Les Misch		

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011)	Other Regulations	Special Instructions
☐ Table 1 ☐ Res/Park ☐ Medium/Fine ☐ Table 2 ☐ Ind/Comm ☐ Coarse ☐ Table 3 ☐ Agr/Other ☐ For RSC ☐ Table ___	☒ CCME ☐ Sanitary Sewer Bylaw ☐ Reg 558. ☐ Storm Sewer Bylaw ☐ MISA Municipality ___ ☐ PWQO Government of Nunavut ☒ Other	

Include Criteria on Certificate of Analysis (Y/N)? ___

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): Metals / Hg / Cr VI	CCME Soil Inorganics Package	CCME Petroleum Hydrocarbons Soil	CCME PAHs (Soil)	CCME Chromium Inorganics Package - Hg	Petroleum Hydro. CCME F1 & BTEX in Water	CCME PAHs (Water)	Yes	General Chem. - Nutrients, Sulphide	Cyanide	# of Bottles	Comments
1		SW - 1	2018/09/07		SW	No				X				X	X	6	Samples are surface water. Total metals to be analyzed. No low level. Samples unpreserved
2		SW - 3	2018/09/07							X				X	X		
3		SW - 4	2018/09/07							X				X	X		
4		SW - 5	2018/09/07							X				X	X		
5		SW - 6	2018/09/07		SW					X				X	X		
6		SW - 7	2018/09/07							X				X	X		
7		SW - 9	2018/09/07							X				X	X		
8		SW - 10	2018/09/07							X				X	X		
9																	ON Ice
10																	

Turnaround Time (TAT) Required:

Regular (Standard) TAT: ☒
(will be applied if Rush TAT is not specified).
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: ___ Time Required: ___ ☐
Rush Confirmation Number: ___ (call lab for #)

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted	Laboratory Use Only: Time Sensitive	Temperature (°C) on Receipt	Custody Seal Present	Yes	No
Les Misch	18/09/08	9:30	[illegible]	2018/09/10	13:00			5; 5; 4	Intact	☒	

* 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.
* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.
** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT HTTP://MAXXAM.CA/WP-CONTENT/UPLOADS/ONTARIO-COC.PDF.

REFER TO ICTR

SAMPLES MUST BE KEPT COOL ( ) UNTIL DELIVERY

10-Sep-18 13:00
Alisha Williamson
B8N5764

Maxxam Analytics International Corporation o/a Maxxam Analytics

FCN ENV-1431

Maxxam
A Bureau Veritas Group Company

Success Through Science®

Your Project #: Campobello job# B8N5764

Attention: Alisha Williamson
MAXXAM ANALYTICS
CAMPOBELLO
6740 CAMPOBELLO ROAD
MISSISSAUGA, ON
CANADA L5N 2L8

Report Date: 2018/09/18
Report #: R2620726
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B877746
Received: 2018/09/11, 18:06

Sample Matrix: Water
Samples Received: 8

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Sulphide (as H2S)	8	N/A	2018/09/14	AB WI-00065	Auto Calc
Total Sulphide	8	N/A	2018/09/14	AB SOP-00080	SM 22 4500 S2-A D Fm

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

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

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam 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 Maxxam, unless otherwise agreed in writing. Maxxam 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 Maxxam, 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.

Your Project #: Campobello job# B8N5764

Attention: Alisha Williamson
MAXXAM ANALYTICS
CAMPOBELLO
6740 CAMPOBELLO ROAD
MISSISSAUGA, ON
CANADA L5N 2L8

Report Date: 2018/09/18
Report #: R2620726
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B877746
Received: 2018/09/11, 18:06

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Omran Desouki, Junior Project Manager
Email: ODesouki@maxxam.ca
Phone# (403) 291-3077
==========
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Maxxam Job #: B877746
Report Date: 2018/09/18

MAXXAM ANALYTICS
Client Project #: Campobello job# B8N5764
Sampler Initials: LM

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		UG9916			UG9916			UG9917	UG9918		
Sampling Date		2018/09/07			2018/09/07			2018/09/07	2018/09/07		
	UNITS	SW-1	RDL	QC Batch	SW-1 Lab-Dup	RDL	QC Batch	SW-3	SW-4	RDL	QC Batch
Calculated Parameters											
Sulphide (as H2S)	mg/L	<0.0020	0.0020	9141771				<0.0020	<0.0020	0.0020	9141771
Anions											
Total Sulphide	mg/L	<0.0019	0.0019	9142023	<0.0019	0.0019	9142023	<0.0019	<0.0019	0.0019	9142023

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate

Maxxam ID		UG9919		UG9920	UG9921	UG9922	UG9923		
Sampling Date		2018/09/07		2018/09/07	2018/09/07	2018/09/07	2018/09/07		
	UNITS	SW-5	QC Batch	SW-6	SW-7	SW-9	SW-10	RDL	QC Batch
Calculated Parameters									
Sulphide (as H2S)	mg/L	<0.0020	9141771	<0.0020	<0.0020	<0.0020	<0.0020	0.0020	9136929
Anions									
Total Sulphide	mg/L	<0.0019	9142023	<0.0019	<0.0019	<0.0019	<0.0019	0.0019	9142023

RDL = Reportable Detection Limit

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Maxxam Job #: B877746
Report Date: 2018/09/18

MAXXAM ANALYTICS
Client Project #: Campobello job# B8N5764
Sampler Initials: LM

TEST SUMMARY

Maxxam ID: UG9916
Sample ID: SW-1
Matrix: Water

Collected: 2018/09/07
Shipped:
Received: 2018/09/11

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Sulphide (as H2S)	CALC	9141771	N/A	2018/09/14	Automated Statchk
Total Sulphide	SPEC	9142023	N/A	2018/09/14	Xiaman (Savannah) Li

Maxxam ID: UG9916 Dup
Sample ID: SW-1
Matrix: Water

Collected: 2018/09/07
Shipped:
Received: 2018/09/11

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Sulphide	SPEC	9142023	N/A	2018/09/14	Xiaman (Savannah) Li

Maxxam ID: UG9917
Sample ID: SW-3
Matrix: Water

Collected: 2018/09/07
Shipped:
Received: 2018/09/11

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Sulphide (as H2S)	CALC	9141771	N/A	2018/09/14	Automated Statchk
Total Sulphide	SPEC	9142023	N/A	2018/09/14	Xiaman (Savannah) Li

Maxxam ID: UG9918
Sample ID: SW-4
Matrix: Water

Collected: 2018/09/07
Shipped:
Received: 2018/09/11

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Sulphide (as H2S)	CALC	9141771	N/A	2018/09/14	Report Automation Engine
Total Sulphide	SPEC	9142023	N/A	2018/09/14	Xiaman (Savannah) Li

Maxxam ID: UG9919
Sample ID: SW-5
Matrix: Water

Collected: 2018/09/07
Shipped:
Received: 2018/09/11

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Sulphide (as H2S)	CALC	9141771	N/A	2018/09/14	Automated Statchk
Total Sulphide	SPEC	9142023	N/A	2018/09/14	Xiaman (Savannah) Li

Maxxam ID: UG9920
Sample ID: SW-6
Matrix: Water

Collected: 2018/09/07
Shipped:
Received: 2018/09/11

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Sulphide (as H2S)	CALC	9136929	N/A	2018/09/14	Automated Statchk
Total Sulphide	SPEC	9142023	N/A	2018/09/14	Xiaman (Savannah) Li

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Maxxam Job #: B877746
Report Date: 2018/09/18

MAXXAM ANALYTICS
Client Project #: Campobello job# B8N5764
Sampler Initials: LM

TEST SUMMARY

Maxxam ID: UG9921
Sample ID: SW-7
Matrix: Water

Collected: 2018/09/07
Shipped:
Received: 2018/09/11

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Sulphide (as H2S)	CALC	9136929	N/A	2018/09/14	Automated Statchk
Total Sulphide	SPEC	9142023	N/A	2018/09/14	Xiaman (Savannah) Li

Maxxam ID: UG9922
Sample ID: SW-9
Matrix: Water

Collected: 2018/09/07
Shipped:
Received: 2018/09/11

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Sulphide (as H2S)	CALC	9136929	N/A	2018/09/14	Automated Statchk
Total Sulphide	SPEC	9142023	N/A	2018/09/14	Xiaman (Savannah) Li

Maxxam ID: UG9923
Sample ID: SW-10
Matrix: Water

Collected: 2018/09/07
Shipped:
Received: 2018/09/11

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Sulphide (as H2S)	CALC	9136929	N/A	2018/09/14	Report Automation Engine
Total Sulphide	SPEC	9142023	N/A	2018/09/14	Xiaman (Savannah) Li

Maxxam Analytics International Corporation o/a Maxxam Analytics Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Maxxam Job #: B877746
Report Date: 2018/09/18

MAXXAM ANALYTICS
Client Project #: Campobello job# B8N5764
Sampler Initials: LM

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	3.7°C

Results relate only to the items tested.

Maxxam Analytics International Corporation o/a Maxxam Analytics Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Maxxam Job #: B877746
Report Date: 2018/09/18

QUALITY ASSURANCE REPORT

MAXXAM ANALYTICS
Client Project #: Campobello job# B8N5764
Sampler Initials: LM

			Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9142023	Total Sulphide	2018/09/14	117	80 - 120	<0.0019	mg/L	NC	20

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

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 (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).

Maxxam Analytics International Corporation o/a Maxxam Analytics Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Maxxam Job #: B877746
Report Date: 2018/09/18

MAXXAM ANALYTICS
Client Project #: Campobello job# B8N5764
Sampler Initials: LM

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Ghayasuddin Khan, M.Sc., P.Chem., QP, Scientific Specialist, Inorganics

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Certificate of Analysis: Sediment

Maxxam
A Bureau Veritas Group Company

Your Project #: OTT-00248813-AO
Site Location: IQALUIT NEW LANDFILL
Your C.O.C. #: 681097-02-01

Attention: Robert Renaud

exp Services Inc
Ottawa Branch
100-2650 Queensview Drive
Ottawa, ON
CANADA K2B 8H6

Report Date: 2018/09/14
Report #: R5399908
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8N5680
Received: 2018/09/10, 13:00

Sample Matrix: Soil
Samples Received: 6

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Hot Water Extractable Boron (1)	6	2018/09/13	2018/09/13	CAM SOP-00408	R153 Ana. Prot. 2011
Free (WAD) Cyanide (1)	6	2018/09/12	2018/09/13	CAM SOP-00457	OMOE E3015 m
Conductivity (1)	6	2018/09/14	2018/09/14	CAM SOP-00414	OMOE E3530 v1 m
Hexavalent Chromium in Soil by IC (1, 2)	6	2018/09/13	2018/09/14	CAM SOP-00436	EPA 3060/7199 m
Soluble Fluoride analysis in Soil (1)	6	2018/09/14	2018/09/14	CAM SOP-00449	SM 23 4500 F C m
Strong Acid Leachable Metals by ICPMS (1)	6	2018/09/13	2018/09/13	CAM SOP-00447	EPA 6020B m
Moisture (1)	6	N/A	2018/09/13	CAM SOP-00445	Carter 2nd ed 51.2 m
pH CaCl2 EXTRACT (1)	6	2018/09/14	2018/09/14	CAM SOP-00413	EPA 9045 D m
Sodium Adsorption Ratio (SAR) (1)	6	N/A	2018/09/14	CAM SOP-00102	EPA 6010C

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

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

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam 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 Maxxam, unless otherwise agreed in writing. Maxxam 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 Maxxam, 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.

Maxxam
A Bureau Veritas Group Company

Your Project #: OTT-00248813-AO
Site Location: IQALUIT NEW LANDFILL
Your C.O.C. #: 681097-02-01

Attention: Robert Renaud

exp Services Inc
Ottawa Branch
100-2650 Queensview Drive
Ottawa, ON
CANADA K2B 8H6

Report Date: 2018/09/14
Report #: R5399908
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8N5680
Received: 2018/09/10, 13:00
(1) This test was performed by Maxxam Analytics Mississauga
(2) Soils are reported on a dry weight basis unless otherwise specified.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Alisha Williamson, Project Manager
Email: AWilliamson@maxxam.ca
Phone# (613) 274-0573

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Maxxam Job #: B8N5680
Report Date: 2018/09/14

exp Services Inc
Client Project #: OTT-00248813-AO
Site Location: IQALUIT NEW LANDFILL
Sampler Initials: LM

RESULTS OF ANALYSES OF SOIL

Maxxam ID		HSF655			HSF655			HSF656		
Sampling Date		2018/09/07			2018/09/07			2018/09/07		
COC Number		681097-02-01			681097-02-01			681097-02-01		
	UNITS	SED-3	RDL	QC Batch	SED-3 Lab-Dup	RDL	QC Batch	SED-4	RDL	QC Batch
Calculated Parameters										
Sodium Adsorption Ratio	N/A	0.36		5725186				0.63		5725186
Inorganics										
Conductivity	mS/cm	0.056	0.002	5729498	0.057	0.002	5729498	0.025	0.002	5729498
Fluoride (F-)	ug/g	<5	5	5729698				<5	5	5729698
Moisture	%	39	1.0	5729254				16	1.0	5729254
Available (CaCl2) pH	pH	6.73		5729722				6.71		5729722
WAD Cyanide (Free)	ug/g	0.10	0.02	5727294				<0.01	0.01	5727294

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

Maxxam ID		HSF657		HSF658	HSF659		HSF660		
Sampling Date		2018/09/07		2018/09/07	2018/09/07		2018/09/07		
COC Number		681097-02-01		681097-02-01	681097-02-01		681097-02-01		
	UNITS	SED-6	RDL	SED-7	SED-9	RDL	SED-10	RDL	QC Batch
Calculated Parameters									
Sodium Adsorption Ratio	N/A	0.61		0.74	0.63		0.31		5725186
Inorganics									
Conductivity	mS/cm	0.028	0.002	0.019	0.020	0.002	0.10	0.002	5729498
Fluoride (F-)	ug/g	<5	5	<5	<5	5	<5	5	5729698
Moisture	%	36	1.0	24	33	1.0	39	1.0	5729254
Available (CaCl2) pH	pH	6.49		6.74	5.90		5.83		5729722
WAD Cyanide (Free)	ug/g	0.05	0.04	<0.01	0.05	0.01	<0.04 (1)	0.04	5727294

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) Due to colour interferences, sample required dilution. Detection limit was adjusted accordingly.

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Maxxam Job #: B8N5680
Report Date: 2018/09/14

exp Services Inc
Client Project #: OTT-00248813-AO
Site Location: IQALUIT NEW LANDFILL
Sampler Initials: LM

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		HSF655	HSF656			HSF656		
Sampling Date		2018/09/07	2018/09/07			2018/09/07		
COC Number		681097-02-01	681097-02-01			681097-02-01		
	UNITS	SED-3	SED-4	RDL	QC Batch	SED-4 Lab-Dup	RDL	QC Batch
Inorganics								
Chromium (VI)	ug/g	<0.2	<0.2	0.2	5728714			
Metals								
Hot Water Ext. Boron (B)	ug/g	0.39	0.17	0.050	5729440			
Acid Extractable Antimony (Sb)	ug/g	<0.20	<0.20	0.20	5729894	<0.20	0.20	5729894
Acid Extractable Arsenic (As)	ug/g	<1.0	<1.0	1.0	5729894	<1.0	1.0	5729894
Acid Extractable Barium (Ba)	ug/g	57	22	0.50	5729894	23	0.50	5729894
Acid Extractable Beryllium (Be)	ug/g	0.57	<0.20	0.20	5729894	0.20	0.20	5729894
Acid Extractable Boron (B)	ug/g	<5.0	<5.0	5.0	5729894	<5.0	5.0	5729894
Acid Extractable Cadmium (Cd)	ug/g	<0.10	<0.10	0.10	5729894	<0.10	0.10	5729894
Acid Extractable Chromium (Cr)	ug/g	28	25	1.0	5729894	25	1.0	5729894
Acid Extractable Cobalt (Co)	ug/g	6.0	3.7	0.10	5729894	4.1	0.10	5729894
Acid Extractable Copper (Cu)	ug/g	48	9.2	0.50	5729894	9.4	0.50	5729894
Acid Extractable Lead (Pb)	ug/g	7.2	3.1	1.0	5729894	3.2	1.0	5729894
Acid Extractable Molybdenum (Mo)	ug/g	0.70	0.62	0.50	5729894	0.64	0.50	5729894
Acid Extractable Nickel (Ni)	ug/g	15	7.6	0.50	5729894	7.6	0.50	5729894
Acid Extractable Selenium (Se)	ug/g	0.73	<0.50	0.50	5729894	<0.50	0.50	5729894
Acid Extractable Silver (Ag)	ug/g	<0.20	<0.20	0.20	5729894	<0.20	0.20	5729894
Acid Extractable Thallium (Tl)	ug/g	0.073	<0.050	0.050	5729894	<0.050	0.050	5729894
Acid Extractable Tin (Sn)	ug/g	<1.0	<1.0	1.0	5729894	<1.0	1.0	5729894
Acid Extractable Uranium (U)	ug/g	1.5	0.50	0.050	5729894	0.50	0.050	5729894
Acid Extractable Vanadium (V)	ug/g	37	43	5.0	5729894	43	5.0	5729894
Acid Extractable Zinc (Zn)	ug/g	76	51	5.0	5729894	51	5.0	5729894
Acid Extractable Mercury (Hg)	ug/g	<0.050	<0.050	0.050	5729894	<0.050	0.050	5729894

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

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exp Services Inc
Client Project #: OTT-00248813-AO
Site Location: IQALUIT NEW LANDFILL
Sampler Initials: LM

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		HSF657	HSF658	HSF659	HSF660		
Sampling Date		2018/09/07	2018/09/07	2018/09/07	2018/09/07		
COC Number		681097-02-01	681097-02-01	681097-02-01	681097-02-01		
	UNITS	SED-6	SED-7	SED-9	SED-10	RDL	QC Batch
Inorganics							
Chromium (VI)	ug/g	<0.2	<0.2	<0.2	<0.2	0.2	5728714
Metals							
Hot Water Ext. Boron (B)	ug/g	0.10	0.066	0.15	0.38	0.050	5729440
Acid Extractable Antimony (Sb)	ug/g	<0.20	<0.20	<0.20	<0.20	0.20	5729894
Acid Extractable Arsenic (As)	ug/g	<1.0	<1.0	<1.0	<1.0	1.0	5729894
Acid Extractable Barium (Ba)	ug/g	15	23	17	19	0.50	5729894
Acid Extractable Beryllium (Be)	ug/g	0.26	0.22	0.23	0.23	0.20	5729894
Acid Extractable Boron (B)	ug/g	<5.0	<5.0	<5.0	<5.0	5.0	5729894
Acid Extractable Cadmium (Cd)	ug/g	<0.10	<0.10	<0.10	<0.10	0.10	5729894
Acid Extractable Chromium (Cr)	ug/g	20	24	22	17	1.0	5729894
Acid Extractable Cobalt (Co)	ug/g	4.1	5.5	3.2	2.6	0.10	5729894
Acid Extractable Copper (Cu)	ug/g	19	8.5	15	25	0.50	5729894
Acid Extractable Lead (Pb)	ug/g	2.9	3.2	3.5	3.2	1.0	5729894
Acid Extractable Molybdenum (Mo)	ug/g	<0.50	0.50	1.4	0.86	0.50	5729894
Acid Extractable Nickel (Ni)	ug/g	9.6	9.9	7.4	7.6	0.50	5729894
Acid Extractable Selenium (Se)	ug/g	<0.50	<0.50	<0.50	<0.50	0.50	5729894
Acid Extractable Silver (Ag)	ug/g	<0.20	<0.20	<0.20	<0.20	0.20	5729894
Acid Extractable Thallium (Tl)	ug/g	<0.050	<0.050	<0.050	<0.050	0.050	5729894
Acid Extractable Tin (Sn)	ug/g	<1.0	<1.0	<1.0	<1.0	1.0	5729894
Acid Extractable Uranium (U)	ug/g	1.3	0.58	1.0	1.1	0.050	5729894
Acid Extractable Vanadium (V)	ug/g	18	43	41	26	5.0	5729894
Acid Extractable Zinc (Zn)	ug/g	29	39	46	36	5.0	5729894
Acid Extractable Mercury (Hg)	ug/g	<0.050	<0.050	<0.050	<0.050	0.050	5729894

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Sampler Initials: LM

TEST SUMMARY

Maxxam ID: HSF655
Sample ID: SED-3
Matrix: Soil

Collected: 2018/09/07
Shipped:
Received: 2018/09/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	5729440	2018/09/13	2018/09/13	Suban Kanapathippllai
Free (WAD) Cyanide	TECH	5727294	2018/09/12	2018/09/13	Christine Pham
Conductivity	AT	5729498	2018/09/14	2018/09/14	Neil Dassanayake
Hexavalent Chromium in Soil by IC	IC/SPEC	5728714	2018/09/13	2018/09/14	Rupinder Sihota
Soluble Fluoride analysis in Soil	ISE	5729698	2018/09/14	2018/09/14	Surinder Rai
Strong Acid Leachable Metals by ICPMS	ICP/MS	5729894	2018/09/13	2018/09/13	Daniel Teclu
Moisture	BAL	5729254	N/A	2018/09/13	Prgya Panchal
pH CaCl2 EXTRACT	AT	5729722	2018/09/14	2018/09/14	Gnana Thomas
Sodium Adsorption Ratio (SAR)	CALC/MET	5725186	N/A	2018/09/14	Automated Statchk

Maxxam ID: HSF655 Dup
Sample ID: SED-3
Matrix: Soil

Collected: 2018/09/07
Shipped:
Received: 2018/09/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Conductivity	AT	5729498	2018/09/14	2018/09/14	Neil Dassanayake

Maxxam ID: HSF656
Sample ID: SED-4
Matrix: Soil

Collected: 2018/09/07
Shipped:
Received: 2018/09/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	5729440	2018/09/13	2018/09/13	Suban Kanapathippllai
Free (WAD) Cyanide	TECH	5727294	2018/09/12	2018/09/13	Christine Pham
Conductivity	AT	5729498	2018/09/14	2018/09/14	Neil Dassanayake
Hexavalent Chromium in Soil by IC	IC/SPEC	5728714	2018/09/13	2018/09/14	Rupinder Sihota
Soluble Fluoride analysis in Soil	ISE	5729698	2018/09/14	2018/09/14	Surinder Rai
Strong Acid Leachable Metals by ICPMS	ICP/MS	5729894	2018/09/13	2018/09/13	Daniel Teclu
Moisture	BAL	5729254	N/A	2018/09/13	Prgya Panchal
pH CaCl2 EXTRACT	AT	5729722	2018/09/14	2018/09/14	Gnana Thomas
Sodium Adsorption Ratio (SAR)	CALC/MET	5725186	N/A	2018/09/14	Automated Statchk

Maxxam ID: HSF656 Dup
Sample ID: SED-4
Matrix: Soil

Collected: 2018/09/07
Shipped:
Received: 2018/09/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Strong Acid Leachable Metals by ICPMS	ICP/MS	5729894	2018/09/13	2018/09/13	Daniel Teclu

Maxxam ID: HSF657
Sample ID: SED-6
Matrix: Soil

Collected: 2018/09/07
Shipped:
Received: 2018/09/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	5729440	2018/09/13	2018/09/13	Suban Kanapathippllai

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Sampler Initials: LM

TEST SUMMARY

Maxxam ID: HSF657
Sample ID: SED-6
Matrix: Soil

Collected: 2018/09/07
Shipped:
Received: 2018/09/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Free (WAD) Cyanide	TECH	5727294	2018/09/12	2018/09/13	Christine Pham
Conductivity	AT	5729498	2018/09/14	2018/09/14	Neil Dassanayake
Hexavalent Chromium in Soil by IC	IC/SPEC	5728714	2018/09/13	2018/09/14	Rupinder Sihota
Soluble Fluoride analysis in Soil	ISE	5729698	2018/09/14	2018/09/14	Surinder Rai
Strong Acid Leachable Metals by ICPMS	ICP/MS	5729894	2018/09/13	2018/09/13	Daniel Teclu
Moisture	BAL	5729254	N/A	2018/09/13	Prgya Panchal
pH CaCl2 EXTRACT	AT	5729722	2018/09/14	2018/09/14	Gnana Thomas
Sodium Adsorption Ratio (SAR)	CALC/MET	5725186	N/A	2018/09/14	Automated Statchk

Maxxam ID: HSF658
Sample ID: SED-7
Matrix: Soil

Collected: 2018/09/07
Shipped:
Received: 2018/09/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	5729440	2018/09/13	2018/09/13	Suban Kanapathippllai
Free (WAD) Cyanide	TECH	5727294	2018/09/12	2018/09/13	Christine Pham
Conductivity	AT	5729498	2018/09/14	2018/09/14	Neil Dassanayake
Hexavalent Chromium in Soil by IC	IC/SPEC	5728714	2018/09/13	2018/09/14	Rupinder Sihota
Soluble Fluoride analysis in Soil	ISE	5729698	2018/09/14	2018/09/14	Surinder Rai
Strong Acid Leachable Metals by ICPMS	ICP/MS	5729894	2018/09/13	2018/09/13	Daniel Teclu
Moisture	BAL	5729254	N/A	2018/09/13	Prgya Panchal
pH CaCl2 EXTRACT	AT	5729722	2018/09/14	2018/09/14	Gnana Thomas
Sodium Adsorption Ratio (SAR)	CALC/MET	5725186	N/A	2018/09/14	Automated Statchk

Maxxam ID: HSF659
Sample ID: SED-9
Matrix: Soil

Collected: 2018/09/07
Shipped:
Received: 2018/09/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	5729440	2018/09/13	2018/09/13	Suban Kanapathippllai
Free (WAD) Cyanide	TECH	5727294	2018/09/12	2018/09/13	Christine Pham
Conductivity	AT	5729498	2018/09/14	2018/09/14	Neil Dassanayake
Hexavalent Chromium in Soil by IC	IC/SPEC	5728714	2018/09/13	2018/09/14	Rupinder Sihota
Soluble Fluoride analysis in Soil	ISE	5729698	2018/09/14	2018/09/14	Surinder Rai
Strong Acid Leachable Metals by ICPMS	ICP/MS	5729894	2018/09/13	2018/09/13	Daniel Teclu
Moisture	BAL	5729254	N/A	2018/09/13	Prgya Panchal
pH CaCl2 EXTRACT	AT	5729722	2018/09/14	2018/09/14	Gnana Thomas
Sodium Adsorption Ratio (SAR)	CALC/MET	5725186	N/A	2018/09/14	Automated Statchk

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Sampler Initials: LM

TEST SUMMARY

Maxxam ID: HSF660
Sample ID: SED-10
Matrix: Soil

Collected: 2018/09/07
Shipped:
Received: 2018/09/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	5729440	2018/09/13	2018/09/13	Suban Kanapathippllai
Free (WAD) Cyanide	TECH	5727294	2018/09/12	2018/09/13	Christine Pham
Conductivity	AT	5729498	2018/09/14	2018/09/14	Neil Dassanayake
Hexavalent Chromium in Soil by IC	IC/SPEC	5728714	2018/09/13	2018/09/14	Rupinder Sihota
Soluble Fluoride analysis in Soil	ISE	5729698	2018/09/14	2018/09/14	Surinder Rai
Strong Acid Leachable Metals by ICPMS	ICP/MS	5729894	2018/09/13	2018/09/13	Daniel Teclu
Moisture	BAL	5729254	N/A	2018/09/13	Prgya Panchal
pH CaCl2 EXTRACT	AT	5729722	2018/09/14	2018/09/14	Gnana Thomas
Sodium Adsorption Ratio (SAR)	CALC/MET	5725186	N/A	2018/09/14	Automated Statchk

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GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	5.0°C

Sample HSF655 [SED-3] : SAR Analysis: Sodium was not detected. To report SAR the sodium detection limit was used in the calculation. This value represents a maximum ratio.

Sample HSF656 [SED-4] : SAR Analysis: Sodium was not detected. To report SAR the sodium detection limit was used in the calculation. This value represents a maximum ratio.

Sample HSF657 [SED-6] : SAR Analysis: Sodium was not detected. To report SAR the sodium detection limit was used in the calculation. This value represents a maximum ratio.

Sample HSF658 [SED-7] : SAR Analysis: Sodium was not detected. To report SAR the sodium detection limit was used in the calculation. This value represents a maximum ratio.

Sample HSF659 [SED-9] : SAR Analysis: Sodium was not detected. To report SAR the sodium detection limit was used in the calculation. This value represents a maximum ratio.

Sample HSF660 [SED-10] : SAR Analysis: Sodium was not detected. To report SAR the sodium detection limit was used in the calculation. This value represents a maximum ratio.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

exp Services Inc
Client Project #: OTT-00248813-AO
Site Location: IQALUIT NEW LANDFILL
Sampler Initials: LM

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5727294	WAD Cyanide (Free)	2018/09/13	94	75 - 125	102	80 - 120	<0.01	ug/g	NC	35
5728714	Chromium (VI)	2018/09/14	NC (1)	70 - 130	89	80 - 120	<0.2	ug/g	NC	35
5729254	Moisture	2018/09/13							5.1	20
5729440	Hot Water Ext. Boron (B)	2018/09/13	101	75 - 125	102	75 - 125	<0.050	ug/g	NC	40
5729498	Conductivity	2018/09/14			104	90 - 110	<0.002	mS/cm	2.6	10
5729698	Fluoride (F-)	2018/09/14	64 (2)	80 - 120	98	80 - 120	<5	ug/g	NC	25
5729722	Available (CaCl2) pH	2018/09/14			100	97 - 103			0.76	N/A
5729894	Acid Extractable Antimony (Sb)	2018/09/13	100	75 - 125	100	80 - 120	<0.20	ug/g	NC	30
5729894	Acid Extractable Arsenic (As)	2018/09/13	102	75 - 125	107	80 - 120	<1.0	ug/g	NC	30
5729894	Acid Extractable Barium (Ba)	2018/09/13	101	75 - 125	102	80 - 120	<0.50	ug/g	4.8	30
5729894	Acid Extractable Beryllium (Be)	2018/09/13	102	75 - 125	98	80 - 120	<0.20	ug/g	1.7	30
5729894	Acid Extractable Boron (B)	2018/09/13	101	75 - 125	100	80 - 120	<5.0	ug/g	NC	30
5729894	Acid Extractable Cadmium (Cd)	2018/09/13	103	75 - 125	100	80 - 120	<0.10	ug/g	NC	30
5729894	Acid Extractable Chromium (Cr)	2018/09/13	NC	75 - 125	101	80 - 120	<1.0	ug/g	0.91	30
5729894	Acid Extractable Cobalt (Co)	2018/09/13	105	75 - 125	103	80 - 120	<0.10	ug/g	8.5	30
5729894	Acid Extractable Copper (Cu)	2018/09/13	101	75 - 125	101	80 - 120	<0.50	ug/g	1.4	30
5729894	Acid Extractable Lead (Pb)	2018/09/13	105	75 - 125	104	80 - 120	<1.0	ug/g	3.8	30
5729894	Acid Extractable Mercury (Hg)	2018/09/13	96	75 - 125	98	80 - 120	<0.050	ug/g	NC	30
5729894	Acid Extractable Molybdenum (Mo)	2018/09/13	104	75 - 125	104	80 - 120	<0.50	ug/g	2.4	30
5729894	Acid Extractable Nickel (Ni)	2018/09/13	103	75 - 125	101	80 - 120	<0.50	ug/g	0.17	30
5729894	Acid Extractable Selenium (Se)	2018/09/13	107	75 - 125	105	80 - 120	<0.50	ug/g	NC	30
5729894	Acid Extractable Silver (Ag)	2018/09/13	104	75 - 125	102	80 - 120	<0.20	ug/g	NC	30
5729894	Acid Extractable Thallium (Tl)	2018/09/13	105	75 - 125	104	80 - 120	<0.050	ug/g	NC	30
5729894	Acid Extractable Tin (Sn)	2018/09/13	105	75 - 125	99	80 - 120	<1.0	ug/g	NC	30
5729894	Acid Extractable Uranium (U)	2018/09/13	103	75 - 125	100	80 - 120	<0.050	ug/g	1.6	30
5729894	Acid Extractable Vanadium (V)	2018/09/13	NC	75 - 125	99	80 - 120	<5.0	ug/g	0.52	30

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QUALITY ASSURANCE REPORT(CONT'D)

exp Services Inc
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Sampler Initials: LM

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5729894	Acid Extractable Zinc (Zn)	2018/09/13	NC	75 - 125	108	80 - 120	<5.0	ug/g	0.78	30

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.

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) The matrix spike recovery was below the lower control limit. This may be due in part to the reducing environment of the sample. The matrix spike was reanalyzed to confirm result.

(2) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

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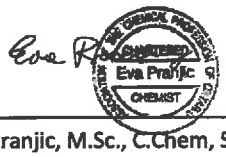
Maxxam
A Bureau Veritas Group Company

Maxxam Job #: B8N5680
Report Date: 2018/09/14

exp Services Inc
Client Project #: OTT-00248813-AO
Site Location: IQALUIT NEW LANDFILL
Sampler Initials: LM

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Ewa Pranjic, M.Sc., C.Chem, Scientific Specialist

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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CHAIN OF CUSTODY RECORD

Page 1 of 1

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:		Laboratory Use Only:	
Company Name	#17498 exp Services Inc	Company Name		Quotation #	B83935	Maxxam Job #:	Bottle Order #: 681097
Attention	Accounts Payable	Attention	Rob Renaud / Les Misch	P.O. #			
Address	100-2650 Queensview Drive	Address		Project	OTT-00248813-A0		
	Ottawa ON K2B 8H6			Project Name	Iqaluit New Landfill	COC #:	Project Manager:
Tel	(613) 688-1899 Fax (613) 225-7337	Tel	Fax	Site #		C#681097-02-01	Alisha Williamson
Email	accounting.ottawa@exp.com; Karen.Burke@exp.com;	Email	Robert.Renaud@exp.com / les	Samples By	L.Misch		

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011)	Other Regulations	Special Instructions
☐ Table 1 ☐ Res/Park ☐ Medium/Fine ☐ Table 2 ☐ Ind/Comm ☐ Coarse ☐ Table 3 ☐ Agr/Other ☐ For RSC ☐ Table ___	☒ CCME ☐ Sanitary Sewer Bylaw ☐ Reg 558 ☐ Storm Sewer Bylaw ☐ MISA Municipality ___ ☐ PWQO ☒ Other Gov. of Nunavut	

Include Criteria on Certificate of Analysis (Y/N)? ___

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): Metals / Hg / Cr VI	CCME Sed. Inorganics Package	CCME Petroleum Hydrocarbons Soil	CCME PAHs - Soil	CCME Groundwater Inorganics Package	Petroleum Hydro. CCME FL & BTEX in Water	CCME PAHs (Water)	Refer to Quote (Full package)				# of Bottles	Comments
1		SED-3	Sep. 7		Sed.								X				1	10-Sep-18 13:00 Alisha Williamson B8N5680 FCN ENV-1214
2		SED-4	Sep. 7		Sed.								X					
3		SED-5	Sep. 7		Sed.								X					
4		SED-6	Sep. 7		Sed.								X					
5		SED-7	Sep. 7		Sed.								X					
6		SED-9	Sep. 7		Sed.								X					
7		SED-10	Sep. 7		Sed.								X					
8																		
9																		
10																		CW Here

* RELINQUISHED BY (Signature/Print)	Date (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date (YY/MM/DD)	Time	# jars used and not submitted	Laboratory Use Only			
L. Misch	18/09/10	9:30	[illegible]	2018/09/11	13:-		Time Sensitive	Temperature (°C) on Rece: 6 5, 4	Custody Seal Present	Yes
			[illegible]	2018/09/11	08:00				Intact	½

* 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.

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT HTTP://MAXXAM.CA/WP-CONTENT/UPLOADS/ONTARIO-COC.PDF

Refer to ACTL

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

White: Maxxam Yellow: Client

Appendix E: Species Lists

Plant Species Observed on Site

#	Common Name	Scientific Name	Status		Comments
			SARA	COSEWIC	
1	Alpine Arnica	*Arnica angustifolia*	-	-	
2	Alpine Bearberry	*Arctostephylos alpine*	-	-	
3	Alpine Bistort	*Bistorta vivipara*	-	-	
4	Alpine Milkvetch	*Astragalus alpinus*	-	-	
5	Alpine Sorrel	*Oxyria digyna*	-	-	
6	Arctic Bell Heather*	*Cassiope tetragona*	-	-	
7	Arctic Thrift	*Armeria maritima subsp. Sibirica*	-	-	
8	Arctic Willow*	*Salix arctica*	-	-	
9	Arctic Wintergreen	*Pyrola grandiflora*	-	-	
10	Bog Bilberry*	*Vaccinium uliginosum*	-	-	
11	Cottongrass	*Eriophorum spp.*	-	-	
12	Crowberry	*Empetrum nigrum*	-	-	
13	Entireleaf Mountain-Avens	*Dryas integrifolia*	-	-	
14	Grass	*Grass sp*	-	-	Species ID could not be determined
15	Lichen	*Lichen sp*	-	-	Species ID could not be determined
16	Map Lichen	*Rhizocarpon geographicum*	-	-	
17	Marsh Labrador Tea	*Rhododendron tomentosum*	-	-	
18	Moss	*Moss sp*	-	-	
19	Mushroom species	*Mushroom sp*	-	-	Species ID could not be determined
20	Net-vein Willow*	*Salix reticulata*	-	-	
21	Red-tipped Lousewort	*Pedicularis flammea*	-	-	
22	Reindeer Lichen*	*Cladonia rangiferina*	-	-	
23	Sedge	*Carex spp.*	-	-	Species ID could not be determined

*Dominant plant

Wildlife Species Observed On and Adjacent to Site

#	Common Name	Scientific Name	Status		Comments
			SARA	COSEWIC	
MAMMALS					
1	Lemming	*Lemmus trimucronatus*	-	-	Number of burrows throughout site
2	Fox	*Vulpes sp*	-	-	Identified scat in east half of site
3	Caribou	*Rangifer tarandus*	No Status	THR	Skeletol remains throughout site
BIRDS					
1	Savannah Sparrow	*Passerculus sandwichensis*	-	-	
2	Red-throated Loon	*Gavia stellata*	-	-	Observed in lake west of site
3	Common Raven	*Corvus corax*	-	-	
4	Falcon	*Falco sp.*	-	-	Observed flying overhead on Site
5	American Pipit	*Anthus rubescens*	-	-	
FISH					
0	No fish recorded		-	-	
INSECTS					
1	American Copper	*Lycaena phlaeas*	-	-	
2	Forest Bumblebee	*Bombus sylvicola*	-	-	
3	Wolf Spider	*Hogna lenta*	-	-	

References

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EXP Services Inc., 2018. Phase II Environmental Site Assessment, New Waste Transfer Station, Iqaluit, NU. Prepared for: City of Iqaluit.

Zeiner, S.T., Realistic Criteria for the Evaluation of Field Duplicate Sample Results, Proceedings of Superfund XV, November 29-December 1, 1994, Sheraton Washington Hotel, Washington, D.C. – modified to use Method Detection Limit (MDL) or Reportable Detection Limit (RDL) in lieu of the Quantitation Limit (QL), the Instrument Detection Limit (IDL) and/or Laboratory Reporting Limit (LRL).