



Physical and Biological Assessment

Proposed New Landfill Site, Iqaluit, NU

FINAL REPORT

Project Number:
OTT-00248813-A0

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October 2018

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Table of Contents

	Page
Legal Notification	i
1 Introduction	1
2 Methodology.....	1
2.1 Desktop Review	1
2.2 Agency Consultation	1
2.3 Field Investigations.....	2
2.3.1 Biophysical Assessment.....	2
2.3.2 Environmental Sampling.....	2
3 Findings	4
3.1 Physical Environment.....	4
3.1.1 Designated and Protected Areas	4
3.1.2 Landscape Features.....	4
3.1.3 Cultural Heritage and Activities	4
3.1.4 Surface Hydrology	5
3.1.5 Soil and Water Conditions.....	5
3.1.5.1 Field Observations	5
3.1.5.2 Soil Chemistry Exceedances	5
3.1.5.3 Surface Water Chemistry Exceedances.....	6
3.1.5.4 Sediment Chemistry Exceedances.....	6
3.1.6 Climate Conditions	6
3.1.6.1 Current Climate	6
3.1.6.2 Future Climate Trends	7
3.2 Biological Environment.....	8
3.2.1 Vegetation.....	8
3.2.2 Wildlife	8
3.2.3 Wildlife Habitat.....	9
3.2.3.1 Terrestrial	9
3.2.3.2 Aquatic	9
3.2.4 Species of Concern	9
4 Conclusions and Recommendations	10
5 General Limitations	11
6 Closure.....	12
7 References.....	13

List of Tables

Table 1: Summary of Environmental Samples Submitted for Chemical Analyses	3
Table 2: Summary of Soil Exceedances.....	6
Table 3: Summary of Surface Water Exceedances	6
Table 4: Summary of Sediment Exceedances	6
Table 5: Monthly Average Temperature, Precipitation and Wind Speed for Iqaluit (1981-2010)	7
Table 6: Monthly Average Temperature and Precipitation for Iqaluit (1961-1990)	7

List of Appendices

Appendix A: Figures

- Figure 1 – Site Location
- Figure 2 – Sampling Locations
- Figure 3 – Designated Features and Protected Areas
- Figure 4 – Landscape Features
- Figure 5 – Cultural Features and Uses
- Figure 6 – Catchment Area
- Figure 7 – Surface Water Features
- Figure 8 – Ecological Land Classification

Appendix B: Site Photographs

Appendix C: Analytical Results

Appendix D: Certificates of Analysis

Appendix E: Species Lists

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 afterward 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 Plants 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 developed 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 of 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 coarse 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 Aniiirajak 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 assess 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 is 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 than 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 Arctic 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.



Thomas Gristey, B.Sc.
Biologist
Environmental Division



Les Misch, B.E.S., Env. Tech.
Senior Ecologist, Team Lead
Environmental Division

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Appendix A: Figures



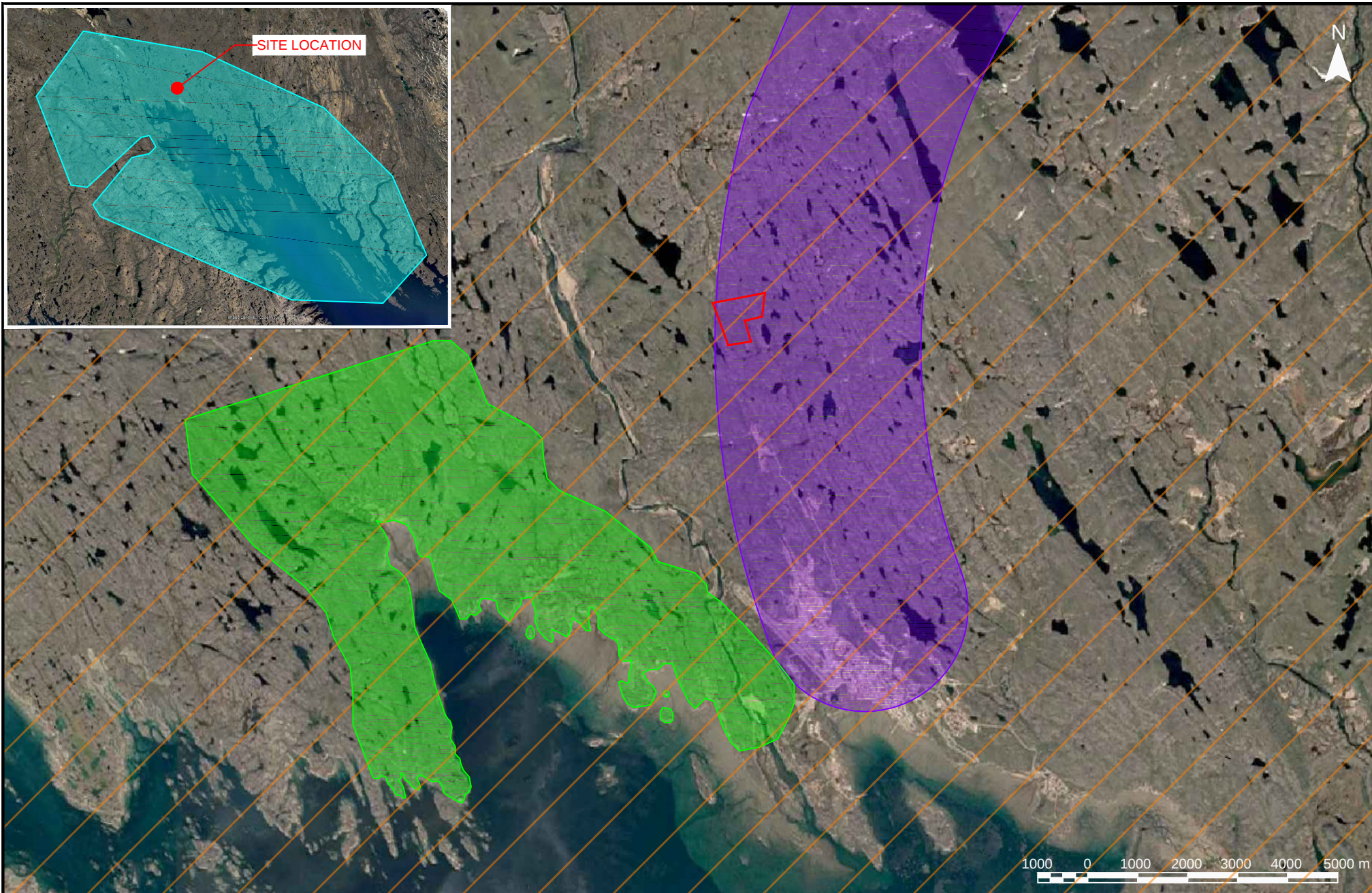
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			DATE: OCTOBER 2018	FIG. NO.: 1

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			OTT-00248813-A0	AS
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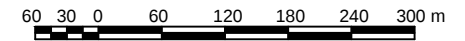
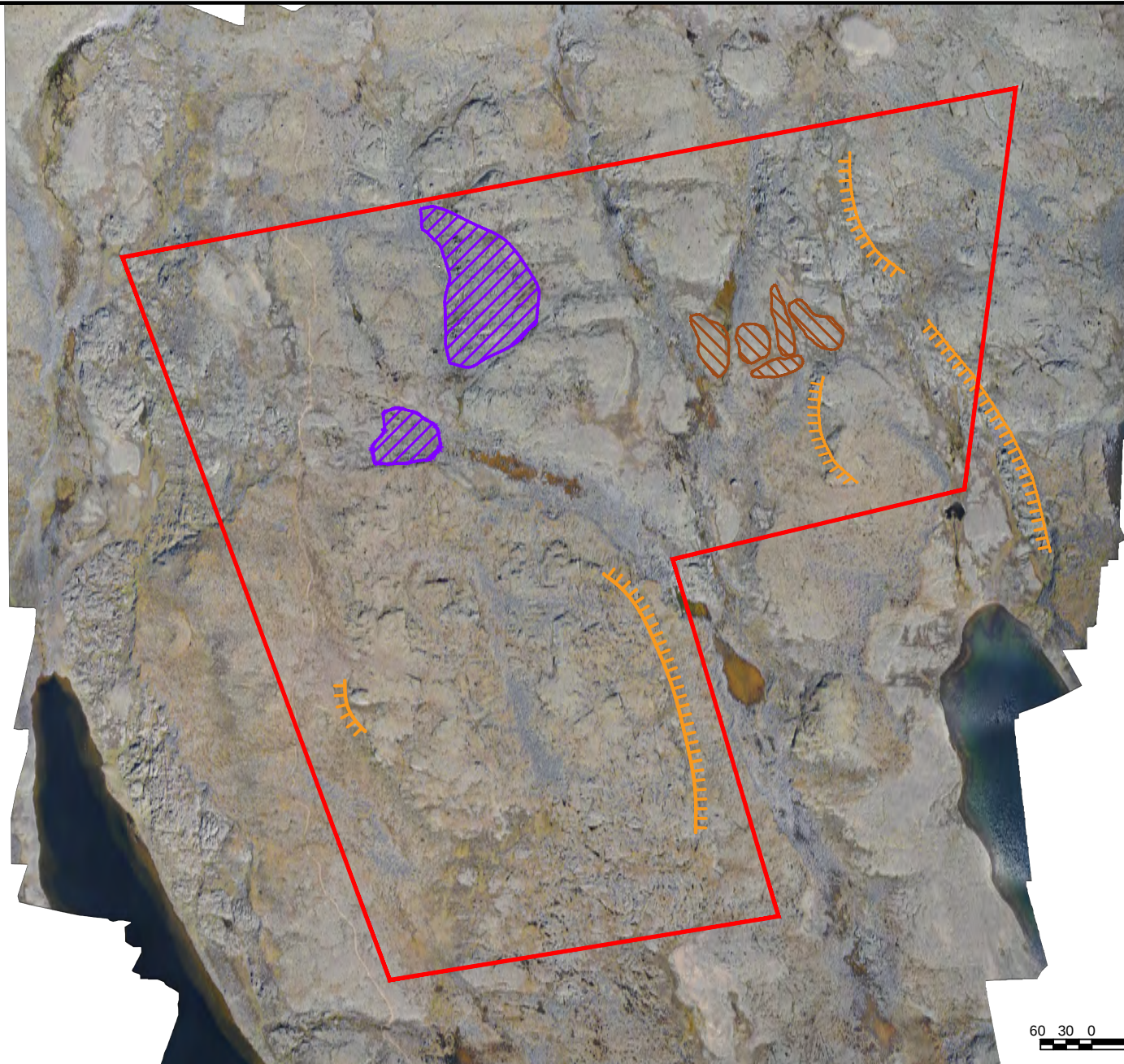
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	PROPOSED TRANSPORTATION CORRIDOR
	CHAR AREAS OF ABUNDANCE
	WATER MANAGEMENT AREA

TITLE AND LOCATION:	
DESIGNATED AND PROTECTED AREAS PHYSICAL AND BIOLOGICAL ASSESSMENT IQUALUIT, NUNAVUT	

PROJECT NO.:	DWN.:
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LEGEND:

-  SITE BOUNDARY
-  BEDROCK OUTCROP
-  BOULDER FIELD
-  GLACIOFLUVIAL TERRACE

TITLE AND LOCATION:

LANDSCAPE FEATURES
PHYSICAL AND BIOLOGICAL ASSESSMENT
IQALUIT, NUNAVUT

PROJECT NO.:

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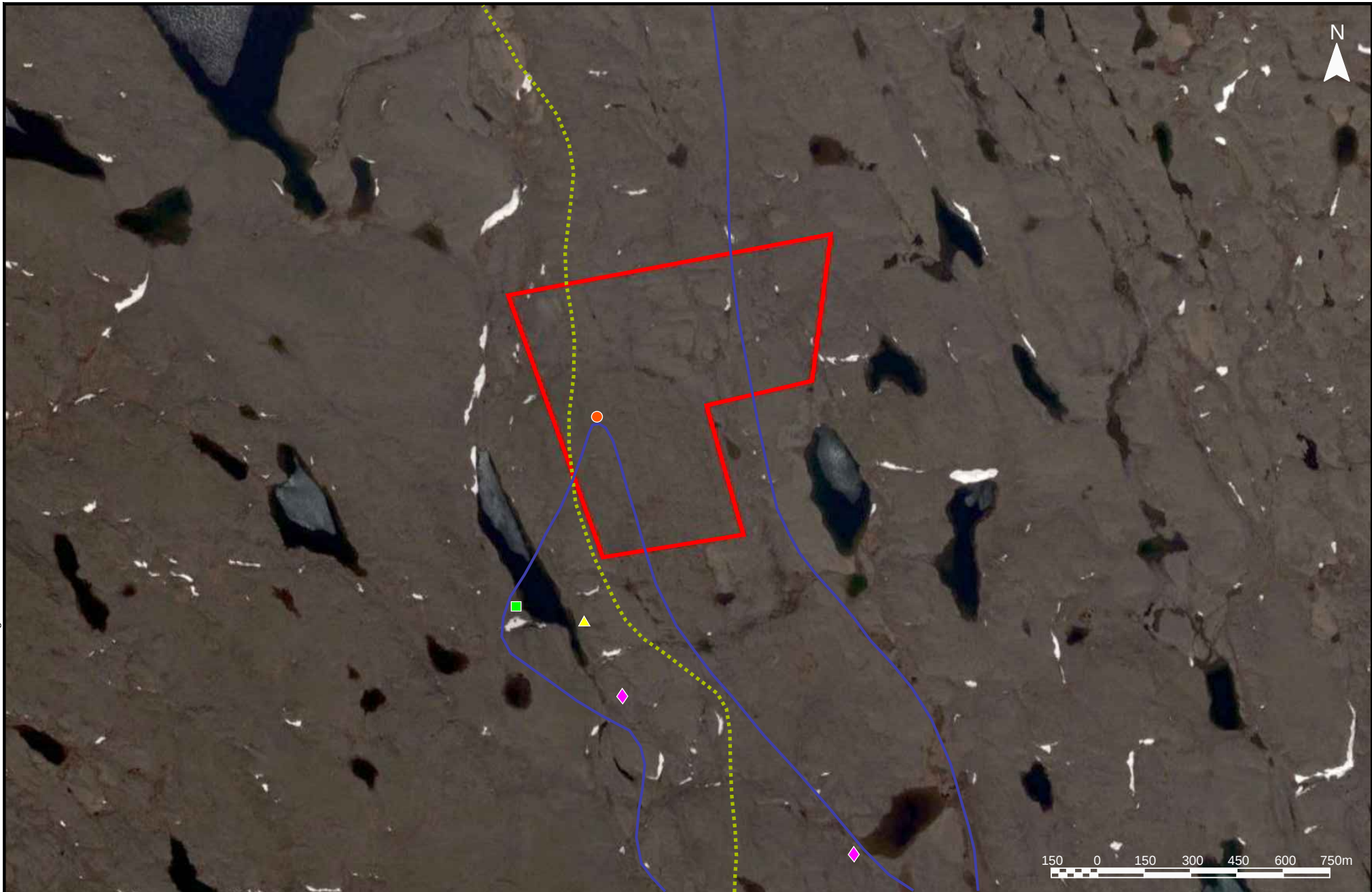
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LEGEND:

SITE BOUNDARY

ATV TRAIL

SKI TRAIL

CABIN

CAMPSITE

HIKERS / CAMPERS

FIREPIT

TITLE AND LOCATION:

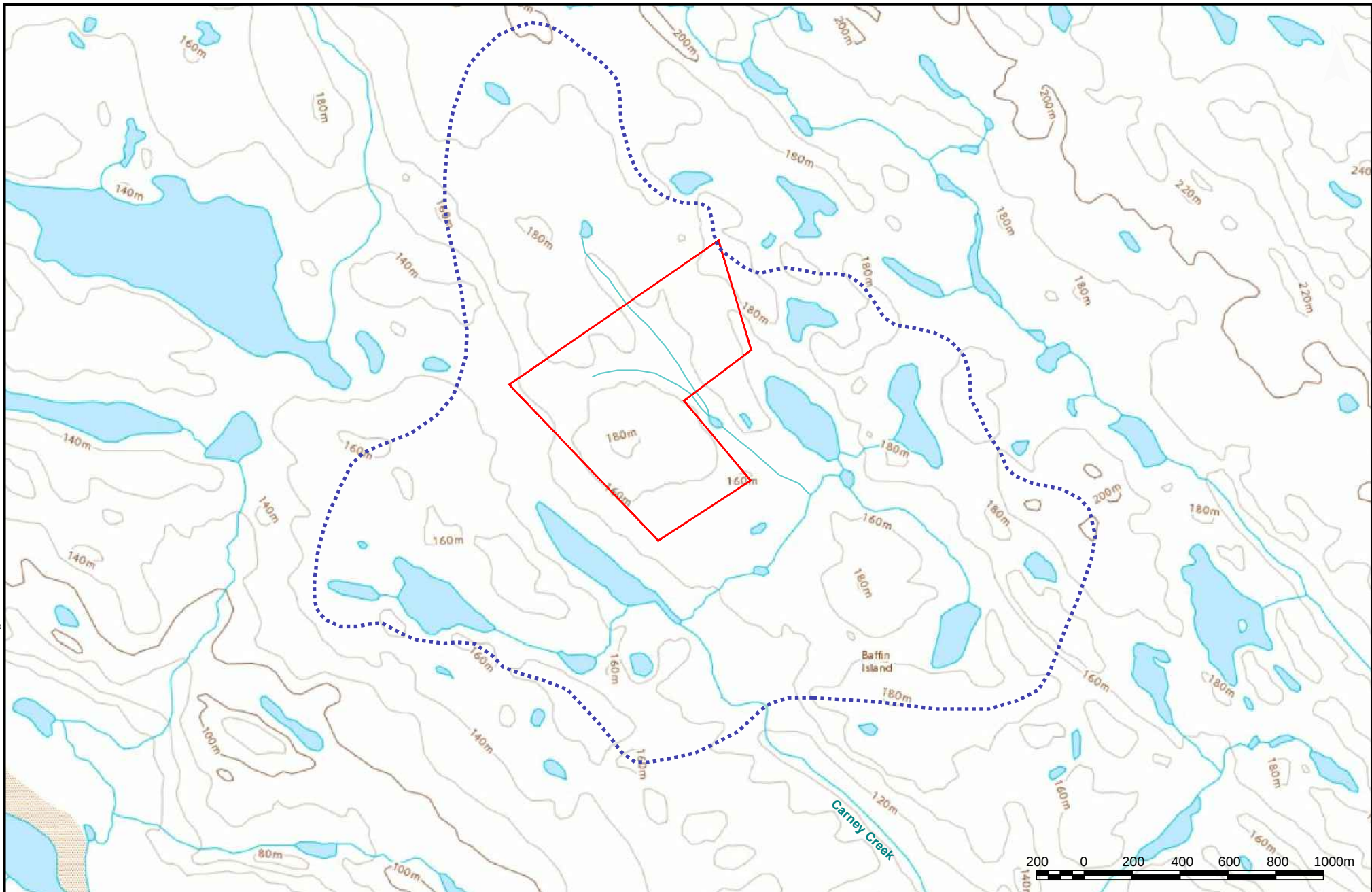
CULTURAL FEATURES AND USES

PHYSICAL AND BIOLOGICAL ASSESSMENT

IQALUIT, NUNAVUT

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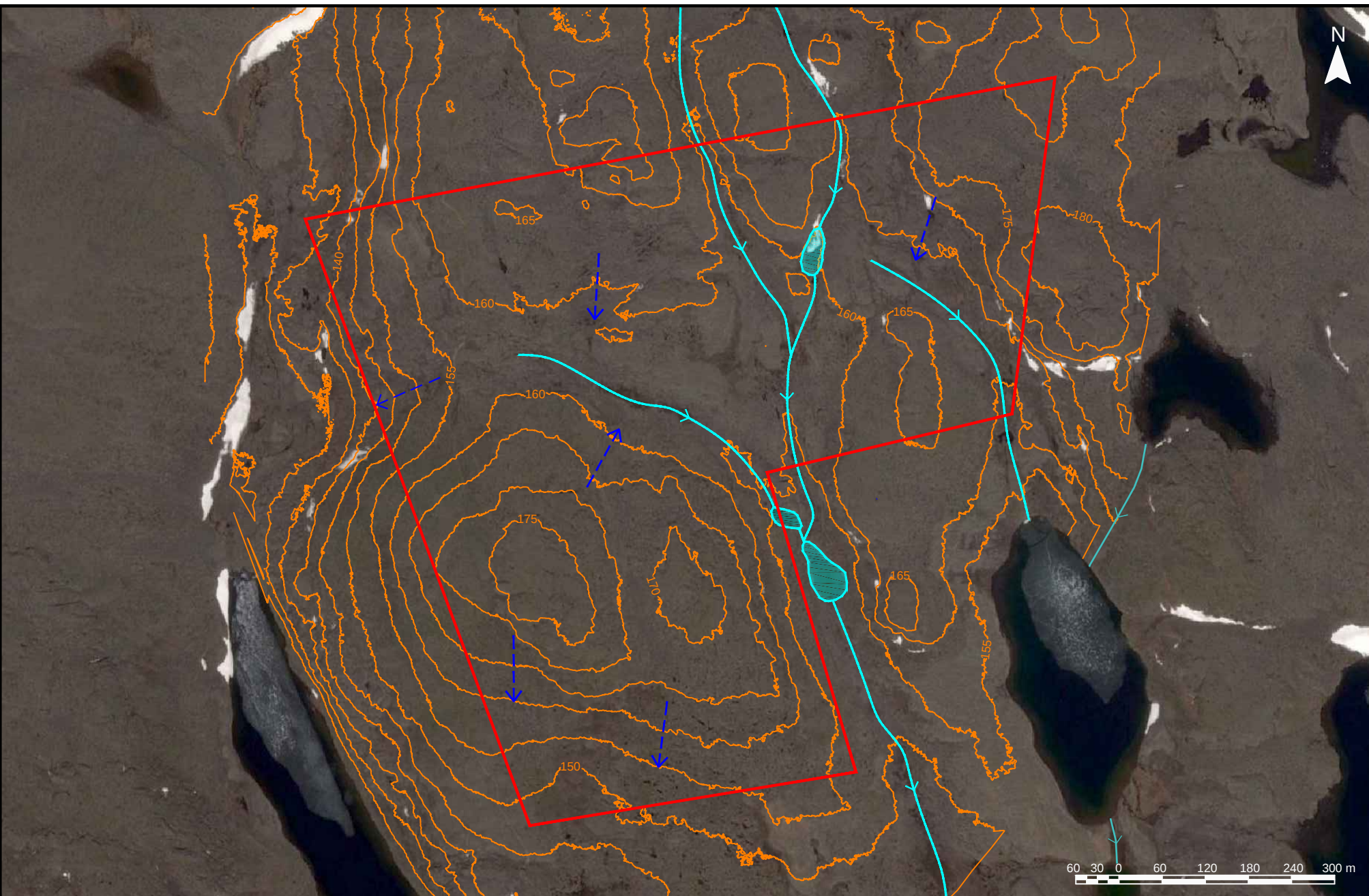
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	CATCHMENT AREA BOUNDARY

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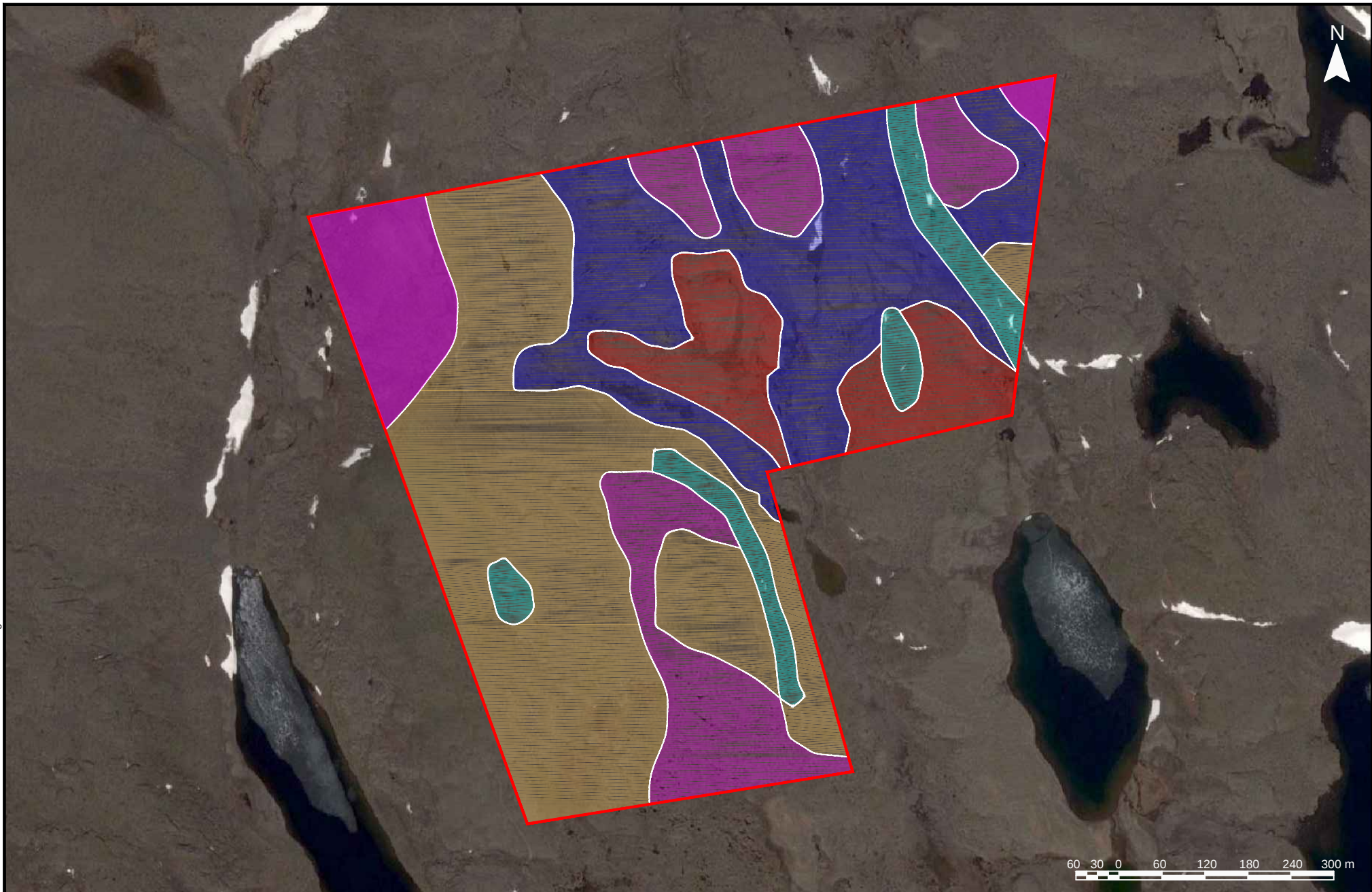
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LEGEND:	
	SITE BOUNDARY
	CONTOUR LINE (5m)
	STREAM
	POND
	SEEPAGE / SUBSURFACE FLOW

TITLE AND LOCATION:

SURFACE HYDROLOGY
PHYSICAL AND BIOLOGICAL ASSESSMENT
IQALUIT, NUNAVUT

PROJECT NO.:	DWN.:
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SCALE:	CK:
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DATE:	FIG. NO.:
OCTOBER 2018	7



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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)

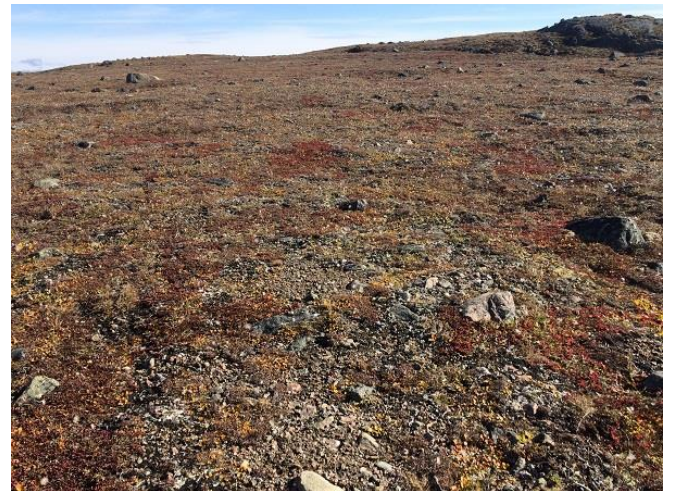


Photo 4 – Heath Upland (Sept. 2018)



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 (CaCl ₂) 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.

² 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)

Department of Environment and Natural Resources Canada, Environmental Guidelines for Contaminated Site Remediation, revised December 2004, Part 2: Remedial 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	13.9	<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).

Shaded/Bold

Concentration exceeds CCME Freshwater Guidelines.

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	10	<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).

Shaded/Bold

Concentration exceeds CCME Freshwater Guidelines.

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 (CaCl ₂) 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

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

=====

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
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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
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RDL = Reportable Detection Limit

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									

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						

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

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

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
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Results relate only to the items tested.

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

QUALITY ASSURANCE REPORT

MAXXAM ANALYTICS
Client Project #: Campobello job# B8N5673

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% 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

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

QUALITY ASSURANCE REPORT(CONT'D)

MAXXAM ANALYTICS
Client Project #: Campobello job# B8N5673

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% 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

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

QUALITY ASSURANCE REPORT(CONT'D)

MAXXAM ANALYTICS
Client Project #: Campobello job# B8N5673

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% 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										

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 Ngandu, B.Sc., P.Chem., QP, Supervisor, Organics



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

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.

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

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-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

=====

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.

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			
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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			
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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
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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
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RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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
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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
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RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

Lab-Dup = Laboratory Initiated Duplicate

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

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

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
RDL = Reportable Detection Limit							
QC Batch = Quality Control Batch							

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								

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								

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
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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

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

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								

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
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								

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
RDL = Reportable Detection Limit					
QC Batch = Quality Control Batch					

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
RDL = Reportable Detection Limit					
QC Batch = Quality Control Batch					

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						
QC Batch = Quality Control Batch						

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: 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 Kanapathippalai
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 Kanapathippalai
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

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: 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 Kanapathipillai
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 Kanapathipillai
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

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: 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 Kanapathipillai
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	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 Kanapathipillai
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

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: 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 Kanapathipplai
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

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 Kanapathippalai
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 Kanapathippalai
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

GENERAL COMMENTS

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

Package 1	4.7°C
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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.

QUALITY ASSURANCE REPORT

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

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD	
			% 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

QUALITY ASSURANCE REPORT(CONT'D)

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

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD	
			% 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

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

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD	
			% 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		

QUALITY ASSURANCE REPORT(CONT'D)

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

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD	
			% 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		

QUALITY ASSURANCE REPORT(CONT'D)

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

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD	
			% 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 $\leq 2 \times \text{RDL}$).

(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.

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 Ngandu, 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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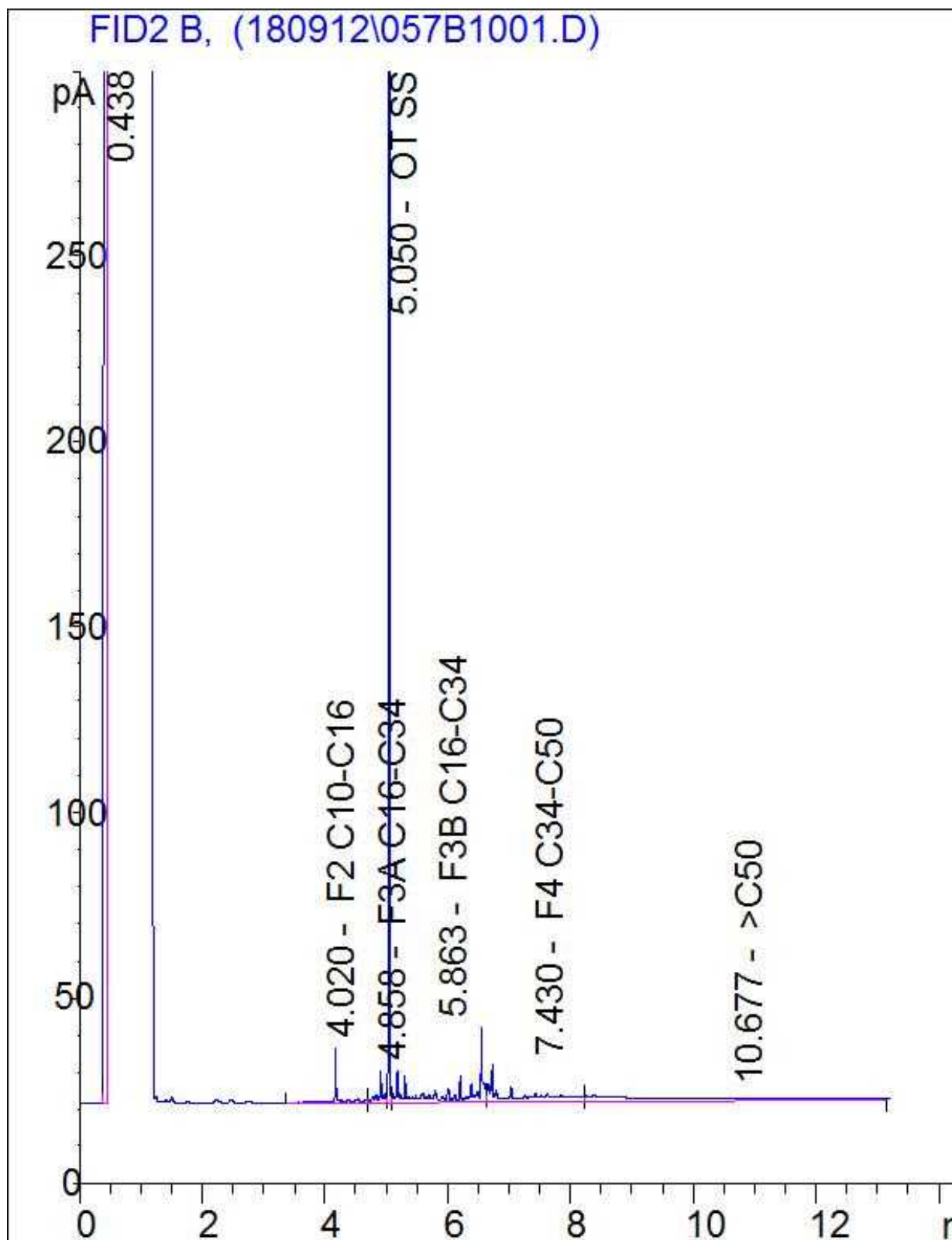
CHAIN OF CUSTODY RECORD

Page 1 of 1

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:		Laboratory Use Only:	
Company Name:	#17498 exp Services Inc	Company Name:	Rob Renaud / Les Misch	Quotation #:	B83935	Maxxam Job #:	Bottle Order #:
Attention:	Accounts Payable	Attention:		P.O. #:			
Address:	100-2650 Queensview Drive	Address:		Project:	OTT-00248813-AP		
	Ottawa ON K2B 8H6			Project Name:	Iqaluit New Landfill	COC #:	Project Manager:
Tel:	(613) 688-1899	Tel:		Site #:			
Email:	accounting.ottawa@exp.com; Karen.Burke@exp.com;	Email:	Robert.Renaud@exp.com	Sampled By:	L. Misch		Alisha Williamson

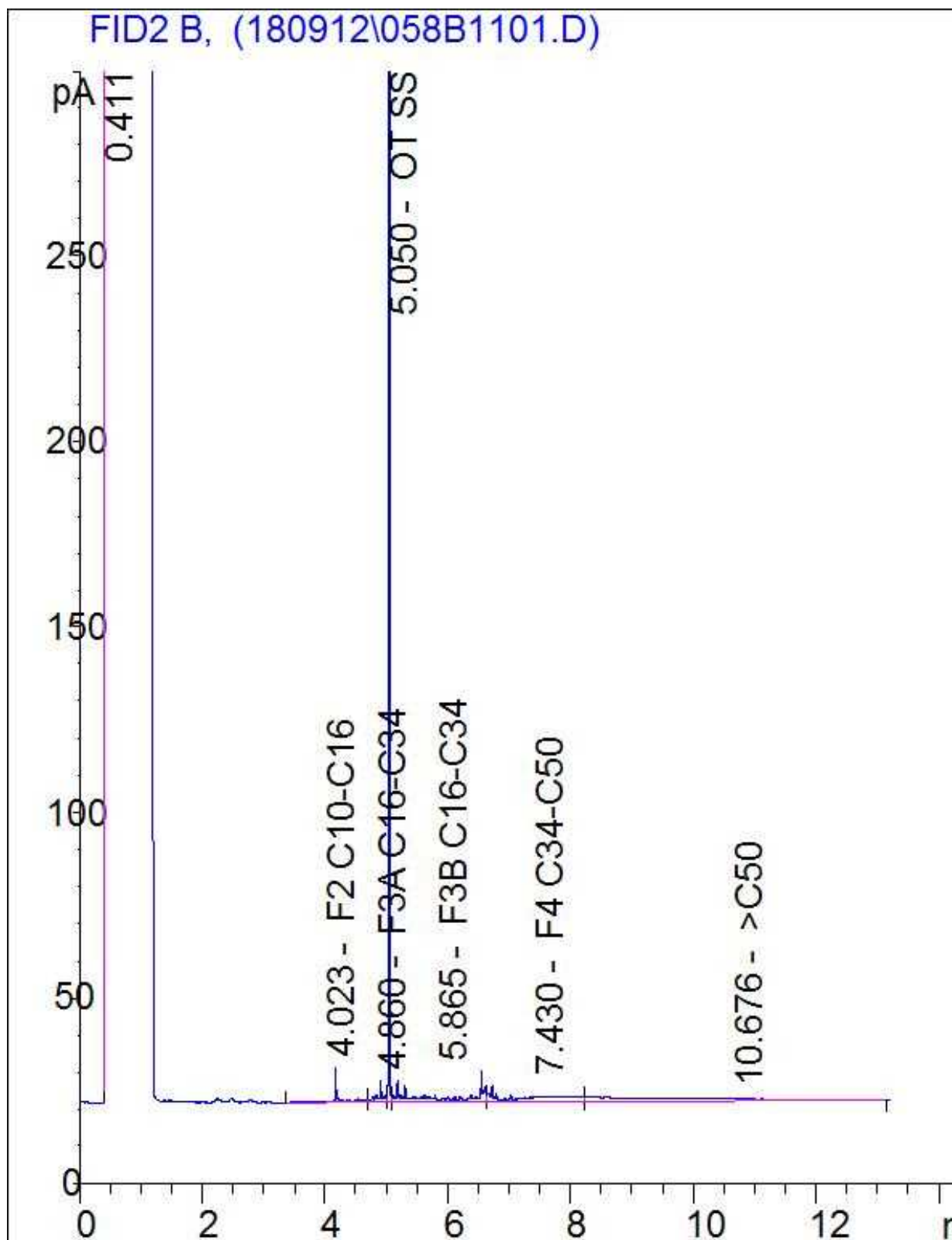
MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY				ANALYSIS REQUESTED (PLEASE BE SPECIFIC)										Turnaround Time (TAT) Required:			
Regulation 153 (2011)		Other Regulations		Special Instructions												Please provide advance notice for rush projects	
☐ Table 1	☐ Res/Park	☐ Medium/Fine	☒ CCME	☐ Sanitary Sewer Bylaw		Field Filtered (please circle):	Metals / Hg / Cr / VI	CCME Soil Inorganics Package	+ Hg + Metals	CCME Petroleum Hydrocarbons Soil	+ BTEX	CCME PAHs (Soil)	CCME Groundwater Inorganics Package	CCME Hydric CCME F1 & BTEX in Water	CCME PAHs (Water)	VOC	Regular (Standard) TAT:
☐ Table 2	☒ Ind/Comm	☐ Coarse	☐ Reg 558	☐ Storm Sewer Bylaw													(will be applied if Rush TAT is not specified):
☐ Table 5	☐ Agri/Other	☐ For RSC	☐ MISA	☐ Municipality													Standard TAT = 5-7 Working days for most tests.
☐ Table			☒ Other	Government of Nunavut													Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are >5 days - contact your Project Manager for details.
Include Criteria on Certificate of Analysis (Y/N)?																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													# of Bottles
1	S-1	2018/09/07		SOIL				X	X	X							6
2	S-2	2018/09/07		SOIL													
3	S-3	2018/09/07		SOIL													
4	S-4	2018/09/07		SOIL													
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																	
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		Custody Seal		Yes		No	
Les Misch		18/07/08	9:30	Alisha Williamson		2018/07/10	13:00			Time Sensitive		Temperature (°C) on Recel		Present			
												515.4		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.										SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM							
* 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.										White: Maxxa Yellow: Client							
** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT HTTP://MAXXAM.CA/CONTENT/UPLOADS/ONTARIO-COC.PDF.										REFER TO ACT12							

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram



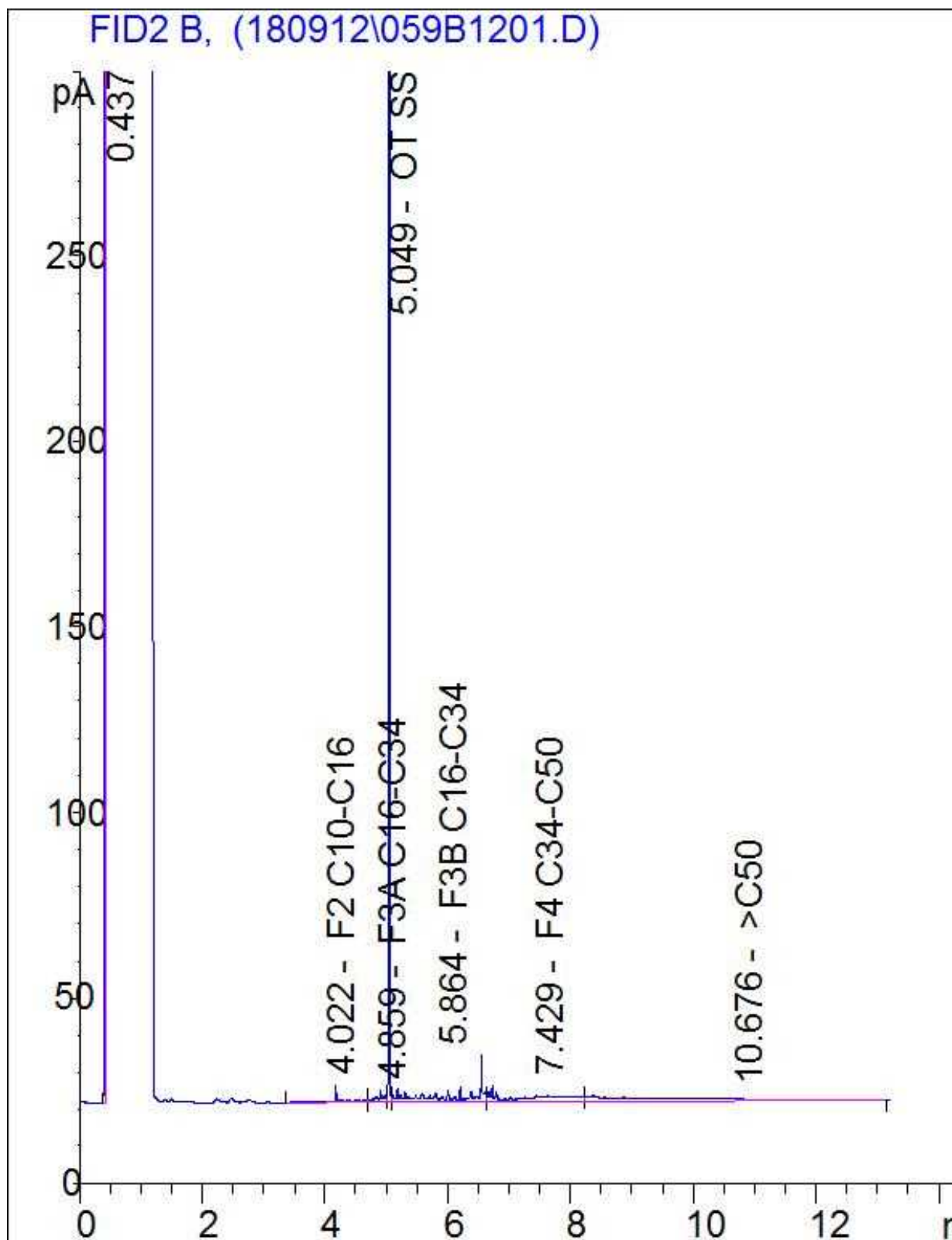
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram



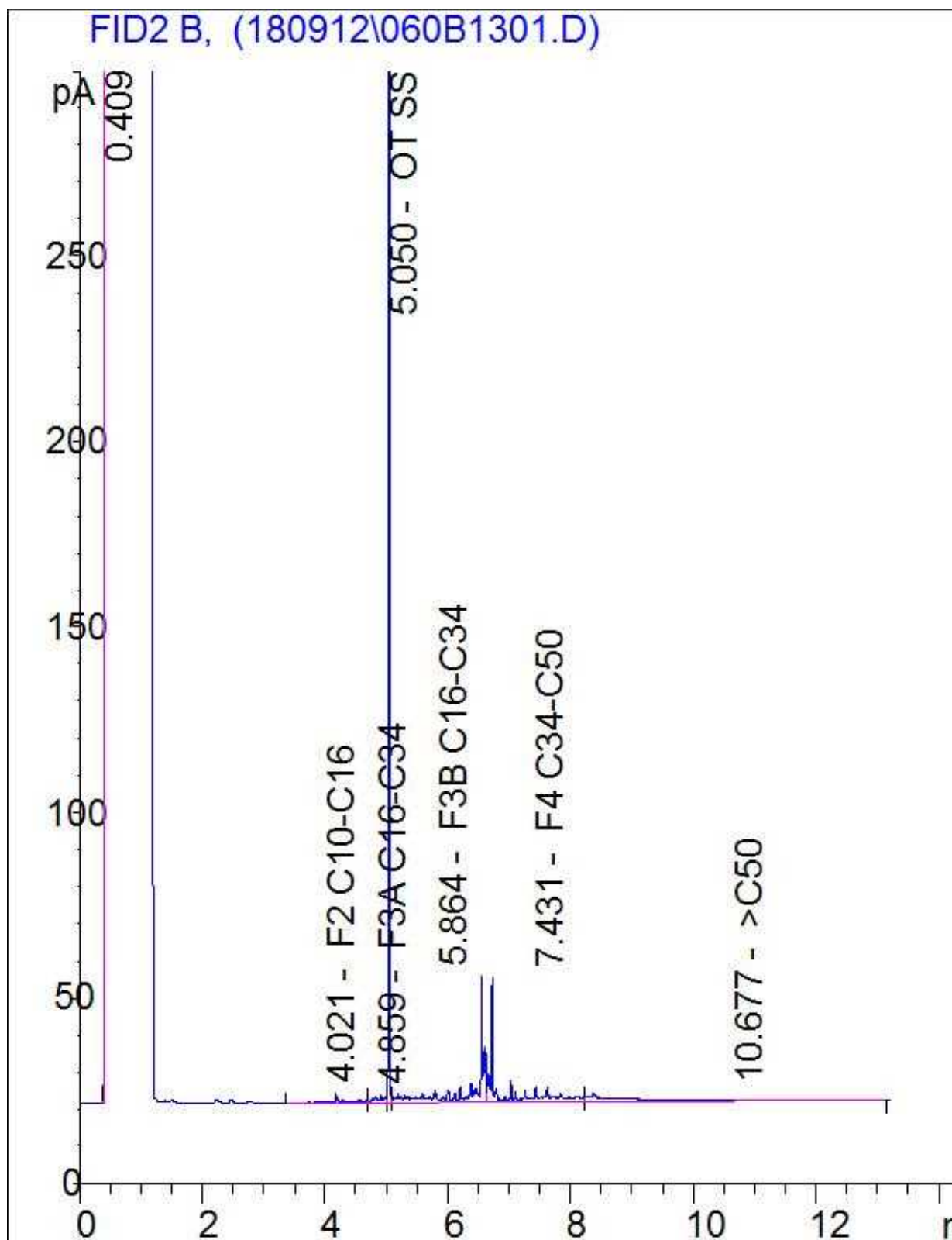
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram



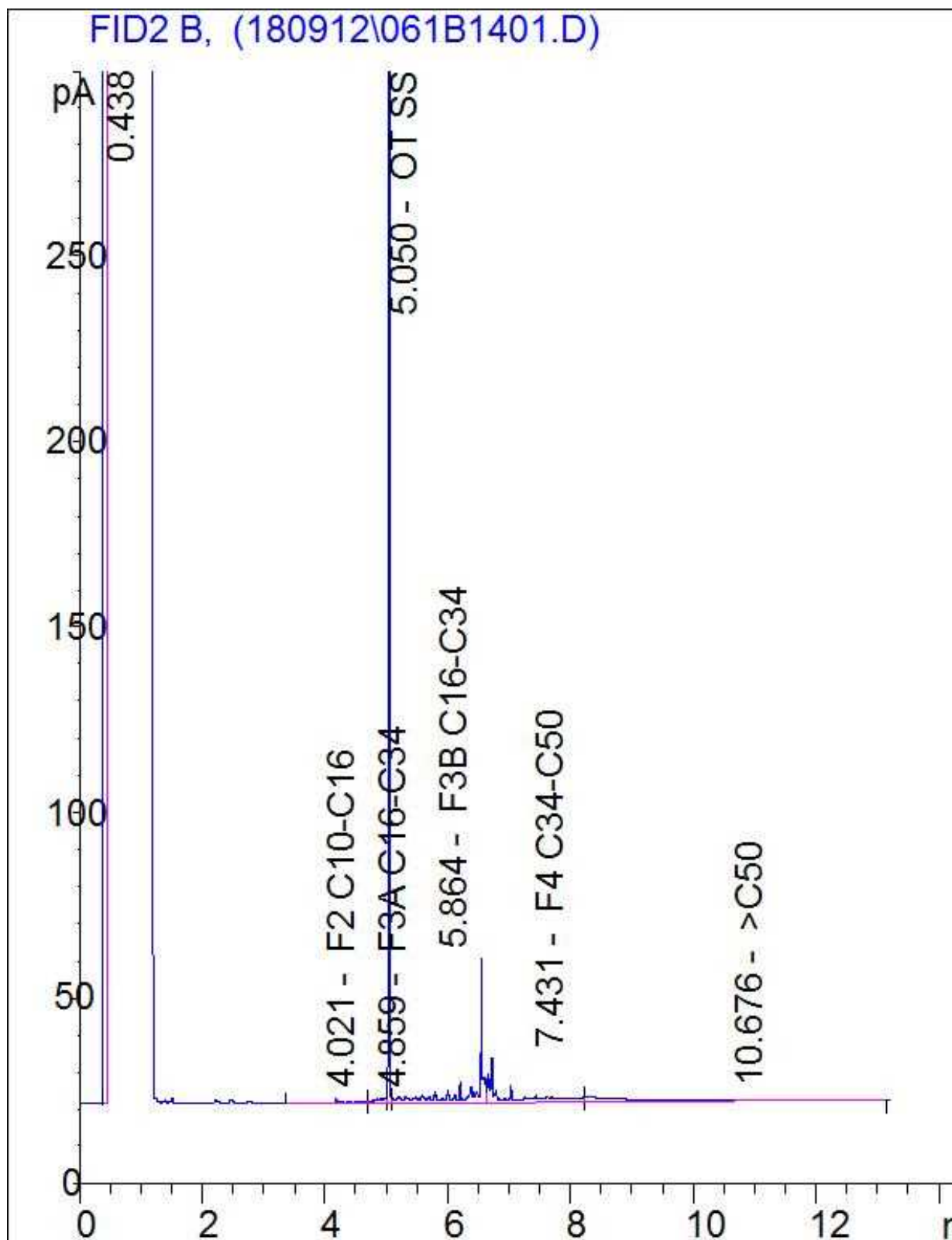
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram



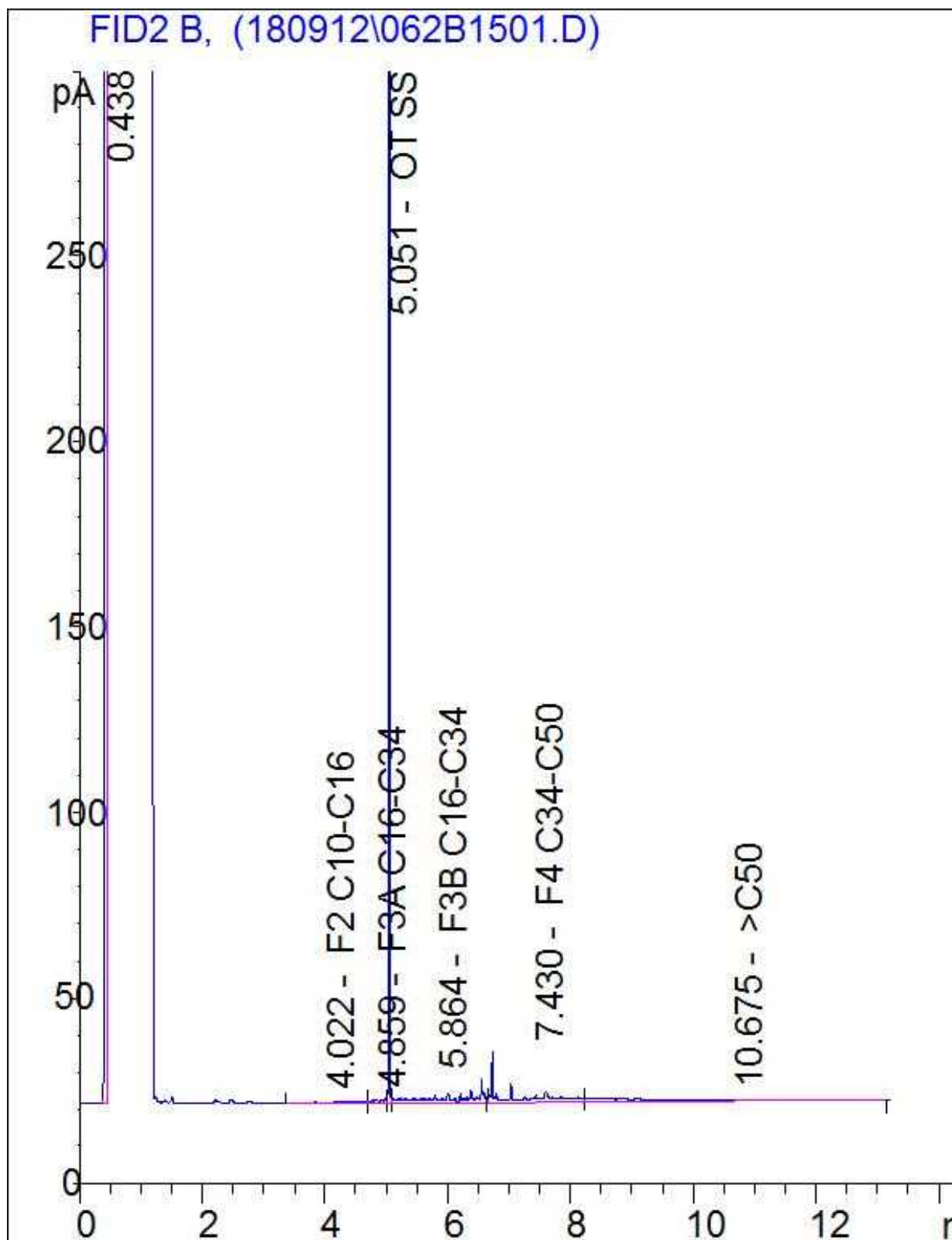
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram



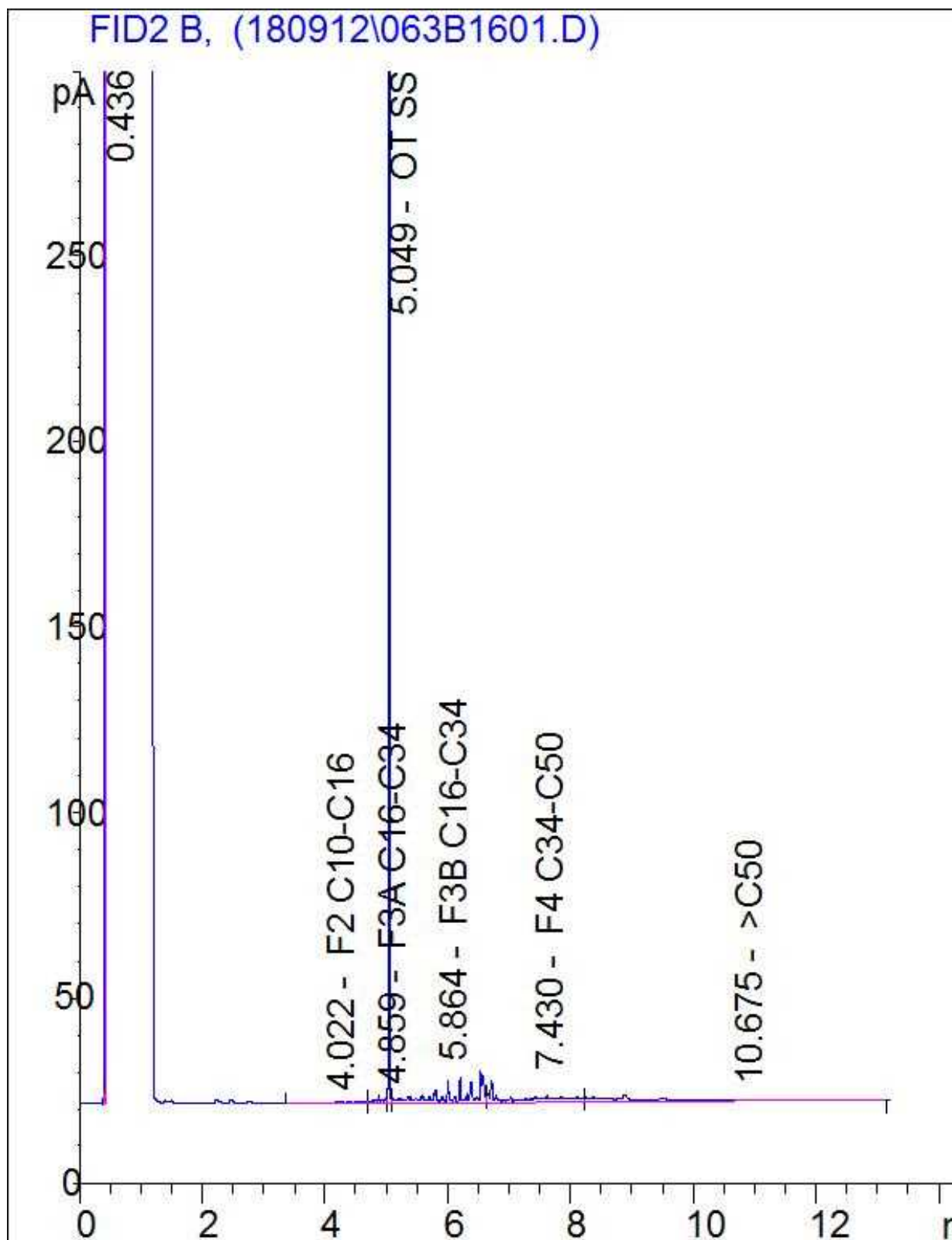
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram



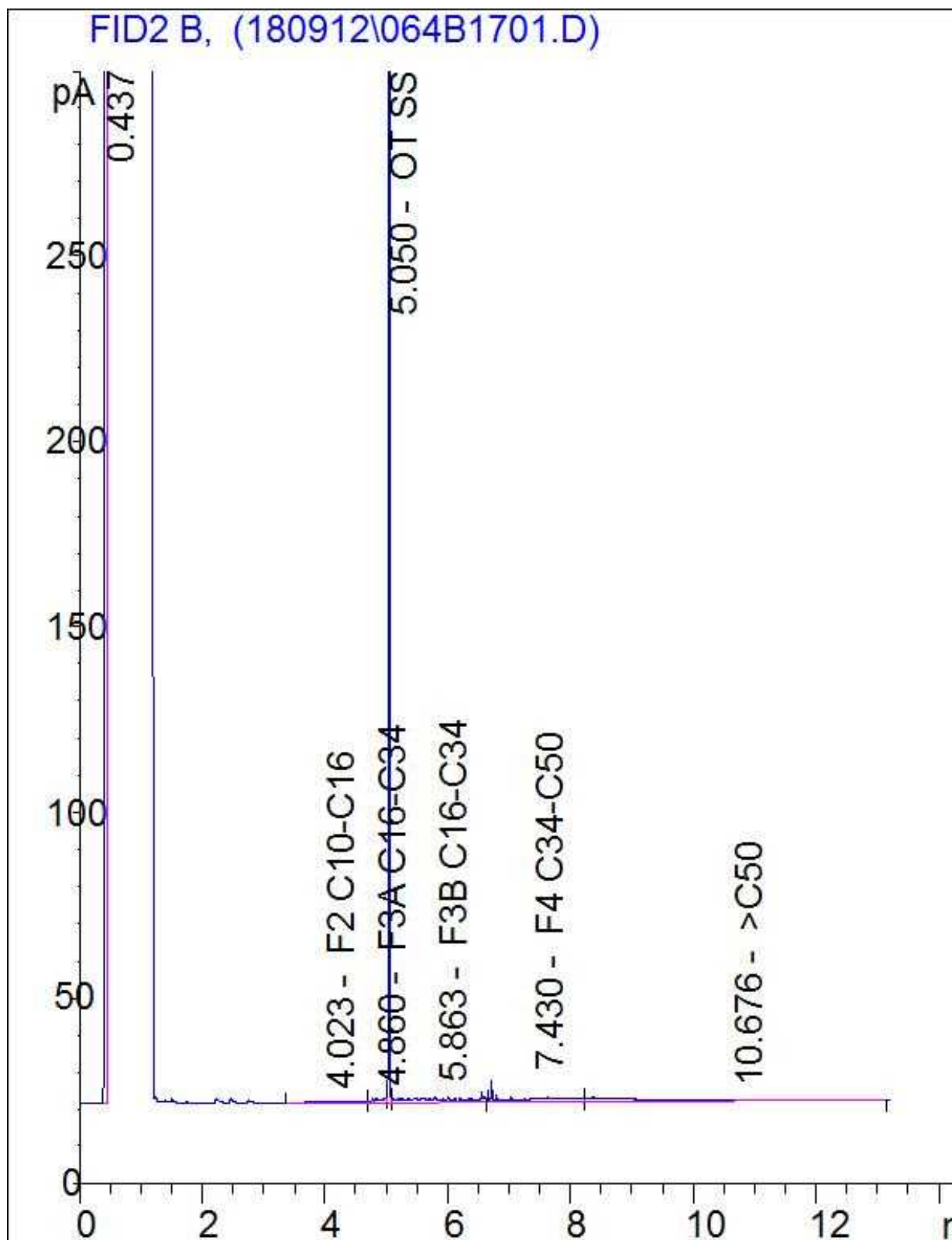
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram



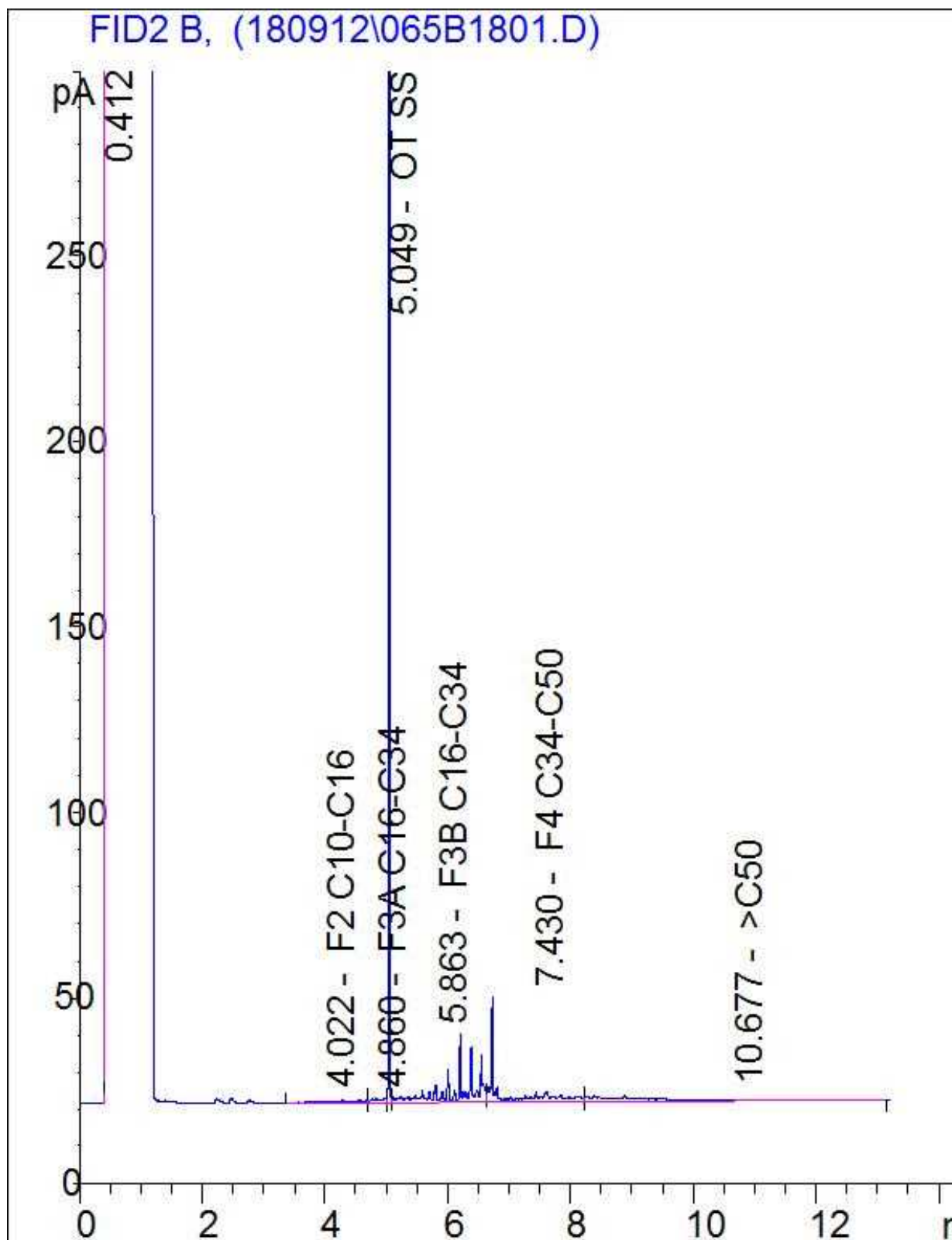
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

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.

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

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 H ₂ S) (2)	8	N/A	2018/09/14	AB WI-00065	Auto Calc.
Hardness (calculated as CaCO ₃) (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 HNO ₃ 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 (NO ₃) and Nitrite (NO ₂) 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.

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

=====

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.

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
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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

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

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

Lab-Dup = Laboratory Initiated Duplicate

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
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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

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

Lab-Dup = Laboratory Initiated Duplicate

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

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

Lab-Dup = Laboratory Initiated Duplicate

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
RDL = Reportable Detection Limit								
QC Batch = Quality Control Batch								

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
RDL = Reportable Detection Limit								
QC Batch = Quality Control Batch								

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							

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							

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
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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
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RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

Lab-Dup = Laboratory Initiated Duplicate

Maxxam Job #: B8N5764
Report Date: 2018/09/19

exp Services Inc
Client Project #: OTT-0248813-AO
Site Location: IQALUIT-NEW LANDFILL
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 H ₂ S)	CALC	5737429	N/A	2018/09/14	Automated Statchk
Hardness (calculated as CaCO ₃)	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 HNO ₃ 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/NH ₄	5727120	N/A	2018/09/13	Parminder Sangha
Nitrate (NO ₃) and Nitrite (NO ₂) 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 H ₂ S)	CALC	5737429	N/A	2018/09/14	Automated Statchk
Hardness (calculated as CaCO ₃)	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 HNO ₃ 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/NH ₄	5727120	N/A	2018/09/13	Parminder Sangha
Nitrate (NO ₃) and Nitrite (NO ₂) 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 Job #: B8N5764
Report Date: 2018/09/19

exp Services Inc
Client Project #: OTT-0248813-AO
Site Location: IQALUIT-NEW LANDFILL
Sampler Initials: LM

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 H ₂ S)	CALC	5737429	N/A	2018/09/14	Report Automation Engine
Hardness (calculated as CaCO ₃)	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 HNO ₃ 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/NH ₄	5727120	N/A	2018/09/13	Parminder Sangha
Nitrate (NO ₃) and Nitrite (NO ₂) 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 (NO ₃) and Nitrite (NO ₂) 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 H ₂ S)	CALC	5737429	N/A	2018/09/14	Automated Statchk
Hardness (calculated as CaCO ₃)	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 HNO ₃ 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/NH ₄	5727120	N/A	2018/09/13	Parminder Sangha
Nitrate (NO ₃) and Nitrite (NO ₂) 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 Job #: B8N5764
Report Date: 2018/09/19

exp Services Inc
Client Project #: OTT-0248813-AO
Site Location: IQALUIT-NEW LANDFILL
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 H ₂ S)	CALC	5734147	N/A	2018/09/14	Automated Statchk
Hardness (calculated as CaCO ₃)	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 HNO ₃ 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/NH ₄	5727120	N/A	2018/09/13	Parminder Sangha
Nitrate (NO ₃) and Nitrite (NO ₂) 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 H ₂ S)	CALC	5734147	N/A	2018/09/14	Automated Statchk
Hardness (calculated as CaCO ₃)	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 HNO ₃ 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/NH ₄	5727120	N/A	2018/09/13	Parminder Sangha
Nitrate (NO ₃) and Nitrite (NO ₂) 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

Maxxam Job #: B8N5764
Report Date: 2018/09/19

exp Services Inc
Client Project #: OTT-0248813-AO
Site Location: IQALUIT-NEW LANDFILL
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 H ₂ S)	CALC	5734147	N/A	2018/09/14	Automated Statchk
Hardness (calculated as CaCO ₃)	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 HNO ₃ 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/NH ₄	5727120	N/A	2018/09/13	Parminder Sangha
Nitrate (NO ₃) and Nitrite (NO ₂) 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/NH ₄	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 H ₂ S)	CALC	5734147	N/A	2018/09/14	Report Automation Engine
Hardness (calculated as CaCO ₃)	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 HNO ₃ 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/NH ₄	5727120	N/A	2018/09/13	Parminder Sangha
Nitrate (NO ₃) and Nitrite (NO ₂) 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

GENERAL COMMENTS

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

Package 1	4.7°C
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Results relate only to the items tested.

QUALITY ASSURANCE REPORT

exp Services Inc
Client Project #: OTT-0248813-AO
Site Location: IQALUIT-NEW LANDFILL
Sampler Initials: LM

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD	
			% 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		

QUALITY ASSURANCE REPORT(CONT'D)

exp Services Inc
Client Project #: OTT-0248813-AO
Site Location: IQALUIT-NEW LANDFILL
Sampler Initials: LM

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD	
			% 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.

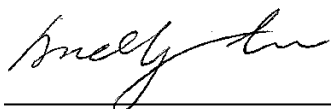
Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

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).

VALIDATION SIGNATURE PAGE

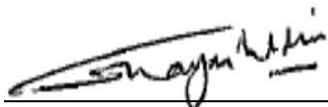
The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Andy Lu, Ph.D., P.Chem., Scientific Specialist



Brad Newman, Scientific Service Specialist



Ghayasuddin Khan, M.Sc., P.Chem., QP, Scientific Specialist, Inorganics

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.

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:		Laboratory Use Only:	
Company Name: #17498 exp Services Inc		Company Name: <u>Exp Services</u>		Quotation #: B83935		Maxxam Job #:	
Attention: Accounts Payable		Attention: Rob Renaud		P.O. #:		Bottle Order #:	
Address: 100-2650 Queensview Drive		Address:		Project: <u>OTT-0248813-A0</u>		COC #:	
Ottawa ON K2B 8H6		Address:		Project Name: <u>Iqaluit - New Landfill</u>		Project Manager:	
Tel: (613) 688-1899 Fax: (613) 225-7337		Tel:		Site #:		Alisha Williamson	
Email: accounting.ottawa@exp.com; Karen.Burke@exp.com;		Email: Robert.Renaud@exp.com; <u>Les Misch</u>		Sampled By: <u>Les Misch</u>		C#681097-07-01	

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		Field Filtered (please circle): Metals / Hg / Cr / VI	CCME Soil Inorganics Package	CCME Petroleum Hydrocarbons Soil	CCME PAHs (Soil)	CCME Groundwater Inorganics Package - Hg	Petroleum Hydro. CCME F1 & BTEX in Water	CCME PAHs (Water)	vce	General Chem. Nutrients Sulphide	Cyanide	# of Bottles	Comments
☐ Table 1	☐ Res/Park	☐ Medium/Fine	☒ CCME	☐ Sanitary Sewer Bylaw														
☐ Table 2	☐ Ind/Comm	☐ Coarse	☐ Reg 558	☐ Storm Sewer Bylaw														
☐ Table 3	☐ Agri/Other	☐ For RSC	☐ MISA	☐ Municipality														
☐ Table			☒ PWQO	<u>Government of Nunavut</u>														
Include Criteria on Certificate of Analysis (Y/N)?																		
Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix														
1	SW-1	2018/09/07		SW	No						X				X	X	6	Samples are surface water. Total metals to be analyzed. No low level.
2	SW-3	2018/09/07									X				X	X		
3	SW-4	2018/09/07									X				X	X		Samples unpreserved.
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 SW
10																		

* 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				
<u>Les Misch</u>		18/09/08	9:30	<u>Alice Gruisich</u>		2018/09/10	13:00		Time Sensitive	Temperature (°C) on Receipt	Custody Seal Present	Yes	No
										5.5/4	Intact		

10-Sep-18 13:00
Alisha Williamson
B8N5764

SAMPLES MUST BE KEPT COOL (< 4°C) UNTIL DELIVERY

REFER TO ACTR

* 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/CONTENT/UPLOADS/ONTARIO-COC.PDF.

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	Date		Date Analyzed	Laboratory Method	Analytical Method
	Quantity	Extracted			
Sulphide (as H ₂ S)	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

=====

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 #: 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 H ₂ S)	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 H ₂ S)	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

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 H ₂ S)	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 H ₂ S)	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 H ₂ S)	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 H ₂ S)	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 H ₂ S)	CALC	9136929	N/A	2018/09/14	Automated Statchk
Total Sulphide	SPEC	9142023	N/A	2018/09/14	Xiaman (Savannah) Li

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 H ₂ S)	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 H ₂ S)	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 H ₂ S)	CALC	9136929	N/A	2018/09/14	Report Automation Engine
Total Sulphide	SPEC	9142023	N/A	2018/09/14	Xiaman (Savannah) Li

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
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Results relate only to the items tested.

Maxxam Job #: B877746
Report Date: 2018/09/18

QUALITY ASSURANCE REPORT

MAXXAM ANALYTICS
Client Project #: Campobello job# B8N5764
Sampler Initials: LM

QC Batch	Parameter	Date	Spiked Blank		Method Blank		RPD	
			% 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 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

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.

Certificate of Analysis: Sediment

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 CaCl ₂ 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.

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 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.

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
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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
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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.

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								

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							

Maxxam Job #: B8N5680
Report Date: 2018/09/14

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

Maxxam Job #: B8N5680
Report Date: 2018/09/14

exp Services Inc
Client Project #: OTT-00248813-AO
Site Location: IQALUIT NEW LANDFILL
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 CaCl ₂ 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 Kanapathipplai
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 CaCl ₂ 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 Kanapathipplai
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 CaCl ₂ 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 Job #: B8N5680
Report Date: 2018/09/14

exp Services Inc
Client Project #: OTT-00248813-AO
Site Location: IQALUIT NEW LANDFILL
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 Kanapathippalai
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 CaCl ₂ 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

GENERAL COMMENTS

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

Package 1	5.0°C
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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.

QUALITY ASSURANCE REPORT

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

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD	
			% 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

QUALITY ASSURANCE REPORT(CONT'D)

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

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD	
			% 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)

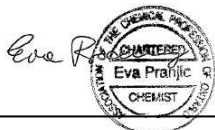
NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference $\leq 2 \times \text{RDL}$).

(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.

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.

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:		Laboratory Use Only:							
Company Name: #17498 exp Services Inc		Company Name: Rob Renaud / LES Misch		Quotation #: B83935		Maxxam Job #: 681097							
Attention: Accounts Payable		Attention: Rob Renaud		P.O. #: OTT-00248813-A0		Bottle Order #: 681097							
Address: 100-2650 Queensview Drive		Address: Robert.Renaud@exp.com		Project: Equalit New Landfill		COC #: 681097-02-01							
Ottawa ON K2B 8H6		Tel: (613) 688-1899 Fax: (613) 225-7337		Project Name: L. Misch		Project Manager: Alisha Williamson							
Tel: (613) 688-1899 Fax: (613) 225-7337		Tel: Robert.Renaud@exp.com Fax: 185		Site #: L. Misch		Alisha Williamson							
Email: accounting.ottawa@exp.com; Karen.Burke@exp.com		Email: Robert.Renaud@exp.com		Sampled By: L. Misch		COC #: 681097-02-01							
MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th>Regulation 153 (2011)</th> <th>Other Regulations</th> <th>Special Instructions</th> </tr> </thead> <tbody> <tr> <td> ☐ Table 1 ☐ Res/Park ☐ Medium/Fine ☐ Table 2 ☐ Ind/Comm ☐ Coarse ☐ Table 3 ☐ Agri/Other ☐ For RSC ☐ Table </td> <td> ☒ CCME ☐ Sanitary Sewer Bylaw ☐ Reg 558 ☐ Storm Sewer Bylaw ☐ MISA ☐ Municipality ☐ PWQO ☒ Other <u>Govt of Nunavut</u> </td> <td></td> </tr> </tbody> </table> Include Criteria on Certificate of Analysis (Y/N)?								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 <u>Govt of Nunavut</u>	
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 <u>Govt of Nunavut</u>												
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 Groundwater Inorganics Package							
						Petroleum Hydro. CCME F1 & BTEX in Water							
						CCME PAHs (Water)							
						Refer to Quote (full package)							
1		SED-3		Sep-7		Sed.							
2		SED-4		Sep-7		Sed.							
3		SED-5		Sep-7		Sed.							
4		SED-6		Sep-7		Sed.							
5		SED-7		Sep-7		Sed.							
6		SED-9		Sep-7		Sed.							
7		SED-10		Sep-7		Sed.							
8													
9													
10													
* RELINQUISHED BY: (Signature/Print)		Date: (YY/MM/DD)		Time		RECEIVED BY: (Signature/Print)							
L. Misch		18/07/08		9:30		Alisha Williamson							
						Date: (YY/MM/DD)							
						Time							
						13:00							
						Date: (YY/MM/DD)							
						Time							
						13:00							
						# Jars used and not submitted							
						Laboratory Use Only							
						Time Sensitive							
						Temperature (°C) on Receipt							
						65.4							
						Custody Seal Present							
						Intact							
						Yes							
						No							
						White: Maxxa Yellow: Client							

* 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.

26720 ACTR

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

Appendix E: Species Lists

Plant Species Observed on Site

#	Common Name	Scientific Name	Status		Comments
			SARA	COSEWIC	
1	Alpine Arnica	<i>Arnica angustifolia</i>	-	-	
2	Alpine Bearberry	<i>Arctostaphylos alpine</i>	-	-	
3	Alpine Bistort	<i>Bistorta vivipara</i>	-	-	
4	Alpine Milkvetch	<i>Astragalus alpinus</i>	-	-	
5	Alpine Sorrel	<i>Oxyria digyna</i>	-	-	
6	Arctic Bell Heather*	<i>Cassiope tetragona</i>	-	-	
7	Arctic Thrift	<i>Armeria maritima subsp. Sibirica</i>	-	-	
8	Arctic Willow*	<i>Salix arctica</i>	-	-	
9	Arctic Wintergreen	<i>Pyrola grandiflora</i>	-	-	
10	Bog Bilberry*	<i>Vaccinium uliginosum</i>	-	-	
11	Cottongrass	<i>Eriophorum spp.</i>	-	-	
12	Crowberry	<i>Empetrum nigrum</i>	-	-	
13	Entireleaf Mountain-Avens	<i>Dryas integrifolia</i>	-	-	
14	Grass	<i>Grass sp</i>	-	-	Species ID could not be determined
15	Lichen	<i>Lichen sp</i>	-	-	Species ID could not be determined
16	Map Lichen	<i>Rhizocarpon geographicum</i>	-	-	
17	Marsh Labrador Tea	<i>Rhododendron tomentosum</i>	-	-	
18	Moss	<i>Moss sp</i>	-	-	
19	Mushroom species	<i>Mushroom sp</i>	-	-	Species ID could not be determined
20	Net-vein Willow*	<i>Salix reticulata</i>	-	-	
21	Red-tipped Lousewort	<i>Pedicularis flammea</i>	-	-	
22	Reindeer Lichen*	<i>Cladonia rangiferina</i>	-	-	
23	Sedge	<i>Carex spp.</i>	-	-	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	<i>Lemmus trimucronatus</i>	-	-	Number of burrows throughout site
2	Fox	<i>Vulpes sp</i>	-	-	Identified scat in east half of site
3	Caribou	<i>Rangifer tarandus</i>	No Status	THR	Skeletol remains throughout site
BIRDS					
1	Savannah Sparrow	<i>Passerculus sandwichensis</i>	-	-	
2	Red-throated Loon	<i>Gavia stellata</i>	-	-	Observed in lake west of site
3	Common Raven	<i>Corvus corax</i>	-	-	
4	Falcon	<i>Falco sp.</i>	-	-	Observed flying overhead on Site
5	American Pipit	<i>Anthus rubescens</i>	-	-	
FISH					
0	No fish recorded		-	-	
INSECTS					
1	American Copper	<i>Lycaena phlaeas</i>	-	-	
2	Forest Bumblebee	<i>Bombus sylvicola</i>	-	-	
3	Wolf Spider	<i>Hogna lenta</i>	-	-	