DILLON CONSULTING

PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

Closure Report

Cambridge Bay Airport Fire Training Area, Victoria Island, NU
PWGSC Project No. R.056019.005

January 2016 – FINAL – 15-2356

Executive Summary

Dillon Consulting Limited (Dillon) was retained by Public Works and Government Services Canada (PWGSC) to monitor fire training area (FTA) remediation activities at the Cambridge Bay Airport on Victoria Island, Nunavut.

The objectives of the remediation program at the Cambridge Bay airport FTA were to construct a Land Treatment Unit (LTU) on airport land, and excavate and transport hydrocarbon-impacted material from the FTA to the constructed LTU.

The work program took place over two years, 2014 and 2015. On-site activities took place from July 29 to October 4, 2014 and July 14 to September 2, 2015

Concurrently with the 2015 remediation activities, several soil and groundwater samples were collected and analyzed for perfluorinated compounds (PFCs) including, specifically, perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA) to characterize current site conditions with regard to the previously identified contaminants of potential concern associated with the FTA and develop an understanding of potential fate and transport considerations to support future assessment of environmental risks as warranted.

In 2014, the saturated soil conditions in the LTU area resulted in a design decision to lay down a ballast layer or base layer of larger sized aggregate material to serve as support for the LTU. A 0.3 m (approximately) thick layer of base material was laid on the native ground surface to provide a supportive base. In heavy traffic areas, the base layer was increased to a thickness up to approximately 0.6 m for support. In total, approximately 9350 m^3 of base layer and crushed aggregate was used to provide the additional support for LTU construction.

An additional design change was made which utilized the natural topography of the area for construction of the LTU. The near center of the LTU footprint was determined from the topographic survey to be the highest point. Two slopes from this high point were constructed for collection of water in two sumps versus the original design of one slope across the entire length of the LTU with one sump for water collection. In 2014, only one sump was installed in the north western corner of the LTU.

Numerous crushed drums and metal cylinders were uncovered along the south side of the LTU footprint. The discovery triggered an investigation to evaluate the extent of the buried drum cache. The drum cache investigation analytical results indicated hydrocarbon impacted soils were present surrounding the drum cache. A remediation program was conducted to remove the drums and metal cylinders and associated impacted soil. Water that accumulated in the excavation was also removed, treated and disposed (approximately 1,250 L). The excavation

included the removal of approximately 20 tonnes of metal drums and cylinders and 560 m^3 of impacted soil. The impacted soil was placed in the LTU constructed in 2013 for airport apron impacted soils. Based on the laboratory results of the confirmatory soil samples in the excavation, the soil from the drum cache area was excavated to an extent where remaining soils did not exhibit contaminants of concern above the selected soil remediation standards, with the exception of one south wall sample (exceeding Fraction 1 criteria).

The LTU was substantially constructed in 2014 but required additional demarcation material and the installation of a second sump. In addition, the hydrocarbon-impacted soils of the FTA were not remediated. Site work was put on hold due to the onset of winter weather conditions.

Site work resumed in 2015 and included finishing the construction of the FTA LTU and excavating and transporting PHC-impacted soil from the FTA to the constructed LTU including backfilling of the FTA. Site work began with dewatering of the LTU to remove water from the existing demarcation material and prepare for final demarcation material placement. In total, approximately 750 m^3 of water that had accumulated in the FTA as a result of precipitation was pumped and discharged locally to ground surface to allow for infiltration into the ground surface.

In 2015, 2,332.5 m^3 of demarcation material was placed and compacted for a total of 4,746.5 m^3 of demarcation material in the LTU (2,414 m^3 of demarcation was placed in 2014). The LTU was built to measure approximately 67 m by 240 m.

The FTA excavation was initiated on August 14 and continued to August 20, 2015. The vertical extent of the excavation extended to permafrost levels which ranged from approximately 1.7 to 2 mbgs. Confirmatory soil samples were collected from the walls and floor of the excavated footprint for analysis of benzene, toluene, ethylbenzene, and xylenes (BTEX), PHCs Fraction 1 through 4 (F1 – F4) and lead (in four soil samples). Based on the laboratory results of the confirmatory soil samples, the excavation extended to concentrations of PHC constituents of concern at or below the soil remediation criteria.

In total, approximately 4,262 m^3 of impacted soil was removed from the FTA excavation and hauled to the constructed LTU for treatment. In addition, 11 monitoring wells were installed surrounding the FTA and LTU. The objectives of the work program were achieved over two years, 2014 and 2015.

Review of the laboratory results of the PFCs samples indicated two groundwater samples and two soil samples exhibited concentrations that exceed criteria for the protection of freshwater aquatic receptors. These results suggest that PFOS migration through soils and seasonal groundwater may have been facilitated by the presence of PHCs. The FTA remedial activities removed both PHC and PFC-impacted soils from the FTA thus reducing potential risks to downgradient receptors.

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1.0 INTRODUCTION

Dillon Consulting Limited (Dillon) was retained by Public Works and Government Services Canada (PWGSC) to monitor fire training area (FTA) remediation activities at the Cambridge Bay Airport on Victoria Island, Nunavut. See **Figure 1** (attached) for a site location map. The scope of work performed was in accordance with PWGSC North As and When Standing Offer EW699-121587-004.

The objectives of the remediation program at the Cambridge Bay airport FTA were to construct a Land Treatment Unit (LTU) on airport land, and excavate and transport hydrocarbon-impacted material from the FTA to the constructed LTU.

The remediation program was intended to be completed in the 2014 field season. However, due to soft soil conditions and unexpected buried drums within the LTU footprint, the remediation program could not be completed. The remediation program was completed during the 2015 field season which involved the completion of the LTU, excavation of impacted soil from the FTA with placement in the LTU, and monitoring well installations.

This report summarizes the work completed at the site from July 29 to October 4, 2014 and July 14 to September 2, 2015 and includes a site description, summary of previous investigations, identification of soil remediation criteria, summary of site activities, discussion of the sampling results, and a discussion of quality assurance / quality control (QA / QC).

Concurrently with the above remediation activities, several soil and groundwater samples were collected and analyzed for perfluorinated compounds (PFCs) including, specifically, perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA) to characterize current site conditions with regard to the previously identified contaminants of potential concern associated with the FTA and develop an understanding of potential fate and transport considerations to support future assessment of environmental risks as warranted. Results and discussion are included herein.

1.1 Site Description and History

The Cambridge Bay Airport is located on the southeast side of Victoria Island approximately 3 km west of the Hamlet of Cambridge Bay, Nunavut (**Figure 1**, attached).

The Cambridge Bay Airport is owned by the Government of Nunavut. The airport covers an area of approximately 140 hectares. The site has been used as an airport since the 1950s. Operations on-site include air transportation and an air terminal building, airline offices, airport manager office, fuel storage and distribution, aircraft, and vehicle maintenance.

The FTA (i.e., the "site"), as presented on **Figure 2** (attached)**,** is located southwest of the northwest end of the runway. Fuel storage was historically provided by an aboveground storage tank (AST) farm and pipe system formerly located west of the fire training area.

The following excerpt from AECOM's 2011 Phase III Environmental Site Investigation report describes both the property transfer and remediation of the site in the mid-1990s:

> The FTA was in use for a brief period after the transfer of the Cambridge Bay Airport from Transport Canada to the Government of Northwest Territories (and later transferred to the Government of Nunavut). Transport Canada returned to the site and removed the AST and the associated piping, then tilled the area to aerate the soil. Tilling was reported to have been completed on two or three occasions from 1994 to 1996.

In 2014 and 2015, Dillon observed the FTA to be vacant with an area approximately 50 m by 50 m in size. The FTA was defined with noticeable till marks. Three monitoring wells (PVC casings) were observed to be protruding aboveground in this area.

Current and future land use at the airport is considered to be commercial.

Dillon prepared a report summarizing the 2014 Cambridge Bay airport work program titled ***Site Activities Report, Cambridge Bay Airport Fire Training Area, Victoria Island, NU****, March 2015 Final Report*. This report is summarized as follows:

- Due to the saturated condition of the soils in the LTU area and the area limitation to build the LTU, a design decision was made to lay down a ballast layer or base layer of larger sized aggregate material to serve as support for the LTU. A 0.3 m (approximately) thick layer of base material was laid on the native ground surface to provide a supportive base. In heavy traffic areas, the base layer was increased to a thickness up to approximately 0.6 m for support. Approximately, 9350 m^3 of base layer and crushed aggregate was used to provide the additional support for LTU construction.
- An additional design change was made which utilized the natural topography of the area for construction of the LTU. The near center of the LTU footprint was determined from the topographic survey to be the highest point. Two slopes from this high point were constructed for collection of water in two sumps versus the original design of one slope across the entire length of the LTU with one sump for water collection. In 2014, only one sump was installed in the north western corner of the LTU.
- Numerous crushed drums and metal cylinders were uncovered along the south side of the LTU footprint. The discovery triggered an investigation to evaluate the extent of the buried drum cache. The drum cache investigation analytical results indicated hydrocarbon impacted soils were present surrounding the drum cache. A remediation program was conducted to remove the drums and metal cylinders and associated

impacted soil. Water that accumulated in the excavation was also removed, treated and disposed (approximately 1250 L). The excavation included the removal of approximately 20 tonnes of metal drums and cylinders and 560 m^3 of impacted soil. The impacted soil was placed in the LTU constructed in 2013 for airport apron impacted soils.

- Based on the laboratory results of the confirmatory soil samples in the excavation, the soil from the drum cache area was excavated to an extent where remaining soils did not exhibit contaminants of concern above the selected soil remediation standards, with the exception of one south wall sample (exceeding Fraction 1 criteria).

The LTU was substantially constructed in 2014 but required additional demarcation material and the installation of a second sump. In addition, the hydrocarbon-impacted soils of the FTA were not remediated. Site work was put on hold due to the onset of winter weather conditions.

The objectives of the 2015 activities, as documented herein, were two-fold:

1. Complete and document the remediation of the FTA including the completion of the construction of the LTU, excavation and transport (to the LTU) of petroleum hydrocarbon (PHC) impacted soil from the FTA, and backfill of the FTA excavation; and,
2. Characterize PFC impacts in soil and groundwater and develop an understanding of potential fate and transport considerations to support future assessment of environmental risks and to support updating of the National Contaminated Site Classification (NCSCS) worksheet, as per Federal Contaminated Sites Action Plan (FCSAP) Stage 4.

1.2 Previous Investigations

Dillon completed a review of the following available reports to gain information regarding impacts in the FTA:

- Franz Environmental Inc. March 2010. Phase II/III Environmental Site Assessment, Cambridge Bay Airport, Cambridge Bay, Nunavut;
- Franz Environmental Inc. March 2010. Human Health and Ecological Risk Assessment, Cambridge Bay Airport, Cambridge Bay, Nunavut;
- AECOM. March 2011. Phase II/III Environmental Site Investigation, Firefighter Training Area, Cambridge Bay Airport, Cambridge Bay, Nunavut. Prepared for Public Works and Government Services Canada; and,
- Dillon Consulting Limited, March 2014. Data Gap Assessment.

The following is a summary of relevant findings and assessment approaches from the above noted previous site investigations.

Franz Environmental, Phase II/III Environmental Site Assessment, Cambridge Bay Airport, Cambridge Bay, NU, 2010

In 2009, PWGSC contracted Franz to conduct a Phase II/III Environmental Site Assessment (ESA) to further characterize the extent, types and levels of contamination at the Cambridge Bay Airport. Based on the use of the FTA and historical investigation findings, the following potential sources of potential contamination were identified:

- Fuels (e.g., avgas, jet fuel);
- Spent solvents, oils; and,
- Fire-fighting retardants.

No surficial soil staining was observed during the 2009 site investigation. Six test pits were excavated and three were installed as monitoring wells. Hydrocarbon odour and staining were encountered in several test pits, and hydrocarbon sheen was observed in ponded water within the FTA. Measured soil concentrations of (PHC Fraction 2, benzene and ethylbenzene were above applicable CCME guidelines in four test pit locations. The depth of soil impacts was observed to be 0 to 2 metres below ground surface (mbgs).

Lead, benzene, and naphthalene were identified as contaminants of concern (COCs) in groundwater. The extent of contamination was not delineated.

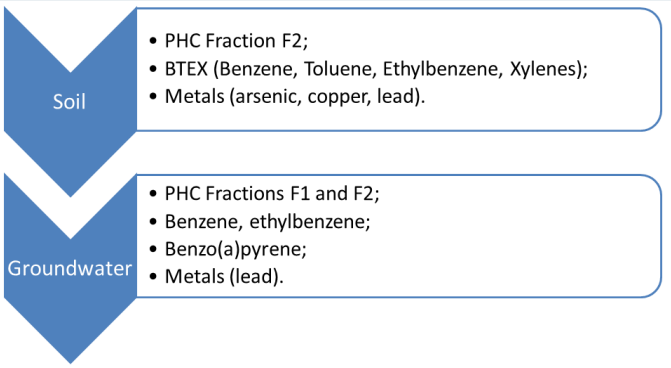
The Phase II/III ESA recommended further assessment of the FTA to determine the extent of contamination. The FTA was identified as an Area of Environmental Concern (AEC).

During their historical record review, Franz reported that tilling of the FTA to aerate the soil was completed by Transport Canada between 1995 and 1996 after it was taken out of use (AGRA, 1999, as cited in Franz, 2010).

Franz Environmental, Human Health and Ecological Risk Assessment, Cambridge Bay Airport, Cambridge Bay, Nunavut, 2010

Franz Environmental Inc. (Franz) was retained by PWGSC on behalf of Transport Canada to complete a risk assessment for the Cambridge Bay Airport. The risk assessment report consists of a preliminary human health and qualitative ecological risk assessment. The scope of work undertaken was to assess whether environmental conditions presented a potential risk to human and ecological receptors.

The human health risk assessment was conducted in accordance with Health Canada PQRA (Preliminary Qualitative Guidance Documents). Chemicals of potential concern (COPC) were screened by comparing maximum concentrations of contaminants in media with federal CCME guidelines and standards. Identified COPC in environmental media on-site for the human health risk assessment were:



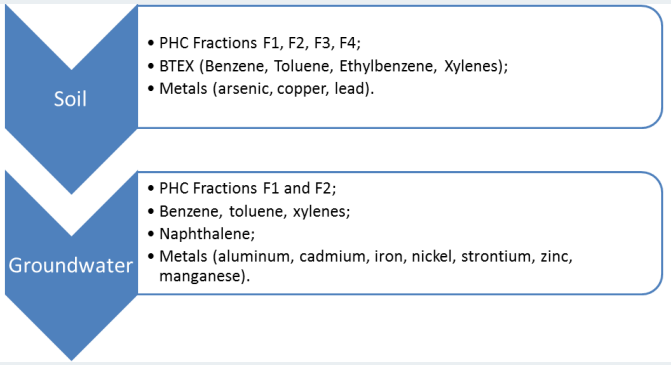
Two human receptors were identified as adult employees involved with operational and maintenance activities on-site and remedial workers involved in remediation.

Three exposure pathways were identified:

- Incidental ingestion of soil particles and inhalation of soil particles (fugitive dust and vapours);
- Dermal contact with soil; and,
- Dermal contact with groundwater.

The human health risk assessment concluded that potential oral / dermal exposure to PHCs in soil posed unacceptable risks to the remediation worker. Recommendations included the adherence to a site specific health and safety plan that managed potential oral / dermal exposure to PHCs and benzene in soils and groundwater during remedial activities.

Franz conducted a qualitative evaluation of COPCs, receptors and relevant exposure pathways to develop an Ecological Conceptual Site Model for both the "foreshore" and "terrestrial" sub-sites, and to support an ecological risk assessment of the property as a whole. Identified COPC in environmental media on-site for the ecological risk assessment consisted of:



Although PFOS was considered as a COPC during the Phase II/III ESA sampling plan, no human health risk assessment (HHRA) work or ecological risk assessment (ERA) screening work was conducted to evaluate exposure pathways and existing PFOS concentrations in soils and groundwater (likely due to insufficient data).

The ERA considered species known or likely to be on or in the immediate vicinity of the sites. Routes of environmental exposure pathways for ecological receptors identified at the sites include:

- Leaching of subsurface contamination into groundwater and transport into surface waters in the site vicinity, followed by trans-dermal uptake by aquatic species (higher and lower trophic levels) through contact with surface water and sediments;
- Ingestion of contaminated surface waters (terrestrial and aquatic);
- Ingestion of contaminated food items (aquatic and terrestrial) as well as ingestion of contaminated soil (terrestrial) or sediment (aquatic);
- Inhalation of volatile soil contaminants (terrestrial); and,
- Direct dermal contact with contaminated soil (terrestrial).

There were seven preliminary ERA conclusions. The conclusions relating to the "foreshore" sub-site, which contains both the FTA and the Transport Canada Shoreline Disposal Area were:

- PHC Fraction 2 and lead in soil represent medium risk to terrestrial plants at the "foreshore" sub-site through dermal contact and to soil invertebrates via contaminated soil ingestion;
- Volatile COPC in soil represent low risk to burrowing terrestrial receptors (e.g., small burrowing mammals) exposed via inhalation of soil vapours at the "terrestrial" or "foreshore" sub-sites;
- Estimated COPC concentrations in receiving marine water at the "foreshore" sub-site indicate PHCs Fraction 1, Fraction 2, aluminum, nickel, iron, cadmium, and toluene from discharging groundwater may represent medium risks to aquatic invertebrates exposed via dermal contact and ingestion of contaminated water;
- Estimated PHC Fraction 1 and Fraction 2 concentrations in surface water may represent a medium risk to fish exposed via ingestion of contaminated food / water; and,
- Estimated concentration in receiving marine water at the "foreshore" sub-site indicate xylene, aluminum, and naphthalene from discharging groundwater may represent medium risks to piscivorous shorebirds exposed via ingestion of contaminated marine water and food items such as fish.

The recommendations from the ERA were to refine the human health and ecological exposure scenarios to better reflect actual patterns of exposure for on-site receptors, refine the statistical database / input parameters to determine the most appropriate statistic values (e.g., 95% upper confidence limits) for contaminant concentrations and to conduct an ERA in which site-specific modelling of ecological receptors exposure to contaminants is applied to quantitatively assess risks to ecological receptors. Recommendations for a site-specific ERA would require further site investigations.

AECOM, Phase II/III Environmental Site Investigation, Firefighter Training Area, Cambridge Bay Airport, Cambridge Bay, NU, 2011

In October 2010, AECOM conducted a field investigation for a Phase II/III ESA at the Cambridge Bay Airport FTA to further characterize the extent, types and levels of contamination and chemicals of concern. Soil samples were collected from eight test pits excavated by a backhoe. Groundwater investigations were not pursued during the site visit, as site conditions precluded the collection of groundwater samples.

Contaminants of Concern identified in the AECOM Phase II/III ESA were:

- Benzene;
- Ethylbenzene; and,
- PHC Fraction 2.

Soil sample results were below applicable guidelines, with the exception of one sample (CB-17) for PHC Fraction 2, from test pit TP10-05 at a depth of 2 m (at permafrost level). Overlying soil samples were below applicable guidelines.

Soil samples were collected for PFOS from the surface of each test pit, with the exception of test pit TP10-03, where the sample was collected at 1.2 mbgs. PFOS concentrations were detected in surface soils in concentrations ranging from <25 µg/kg (below laboratory analytical detection limits) to 730 µg/kg.

AECOM used both the samples collected by Franz in 2009 and the results of the 2010 AECOM sampling program to estimate the extent of soil contamination at the FTA. AECOM estimated a PHC-impacted soil volume of 6624 m^3 over an area of 3312 m^2, to a depth of 2 mbgs.

Dillon, Data Gap Assessment Relative to Perluorinated Compounds, Firefighter Training Area, Cambridge Bay Airport, Cambridge Bay, NU, 2015

In August 2014, Dillon conducted a Data Gap Assessment at the Cambridge Bay FTA to characterize PFCs in soil at the site. Dillon reviewed the above-mentioned reports, and conducted a soil-sampling field program to identify potential PFC impacts in soil.

Measured concentrations of PFOS in soil were observed to be below the referenced soil criteria available at the time of the investigation. Comparison of the 2014 soil results with current soil criteria, available as of October 2015, reveals that 2014 PFOS concentrations were in excess of 2015 soil criteria of 130 ug/kg with 180 ug/kg at TP14-8 at 1.32 mbgs located south of the south access road. Sampling within and around the FTA confirmed that soil impacts were limited to the FTA, as background PFCs in soil concentrations were observed to be below laboratory reportable detection limits. Impacts were observed to be consistent with the past release of contaminants during firefighting activities in FTA burn areas.

In prior site investigations, elevated PHC concentrations in soil were noted at depth and in active-layer groundwater – suggesting (based on the understanding that PFCs and PHCs co-mingle) that PFC would likely migrate vertically at this site. PFCs were noted in greater concentrations at depth than in some surface sampling areas. The 2014 field results suggested that downwards vertical migration of PFCs in soil has occurred.

Lateral distribution of PFC impacts in soil were observed to be compatible with site history and observed PHC impacts in soil. PHC impacts in soil were attenuated at depths less than 2 mbgs through tilling / aeration practices. PFC impacts were likely 'mixed', diluted, and were not attenuated.

From the desk top review and field results, four data gaps were identified:

- Confirmation of PFOS concentrations at soil locations with historical elevated PHC concentrations is required to confirm downward vertical migration of PFOS in soil and that PFOS migration pathways follow and/or are similar to PHC pathways;
- No groundwater concentration data for PFOS. The identification and quantification of PFOS concentrations in this media is important to understanding exposure risk to potential ecological and aquatic receptors;
- Lateral extent of PFOS in surface soils may not have been delineated, as risk associated with wide-spread, low-level impacts associated with PFOS in narrow food chains (such as in the Canadian Arctic) are not known. Given run-off potential and soil migration during spring freshet, this poses a potential exposure pathway to down gradient, sensitive aquatic receptors (approximately 100 m to the West Arm of Cambridge Bay); and,
- Risks associated with PFOS (and other PFCs) on the local Arctic ecosystem have not been assessed. Aboriginal Affairs and Northern Development Canada (AANDC) have identified PFOS as a persistent organic pollutant. Government of Canada scientists found that current levels of exposure for PFOS are below levels that would harm human health, but that some wildlife such as polar bears and fish-eating bird species could be at or near levels that could cause harmful effects (INAC, 2010).From the data gaps identified above, Dillon had the following recommendations:

- PFCs in groundwater should be measured and delineated. It is recommended that groundwater samples be taken from the existing monitoring well network for both PFOS and PHCs prior to initiating remedial activities, to identify and establish whether the groundwater is a viable exposure pathway that requires further investigation;
- Some groundwater testing should be performed that would enable order of magnitude estimates for contaminant migration;
- Following confirmation of PFCs in groundwater, potential impacts of PFC concentrations in groundwater on the surrounding receptors should be evaluated; (e.g., the potential for migration to reach the West Arm of Cambridge Bay);
- PFCs in soil should be measured in locations where downwards vertical migration of PHCs has been observed. Sampling should be done prior to remedial activities to evaluate the potential for this pathway for PFOS;
- The above data should be collected in such a manner to support site-specific HHRA and ERA evaluations;
- An evaluation of the available toxicity data that could be used for risk assessment work for PFCs (specifically PFOS); and,
- Update NCSCS scores based on findings.

A preliminary conceptual site exposure model was formulated for the site, linking the relevant contaminant transport mechanisms, and potential human and ecological receptors at the site. More detailed risk assessment work would need to be completed to quantitatively assess whether an unacceptable risk is present under current conditions.

TABLE 1: POTENTIAL SOURCES AND EXPOSURE PATHWAYS FOR PFOS AT FTA

Potential Sources	Identified Exposure Pathways	Potential Risk Associated with Pathway
PFOS in Surface Soils (< 1.5 mbgs)	• Lateral migration of soil particles through spring freshet; • Lateral migration through leaching and runoff; • Dermal contact; • Ingestion	• Medium (ECO); • Medium (ECO); • Low to None (HH); • Low to None (HH).
PFOS in Subsoils (> 1.5 mbgs)	• Downwards migration through leaching; • Lateral migration through groundwater	• High (ECO); • Medium (ECO).

ECO denotes ecological exposure pathway
HH denotes human health exposure pathway

2.0 SOIL REMEDIATION CRITERIA

For the work described subsequently (i.e., **Section 3.0** site activities), soil remediation standards were identified as a means to evaluate the effectiveness and extent of the remedial approach.

The following site conditions were considered in identifying the remediation standards:

- The site is zoned commercial;
- Benzene criteria based on an assumed at a 10^{-5} incremental cancer risk;
- Groundwater at the site is not used for drinking water;
- Soil sieve analysis indicated that the FTA soil is coarse-grained; and,
- Ecological soil contact is the most conservative and applicable pathway.

Analytical results from confirmatory soil samples collected as part of the FTA remediation program were compared to the Canadian Council of Ministers of the Environment (CCME) Canadian Soil Quality Guidelines for the Protection of Environmental Health for commercial land use given that the current and future use of the property is commercial. PHC fraction analytical results were compared to the Canada-Wide Standard for PHC in soil for coarse-grained soils.

Analytical results for the PFCs samples were compared to the October 2015 Interim Federal Guidelines for soil and groundwater using the commercial land use and freshwater life protection pathways. Also, referenced for soil results comparison is the FCSAP Interim Advice to Federal Departments for the Management of Federal Contaminated Sites Containing PFOS dated October 2015.

The selected criteria are summarized in the tables attached as **Appendix C**.

3.0 SITE ACTIVITIES

The main project components in 2014 and 2015 were:

- The construction of the FTA LTU which was substantially constructed in 2014 but required additional demarcation material and the installation of a second sump in 2015;
- Excavation and transportation of PHC-impacted soil from the FTA to the constructed LTU including backfilling of the FTA; and,
- Installation of 11 monitoring wells surrounding the FTA and LTU.

PWGSC retained Uplogiaq Inc. as the contractor responsible for 2014 and 2015 construction of the LTU and the excavation and transport of PHC-impacted soil. The 2014 program occurred July 29 to October 4, 2014. The 2015 program was initiated on July 14 and ended on September 2, 2015. Dillon personnel were present throughout the course of the work program. Photos of the work activities are attached in **Appendix B**.

A site plan illustrating the airport and FTA location is included as **Figure 2** (attached).

3.1 2014 Site Activities

In 2014, the saturated soil conditions in the LTU area resulted in a design decision to lay down a ballast layer or base layer of larger sized aggregate material to serve as support for the LTU. A 0.3 m (approximately) thick layer of base material was laid on the native ground surface to provide a supportive base. In heavy traffic areas, the base layer was increased to a thickness up to approximately 0.6 m for support. In total, approximately 9350 m^3 of base layer and crushed aggregate was used to provide the additional support for LTU construction.

An additional design change was made which utilized the natural topography of the area for construction of the LTU. The near center of the LTU footprint was determined from the topographic survey to be the highest point. Two slopes from this high point were constructed for collection of water in two sumps versus the original design of one slope across the entire length of the LTU with one sump for water collection. In 2014, only one sump was installed in the north western corner of the LTU.

Numerous crushed drums and metal cylinders were uncovered along the south side of the LTU footprint. The discovery triggered an investigation to evaluate the extent of the buried drum cache. The drum cache investigation analytical results indicated hydrocarbon impacted soils were present surrounding the drum cache. A remediation program was conducted to remove the drums and metal cylinders and associated impacted soil. Water that accumulated in the excavation was also removed, treated and disposed (approximately 1,250 L). The excavation

included the removal of approximately 20 tonnes of metal drums and cylinders and 560 m^3 of impacted soil. The impacted soil was placed in the LTU constructed in 2013 for airport apron impacted soils. Based on the laboratory results of the confirmatory soil samples in the excavation, the soil from the drum cache area was excavated to an extent where remaining soils did not exhibit contaminants of concern above the selected soil remediation standards, with the exception of one south wall sample (exceeding Fraction 1 criteria).

The LTU was substantially constructed in 2014 but required additional demarcation material and the installation of a second sump. In addition, the hydrocarbon-impacted soils of the FTA were not remediated. Site work was put on hold due to the onset of winter weather conditions. The 2014 activities are discussed in further detail in the Dillon report titled ***Site Activities Report, Cambridge Bay Airport Fire Training Area, Victoria Island, NU****, March 2015 Final Report*. The 2015 site activities are discussed in the following sections.

3.2 Start-Up Meeting

On July 14, 2015, a start-up meeting was held with stakeholders (i.e., PWGSC, Transport Canada, Government of Nunavut, contractor (Uplogiaq Inc.) and Dillon) to review the work tasks, airport protocols, safety requirements, and site conditions.

3.3 2015 Completion of Land Treatment Unit Construction

Dewatering of the LTU began on July 23, 2015 to remove water from the existing demarcation material and prepare for final demarcation material placement. Notification of discharging activities to the Nunavut Water Board was not required, as no impacted soil was stored in the LTU from 2014 activities. Therefore, there was no potential contamination of standing water in the LTU. In total, approximately 750 m^3 of water that had accumulated in the FTA as a result of precipitation directly within the lined LTU (i.e., not from surface water runoff or groundwater intrusion) was pumped and discharged locally to ground surface to allow for infiltration into the ground surface. The dewatering activities were completed on August 4, 2015. On August 5, 2015, the remaining demarcation material began to be placed in the LTU. The demarcation layer consisted of clean local crushed pit run material (20 mm minus) from a local quarry placed to a depth of 0.25 m across the surface of the LTU. From August 5 to August 14, 2015, 2,332.5 m^3 was placed and compacted for a total of 4,746.5 m^3 of demarcation material in the LTU (2,414 m^3 of demarcation was placed in 2014). The LTU was built to measure approximately 67 m by 240 m. As-built drawings of the LTU and demarcation layer are attached in **Appendix A**.

The second and final sump was installed in the southeast corner of the LTU on August 8, 2015.

3.4 Fire Training Area Remediation

The FTA excavation was initiated on August 14 and continued to August 20, 2015. The excavation limits and sampling locations are shown in **Figure 2**, attached. The vertical extent of the excavation extended to permafrost levels which ranged from approximately 1.7 to 2 mbgs. The excavation began at the northwest corner and continued along the west extent then the northeast extent and southward. The southeastern extent was excavated last. Further excavation on the west wall occurred on August 20, 2015 in an effort to remediate impacts found in soil sample, West Wall SA5 (1 m). Approximately 36 m^3 of additional soil was removed from the west wall. Confirmatory soil samples were collected from the walls and floor of the excavated footprint (**Figure 2**, attached) and send to Maxxam Analytics (Maxxam) in Calgary, Alberta for analysis of benzene, toluene, ethylbenzene, and xylenes (BTEX), PHCs Fraction 1 through 4 (F1 – F4) and lead (in four soil samples). The summary analytical results tables are presented in **Appendix C** (attached) along with the selected soil criteria. A total of 39 soil samples were submitted to Maxxam for BTEX and PHC Fracture 1 to 4 analyses. Full laboratory reports are attached to this report in **Appendix D**.

A total of 4,262 m^3 of impacted soil was removed from the FTA excavation and hauled to the LTU for treatment. The soil was placed in the LTU to a maximum depth of 0.5 m. Backfilling of the excavation began on August 20 and was completed on August 28, 2015. Backfilling was completed in 300 mm lifts and rolled / tracked with equipment prior to placement of the next lift (no compaction tests completed). A total of approximately 5,125 m^3 of pit run backfill was placed in the excavation and backfilled to 300 mm above pre-excavated conditions to allow for future settlement and to create drainage. The contractor had the backfill analysed at a laboratory for PHCs, and Dillon reviewed the results to confirm that the backfill material was a 'clean' source. No dewatering of the excavation was required.

3.5 Monitoring Wells

Eight monitoring wells were installed around the FTA and three monitoring wells were installed surrounding the LTU totalling 11 monitoring wells. The wells were installed on August 19, 29 and August 30, 2015 and are shown in **Figure 3** (attached) and the as-built drawings attached as **Appendix A**. The monitoring wells have silica sand pre-packed over the screened section. The wells were installed above grade with steel protective casings. The wells were installed in test pits to the depth of permafrost at approximately 2 mbgs.

3.6 Walkthrough Inspection

A walkthrough inspection of the site was completed with the airport manager on September 2, 2015. The items discussed included the grading and drainage surrounding the LTU, aesthetic observations, and site cleanup requirements.

3.7 PFC Characterization

In 2015, six soil samples were collected and analysed for PFCs, including PFOS and PFOA. Four of the six soil samples were additionally analysed for pH, salinity, and fraction of organic carbon in conjunction with BTEX/Fraction 1 to 4 analyses. In addition, three groundwater samples were collected and analysed for PFCs from monitoring wells located within the FTA prior to the excavation. These results are discussed in the next section. The summary analytical results tables are presented in **Appendix C** (attached) along with the selected soil criteria. **Figure 4**, attached, also shows the results of the PFC analyses. Full laboratory reports are attached to this report in **Appendix D**.

4.0 SAMPLING RESULTS AND DISCUSSION

4.1 PHC Soil Remediation Results

Review of the analytical results from the confirmatory soil samples, as presented in **Appendix C**, indicates the following:

- No lead concentrations were detected above the soil remediation standards;
- No BTEX were detected above the soil remediation standards;
- PHC Fractions 1 and 3 were detected in one soil sample (FTA West Wall SA5 at 1 m) at concentrations greater than the soil remediation standard. This soil was removed through remedial excavation and the confirmatory soil sample, FTA West Wall SA27, had concentrations below the applicable criteria; and,
- Upon completing remedial activities, no PHCs were detected above the soil remediation standards in the confirmatory soil samples.

Based on the laboratory results of the confirmatory soil samples, impacted soil from the former FTA has been excavated to an extent where remaining soils do not exhibit PHC concentrations above the selected remediation standards.

4.2 PFC Characterization Results

Historical use of aqueous film-forming foam (AFFF) at the Former FTA resulted in the release of PFCs to the environment. At this time, guidelines for the protection of environmental and human health in soil and groundwater have been developed for only one of the many PFCs found in AFFF (i.e., PFOS). It is known that there is some potential ecological risks associated with the other compounds, and these potential risks; however, remain unquantified. Some guidelines for the protection of human health have been developed, which suggests that further risks may be identified for other PFCs. Drinking water guidelines, for example, have been developed by Health Canada for several PFCs including PFOS, PFOA, Perfluorobutanesulfonic acid (PFBS), and Perfluorobutanoic acid (PFBA). Despite the lack of guidelines, review of the distribution patterns of PFCs may help evaluate fate and transport mechanisms for the site, as factors that affect fate and transport mechanisms for PFCs are often site-specific. Site-specific factors at Cambridge Bay include hydrogeological and geochemical factors, but also the presence of permafrost, which will likely limit downward migration of PFCs. Identifying the extent to which certain PFCs are mobile and by what pathway helps us to understand these behaviours. This understanding in turn helps us to better qualify identified potential risks in an updated site score using NCSCS.

Soil and groundwater concentrations for measured perfluorinated compounds are shown below on **Chart 4-1**and **Chart 4-2** shown below, respectively**.** The overall height of each column represents the cumulative total concentration (i.e., contaminant mass) from each measured perfluorinated compound (e.g., PFOS, PFOA) in a sample. For example, **Chart** 4-1 shows that the overall mass of PFCs are greatest at 3-09-4M (1 mbgs), as evidenced by the greatest overall cumulative concentration (greatest height). Each colour within a column represents a different PFC. It is preferable to see a lower cumulative quantity moving away from the 'source area' – this would suggest the degree of mobility of these compounds in native soils and groundwater.

Comparison of soil to groundwater cumulative concentrations as represented by the chart columns helps to identify which particular PFC are 'sorbing' to site soils and which are more mobile in groundwater. Those compounds that are identified to be more mobile in groundwater are likely to present a greater potential risk associated with mobilization via groundwater pathways. Minimal change in overall composition between soil and water in a single location suggests that partitioning effects dominate, as there are limited sorption sites on soil particles available to the compounds.

The composition in soil is exaggerated in **Chart 4-3**, which depicts the composition of perfluorinated compounds by percentage observed in the sample (to a total of 100% being equivalent to the sample concentration for that particular sample).

Results depicted on **Chart 4-1** and **Chart 4-2** show that although cumulative concentrations decrease with distance from the center of the FTA, the PFOS component is more mobile, as it is observed in greater proportions towards the southeastern edge of the FTA, suggesting that it is being mobilized in seasonal groundwater. This effect is more easily observed and exaggerated in **Chart 4-3,** which converts the measured concentrations to percentage observed (of the overall PFCs measured). The overall mass of PFOS, although initially lower, would increase with distance, as it preferentially moves and sorbs to surfaces.

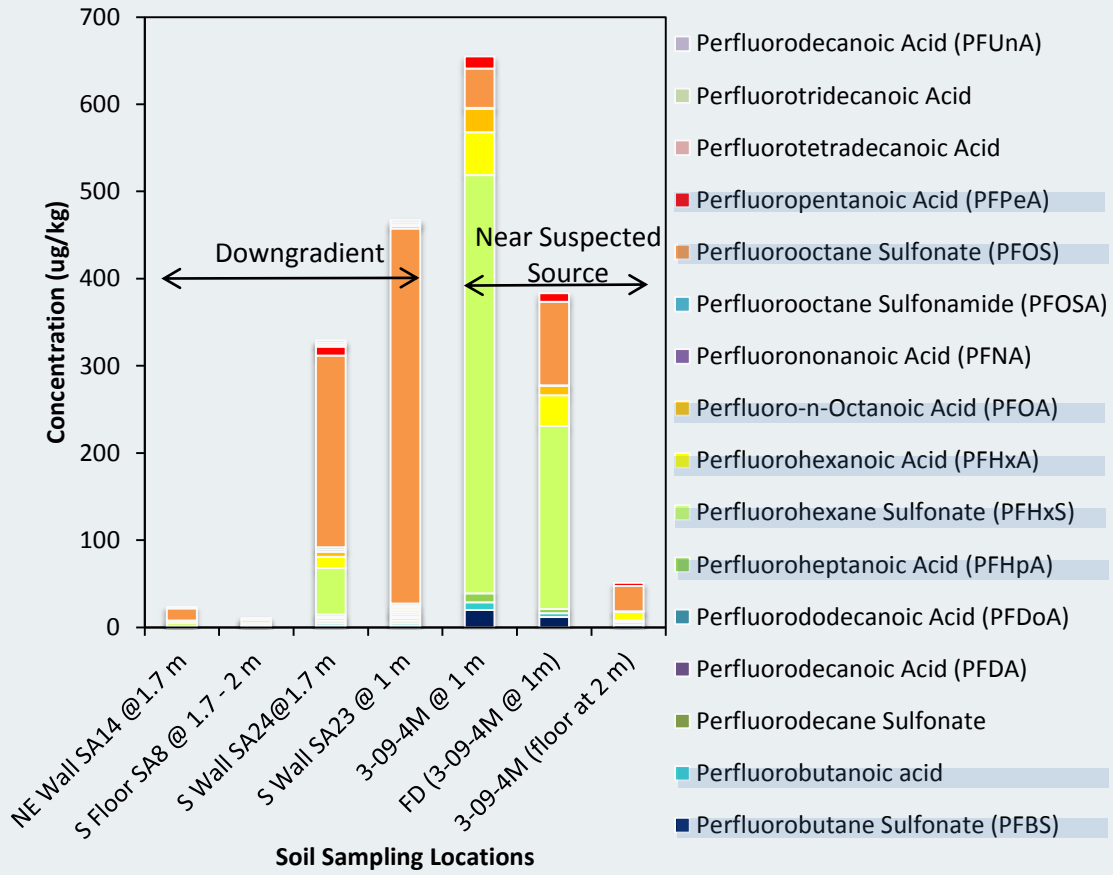


CHART 4-1: COMPOSITION OF PERFLUORINATED COMPOUNDS IN SOIL

****CHEMICAL NAMES WITH SHADING INDICATE COMPOUNDS THAT WERE DETECTED ABOVE LABORATORY REPORTABLE DETECTION LIMITS.**

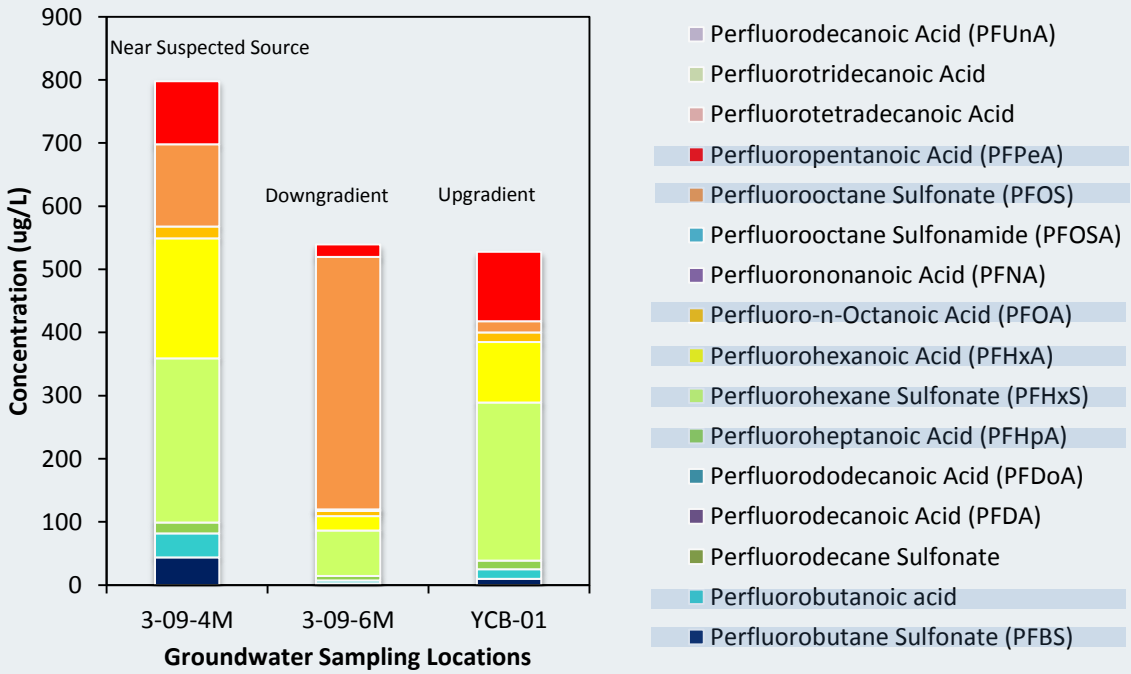


CHART 4-2: COMPOSITION OF PERFLUORINATED COMPOUNDS IN GROUNDWATER

****CHEMICAL NAMES WITH SHADING INDICATE COMPOUNDS THAT WERE DETECTED ABOVE LABORATORY REPORTABLE DETECTION LIMITS.**

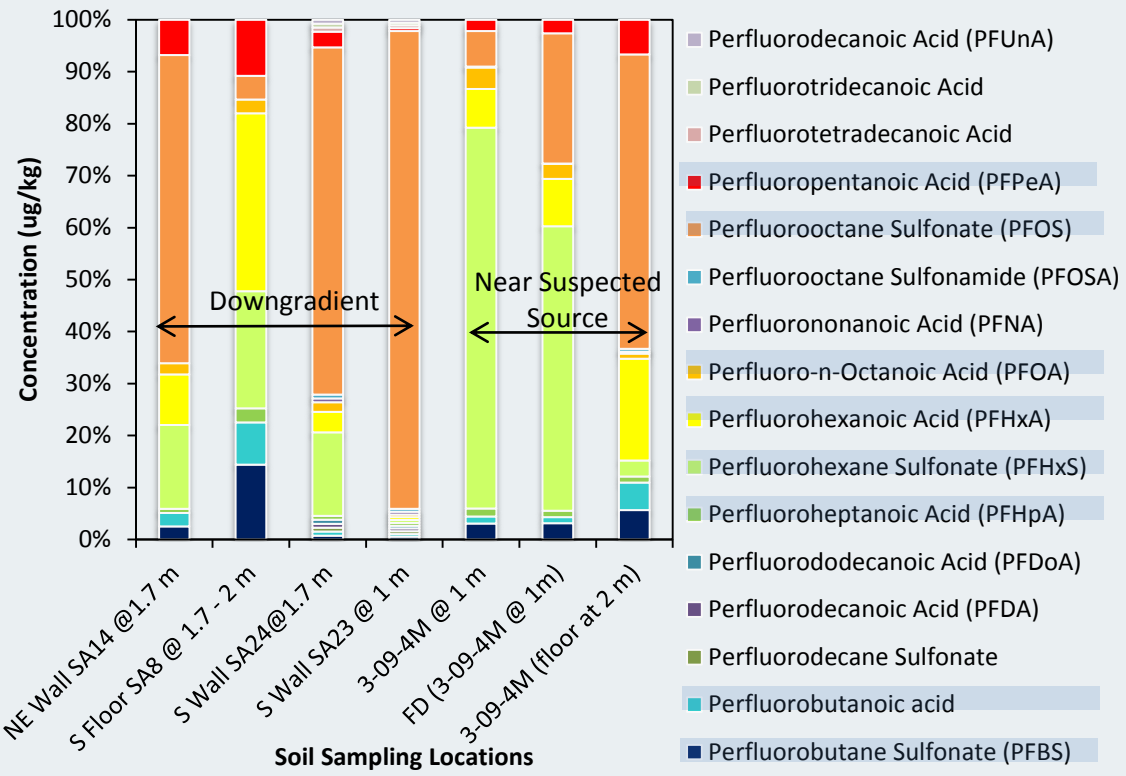


CHART 4-3: COMPOSITION OF PERFLUORINATED COMPOUNDS IN SOIL (BY PERCENTAGE).
****CHEMICAL NAMES WITH SHADING INDICATE COMPOUNDS THAT WERE DETECTED ABOVE LABORATORY REPORTABLE DETECTION LIMITS.**

Further review of the analytical results from the soil and groundwater samples, as presented in **Appendix C**, indicates the following:

- PFOS concentrations in soil were detected above the ecological soil criteria (for the protection of aquatic receptors) at FTA South Wall SA23 (depth of 1 mbgs) and FTA South Wall SA24 (depth of 1.7 mbgs). Because these PFOS impacts in soil are at depth, most exposure pathways, with the exception of seasonal groundwater, are effectively incomplete;
- PFOS concentrations in groundwater were observed to exceed criteria for the protection of freshwater-life (coarse-grained soil) at monitoring well locations 3-09-4M and 3-09-6M;
- Total analyzed PFCs were greatest in 3-09-4M (significant components of perfluorohexane sulfonate (PFHxS) and perfluorohexanoic acid (PFHxA)). Composition of PFCs were similar between groundwater and soil at this location, as indicated on **Chart 4-1** and **Chart 4-2**;
- The greatest total analyzed PFCs corresponded with the greatest analyzed amount of PHCs (i.e., maximums for both chemical classes were observed at 3-09-4M at 1 mbgs);

- Strong correlations were noted between PFHxS (0.9996) and PFHxA (0.9860) in soil with measured total organic carbon content, indicating that these compounds were 'sorbing' more strongly to carbon surfaces (including PHCs). No correlation was observed for PFOS, indicating that PFOS is not sticking to soil particles impacted by PHCs, but that it is either being transported with PHCs in groundwater. Where sorption of PFOS to soil particles does occur, mineral surface sorption sites are preferred, as discussed further below; and,
- A strong correlation was noted between measured PFOS in soil and percent saturation (0.9900), indicating that when PFOS is sorbing to soils, there is a strong preference for mineral surfaces, and, thus, that the native soils themselves are the preferred sorption sites for PFOS at the site. These sorption sites are not as binding as organic carbon. The presence of PFOS in water confirms that even though the preferred sorption sites are mineral sorption sites in soil, there is a relatively weak affinity for the soil mineral sorption sites – at this site, PFOS can be mobilized via groundwater pathways.

In 2014, it was noted that measured PFOS in soil increased with depth in areas observed to be impacted with PHCs. These results were confirmed in 2015 – PFC and PHC impacts coincided in sampling location 3-09-04M. Additionally, the 2015 results show that the PFC mixture composition changes with soil depth (shown in plots with concentrations on **Chart 4-1**, and shown as total overall composition in **Chart 4-3**).

These results confirm that the presence of PHCs contribute to increasing downwards and lateral movement of PFOS in soils and groundwater. Further downward migration may be mitigated by the presence of permafrost at the site. Lateral migration may occur with the dominant horizontal groundwater gradient throughout the active layer, in seasonal melt waters. In downgradient locations (such as 3-09-6M), it may be possible that, although PHC impacts are no longer detectable, the previously observed PHC impacts in soil may have contributed to PFOS migration and have since attenuated over time, or been remediated during soil aeration / tilling activities.

The criteria selected for comparison are for the protection of freshwater aquatic life. Given the distance to the nearest aquatic receptor (approximately 100 m to West Arm of Cambridge Bay), and the recalcitrant nature of the contaminants, the observed concentrations of PFOS in soil and groundwater may pose a potential environmental risk, particularly given the propensity of some PFCs to bioaccumulate in tissues. This potential risk has not been quantified.

5.0 LABORATORY QA / QC DATA

The laboratory's QA / QC program showed acceptable relative percent differences (RPD) for soil analyses where laboratory duplicates were evaluated except for two field duplicates which exceeded the acceptance criteria (>50% RPD) likely due to sample non homogeneity. The nature of the soil was primarily coarse silty gravels which ranged in heterogeneity. The overall quality control for analyses met the lab's acceptability criteria. The laboratory's surrogate spike recovery sample results were within the acceptable range for samples analyzed. The field blank samples were observed to be below reportable detection limits. Overall the laboratory results are considered valid for the purpose of this program.

6.0 NATIONAL CONTAMINATED SITE CLASSIFICATION

The National Contaminated Site Classification (NCSC) was updated based on the results of this report including the PFC data. Based on Dillon's site investigations, the NCSC score was determined to be 64.5 which is a site classification of two (medium priority for action). This score is attributed by the PFOS results which exceeded the referenced criteria in four instances. The remediation of the PHC impacts resulted in a lower score than AECOM's 2011 NCSC score of 70.7, class 1 (high priority for action).

The NCSC worksheets can be found attached as **Appendix E.**

7.0 SUMMARY AND CONCLUSIONS

A summary of the 2015 Cambridge Bay Airport work program is as follows:

- The completed project components included finishing the construction of the FTA LTU and excavating and transporting PHC-impacted soil from the FTA to the constructed LTU including backfilling of the FTA;
- Installation of 11 monitoring wells surrounding the FTA and LTU;
- The Canada-Wide Standards for PHC in Soil and CCME Canadian Soil Quality Guidelines for the Protection of Environmental Health criteria for commercial land use were used to compare confirmatory soil analytical results;
- 4,262 m^3 of impacted soil was removed from the FTA excavation and hauled to the constructed LTU for treatment;
- Based on the laboratory results of the confirmatory soil samples, the excavation extended to concentrations of PHC constituents of concern at or below the soil remediation criteria;
- Review of the laboratory results of the PFCs samples indicated two groundwater samples and two soil samples exhibited concentrations that exceed criteria for the protection of freshwater aquatic receptors;
- Results suggest that PFOS migration through soils and seasonal groundwater may have been facilitated by the presence of PHCs;
- Remedial activities removed both PHC and PFC-impacted soils from the FTA, reducing potential risks to downgradient receptors; and,
- The objectives of the work program were achieved.

8.0 CLOSURE

This report was prepared exclusively for the purposes, project, and site location outlined in the report. The report is based on information provided to, or obtained by Dillon as indicated in the report, and applies solely to site conditions and the regulatory and planning frameworks existing at the time of the site investigation. Although a reasonable investigation was conducted by Dillon, Dillon's investigation was by no means exhaustive and cannot be construed as a certification of the absence of any contaminants from the site. Rather, Dillon's report represents a reasonable review of available information within an established work scope and schedule.

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

Respectfully submitted,

Dillon Consulting Limited

Heather Fisher, P.Eng.
Project Manager

HLF/knp

Figures

0 25 50 Metres

SCALE: 1:15000

DILLON CONSULTING

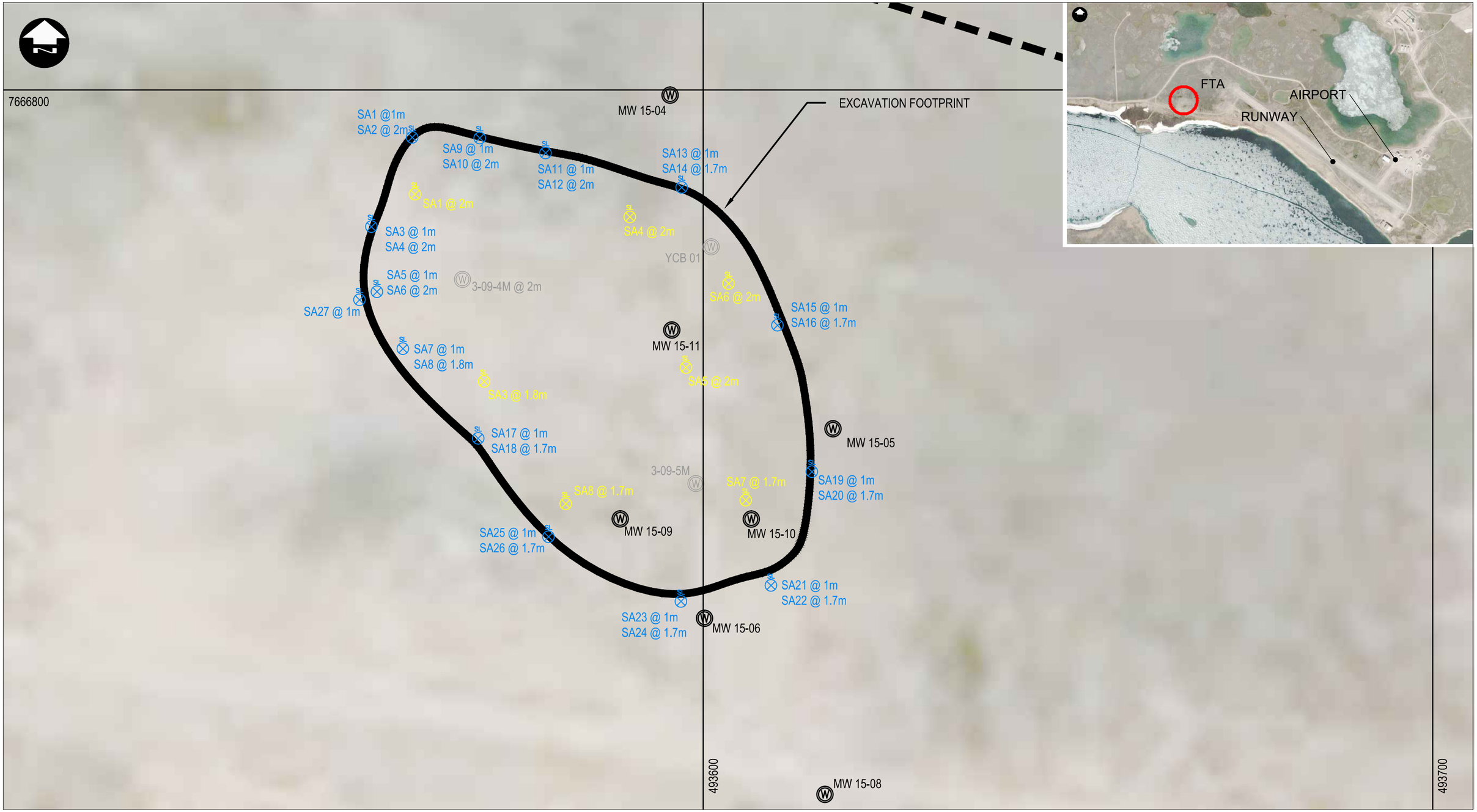
DRAWN BY: GLG
CHECKED BY: HLF
PROJECT: 152356

Public Works and Government Services Canada

SITE PLAN CAMBRIDGE BAY AIRPORT VICTORIA ISLAND, NU

FIG-01

Documents\Projects\2015\152356 Fire Training Area Site - CBA\Project Workspace\2. Technical Workspace\1. Engineering\Drawings and Figures\152356-05-FIGURES-F01.dwg



DILLON CONSULTING

LEGEND

- MONITORING WELL
- DECOMMISSIONED MONITORING WELL
- WALL SAMPLE LOCATION
- FLOOR SAMPLE LOCATION

SCALE:
N.T.S.
DO NOT SCALE DRAWING

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CHECKED BY: HLF
PROJECT: 152356

Public Works and Government Services Canada

Cambridge Bay Airport FTA

SITE PLAN
SHOWING SOIL SAMPLE LOCATIONS

FIG-02

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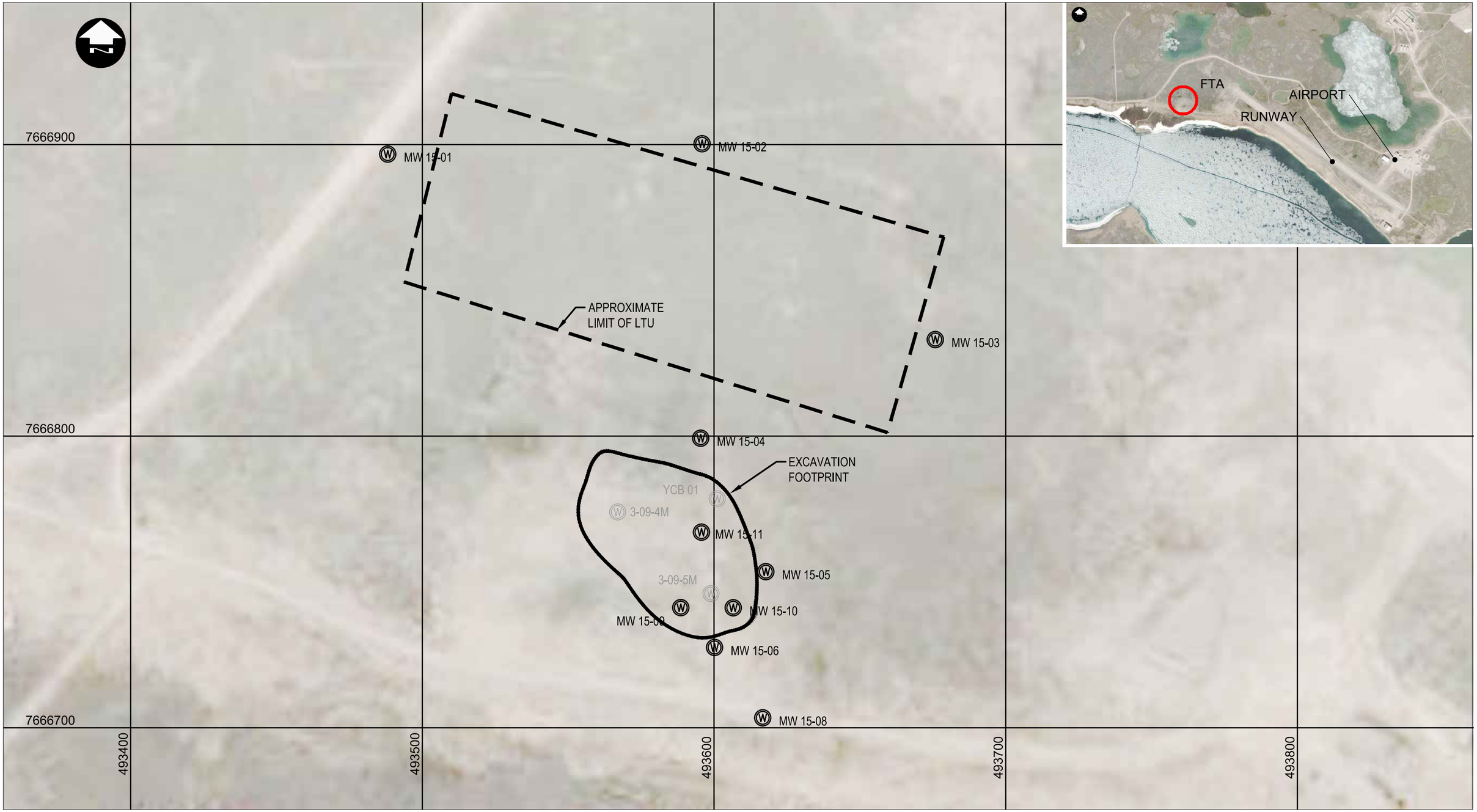

LEGEND

- MONITORING WELL
- DECOMMISSIONED MONITORING WELL

DILLON CONSULTING

SCALE:
N.T.S.
DO NOT SCALE DRAWING

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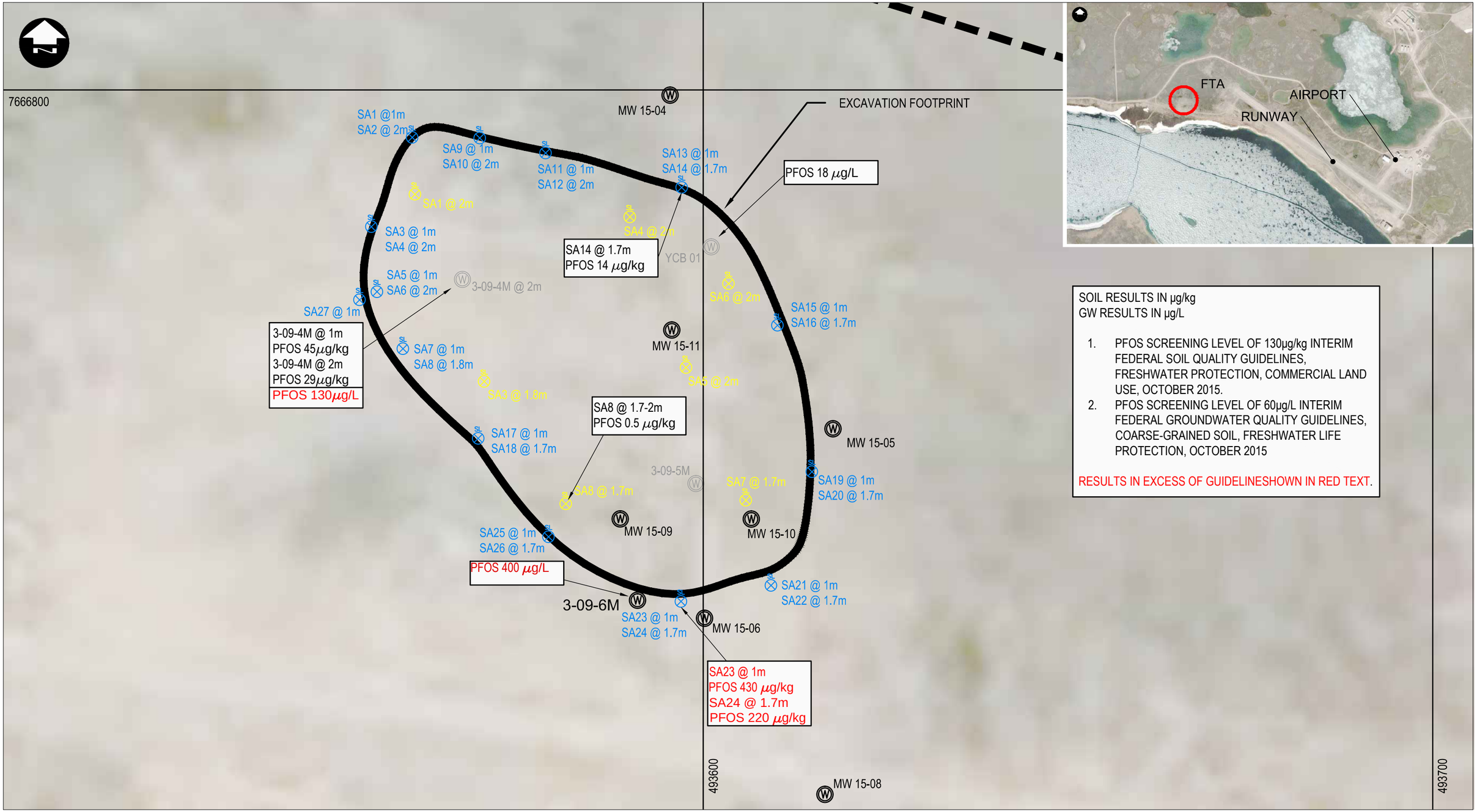
CHECKED BY: HLF
PROJECT: 152356

Public Works and Government Services Canada
Cambridge Bay Airport FTA

SITE PLAN
SHOWING MONITORING WELL LOCATIONS

FIG-03

Documents\Projects\2015\152356 Fire Training Area Site - CBA\Project Workspace\2. Technical Workspace\1. Engineering\Drawings and Figures\152356-05-FIGURE-F03



SOIL RESULTS IN µg/kg
GW RESULTS IN µg/L

1. PFOS SCREENING LEVEL OF 130µg/kg INTERIM FEDERAL SOIL QUALITY GUIDELINES, FRESHWATER PROTECTION, COMMERCIAL LAND USE, OCTOBER 2015.
2. PFOS SCREENING LEVEL OF 60µg/L INTERIM FEDERAL GROUNDWATER QUALITY GUIDELINES, COARSE-GRAINED SOIL, FRESHWATER LIFE PROTECTION, OCTOBER 2015

RESULTS IN EXCESS OF GUIDELINESHOWN IN RED TEXT.

DILLON CONSULTING

LEGEND

- MONITORING WELL
- DECOMMISSIONED MONITORING WELL
- WALL SAMPLE LOCATION
- FLOOR SAMPLE LOCATION

SCALE:
N.T.S.
DO NOT SCALE DRAWING

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PROJECT: 152356

Public Works and Government Services Canada
Cambridge Bay Airport FTA

SITE PLAN SHOWING PFOS RESULTS

FIG-04

Documents\Projects\2015\152356 Fire Training Area Site - CBA\Project Workspace\2. Technical Workspace\1. Engineering\Drawings and Figures\152356-05-FIGURE-F02-04.dwg

Appendix A

As-Built LTU Drawings

Sub-Arctic Surveys Ltd.
Canada Lands Surveyors
PO Box 2441
Yellowknife, NT X1A 2P8
Tel: 867-873-2047 Fax: 867-873-9079

Nov.9, 2015

Noel Perera
Uplogiaq Inc.
Hanger 1, PO Box 1207
Cambridge Bay, NU X0A 0C0

Project: 2014 Cambridge Bay Airport – FTA Remediation

In response to your recent request I am providing material volumes in relation to works conducted pertaining to the Fire Training Area Remediation project in Cambridge Bay, NU.

Contaminated material removed from subject site measured by field survey = 4,226 M3

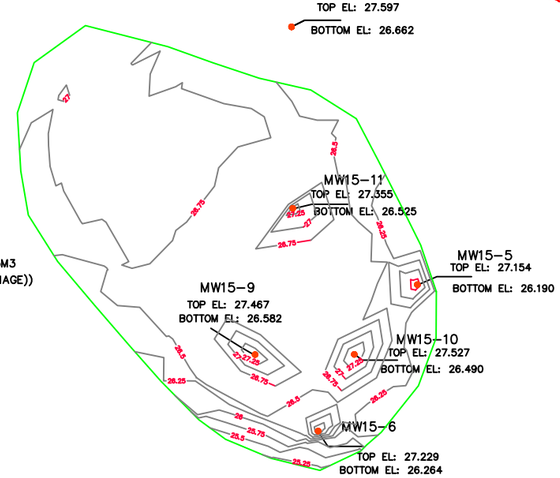
We understand an additional 34 M3 of additional contaminated material was removed as observed by the consultant on site after our surveyors left Cambridge Bay. This brought the final total to 4,260 M3 exported to the LTU as shown on our as-built plan.

Total fill material to backfill resulting void including positive grade capping material=5,125 M3.

Please do not hesitate to contact me with any further requirements.

Sincerely

Manson L. Ward



TOTAL FILL MATERIAL VOLUME FOR CONTAMINATED AREA = 5,125M3
(INCLUDING POSSITIVE GRADE CAPPING MATERIAL TO CREATE DRAINAGE))

SCALE 1 : 300

20 10 8 6 4 2 0 5 10 15 METRES

MW15-8
TOP EL: 25.115
BOTTOM EL: 24.178

MW15-7
TOP EL: 21.607
BOTTOM EL: 20.688

SUB-ARCTIC SURVEYS LTD.
P.O. BOX 2441
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PHONE: 873-2047 FAX: 873-9079
WEB PAGE www.sub-arctic.ca
E-MAIL sas@sub-arctic.ca

NO.	REVISION\ISSUE	DATE:

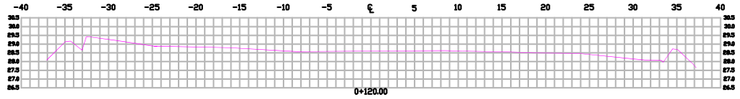
DRAWN BY: M.W.
CHECKED BY: M.W.

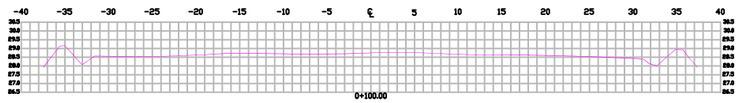
UPLOGIAQ Inc

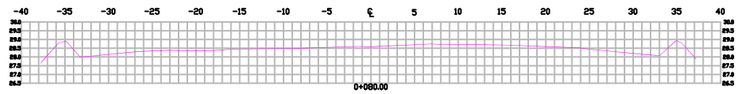
AS-BUILT LTU
SHOWING
CONTAMINATED MATERIAL
IMPORTED
CAMBRIDGE BAY - NU

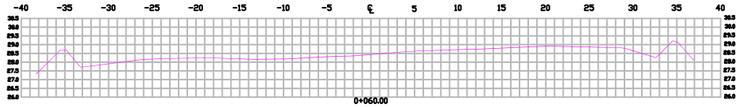
PROJECT NO.: 14-075-GI
FILE NO.:

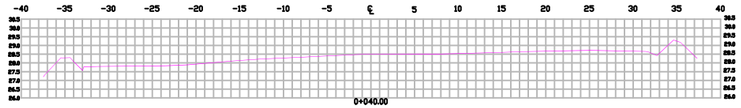
DATE: SEPTEMBER 4, 2015
SCALE: 1:300

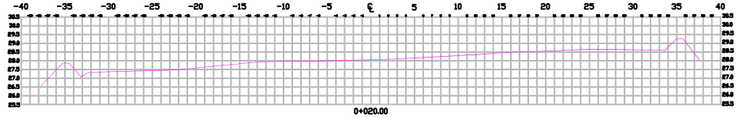


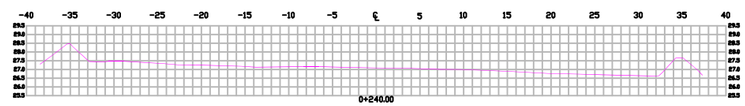


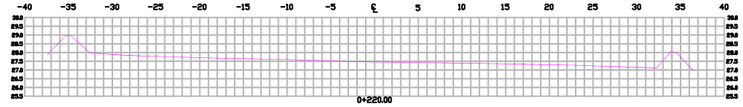


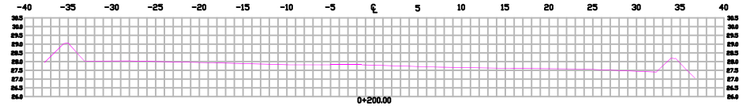


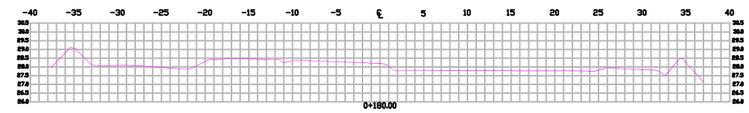


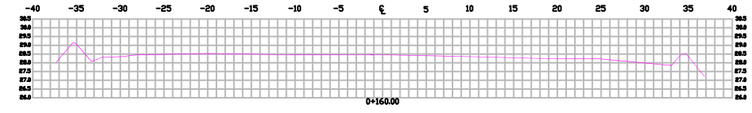


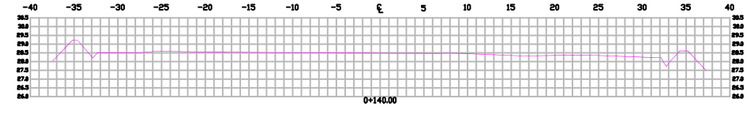












NOTES:

ALL ELEVATIONS AND DISTANCES ARE EXPRESSED IN METRES OR DECIMALS THEREOF.

CONTOUR INTERVAL IS 0.25 METRES.

NO.	REVISION\ISSUE	DATE:

DRAWN BY: M.L.W.

CHECKED BY:

UPLOGIAQ Inc

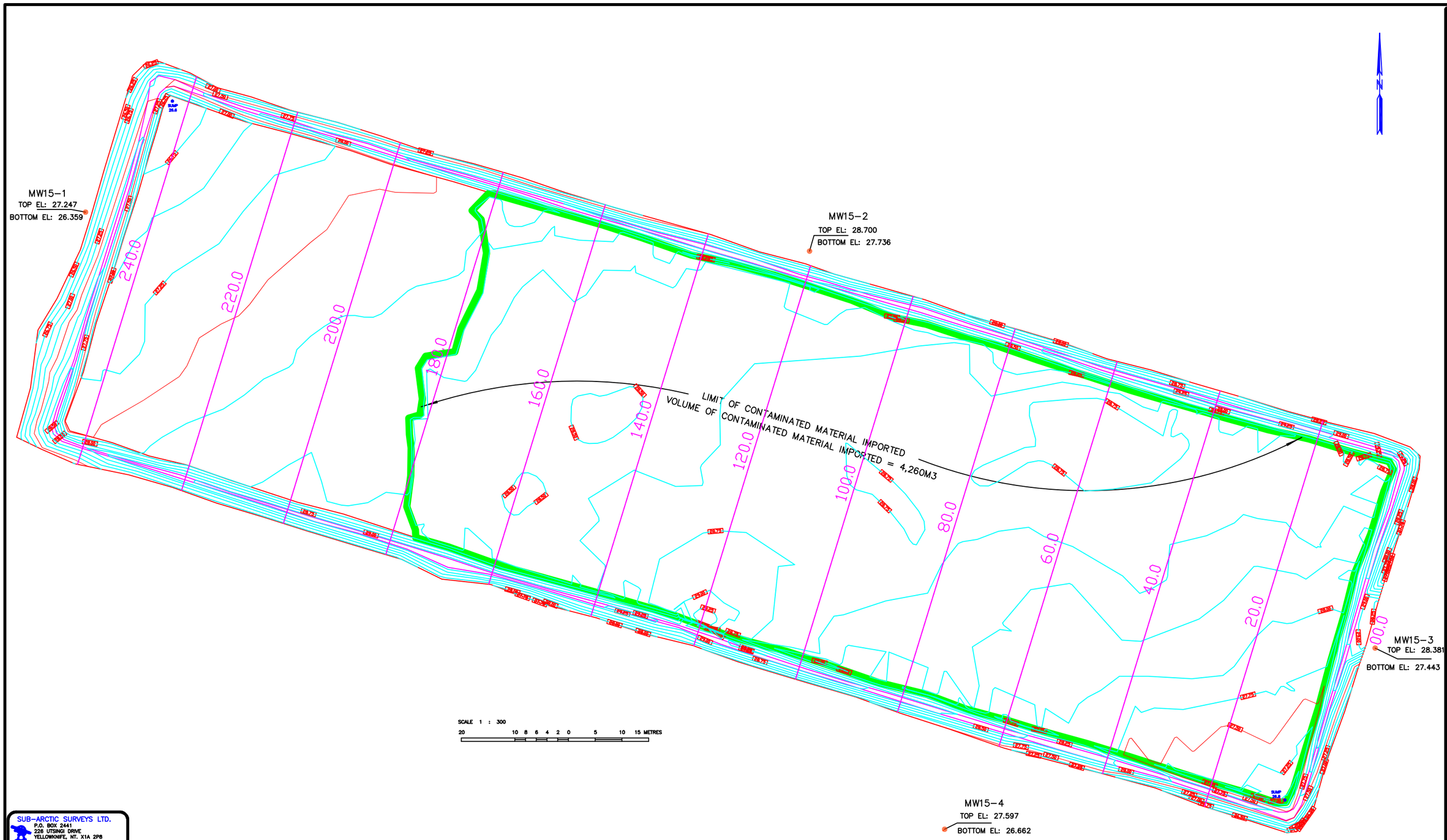
AS-BUILT LTU
SHOWING
CROSS SECTIONS
OF IMPORTED MATERIAL
CAMBRIDGE BAY – NU

PROJECT NO.: 14-075-GI
FILE NO.:

DATE: NOVEMBER 4, 2015

SCALE: AS NOTED

SUB-ARCTIC SURVEYS LTD.
P.O. BOX 2441
226 UTSINGI DRIVE
YELLOWKNIFE, NT. X1A 2P8
PHONE: 873-2047 FAX: 873-9079
WEB PAGE www.sub-arctic.ca
E-MAIL sas@sub-arctic.ca



NOTES:

ALL ELEVATIONS AND DISTANCES ARE EXPRESSED IN METRES OR DECIMALS THEREOF.

CONTOUR INTERVAL IS 0.25 METRES.

NO.	REVISION\ISSUE	DATE:

DRAWN BY: M.W.
CHECKED BY: M.W.

UPLOGIAQ Inc

AS-BUILT LTU
SHOWING
CONTAMINATED MATERIAL
IMPORTED
CAMBRIDGE BAY - NU

PROJECT NO.: 14-075-GI
FILE NO.:

DATE: SEPTEMBER 4, 2015
SCALE: 1:300

SUB-ARCTIC SURVEYS LTD.
P.O. BOX 2441
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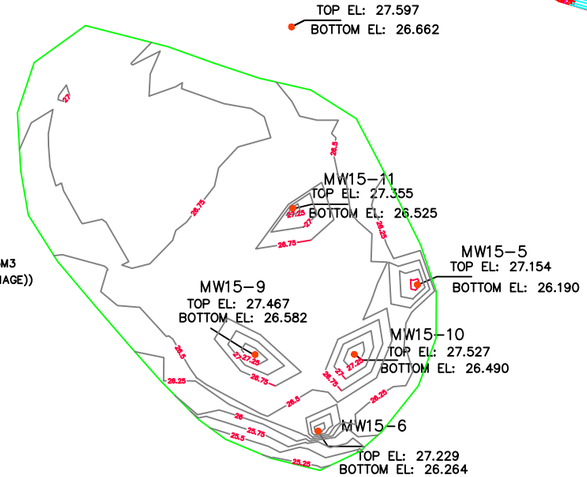
YELLOWKNIFE, NT. X1A 2P8
PHONE: 873-2047 FAX: 873-9079
WEB PAGE www.sub-arctic.ca
E-MAIL sas@sub-arctic.ca

Point No.	Northing	Easting	Elevation	Description
9011020	7666833.113	493675.878	28.382	MW15 #3 Top
9011043	7666907.268	493570.236	28.7	MW15 #2 Top
9011065	7666914.554	493434.999	27.247	MW15 #1 Top
9011574	7666799.272	493595.47	27.598	MW15 #4 Top
9011576	7666767.062	493595.694	27.355	MW15 #11 Top
9011578	7666753.517	493617.796	27.154	MW15 #5 Top
9011580	7666741.128	493606.61	27.527	MW15 #10 Top
9011582	7666741.162	493588.639	27.468	MW15 #9 Top
9011584	7666727.524	493600.189	27.229	MW15 #6 Top
9011586	7666703.379	493616.704	25.116	MW15 #8 Top
9011588	7666677.668	493600.9	21.608	MW15 #7 Top

TOTAL FILL MATERIAL VOLUME FOR CONTAMINATED AREA = 5,125M3
(INCLUDING POSSITIVE GRADE CAPPING MATERIAL TO CREATE DRAINAGE))



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NO.	REVISION\ISSUE	DATE:

DRAWN BY: M.W.
CHECKED BY: M.W.

UPLOGIAQ Inc

AS–BUILT LTU
SHOWING
MONITORING WELLS
LOCATION AND ELEVATION
CAMBRIDGE BAY – NU

PROJECT NO.: 14–075–GI
FILE NO.:

DATE: NOVEMBER 17, 2015
SCALE: 1:300

Appendix B

Site Photos

July 14, 2015

Photo #1: View looking east, accumulated snowmelt and rainfall in the FTA LTU.

July 21, 2015

Photo #2: View looking north, importing backfill for FTA excavation.

July 22, 2015

Photo #3: Flow meters to be used for FTA LTU de-watering.

July 23, 2015

Photo #4: Heavy rain in Cambridge Bay.

Photo #5: View looking south, de-watering FTA LTU.

July 25, 2015

Photo #6: View looking south east, de-watering FTA LTU.

July 28, 2015

Photo #7: View looking north, importing backfill for FTA LTU excavation.

July 30, 2015

Photo #8: View looking south, importing demarcation material/crush.

August 2, 2015

Photo #9: View looking north, dewatering FTA LTU.

Photo #10: View looking east, dewatering FTA LTU.

August 4, 2015

Photo #11: View looking east, de-watered FTA-LTU.

August 5, 2015

Photo #12: View looking east, constructing ramp to access the interior FTA LTU.

August 6, 2015

Photo #13: View looking northwest, placing demarcation material/crush along eastern berm.

August 8, 2015

Photo #14: Looking at the south eastern sump prior to installation.

August 9, 2015

Photo #15: View looking west, spreading demarcation material.

August 11, 2015

Photo #16: View looking north, spreading and surveying demarcation material.

August 12, 2015

Photo #17: View looking north, spreading demarcation material.

August 13, 2015

Photo #18: View looking east, spreading demarcation material.

August 14, 2015

Photo #19: View looking south, FTA remedial excavation.

Photo #20: View looking north east, spreading impacted soil in the FTA LTU.

August 15, 2015

Photo #21: View looking south, FTA remedial excavation

Photo #22: View looking north east, spreading impacted soil in the FTA LTU.

August 16, 2015

Photo #23: View looking south, FTA remedial excavation

Photo #24: View looking north east, spreading impacted soil in the FTA LTU.

August 17, 2015

Photo #25: View looking south, FTA remedial excavation.

Photo #26: View looking north east, spreading impacted soil in the FTA LTU.

August 18, 2015

Photo #27: View looking south, FTA remedial excavation.

Photo #28: View looking north east, spreading impacted soil in the FTA LTU.

August 19, 2015

Photo #29: View looking north, monitor well installation.

August 20, 2015

Photo #30: View looking south, additional impacted soil removed.

August 21, 2015

Photo #31: View looking north, backfilling excavation.

August 22, 2015

Photo 32: View of FTA Excavation backfill facing south.

August 24, 2015

Photo 33: View of FTA excavation backfill facing northwest.

August 25, 2015

Photo 34: View of FTA backfill process facing east.

August 26, 2015

Photo 35: View of west side of FTA excavation backfill facing north.

August 27, 2015

Photo 36: View of low area of water on the north side of the FTA LTU facing east.

August 28, 2015

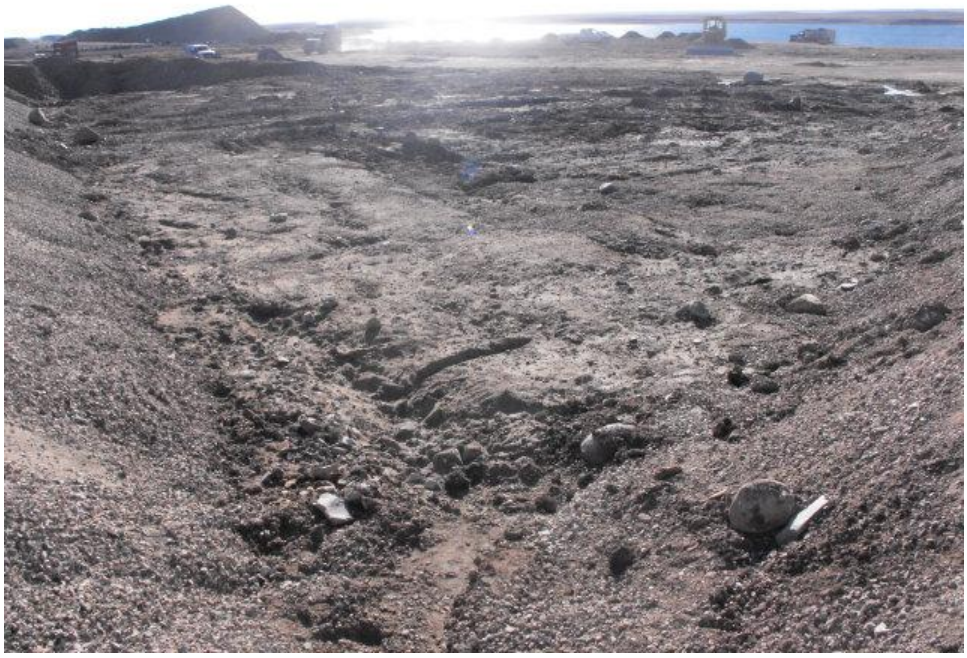

Photo 37: View of low area on the south side of FTA LTU facing southeast.

August 29, 2015

Photo 38: View of instllation of MW15-9.

August 30, 2015

Photo 39: View corrected low area to the north of FTA LTU facing east.

August 31, 2015

Photo 40: View of corrected low area to the south of FTA LTU facing west.

September 1, 2015

Photo 41: View of water accumulation to the southeast of the FTA facing south.

September 2, 2015

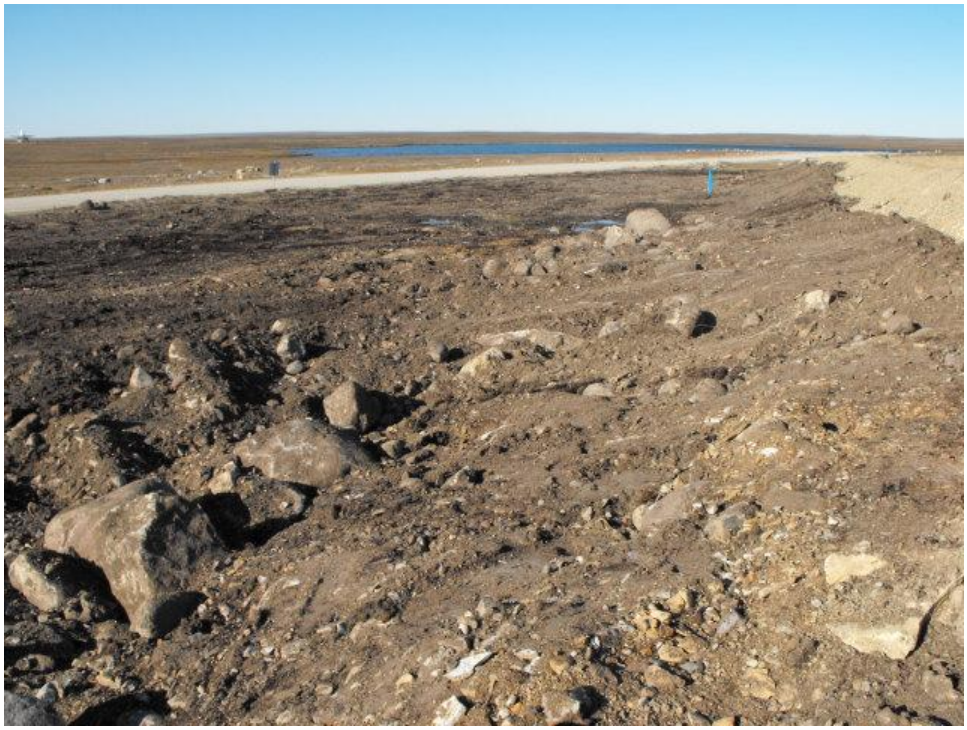

Photo 42: View of the west side of the FTA LTU facing northwest.

Appendix C

Analytical Summary Tables

SUMMARY OF SOIL ANALYTICAL RESULTS FOR HYDROCARBONS - FTA
CAMBRIDGE BAY AIRPORT

Parameter / *Sample ID* / *Collection Date* / *Laboratory Job #* / *Laboratory Report Date* / *GPS Coordindates - Northing* / *Easting*	Standard 1: CCME CWS Commercial Ecological Soil Pathway Coarse-Grained	Standard 2: CCME CSQG for Protection of Environmental Health Commercial Surface/Subsoil Coarse-Grained	Units	COC-A158826							
Sample ID				FTA NW WALL SA1 1.0m	FTA NW WALL SA2 2.0m	FTA NW WALL SA2 2.0m (Field Dup - 1)	FTA NW FLOOR SA1 2.0m	3-09-4M 1.0m (this material was excavated - not a confirmatory sample)	3-09-4M 2.0m - Floor	FTA West Wall SA3 - 1.0m	FTA West Wall SA4 - 2.0m
Collection Date				14-Aug-15	14-Aug-15	14-Aug-15	14-Aug-15	14-Aug-15	15-Aug-15	15-Aug-15	15-Aug-15
Laboratory Job #				B570599	B570599	B570599	B570599	B570599	B570354	B570354	B570354
Laboratory Report Date				4-Sep-15	4-Sep-15	4-Sep-15	4-Sep-15	4-Sep-15	4-Sep-15	4-Sep-15	4-Sep-15
GPS Coordindates - Northing				7666794.6	7666794.6	7666794.6	7666785.7	7666774.5	7666774.5	7666781.2	7666781.2
Easting				493560.1	493560.1	493560.1	493560.5	493565.2	493565.2	493565.2	493565.2
Volatile Organic Compounds											
Benzene	-	180/360	mg/kg	<0.015	<0.008	<0.008	<0.015	3.7	0.5	<0.005	<0.005
Toluene	-	250/500	mg/kg	<0.02	<0.02	<0.02	<0.02	15	<0.02	<0.02	<0.02
Ethylbenzene	-	300/600	mg/kg	<0.01	<0.01	<0.01	<0.01	11	<0.01	<0.01	<0.01
Xylenes (total)	-	350/700	mg/kg	<0.04	<0.04	<0.04	<0.04	52	<0.04	<0.04	<0.04
Petroleum Hydrocarbons F1 to F4											
F1 (C6 to C10)	320	-	mg/kg	<12	<12	<12	<12	2600	<12	<12	<12
F1 (C6 to C10 minus BTEX)	nv	-	mg/kg	<12	<12	<12	<12	2500	<12	<12	<12
F2 (C10 to C16)	260	-	mg/kg	<10	<10	<10	<10	310	<10	<10	<10
F3 (C16 to C34)	1700	-	mg/kg	<50	<50	<50	<50	220	<50	<50	<50
F4 (C34 to C50)	3300	-	mg/kg	<50	<50	<50	<50	<50	<50	<50	<50
Metals											
Lead	-	260	mg/kg	---	5.3	---	4.4	---	---	---	---

Notes:

< - not detectable, less than laboratory instrument detection limit

nv - no standard exists

Bold - value exceeds CCME Guideline

*Samples reported with detection limits above the CCME guidelines due to soil conditions

1 - Canada-Wide Standard for Petroleum Hydrocarbons in Soil, January 2008, Ecological Soil Contact, Commercial, Coarse-grained soils

2 - Canadian Environmental Quality Guidelines, CCME Soil Quality Guidelines for the Protection of Environmental and Human Health, 2004, Commercial, Coarse-Grained, surface soil (<1.5 m depth)/subsoil(>1.5 m depth), Benzene: 10^{-5} incremental risk

(1) Qualifying ion outside of acceptance criteria. Results are tentatively identified and potentially biased high.

SUMMARY OF SOIL ANALYTICAL RESULTS FOR HYDROCARBONS - FTA
CAMBRIDGE BAY AIRPORT

Parameter / *Sample ID*	Standard 1	Standard 2	Units	COC - A158825					COC - A			
				FTA West Wall SA5 - 1.0m (excavated)	FTA West Wall SA6 - 2.0m	FTA West Wall SA7 - 1.0m	FTA West Wall SA8 - 1.8m	FTA West Floor SA 3 - 1.8m	FTA North Wall SA9 - 1.0m	FTA North Wall SA10 - 2.0m	FTA North Wall SA11 - 1.0m	FTA North Wall SA12 - 2.0m
Collection Date	CCME CWS Commercial Ecological Soil Pathway Coarse-Grained	CCME CSQG for Protection of Environmental Health Commercial Surface/Subsoil Coarse-Grained		15-Aug-15	15-Aug-15	15-Aug-15	15-Aug-15	15-Aug-15	16-Aug-15	16-Aug-15	16-Aug-15	16-Aug-15
Laboratory Job #				B570354	B570354	B570354	B570354	B570354	B570766	B570766	B570766	B570766
Laboratory Report Date				4-Sep-15	4-Sep-15	4-Sep-15	4-Sep-15	4-Sep-15	19-Sep-15	19-Sep-15	19-Sep-15	19-Sep-15
GPS Coordindates - Northing				7666772.3	7666772.3	7666764.5	7666764.5	7666760.0	7666790.1	7666790.1	7666786.8	7666786.8
Easting				493555.3	493555.3	493558.8	493558.8	493570.0	493569.3	493569.3	493578.4	493578.4
Volatile Organic Compounds												
Benzene	-	180/360	mg/kg	0.011	<0.005	<0.005	0.015	<0.005	<0.005	0.012	0.011	<0.005
Toluene	-	250/500	mg/kg	0.031	<0.02	<0.02	<0.02	0.024	0.059	0.1	0.1	<0.02
Ethylbenzene	-	300/600	mg/kg	0.073	<0.01	0.1	<0.01	<0.01	0.018	0.049	0.047	<0.01
Xylenes (total)	-	350/700	mg/kg	1.8	<0.04	0.3	<0.04	<0.04	0.09	0.23	0.23	<0.04
Petroleum Hydrocarbons F1 to F4												
F1 (C6 to C10)	320	-	mg/kg	**520**	<12	27	<12	<12	<12	<12	<12	<12
F1 (C6 to C10 minus BTEX)	nv	-	mg/kg	520	<12	26	<12	<12	<12	<12	<12	<12
F2 (C10 to C16)	260	-	mg/kg	**410**	<10	39	<10	140	<10	<10	<10	<10
F3 (C16 to C34)	1700	-	mg/kg	57	<50	53	<50	340	<50	<50	<50	<50
F4 (C34 to C50)	3300	-	mg/kg	<50	<50	<50	<50	<50	<50	<50	<50	<50
Metals												
Lead	-	260	mg/kg	---	---	---	---	---	---	---	---	5.1

Notes:

< - not detectable, less than laboratory instrument detection limit

nv - no standard exists

Bold - value exceeds CCME Guideline

*Samples reported with detection limits above the CCME guidelines due to soil conditions

1 - Canada-Wide Standard for Petroleum Hydrocarbons in Soil, January 2008, Ecological Soil Contact, Commercial, Coarse-grained soils

2 - Canadian Environmental Quality Guidelines, CCME Soil Quality Guidelines for the Protection of Environmental and Human Health, 2004, Commercial, C

(1) Qualifying ion outside of acceptance criteria. Results are tentatively identified and potentially biased high.

SUMMARY OF SOIL ANALYTICAL RESULTS FOR HYDROCARBONS - FTA
CAMBRIDGE BAY AIRPORT

				158827				COC - A158831				
Parameter / *Sample ID*	Standard 1	Standard 2	Units	FTA North Floor SA4 - 2.0m	Field Dup. 3 North Floor SA4 - 2.0m	FTA South Floor SA5 - 2.0m	FTA West Wall SA6 - 2.0m	FTA North East Wall SA13 -1.0m	FTA North East Wall SA14 -1.7m	FTA East Floor SA6 -1.7m	FTA East Wall SA15m - 1.0m	FTA East Wall SA16m - 1.7m
Collection Date	CCME CWS Commercial Ecological Soil Pathway Coarse-Grained	CCME CSQG for Protection of Environmental Health Commercial Surface/Subsoil Coarse-Grained		16-Aug-15	16-Aug-15	16-Aug-15	15-Aug-15	17-Aug-15	17-Aug-15	17-Aug-15	17-Aug-15	17-Aug-15
Laboratory Job #				B570766	B570766	B570766	B570766	B571920	B571920	B571920	B571920	B571920
Laboratory Report Date				19-Sep-15	19-Sep-15	19-Sep-15	19-Sep-15	14-Sep-15	14-Sep-15	14-Sep-15	14-Sep-15	14-Sep-15
GPS Coordindates - Northing				7666774.5	7666774.5	7666764.4	7666772.3	7666782.2	7666782.2	7666762.2	7666767.7	7666767.7
Easting				493580.8	493580.8	493583.5	493555.3	493597.5	493597.5	493603.8	493610.2	493610.2
Volatile Organic Compounds												
Benzene	-	180/360	mg/kg	0.11	0.079 (1)	0.058	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Toluene	-	250/500	mg/kg	0.77	0.52	0.11	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Ethylbenzene	-	300/600	mg/kg	0.41	0.31	0.2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Xylenes (total)	-	350/700	mg/kg	3.7	2.8	0.86	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Petroleum Hydrocarbons F1 to F4												
F1 (C6 to C10)	320	-	mg/kg	160	140	32	<12	<12	<12	<12	<12	<12
F1 (C6 to C10 minus BTEX)	nv	-	mg/kg	160	140	31	<12	<12	<12	<12	<12	<12
F2 (C10 to C16)	260	-	mg/kg	45	33	15	<10	<10	<10	<10	<10	<10
F3 (C16 to C34)	1700	-	mg/kg	<50	<50	<50	<50	<50	<50	<50	<50	<50
F4 (C34 to C50)	3300	-	mg/kg	<50	<50	<50	<50	<50	<50	<50	<50	<50
Metals												
Lead	-	260	mg/kg	---	---	5.3	---	---	---	---	---	---

Notes:

< - not detectable, less than laboratory instrument detection limit

nv - no standard exists

Bold - value exceeds CCME Guideline

*Samples reported with detection limits above the CCME guidelines due to soil conditions

1 - Canada-Wide Standard for Petroleum Hydrocarbons in Soil, January 2008, Ecological Soil Contact, Commercial, Coarse-grained soils

2 - Canadian Environmental Quality Guidelines, CCME Soil Quality Guidelines for the Protection of Environmental and Human Health, 2004, Commercial, C

(1) Qualifying ion outside of acceptance criteria. Results are tentatively identified and potentially biased high.

SUMMARY OF SOIL ANALYTICAL RESULTS FOR HYDROCARBONS - FTA
CAMBRIDGE BAY AIRPORT

Parameter / *Sample ID* / *Collection Date* / *Laboratory Job #* / *Laboratory Report Date* / *GPS Coordindates - Northing* / *Easting*	Standard 1: CCME CWS Commercial Ecological Soil Pathway Coarse-Grained	Standard 2: CCME CSQG for Protection of Environmental Health Commercial Surface/Subsoil Coarse-Grained	Units	COC A159257 and A158830									
Sample ID				FTA South Wall SA24 - 1.7m	FTA South Wall SA22 - 1.7m	FTA South Wall SA23 - 1.0m	FTA South Wall SA21 - 1.0m	FTA East Wall SA20 - 1.7m	FTA South Floor SA8 - 1.7m	FTA East Wall SA19 - 1.0m	FTA South Floor SA7 - 1.7m	FTA South Wall SA17 - 1.0m	FTA South Wall SA18 - 1.7m
Collection Date				18-Aug-15	18-Aug-15	18-Aug-15	18-Aug-15	18-Aug-15	18-Aug-15	18-Aug-15	18-Aug-15	18-Aug-15	18-Aug-15
Laboratory Job #				B572411	B572411	B572411	B572411	B572411	B572411	B572411	B572411	B572411	B572411
Laboratory Report Date				4-Sep-15	4-Sep-15	4-Sep-15	4-Sep-15	4-Sep-15	4-Sep-15	4-Sep-15	4-Sep-15	4-Sep-15	4-Sep-15
GPS Coordindates - Northing				7666729.8	7666732.0	7666729.8	7666732.0	7666747.6	7666743.2	7666747.6	76664963.6	7666752.2	7666752.2
Easting				493597.0	493609.3	493597.0	493609.3	493614.9	493592.6	493614.9	493601.5	493569.2	493569.2
Volatile Organic Compounds													
Benzene	-	180/360	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	0.025	0.26	<0.0050	0.17	<0.0050	0.021
Toluene	-	250/500	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Ethylbenzene	-	300/600	mg/kg	<0.010	<0.010	<0.010	<0.010	0.017	0.098	<0.010	0.05	0.023	0.21
Xylenes (total)	-	350/700	mg/kg	<0.040	<0.040	<0.040	<0.040	<0.040	0.46	<0.040	0.22	0.055	0.19
Petroleum Hydrocarbons F1 to F4													
F1 (C6 to C10)	320	-	mg/kg	<12	<12	<12	<12	<12	15	<12	25	<12	<12
F1 (C6 to C10 minus BTEX)	nv	-	mg/kg	<12	<12	<12	<12	<12	16	<12	26	<12	<12
F2 (C10 to C16)	260	-	mg/kg	<10	<10	<10	93	<10	61	<10	140	<10	<10
F3 (C16 to C34)	1700	-	mg/kg	<50	<50	<50	98	<50	83	53	<50	<50	<50
F4 (C34 to C50)	3300	-	mg/kg	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Metals													
Lead	-	260	mg/kg	4.1	---	---	7.9	2.5	6	---	3.4	4.6	---

Notes:

< - not detectable, less than laboratory instrument detection limit

nv - no standard exists

Bold - value exceeds CCME Guideline

*Samples reported with detection limits above the CCME guidelines due to soil conditions

1 - Canada-Wide Standard for Petroleum Hydrocarbons in Soil, January 2008, Ecological Soil Contact, Commercial, Coarse-grained soils

2 - Canadian Environmental Quality Guidelines, CCME Soil Quality Guidelines for the Protection of Environmental and Human Health, 2004, Commercial, C

(1) Qualifying ion outside of acceptance criteria. Results are tentatively identified and potentially biased high.

SUMMARY OF SOIL ANALYTICAL RESULTS FOR HYDROCARBONS - FTA
CAMBRIDGE BAY AIRPORT

Parameter / *Sample ID* / *Collection Date* / *Laboratory Job #* / *Laboratory Report Date* / *GPS Coordinates - Northing* / *Easting*	Standard 1	Standard 2	Units	Field Dup. 4 - South Wall SA18 - 1.7m	FTA South Wall SA25 - 1.0m	FTA South Wall SA26 - 1.7m	FTA West Wall SA27 - 1.0m
							COC A158829
	CCME CWS Commercial Ecological Soil Pathway Coarse-Grained	CCME CSQG for Protection of Environmental Health Commercial Surface/Subsoil Coarse-Grained					
Collection Date				18-Aug-15	19-Aug-15	19-Aug-15	20-Aug-15
Laboratory Job #				B572411	B572411	B572411	B572551
Laboratory Report Date				4-Sep-15	4-Sep-15	4-Sep-15	15-Sep-15
GPS Coordinates - Northing				7666752.2	7666736.6	7666736.6	7666771.2
Easting				493569.2	493583.4	493583.4	493552.9
Volatile Organic Compounds							
Benzene	-	180/360	mg/kg	0.068	<0.0050	<0.0050	<0.005
Toluene	-	250/500	mg/kg	<0.020	<0.020	<0.020	<0.002
Ethylbenzene	-	300/600	mg/kg	0.17	<0.010	<0.010	<0.01
Xylenes (total)	-	350/700	mg/kg	0.13	<0.040	<0.040	<0.04
Petroleum Hydrocarbons F1 to F4							
F1 (C6 to C10)	320	-	mg/kg	<12	<12	<12	<12
F1 (C6 to C10 minus BTEX)	nv	-	mg/kg	<12	<12	<12	<12
F2 (C10 to C16)	260	-	mg/kg	<10	<10	<10	<10
F3 (C16 to C34)	1700	-	mg/kg	<50	70	<50	<50
F4 (C34 to C50)	3300	-	mg/kg	<50	<50	<50	<50
Metals							
Lead	-	260	mg/kg	---	---	4.6	---

Notes:

< - not detectable, less than laboratory instrument detection limit

nv - no standard exists

Bold - value exceeds CCME Guideline

*Samples reported with detection limits above the CCME guidelines due to soil conditions

1 - Canada-Wide Standard for Petroleum Hydrocarbons in Soil, January 2008, Ecological Soil Contact, Commercial, Coarse-grained soils

2 - Canadian Environmental Quality Guidelines, CCME Soil Quality Guidelines for the Protection of Environmental and Human Health, 2004, Commercial, C

(1) Qualifying ion outside of acceptance criteria. Results are tentatively identified and potentially biased high.

SUMMARY OF SOIL LABORATORY RESULTS - Perfluorinated Compounds in Soil
CAMBRIDGE BAY AIRPORT FTA REMEDIATION

Parameter *Sample ID* *GPS Location (Easting, Northing)* *Collection Date* *Laboratory Job #* *Laboratory Report Date*	**Standard 1** FCSAP (Coarse-Grained)	**Standard 2** Interim Federal Soil Quality Guidelines (commercial, freshwater protection)	**Units**		**Blank for PFOS** 17-Aug-15 B571920 14-Sep-15	**Northeast Wall SA14 @1.7 m** 17-Aug-15 B571920 14-Sep-15	**South Floor SA8 @ 1.7 - 2 m** 19-Aug-15 B572551 15-Sep-15	**South Wall SA24@1.7 m** 18-Aug-15 B572411 4-Sep-15	**South Wall SA23 @ 1 m** 18-Aug-15 B572411 4-Sep-15	**3-09-4M @ 1 m** 14-Aug-15 B570599 4-Sep-15	**FD (3-09-4M @ 1m)** 14-Aug-15 B570599 4-Sep-15	**3-09-4M (floor at 2 m)** 15-Aug-15 B570354 4-Sep-15
Inorganics												
Moisture	nv	nv	%		3	12	11	13	4.7	12	10	8.1
Perfluorinated Compounds												
Perfluorobutane Sulfonate (PFBS)	nv	nv	ug/kg		<0.1	0.6	1.6	<5	<5	20	12	2.9
Perfluorobutanoic acid	nv	nv	ug/kg		<0.1	0.6	0.9	<5	<5	9	4.5	2.7
Perfluorodecane Sulfonate	nv	nv	ug/kg		<0.1	<0.1	<0.1	<5	<5	<5	<5	<5
Perfluorodecanoic Acid (PFDA)	nv	nv	ug/kg		<0.1	<0.1	<0.1	<5	<5	<0.1	<0.1	<0.1
Perfluorododecanoic Acid (PFDoA)	nv	nv	ug/kg		<0.1	<0.1	<0.1	<5	<5	<0.1	<0.1	<0.1
Perfluoroheptanoic Acid (PFHpA)	nv	nv	ug/kg		<0.1	0.2	0.3	<5	<5	10	4.7	0.6
Perfluorohexane Sulfonate (PFHxS)	nv	nv	ug/kg		<0.1	3.8	2.5	53	<5	480	210	1.6
Perfluorohexanoic Acid (PFHxA)	nv	nv	ug/kg		<0.1	2.3	3.8	13	<5	49	35	10
Perfluoro-n-Octanoic Acid (PFOA)	nv	nv	ug/kg		<0.1	0.5	0.3	6	<5	27	11	0.5
Perfluorononanoic Acid (PFNA)	nv	nv	ug/kg		<0.1	<0.1	<0.1	<5	<5	<0.1	<0.1	0.2
Perfluorooctane Sulfonamide (PFOSA)	nv	nv	ug/kg		<0.1	<0.1	<0.1	<5	<5	1.1	0.4	0.3
Perfluorooctane Sulfonate (PFOS)	1000	130	ug/kg		0.2	14	0.5	**220**	**430**	45	96	29
Perfluoropentanoic Acid (PFPeA)	nv	nv	ug/kg		<0.1	1.6	1.2	10	<5	14	10	3.4
Perfluorotetradecanoic Acid	nv	nv	ug/kg		<0.1	<0.1	<0.1	<5	<5	<0.1	<0.1	<0.1
Perfluorotridecanoic Acid	nv	nv	ug/kg		<0.1	<0.1	<0.1	<5	<5	<0.1	<0.1	<0.1
Perfluorodecanoic Acid (PFUnA)	nv	nv	ug/kg		<0.1	<0.1	<0.1	<5	<5	<0.1	<0.1	<0.1

Notes:

< denotes less than laboratory reportable detection limitis

ug/kg denotes micrograms per kilogram

GPS denotes Global Positioning System. Northing and Eastings from Universal Transverse Mercator coordinate system, Zone 13W.

n.c. denotes not calculated.

nv denotes no value, no standard exists.

RPD Relative Percent Difference = ((x1-x2)/((x1+x2)/2)) * 100%; absolute value

200 **Bold** and yellow fill - value exceeds EC Guideline

200 **Bold** and green fill - value exceeds Interim Federal Soil Guideline for coarse-grained soil

1 - FCSAP, Interim Advice to Federal Departments for the Management of Federal Contaminated Sites Containing PFOS, October 1, 2015. Commercial, direct soil contact

2 - Interim Federal Soil Quality Guidelines for PFOS, October 2015, Commercial, Coarse-Grained Soil, Freshwater Life Pathway

SUMMARY OF SOIL LABORATORY RESULTS - Groundwater
CAMBRIDGE BAY AIRPORT FTA REMEDIATION

Parameter / *Sample ID* / *Collection Date* / *Laboratory Job #* / *Laboratory Report Date*	[1] Interim Federal GW Quality Guidelines (coarse-grained, freshewater life protection)	Units	**3-09-4M** 28-Jul-15 B567564 18-Aug-15	**3-09-6M** 28-Jul-15 B567564 18-Aug-15	**YCB-01** 28-Jul-15 B567564 18-Aug-15
Perfluorinated Compounds					
Perfluorobutane Sulfonate (PFBS)	nv	ug/L	44	2.6	10
Perfluorobutanoic acid	nv	ug/L	38	4.9	15
Perfluorodecane Sulfonate	nv	ug/L	<0.8	<0.8	<0.8
Perfluorodecanoic Acid (PFDA)	nv	ug/L	<0.8	<0.8	<0.8
Perfluorododecanoic Acid (PFDoA)	nv	ug/L	<0.8	<0.8	<0.8
Perfluoroheptanoic Acid (PFHpA)	nv	ug/L	17	7	14
Perfluorohexane Sulfonate (PFHxS)	nv	ug/L	260	72	250
Perfluorohexanoic Acid (PFHxA)	nv	ug/L	190	23	96
Perfluoro-n-Octanoic Acid (PFOA)	nv	ug/L	19	8	15
Perfluorononanoic Acid (PFNA)	nv	ug/L	<0.8	1.1	<0.8
Perfluorooctane Sulfonamide (PFOSA)	nv	ug/L	<0.8	<0.8	<0.8
Perfluorooctane Sulfonate (PFOS)	60	ug/L	**130**	**400**	18
Perfluoropentanoic Acid (PFPeA)	nv	ug/L	100	20	110
Perfluorotetradecanoic Acid	nv	ug/L	<0.8	<0.8	<0.8
Perfluorotridecanoic Acid	nv	ug/L	<0.8	<0.8	<0.8
Perfluorodecanoic Acid (PFUnA)	nv	ug/L	<0.8	<0.8	<0.8

Notes:

1 Interim Federal Quality Guidelines for PFOS, October 2015, Freshwater Life pathway
< denotes less than laboratory reportable detection limitis
ug/L denotes micrograms per litre

SUMMARY OF SOIL LABORATORY RESULTS
CAMBRIDGE BAY AIRPORT FTA REMEDIATION

Parameter	*Sample ID* *Collection Date* *Laboratory Job #* *Laboratory Report Date*	**Standard** CCME CWS Commercial Ecological Soil Pathway Coarse-Grained	**Units**	**3-09-4M @1.0m** 14-Aug-15 B570599V3 9-Sep-15	**FTA North East Wall SA14 -1.7m** 17-Aug-15 B571920 14-Sep-15	**FTA South Wall SA24 - 1.7m** 18-Aug-15 B572411 4-Sep-15	**FTA South Floor SA8 - 1.7m** 19-Aug-15 B572551V2 15-Sep-15
pH		nv	pH	7.4	7.63	7.57	7.89
Calculated Parameters							
Anion Sum		nv	meq/L	18	110	26	110
Cation Sum		nv	meq/L	20	110	21	110
Cation/EC Ratio		nv	---	11	10	9.8	10
Volatile Organic Compounds							
Benzene		nv	mg/kg	3.7 (2)	<0.0050	<0.0050	<0.005
Toluene		nv	mg/kg	15	<0.020	<0.020	<0.02
Ethylbenzene		nv	mg/kg	11	<0.010	<0.010	<0.01
Xylenes (total)		nv	mg/kg	52	<0.040	<0.040	<0.04
Soluble Parameters							
Soluble Chloride (Cl)		nv	mg/L	340	3000 (1)	410	2300 (1)
Soluble Conductivity		nv	dS/m	1.8	10	2.1	11
Soluble pH		nv	pH	7.40	7.63	7.57	7.89
Sodium Adsorption Ratio		nv	N/A	3.7	23	3.5	19
Soluble Calcium (Ca)		nv	mg/L	86	160	130	240
Soluble Magnesium (Mg)		nv	mg/L	71	180	52	230
Soluble Sodium (Na)		nv	mg/L	190	1800	190	1700
Soluble Potassium (K)		nv	mg/L	67	190	85	180
Saturation %		nv	%	29	30	20	32
Soluble Sulphate (SO4)		nv	mg/L	430	970	700	2000
Petroleum Hydrocarbons F1							
F1 (C6 to C10)		320	mg/kg	**2500**	<12	<12	<12
F1 (C6 to C10 minus BTEX)		nv	mg/kg	2600	<12	<12	<12
F2 (C10-C16 Hydrocarbons)		260	mg/kg	**310**	<10	<10	<10
F3 (C16-C34 Hydrocarbons)		1700	mg/kg	220	<50	<50	<50
F4 (C34-C50 Hydrocarbons)		3300	mg/kg	<50	<50	<50	<50
Parameters							
Soluble Sodium (Na)		nv	mg/L	190	1800	190	1700
Calculated Sodium (Na)		nv	mg/kg	55	540	38	560
Misc. Inorganics							
Fraction of Organic Carbon		nv	g/g	0.013	0.00089	0.0021	0.00058
Total Organic Carbon		nv	%	1.3	0.089	0.21	0.058

Bold - value exceeds CCME Guideline

nv - no standard exists

1 - Canada-Wide Standard for Petroleum Hydrocarbons in Soil, January 2008, Ecological Soil Contact, Commercial, Coarse-grained soils

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

(2) Qualifying ion outside of acceptance criteria. Results are tentatively identified and potentially biased high.

SUMMARY OF RPDs - Perfluorinated Compounds in Soil

CAMBRIDGE BAY AIRPORT FTA REMEDIATION

Parameter	*Sample ID* / *Collection Date* / *Laboratory Job #* / *Laboratory Report Date*	Units	**3-09-4M @ 1 m** 14-Aug-15 B570599 4-Sep-15	**FD (3-09-4M @ 1m)** 14-Aug-15 B570599 4-Sep-15	**RPD** (%)
Inorganics					
Moisture		%	12	10	
Perfluorinated Compounds					
Perfluorobutane Sulfonate (PFBS)		ug/kg	20	12	**50.0**
Perfluorobutanoic acid		ug/kg	9	4.5	**66.7**
Perfluorodecane Sulfonate		ug/kg	<5	<5	n.c.
Perfluorodecanoic Acid (PFDA)		ug/kg	<0.1	<0.1	n.c.
Perfluorododecanoic Acid (PFDoA)		ug/kg	<0.1	<0.1	n.c.
Perfluoroheptanoic Acid (PFHpA)		ug/kg	10	4.7	**72.1**
Perfluorohexane Sulfonate (PFHxS)		ug/kg	480	210	**78.3**
Perfluorohexanoic Acid (PFHxA)		ug/kg	49	35	33.3
Perfluoro-n-Octanoic Acid (PFOA)		ug/kg	27	11	**84.2**
Perfluorononanoic Acid (PFNA)		ug/kg	<0.1	<0.1	n.c.
Perfluorooctane Sulfonamide (PFOSA)		ug/kg	1.1	0.4	**93.3**
Perfluorooctane Sulfonate (PFOS)		ug/kg	45	96	**72.3**
Perfluoropentanoic Acid (PFPeA)		ug/kg	14	10	33.3
Perfluorotetradecanoic Acid		ug/kg	<0.1	<0.1	n.c.
Perfluorotridecanoic Acid		ug/kg	<0.1	<0.1	n.c.
Perfluorodecanoic Acid (PFUnA)		ug/kg	<0.1	<0.1	n.c.

n.c. denotes not calculated

*RPDs have only been considered where a concentration is greater than 5 times the EQL.

**High RPDs are in bold (Acceptable RPDs for each EQL multiplier range are: 50 (5-10 x EQL); 50 (10-30 x EQL); 50 (> 30 x EQL))

SUMMARY OF RPDs FOR SOIL ANALYTICAL RESULTS - FTA
CAMBRIDGE BAY AIRPORT

Parameter / *Sample ID* / *Collection Date* / *Laboratory Job #* / *Laboratory Report Date* / *GPS Coordindates - Northing* / *Easting*	Standard 1 CCME CWS Commercial Ecological Soil Pathway Coarse-Grained	Standard 2 CCME CSQG for Protection of Environmental Health Commercial Surface/Subsoil	Units	FTA NW WALL SA2 2.0m 14-Aug-15 B570599 4-Sep-15 7666794.6 493560.1	FTA NW WALL SA2 2.0m (Field Dup -1) 14-Aug-15 B570599 4-Sep-15 7666794.6 493560.1	RPD (%)	FTA North Floor SA4 - 2.0m 16-Aug-15 B570766 19-Sep-15 7666774.5 493580.8	Field Dup. 3 North Floor SA4 - 2.0m 16-Aug-15 B570766 19-Sep-15 7666774.5 493580.8	RPD (%)	FTA South Wall SA18 - 1.7m 18-Aug-15 B572411 4-Sep-15 7666752.2 493569.2	Field Dup. 4 - South Wall SA18 - 1.7m 18-Aug-15 B572411 4-Sep-15 7666752.2 493569.2	RPD (%)
Volatile Organic Compounds												
Benzene	-	180/360	mg/kg	<0.008	<0.008	n.c.	0.11	0.079	32.8	0.021	0.068	**105.6**
Toluene	-	250/500	mg/kg	<0.02	<0.02	n.c.	0.77	0.52	38.8	<0.020	<0.020	n.c.
Ethylbenzene	-	300/600	mg/kg	<0.01	<0.01	n.c.	0.41	0.31	27.8	0.21	0.17	21.1
Xylenes	-	350/700	mg/kg	<0.04	<0.04	n.c.	3.7	2.8	27.7	0.19	0.13	37.5
Petroleum Hydrocarbons F1 to F4												
F1 (C6 to C10)	320	-	mg/kg	<12	<12	n.c.	160	140	13.3	<12	<12	n.c.
F1 (C6 to C10 minus BTEX)	nv	-	mg/kg	<12	<12	n.c.	160	140	13.3	<12	<12	n.c.
F2 (C10 to C16)	260	-	mg/kg	<10	<10	n.c.	45	33	30.8	<10	<10	n.c.
F3 (C16 to C34)	1700	-	mg/kg	<50	<50	n.c.	<50	<50	n.c.	<50	<50	n.c.
F4 (C34 to C50)	3300	-	mg/kg	<50	<50	n.c.	<50	<50	n.c.	<50	<50	n.c.

n.c. denotes not calculated

*RPDs have only been considered where a concentration is greater than 5 times the Reportable Detection Limit (RDL)

**High RPDs are in bold (Acceptable RPDs for each RDL multiplier range are: 50 (5-10 x RDL); 50 (10-30 x RDL); 50 (> 30 x RDL))

Qualifying ion outside of acceptance criteria. Results are tentatively identified and potentially biased high.

Appendix D

Laboratory Reports

Success Through Science®

Your Project #: B570354
Your C.O.C. #: na

Attention:Linsay Sunderman

Maxxam Analytics
2021 41st Ave NE
Calgary, AB
T2E 6P2

Report Date: 2015/09/04
Report #: R3651663
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B5G6295
Received: 2015/08/20, 10:44

Sample Matrix: Soil
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Moisture	1	N/A	2015/08/21	CAM SOP-00445	Carter 2nd ed 51.2 m
PFOS and PFOA in soil	1	2015/08/26	2015/08/28	CAM SOP-00894	EPA537 m

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Andrea Rieth, Project Manager
Email: ARieth@maxxam.ca
Phone# (905)817-5787 Ext:5787
==========
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 #: B5G6295
Report Date: 2015/09/04

Maxxam Analytics
Client Project #: B570354

RESULTS OF ANALYSES OF SOIL

Maxxam ID		AVJ514		
Sampling Date		2015/08/15		
COC Number		na		
	UNITS	**MX0840\3-09-4M**	**RDL**	**QC Batch**
Inorganics				
Moisture	%	8.1	1.0	4159049
Miscellaneous Parameters				
Perfluorobutane Sulfonate (PFBS)	ug/kg	2.9	0.1	4167364
Perfluorobutanoic acid	ug/kg	2.7	0.1	4167364
Perfluorodecane Sulfonate	ug/kg	<5	5	4172659
Perfluorodecanoic Acid (PFDA)	ug/kg	<0.1	0.1	4167364
Perfluorododecanoic Acid (PFDoA)	ug/kg	<0.1	0.1	4167364
Perfluoroheptanoic Acid (PFHpA)	ug/kg	0.6	0.1	4167364
Perfluorohexane Sulfonate (PFHxS)	ug/kg	1.6	0.1	4167364
Perfluorohexanoic Acid (PFHxA)	ug/kg	10	5	4172659
Perfluoro-n-Octanoic Acid (PFOA)	ug/kg	0.5	0.1	4167364
Perfluorononanoic Acid (PFNA)	ug/kg	0.2	0.1	4167364
Perfluorooctane Sulfonamide (PFOSA)	ug/kg	0.3	0.1	4167364
Perfluorooctane Sulfonate (PFOS)	ug/kg	29	5	4172659
Perfluoropentanoic Acid (PFPeA)	ug/kg	3.4	0.1	4167364
Perfluorotetradecanoic Acid	ug/kg	<0.1	0.1	4167364
Perfluorotridecanoic Acid	ug/kg	<0.1	0.1	4167364
Perfluoroundecanoic Acid (PFUnA)	ug/kg	<0.1	0.1	4167364

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B5G6295
Report Date: 2015/09/04

Maxxam Analytics
Client Project #: B570354

TEST SUMMARY

Maxxam ID: AVJ514
Sample ID: MX0840\3-09-4M
Matrix: Soil

Collected: 2015/08/15
Shipped:
Received: 2015/08/20

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	4159049	N/A	2015/08/21	Jessy Mathew Vinod
PFOS and PFOA in soil	LCMS	4167364	2015/08/26	2015/08/28	Colm McNamara

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Maxxam Job #: B5G6295
Report Date: 2015/09/04

Maxxam Analytics
Client Project #: B570354

GENERAL COMMENTS

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

Package 1	5.0°C
Package 2	6.7°C

Sample AVJ514-01 : Perfluorinated Compounds (PFCs): Due to high concentrations of the target analytes, sample required dilution. Detection limits were adjusted accordingly.

Sample AVJ514, PFOS and PFOA in soil: Test repeated.

Results relate only to the items tested.

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Maxxam Job #: B5G6295
Report Date: 2015/09/04

Maxxam Analytics
Client Project #: B570354

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
4159049	BOP	RPD	Moisture	2015/08/21	0		%	20
4167364	CM5	Matrix Spike	Perfluorobutane Sulfonate (PFBS)	2015/08/28		92	%	70 - 130
			Perfluorobutanoic acid	2015/08/28		111	%	70 - 130
			Perfluorodecanoic Acid (PFDA)	2015/08/28		103	%	70 - 130
			Perfluorododecanoic Acid (PFDoA)	2015/08/28		102	%	70 - 130
			Perfluorononanoic Acid (PFNA)	2015/08/28		104	%	70 - 130
			Perfluorooctane Sulfonamide (PFOSA)	2015/08/28		105	%	70 - 130
			Perfluorotetradecanoic Acid	2015/08/28		97	%	70 - 130
			Perfluorotridecanoic Acid	2015/08/28		113	%	70 - 130
			Perfluoroundecanoic Acid (PFUnA)	2015/08/28		96	%	70 - 130
			Perfluoroheptanoic Acid (PFHpA)	2015/08/28		92	%	70 - 130
			Perfluorohexane Sulfonate (PFHxS)	2015/08/28		97	%	70 - 130
			Perfluoro-n-Octanoic Acid (PFOA)	2015/08/28		95	%	70 - 130
			Perfluoropentanoic Acid (PFPeA)	2015/08/28		95	%	70 - 130
4167364	CM5	RPD	Perfluorobutane Sulfonate (PFBS)	2015/08/28	4.6		%	30
			Perfluorobutanoic acid	2015/08/28	4.2		%	30
			Perfluorodecanoic Acid (PFDA)	2015/08/28	1.6		%	30
			Perfluorododecanoic Acid (PFDoA)	2015/08/28	7.3		%	30
			Perfluorononanoic Acid (PFNA)	2015/08/28	7.8		%	30
			Perfluorooctane Sulfonamide (PFOSA)	2015/08/28	1.9		%	25
			Perfluorotetradecanoic Acid	2015/08/28	11		%	30
			Perfluorotridecanoic Acid	2015/08/28	8.5		%	30
			Perfluoroundecanoic Acid (PFUnA)	2015/08/28	4.7		%	30
			Perfluoroheptanoic Acid (PFHpA)	2015/08/28	3.9		%	30
			Perfluorohexane Sulfonate (PFHxS)	2015/08/28	3.6		%	30
			Perfluoro-n-Octanoic Acid (PFOA)	2015/08/28	0.42		%	30
			Perfluoropentanoic Acid (PFPeA)	2015/08/28	7.7		%	30
			Perfluorobutane Sulfonate (PFBS)	2015/08/28	NC		%	30
			Perfluorononanoic Acid (PFNA)	2015/08/28	NC		%	30
			Perfluoroheptanoic Acid (PFHpA)	2015/08/28	NC		%	30
			Perfluorohexane Sulfonate (PFHxS)	2015/08/28	NC		%	30
			Perfluoro-n-Octanoic Acid (PFOA)	2015/08/28	NC		%	30
4167364	CM5	Spiked Blank	Perfluorobutane Sulfonate (PFBS)	2015/08/28		96	%	70 - 130
			Perfluorobutanoic acid	2015/08/28		105	%	70 - 130
			Perfluorodecanoic Acid (PFDA)	2015/08/28		94	%	70 - 130
			Perfluorododecanoic Acid (PFDoA)	2015/08/28		98	%	70 - 130
			Perfluorononanoic Acid (PFNA)	2015/08/28		103	%	70 - 130
			Perfluorooctane Sulfonamide (PFOSA)	2015/08/28		97	%	70 - 130
			Perfluorotetradecanoic Acid	2015/08/28		97	%	70 - 130
			Perfluorotridecanoic Acid	2015/08/28		99	%	70 - 130
			Perfluoroundecanoic Acid (PFUnA)	2015/08/28		102	%	70 - 130
			Perfluoroheptanoic Acid (PFHpA)	2015/08/28		96	%	70 - 130
			Perfluorohexane Sulfonate (PFHxS)	2015/08/28		99	%	70 - 130
			Perfluoro-n-Octanoic Acid (PFOA)	2015/08/28		100	%	70 - 130
			Perfluoropentanoic Acid (PFPeA)	2015/08/28		92	%	70 - 130
4167364	CM5	Method Blank	Perfluorobutane Sulfonate (PFBS)	2015/08/28	<0.1		ug/kg	
			Perfluorobutanoic acid	2015/08/28	<0.1		ug/kg	
			Perfluorodecanoic Acid (PFDA)	2015/08/28	<0.1		ug/kg	
			Perfluorododecanoic Acid (PFDoA)	2015/08/28	<0.1		ug/kg	
			Perfluorononanoic Acid (PFNA)	2015/08/28	<0.1		ug/kg	
			Perfluorooctane Sulfonamide (PFOSA)	2015/08/28	<0.1		ug/kg	
			Perfluorotetradecanoic Acid	2015/08/28	<0.1		ug/kg	
			Perfluorotridecanoic Acid	2015/08/28	<0.1		ug/kg	
			Perfluoroundecanoic Acid (PFUnA)	2015/08/28	<0.1		ug/kg	

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Maxxam Job #: B5G6295
Report Date: 2015/09/04

Maxxam Analytics
Client Project #: B570354

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Perfluoroheptanoic Acid (PFHpA)	2015/08/28	<0.1		ug/kg	
			Perfluorohexane Sulfonate (PFHxS)	2015/08/28	<0.1		ug/kg	
			Perfluoro-n-Octanoic Acid (PFOA)	2015/08/28	<0.1		ug/kg	
			Perfluoropentanoic Acid (PFPeA)	2015/08/28	<0.1		ug/kg	
4172659	CM5	Matrix Spike	Perfluorodecane Sulfonate	2015/09/02		105	%	70 - 130
			Perfluorohexanoic Acid (PFHxA)	2015/09/02		101	%	70 - 130
			Perfluorooctane Sulfonate (PFOS)	2015/09/02		NC	%	70 - 130
4172659	CM5	Spiked Blank	Perfluorodecane Sulfonate	2015/09/02		105	%	70 - 130
			Perfluorohexanoic Acid (PFHxA)	2015/09/02		102	%	70 - 130
			Perfluorooctane Sulfonate (PFOS)	2015/09/02		94	%	70 - 130
4172659	CM5	Method Blank	Perfluorodecane Sulfonate	2015/09/02	<5		ug/kg	
			Perfluorohexanoic Acid (PFHxA)	2015/09/02	<5		ug/kg	
			Perfluorooctane Sulfonate (PFOS)	2015/09/02	<5		ug/kg	
4172659	CM5	RPD	Perfluorodecane Sulfonate	2015/09/02	NC		%	30
			Perfluorohexanoic Acid (PFHxA)	2015/09/02	24		%	30
			Perfluorooctane Sulfonate (PFOS)	2015/09/02	23		%	30

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

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

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

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of 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 (one or both samples < 5x RDL).

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B5G6295
Report Date: 2015/09/04

Maxxam Analytics
Client Project #: B570354

VALIDATION SIGNATURE PAGE

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

Adam Robinson, Technical Service

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.

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

RUSH

20-Aug-15 10:44
Andrea Rieth
B5G6295
M_P ENV-695

MAXXAM ANALYTICS
4000 19st N.E
Calgary, Alberta, T2E 6P8
Phone: (403) 291-3077
Fax: (403) 291-9468

PUBLIC WORKS &
GOVERNMENT SERVICES
CANADA - EDMONTON
Maxxam PM Linsay Sunderman

SUBCONTRACTING REQUEST FORM

To: Maxxam Ontario (From Calgary)

RUSH

Job# B570354

☐ Yes ☐ No International Sample/BioHazard (if yes, add copy of Movement Cert., heat treat is required prior to disposal)
☐ Yes ☐ No Special Protocol (if yes, Protocol _____).

Sample ID	Matrix	Test(s) Required	Container	Date Sampled	Date Required
MX0840-04R \ 3-09-4M	SOIL	Perfluorinated Compounds - Subcontract	1(COR2)	2015/08/15	2015/09/10

	Temp. 1	Temp. 2	Temp. 3			
Cooler #1	7	6	2	Custody Seal Present	YES ✓	NO
				Custody Seal Intact	YES ✓	NO
				Ice Present Upon Receipt	YES ✓	NO
Cooler #2	8	3	9	Custody Seal Present	YES ✓	NO
				Custody Seal Intact	YES ✓	NO
				Ice Present Upon Receipt	YES ✓	NO
Cooler #3				Custody Seal Present	YES	NO
				Custody Seal Intact	YES	NO
				Ice Present Upon Receipt	YES	NO

Receiving Maxxam Location: Maxxam Ontario (From Calgary) JOB # _____

Relinquished by (Sign) _____ (Print) Sean Kingsbury Date and Time 2015/08/19 10:15

Received by (Sign) Alex Vahdati (Print) Alex VAHDATI Date and Time 2015/08/20 10:44

NOTES:
1) Please call us if due date cannot be met. Please reference Sample ID on your report.
2) Include copy of this completed form, Client COC & signed final report to

Reporting Requirements:
National:
Regional:

SHIPPING INSTRUCTIONS

☐ Ship Immediately (highlight Yellow)
☐ Requires 9am
☐ Requires Sat. Delivery
☐ Regular Ship next available day
☐ Ship Cold
☐ Ship Room Temp
☐ Ship Frozen
☐ COC Must be Attached

Sender (Print) _____ Initial _____

SHIPPING DEPARTMENT CHECKLIST

☐ Correct Shipping location
☐ Correct Sample Ids (Paperwork vs Bottles)
☐ Yes ☐ No Special-Cooler, Ice, Tape-custody seal, Date&Sign
Date Shipped _____ Number of coolers _____
Shipper (Print) _____ Initial _____

Your P.O. #: 700330152
Your Project #: CAMBRIDGE BAY, NU
Your C.O.C. #: A158825

Attention: HEATHER FISHER
DILLON CONSULTING LTD.
WINNIPEG
1558 Willson Place
Winnipeg, MB
CANADA R3T 0Y4

Report Date: 2015/08/19
Report #: R2026984
Version: 1P

CERTIFICATE OF ANALYSIS – PARTIAL RESULTS

MAXXAM JOB #: B570354
Received: 2015/08/17, 08:45

Sample Matrix: Soil
Samples Received: 8

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
BTEX/F1 by HS GC/MS/FID (MeOH extract)	8	2015/08/19	2015/08/19	AB SOP-00039	CCME CWS/EPA 8260c m
CCME Hydrocarbons (F2-F4 in soil) (1)	8	2015/08/19	2015/08/19	AB SOP-00036 / AB SOP-00040	CCME PHC-CWS
Moisture	8	N/A	2015/08/19	AB SOP-00002	CCME PHC-CWS

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) All CCME 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.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Linsay Sunderman, Project Manager
Email: LSunderman@maxxam.ca
Phone# (403) 735-2237 Ext:2237

==========

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.

Total cover pages: 1

Maxxam Job #: B570354
Report Date: 2015/08/19

DILLON CONSULTING LTD.
Client Project #: CAMBRIDGE BAY, NU

Your P.O. #: 700330152

AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		MX0834	MX0835	MX0836	MX0837	MX0838	MX0839		
Sampling Date		2015/08/15	2015/08/15	2015/08/15	2015/08/15	2015/08/15	2015/08/15		
COC Number		A158825	A158825	A158825	A158825	A158825	A158825		
	UNITS	**WEST WALL SA3**	**WEST WALL SA4**	**WEST WALL SA5**	**WEST WALL SA6**	**WEST WALL SA7**	**WEST WALL SA8**	**RDL**	**QC Batch**
Physical Properties									
Moisture	%	7.7	7.6	7.6	8.7	8.0	8.1	0.30	8007880
Ext. Pet. Hydrocarbon									
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	<10	410	<10	39	<10	10	8007281
F3 (C16-C34 Hydrocarbons)	mg/kg	<50	<50	57	<50	53	<50	50	8007281
F4 (C34-C50 Hydrocarbons)	mg/kg	<50	<50	<50	<50	<50	<50	50	8007281
Reached Baseline at C50	mg/kg	Yes	Yes	Yes	Yes	Yes	Yes		8007281
Volatiles									
Benzene	mg/kg	<0.0050	<0.0050	0.011 (1)	<0.0050	<0.0050	0.015	0.0050	8007315
Toluene	mg/kg	<0.020	<0.020	0.031 (1)	<0.020	<0.020	<0.020	0.020	8007315
Ethylbenzene	mg/kg	<0.010	<0.010	0.073	<0.010	0.10	<0.010	0.010	8007315
Xylenes (Total)	mg/kg	<0.040	<0.040	1.8	<0.040	0.30	<0.040	0.040	8007315
m & p-Xylene	mg/kg	<0.040	<0.040	0.84	<0.040	0.30	<0.040	0.040	8007315
o-Xylene	mg/kg	<0.020	<0.020	0.92	<0.020	<0.020	<0.020	0.020	8007315
F1 (C6-C10) - BTEX	mg/kg	<12	<12	520	<12	26	<12	12	8007315
F1 (C6-C10)	mg/kg	<12	<12	520	<12	27	<12	12	8007315
Surrogate Recovery (%)									
1,4-Difluorobenzene (sur.)	%	100	99	100	100	100	99		8007315
4-Bromofluorobenzene (sur.)	%	104	104	102	104	105	103		8007315
D10-ETHYLBENZENE (sur.)	%	118	119	130	118	119	118		8007315
D4-1,2-Dichloroethane (sur.)	%	110	109	110	108	108	110		8007315
O-TERPHENYL (sur.)	%	103	113	126	132 (2)	114	129		8007281

RDL = Reportable Detection Limit
(1) Qualifying ion outside of acceptance criteria. Results are tentatively identified and potentially biased high.
(2) Surrogate recovery exceeds acceptance criteria (high recovery). As results are non-detect, there is no impact on data quality.

Maxxam Job #: B570354
Report Date: 2015/08/19

DILLON CONSULTING LTD.
Client Project #: CAMBRIDGE BAY, NU

Your P.O. #: 700330152

AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		MX0840	MX0841		
Sampling Date		2015/08/15	2015/08/15		
COC Number		A158825	A158825		
	UNITS	**3-09-4M (FLOOR)**	**WEST FLOOR SA3**	**RDL**	**QC Batch**
Physical Properties					
Moisture	%	7.5	8.6	0.30	8007880
Ext. Pet. Hydrocarbon					
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	140	10	8007281
F3 (C16-C34 Hydrocarbons)	mg/kg	<50	340	50	8007281
F4 (C34-C50 Hydrocarbons)	mg/kg	<50	<50	50	8007281
Reached Baseline at C50	mg/kg	Yes	Yes		8007281
Volatiles					
Benzene	mg/kg	0.50	<0.0050	0.0050	8007315
Toluene	mg/kg	<0.020	0.024	0.020	8007315
Ethylbenzene	mg/kg	<0.010	<0.010	0.010	8007315
Xylenes (Total)	mg/kg	<0.040	<0.040	0.040	8007315
m & p-Xylene	mg/kg	<0.040	<0.040	0.040	8007315
o-Xylene	mg/kg	<0.020	<0.020	0.020	8007315
F1 (C6-C10) - BTEX	mg/kg	<12	<12	12	8007315
F1 (C6-C10)	mg/kg	<12	<12	12	8007315
Surrogate Recovery (%)					
1,4-Difluorobenzene (sur.)	%	98	99		8007315
4-Bromofluorobenzene (sur.)	%	104	105		8007315
D10-ETHYLBENZENE (sur.)	%	118	120		8007315
D4-1,2-Dichloroethane (sur.)	%	110	107		8007315
O-TERPHENYL (sur.)	%	105	107		8007281

RDL = Reportable Detection Limit

Maxxam Job #: B570354
Report Date: 2015/08/19

DILLON CONSULTING LTD.
Client Project #: CAMBRIDGE BAY, NU

Your P.O. #: 700330152

General Comments

Results relate only to the items tested.

DILLON CONSULTING LTD.
Attention: HEATHER FISHER
Client Project #: CAMBRIDGE BAY, NU
P.O. #: 700330152
Site Location:

Quality Assurance Report

Maxxam Job Number: EYKB570354

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	UNITS	QC Limits
8007281	LSH	Matrix Spike	O-TERPHENYL (sur.)	2015/08/19		91	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2015/08/19		103	%	50 - 130
			F3 (C16-C34 Hydrocarbons)	2015/08/19		106	%	50 - 130
			F4 (C34-C50 Hydrocarbons)	2015/08/19		102	%	50 - 130
		Spiked Blank	O-TERPHENYL (sur.)	2015/08/19		90	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2015/08/19		98	%	70 - 130
			F3 (C16-C34 Hydrocarbons)	2015/08/19		100	%	70 - 130
			F4 (C34-C50 Hydrocarbons)	2015/08/19		99	%	70 - 130
		Method Blank	O-TERPHENYL (sur.)	2015/08/19		124	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2015/08/19	<10		mg/kg	
			F3 (C16-C34 Hydrocarbons)	2015/08/19	<50		mg/kg	
			F4 (C34-C50 Hydrocarbons)	2015/08/19	<50		mg/kg	
		RPD	F2 (C10-C16 Hydrocarbons)	2015/08/19	NC		%	50
			F3 (C16-C34 Hydrocarbons)	2015/08/19	NC		%	50
			F4 (C34-C50 Hydrocarbons)	2015/08/19	NC		%	50
8007315	ABG	Matrix Spike	1,4-Difluorobenzene (sur.)	2015/08/19		87	%	60 - 140
			4-Bromofluorobenzene (sur.)	2015/08/19		96	%	60 - 140
			D10-ETHYLBENZENE (sur.)	2015/08/19		110	%	60 - 130
			D4-1,2-Dichloroethane (sur.)	2015/08/19		106	%	60 - 140
			Benzene	2015/08/19		127	%	60 - 140
			Toluene	2015/08/19		115	%	60 - 140
			Ethylbenzene	2015/08/19		117	%	60 - 140
			m & p-Xylene	2015/08/19		117	%	60 - 140
			o-Xylene	2015/08/19		116	%	60 - 140
			F1 (C6-C10)	2015/08/19		92	%	60 - 140
		Spiked Blank	1,4-Difluorobenzene (sur.)	2015/08/19		90	%	60 - 140
			4-Bromofluorobenzene (sur.)	2015/08/19		94	%	60 - 140
			D10-ETHYLBENZENE (sur.)	2015/08/19		104	%	60 - 130
			D4-1,2-Dichloroethane (sur.)	2015/08/19		101	%	60 - 140
			Benzene	2015/08/19		118	%	60 - 140
			Toluene	2015/08/19		108	%	60 - 140
			Ethylbenzene	2015/08/19		109	%	60 - 140
			m & p-Xylene	2015/08/19		110	%	60 - 140
			o-Xylene	2015/08/19		108	%	60 - 140
			F1 (C6-C10)	2015/08/19		118	%	60 - 140
		Method Blank	1,4-Difluorobenzene (sur.)	2015/08/19		96	%	60 - 140
			4-Bromofluorobenzene (sur.)	2015/08/19		106	%	60 - 140
			D10-ETHYLBENZENE (sur.)	2015/08/19		121	%	60 - 130
			D4-1,2-Dichloroethane (sur.)	2015/08/19		105	%	60 - 140
			Benzene	2015/08/19	<0.0050		mg/kg	
			Toluene	2015/08/19	<0.020		mg/kg	
			Ethylbenzene	2015/08/19	<0.010		mg/kg	
			Xylenes (Total)	2015/08/19	<0.040		mg/kg	
			m & p-Xylene	2015/08/19	<0.040		mg/kg	
			o-Xylene	2015/08/19	<0.020		mg/kg	
			F1 (C6-C10) - BTEX	2015/08/19	<12		mg/kg	
			F1 (C6-C10)	2015/08/19	<12		mg/kg	
		RPD	Benzene	2015/08/19	35		%	50
			Toluene	2015/08/19	NC		%	50
			Ethylbenzene	2015/08/19	7.6		%	50
			Xylenes (Total)	2015/08/19	13		%	50
			m & p-Xylene	2015/08/19	16		%	50
			o-Xylene	2015/08/19	0.47		%	50
			F1 (C6-C10) - BTEX	2015/08/19	NC		%	50
			F1 (C6-C10)	2015/08/19	NC		%	50

DILLON CONSULTING LTD.
Attention: HEATHER FISHER
Client Project #: CAMBRIDGE BAY, NU
P.O. #: 700330152
Site Location:

Quality Assurance Report (Continued)

Maxxam Job Number: EYKB570354

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	UNITS	QC Limits
8007880	AN0	Method Blank	Moisture	2015/08/19	<0.30		%	
		RPD	Moisture	2015/08/19	6.2		%	20

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.
Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.
Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.
Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.
Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.
NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

Validation Signature Page

Maxxam Job #: B570354

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

Janet Gao, Supervisor

Veronica Falk, Scientific Specialist

==========

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Maxxam
A Bureau Veritas Group Company

Success Through Science®

Your P.O. #: 700330152
Your Project #: FTA
Site Location: CAMBRIDGE BAY, NU
Your C.O.C. #: A158825

Attention:HEATHER FISHER

DILLON CONSULTING LTD.
1558 Willson Place
Winnipeg, MB
CANADA R3T 0Y4

Report Date: 2015/09/10
Report #: R2038920
Version: 2 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B570354
Received: 2015/08/17, 08:45

Sample Matrix: Soil
Samples Received: 8

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
BTEX/F1 by HS GC/MS/FID (MeOH extract) (1)	8	2015/08/19	2015/08/19	AB SOP-00039	CCME CWS/EPA 8260c m
CCME Hydrocarbons (F2-F4 in soil) (1, 2)	8	2015/08/19	2015/08/19	AB SOP-00036 / AB SOP-00040	CCME PHC-CWS
Moisture (1)	8	N/A	2015/08/19	AB SOP-00002	CCME PHC-CWS

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 Calgary Environmental

(2) All CCME 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.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Linsay Sunderman, Project Manager
Email: LSunderman@maxxam.ca
Phone# (403)735-2237 Ext:2237

==========

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Maxxam Job #: B570354
Report Date: 2015/09/10

DILLON CONSULTING LTD.
Client Project #: FTA
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700330152

RESULTS OF CHEMICAL ANALYSES OF SOIL

Maxxam ID		MX0834	MX0835	MX0836	MX0837	MX0838		
Sampling Date		2015/08/15	2015/08/15	2015/08/15	2015/08/15	2015/08/15		
COC Number		A158825	A158825	A158825	A158825	A158825		
	UNITS	WEST WALL SA3	WEST WALL SA4	WEST WALL SA5	WEST WALL SA6	WEST WALL SA7	RDL	QC Batch
Physical Properties								
Moisture	%	7.7	7.6	7.6	8.7	8.0	0.30	8007880
RDL = Reportable Detection Limit								

Maxxam ID		MX0839	MX0840	MX0841		
Sampling Date		2015/08/15	2015/08/15	2015/08/15		
COC Number		A158825	A158825	A158825		
	UNITS	WEST WALL SA8	3-09-4M (FLOOR)	WEST FLOOR SA3	RDL	QC Batch
Physical Properties						
Moisture	%	8.1	7.5	8.6	0.30	8007880
RDL = Reportable Detection Limit						

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B570354
Report Date: 2015/09/10

DILLON CONSULTING LTD.
Client Project #: FTA
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700330152

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		MX0834	MX0835	MX0836	MX0837	MX0838		
Sampling Date		2015/08/15	2015/08/15	2015/08/15	2015/08/15	2015/08/15		
COC Number		A158825	A158825	A158825	A158825	A158825		
	UNITS	WEST WALL SA3	WEST WALL SA4	WEST WALL SA5	WEST WALL SA6	WEST WALL SA7	RDL	QC Batch
Ext. Pet. Hydrocarbon								
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	<10	410	<10	39	10	8007281
F3 (C16-C34 Hydrocarbons)	mg/kg	<50	<50	57	<50	53	50	8007281
F4 (C34-C50 Hydrocarbons)	mg/kg	<50	<50	<50	<50	<50	50	8007281
Reached Baseline at C50	mg/kg	Yes	Yes	Yes	Yes	Yes		8007281
Surrogate Recovery (%)								
O-TERPHENYL (sur.)	%	103	113	126	132 (1)	114		8007281

RDL = Reportable Detection Limit
(1) Surrogate recovery exceeds acceptance criteria (high recovery). As results are non-detect, there is no impact on data quality.

Maxxam ID		MX0839	MX0840	MX0841		
Sampling Date		2015/08/15	2015/08/15	2015/08/15		
COC Number		A158825	A158825	A158825		
	UNITS	WEST WALL SA8	3-09-4M (FLOOR)	WEST FLOOR SA3	RDL	QC Batch
Ext. Pet. Hydrocarbon						
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	<10	140	10	8007281
F3 (C16-C34 Hydrocarbons)	mg/kg	<50	<50	340	50	8007281
F4 (C34-C50 Hydrocarbons)	mg/kg	<50	<50	<50	50	8007281
Reached Baseline at C50	mg/kg	Yes	Yes	Yes		8007281
Surrogate Recovery (%)						
O-TERPHENYL (sur.)	%	129	105	107		8007281

RDL = Reportable Detection Limit

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B570354
Report Date: 2015/09/10

DILLON CONSULTING LTD.
Client Project #: FTA
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700330152

VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		MX0834	MX0835	MX0836	MX0837	MX0838		
Sampling Date		2015/08/15	2015/08/15	2015/08/15	2015/08/15	2015/08/15		
COC Number		A158825	A158825	A158825	A158825	A158825		
	UNITS	WEST WALL SA3	WEST WALL SA4	WEST WALL SA5	WEST WALL SA6	WEST WALL SA7	RDL	QC Batch
Volatiles								
Benzene	mg/kg	<0.0050	<0.0050	0.011 (1)	<0.0050	<0.0050	0.0050	8007315
Toluene	mg/kg	<0.020	<0.020	0.031 (1)	<0.020	<0.020	0.020	8007315
Ethylbenzene	mg/kg	<0.010	<0.010	0.073	<0.010	0.10	0.010	8007315
Xylenes (Total)	mg/kg	<0.040	<0.040	1.8	<0.040	0.30	0.040	8007315
m & p-Xylene	mg/kg	<0.040	<0.040	0.84	<0.040	0.30	0.040	8007315
o-Xylene	mg/kg	<0.020	<0.020	0.92	<0.020	<0.020	0.020	8007315
F1 (C6-C10) - BTEX	mg/kg	<12	<12	520	<12	26	12	8007315
F1 (C6-C10)	mg/kg	<12	<12	520	<12	27	12	8007315
Surrogate Recovery (%)								
1,4-Difluorobenzene (sur.)	%	100	99	100	100	100		8007315
4-Bromofluorobenzene (sur.)	%	104	104	102	104	105		8007315
D10-ETHYLBENZENE (sur.)	%	118	119	130	118	119		8007315
D4-1,2-Dichloroethane (sur.)	%	110	109	110	108	108		8007315

RDL = Reportable Detection Limit
(1) Qualifying ion outside of acceptance criteria. Results are tentatively identified and potentially biased high.

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B570354
Report Date: 2015/09/10

DILLON CONSULTING LTD.
Client Project #: FTA
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700330152

VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		MX0839	MX0840	MX0841		
Sampling Date		2015/08/15	2015/08/15	2015/08/15		
COC Number		A158825	A158825	A158825		
	UNITS	WEST WALL SA8	3-09-4M (FLOOR)	WEST FLOOR SA3	RDL	QC Batch
Volatiles						
Benzene	mg/kg	0.015	0.50	<0.0050	0.0050	8007315
Toluene	mg/kg	<0.020	<0.020	0.024	0.020	8007315
Ethylbenzene	mg/kg	<0.010	<0.010	<0.010	0.010	8007315
Xylenes (Total)	mg/kg	<0.040	<0.040	<0.040	0.040	8007315
m & p-Xylene	mg/kg	<0.040	<0.040	<0.040	0.040	8007315
o-Xylene	mg/kg	<0.020	<0.020	<0.020	0.020	8007315
F1 (C6-C10) - BTEX	mg/kg	<12	<12	<12	12	8007315
F1 (C6-C10)	mg/kg	<12	<12	<12	12	8007315
Surrogate Recovery (%)						
1,4-Difluorobenzene (sur.)	%	99	98	99		8007315
4-Bromofluorobenzene (sur.)	%	103	104	105		8007315
D10-ETHYLBENZENE (sur.)	%	118	118	120		8007315
D4-1,2-Dichloroethane (sur.)	%	110	110	107		8007315
RDL = Reportable Detection Limit						

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Maxxam Job #: B570354
Report Date: 2015/09/10

DILLON CONSULTING LTD.
Client Project #: FTA
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700330152

GENERAL COMMENTS

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

Package 1	3.0°C

PFOS and PHOA Results are attached to this report. The reference number for these results from Maxxam Campobello is B5G6295.

Results relate only to the items tested.

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B570354
Report Date: 2015/09/10

QUALITY ASSURANCE REPORT

DILLON CONSULTING LTD.
Client Project #: FTA
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700330152

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8007281	O-TERPHENYL (sur.)	2015/08/19	91	50 - 130	90	50 - 130	124	%		
8007315	1,4-Difluorobenzene (sur.)	2015/08/19	87	60 - 140	90	60 - 140	96	%		
8007315	4-Bromofluorobenzene (sur.)	2015/08/19	96	60 - 140	94	60 - 140	106	%		
8007315	D10-ETHYLBENZENE (sur.)	2015/08/19	110	60 - 130	104	60 - 130	121	%		
8007315	D4-1,2-Dichloroethane (sur.)	2015/08/19	106	60 - 140	101	60 - 140	105	%		
8007281	F2 (C10-C16 Hydrocarbons)	2015/08/19	103	50 - 130	98	70 - 130	<10	mg/kg	NC	50
8007281	F3 (C16-C34 Hydrocarbons)	2015/08/19	106	50 - 130	100	70 - 130	<50	mg/kg	NC	50
8007281	F4 (C34-C50 Hydrocarbons)	2015/08/19	102	50 - 130	99	70 - 130	<50	mg/kg	NC	50
8007315	Benzene	2015/08/19	127	60 - 140	118	60 - 140	<0.0050	mg/kg	35	50
8007315	Ethylbenzene	2015/08/19	117	60 - 140	109	60 - 140	<0.010	mg/kg	7.6	50
8007315	F1 (C6-C10) - BTEX	2015/08/19					<12	mg/kg	NC	50
8007315	F1 (C6-C10)	2015/08/19	92	60 - 140	118	60 - 140	<12	mg/kg	NC	50
8007315	m & p-Xylene	2015/08/19	117	60 - 140	110	60 - 140	<0.040	mg/kg	16	50
8007315	o-Xylene	2015/08/19	116	60 - 140	108	60 - 140	<0.020	mg/kg	0.47	50
8007315	Toluene	2015/08/19	115	60 - 140	108	60 - 140	<0.020	mg/kg	NC	50
8007315	Xylenes (Total)	2015/08/19					<0.040	mg/kg	13	50
8007880	Moisture	2015/08/19					<0.30	%	6.2	20

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

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

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

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B570354
Report Date: 2015/09/10

DILLON CONSULTING LTD.
Client Project #: FTA
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700330152

VALIDATION SIGNATURE PAGE

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

Janet Gao, Supervisor

Veronica Falk, 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.

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam

Calgary: 4000 19st St. NE, T2E 6P8. Ph: (403) 291-3077, Fax: (403) 735-2240, Toll free: (800) 386-7247
Edmonton: 9331 - 48 Street, T6B 2R4. Ph: (780) 577-7100, Fax: (780) 450-4187, Toll free: (877) 465-8889
www.maxxamanalytics.com

Chain of Custody A158825

618

Page: 1 of 1

	Invoice To:	C/O Report Address ☐	Report To: (Same as Invoice) ☐	Report Distribution (E-Mail):
Company:	PWGSC			hfisher@dillon.ca
Contact:	Natalie Robinson			mhopps@dillon.ca
Address:	Suite 1650, 635-8th Av SW			Natalie.Robinson@pwgsc-tpsgc.ca
	Prov: Alberta	PC: Calgary	Prov: PC:	
Contact #s:	Ph: 403-292.6882	Cell:	Ph: Cell:	

REGULATORY GUIDELINES:
- ☐ AT1
- ☐ CCME
- ☐ Regulated Drinking Water
- ☐ Other:

All samples are held for 60 calendar days after sample receipt, unless specified otherwise.

PO #:	700330152
Project # / Name:	FTA
Site Location:	Cambridge Bay, NU
Quote #:	R.05169.005
Sampled By:	M. Hopps

SERVICE REQUESTED: ☒ RUSH (Contact lab to reserve) Date Required: ☐ REGULAR (5 to 7 Days)

See reverse for package specifics: CME Pac

SOIL: BTEX F1-F4 | Sieve (75 micron) | Regulated Metals (CCME / AT1) | Salinity 4 | Assessment ICP Metals | Basic Class II Landfill | Lead in Soil | PFOS / PFOA

WATER: ☐BTEX F1 ☐VOCs | ☐BTEX F1-F2 ☐BTEX F1-F4 | ☐ Routine Water ☐ Turb ☐ F | ☐ TOC ☐ DOC | Regulated Metals (CCME / AT1): Total, Dissolved | Mercury ☐ Total ☐ Dissolved

Other Analysis: Lead in Soil | HOLD - Do not Analyze | # of Containers Submitted

#	Sample ID	Depth (unit)	Matrix GW / SW Soil	Date/Time Sampled YY/MM/DD 24:00	BTEX F1-F4	PFOS / PFOA	# of Containers Submitted
1	West Wall SA3	1.0m	Soil	15/08/15	X		2
2	West Wall SA4	2.0m	Soil	↓	X		2
3	West Wall SA5	1.0m	Soil	↓	X		2
4	West Wall SA6	2.0m	Soil	↓	X		2
5	West Wall SA7	1.0	Soil	↓	X		2
6	West Wall SA8	1.8	Soil	↓	X		2
7	3-09-4m (Floor)	2.0	Soil	↓	X	X	3
8	West Floor SA3	1.8	Soil	↓	X		2
9							
10							
11							
12							

17-Aug-15 08:45
Lisa Tycholiz
B570354

RECEIVED IN YELLOWKNIFE
By: Michelle Guite
2015-08-17 8:45
Temp: 4 / 3 / 12

Please indicate Filtered, Preserved or Both (F, P, F/P) → F/P

Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):
Matthew Hopps	15/08/15	1000
Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):

Special Instructions: Please contact Heather if there are detectable concentrations of lead in soil.

# of Jars Used & Not Submitted:

LAB USE ONLY

Received By:	Date:	Time:	Maxxam Job #:	
Muhammad Akhter	2015/08/18	16:15	B570354	
Lab Comments:			Custody Seal	Temperature	Ice
			YES	4, 5, 4	YES

AB FCD-00331 Rev3 2010/05

Maxxam Analytics International Corporation o/a Maxxam Analytics

Your P.O. #: 700330152
Your Project #: CBA-FTA
Site Location: CAMBRIDGE BAY, NU
Your C.O.C. #: A158826

Attention: HEATHER FISHER
DILLON CONSULTING LTD.
WINNIPEG
1558 Willson Place
Winnipeg, MB
CANADA R3T 0Y4

Report Date: 2015/08/18
Report #: R2026215
Version: 1P

CERTIFICATE OF ANALYSIS – PARTIAL RESULTS

MAXXAM JOB #: B570599
Received: 2015/08/16, 9:50

Sample Matrix: Soil
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Particle Size by Sieve (75 micron)	1	N/A	2015/08/18	AB SOP-00022	ASTM D422-63 2007 m

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Linsay Sunderman, Project Manager
Email: LSunderman@maxxam.ca
Phone# (403) 735-2237 Ext:2237

==========

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.

Total cover pages: 1

Maxxam Job #: B570599
Report Date: 2015/08/18

DILLON CONSULTING LTD.
Client Project #: CBA-FTA
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700330152
Sampler Initials: MH

RESULTS OF CHEMICAL ANALYSES OF SOIL

Maxxam ID		MX2252		
Sampling Date		2015/08/14		
COC Number		A158826		
	UNITS	**NW WALL SA2 @ 2.0**	**RDL**	**QC Batch**
Physical Properties				
Sieve - Pan	%	49	0.20	8006071
Sieve - #200 (>0.075mm)	%	51	0.20	8006071
Grain Size	%	COARSE	0.20	8006071

RDL = Reportable Detection Limit

Maxxam Job #: B570599
Report Date: 2015/08/18

DILLON CONSULTING LTD.
Client Project #: CBA-FTA
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700330152
Sampler Initials: MH

General Comments

Results relate only to the items tested.

DILLON CONSULTING LTD.
Attention: HEATHER FISHER
Client Project #: CBA-FTA
P.O. #: 700330152
Site Location: CAMBRIDGE BAY, NU

Quality Assurance Report

Maxxam Job Number: EYKB570599

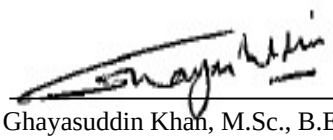
QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	UNITS	QC Limits
8006071	MN0	QC Standard	Sieve - Pan	2015/08/18		99	%	75 - 125
			Sieve - #200 (>0.075mm)	2015/08/18		103	%	75 - 125
		RPD [MX2252-02]	Sieve - Pan	2015/08/18	2.1		%	35
			Sieve - #200 (>0.075mm)	2015/08/18	2.0		%	35

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.
QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Validation Signature Page

Maxxam Job #: B570599

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



Ghayasuddin Khan, M.Sc., B.Ed., P.Chem, Scientific Specialist

==========

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Your P.O. #: 700330152
Your Project #: CBA-FTA
Site Location: CAMBRIDGE BAY, NU
Your C.O.C. #: A158826

Attention: HEATHER FISHER
DILLON CONSULTING LTD.
WINNIPEG
1558 Willson Place
Winnipeg, MB
CANADA R3T 0Y4

Report Date: 2015/08/19
Report #: R2026626
Version: 2P

CERTIFICATE OF ANALYSIS – PARTIAL RESULTS

MAXXAM JOB #: B570599
Received: 2015/08/16, 9:50

Sample Matrix: Soil
Samples Received: 5

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
BTEX/F1 by HS GC/MS/FID (MeOH extract)	5	2015/08/18	2015/08/18	AB SOP-00039	CCME CWS/EPA 8260c m
CCME Hydrocarbons (F2-F4 in soil) (1)	5	2015/08/18	2015/08/18	AB SOP-00036 / AB SOP-00040	CCME PHC-CWS

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) All CCME 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.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Linsay Sunderman, Project Manager
Email: LSunderman@maxxam.ca
Phone# (403) 735-2237 Ext:2237

==========

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.

Total cover pages: 1

Maxxam Job #: B570599
Report Date: 2015/08/19

DILLON CONSULTING LTD.
Client Project #: CBA-FTA
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700330152
Sampler Initials: MH

AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		MX2251		MX2252		MX2253		MX2254		
Sampling Date		2015/08/14		2015/08/14		2015/08/14		2015/08/14		
COC Number		A158826		A158826		A158826		A158826		
	UNITS	**NW WALL SA1 @ 1.0**	**RDL**	**NW WALL SA2 @ 2.0**	**RDL**	**NW FLOOR SA1 @ 2.0**	**RDL**	**FIELD DUPLICATE-1**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon										
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	10	<10	10	<10	10	<10	10	8005406
F3 (C16-C34 Hydrocarbons)	mg/kg	<50	50	<50	50	<50	50	<50	50	8005406
F4 (C34-C50 Hydrocarbons)	mg/kg	<50	50	<50	50	<50	50	<50	50	8005406
Reached Baseline at C50	mg/kg	Yes		Yes		Yes		Yes		8005406
Volatiles										
Benzene	mg/kg	<0.015 (1)	0.015	<0.0080 (1)	0.0080	<0.015 (1)	0.015	<0.0080 (1)	0.0080	8004459
Toluene	mg/kg	<0.020	0.020	<0.020	0.020	<0.020	0.020	<0.020	0.020	8004459
Ethylbenzene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	8004459
Xylenes (Total)	mg/kg	<0.040	0.040	<0.040	0.040	<0.040	0.040	<0.040	0.040	8004459
m & p-Xylene	mg/kg	<0.040	0.040	<0.040	0.040	<0.040	0.040	<0.040	0.040	8004459
o-Xylene	mg/kg	<0.020	0.020	<0.020	0.020	<0.020	0.020	<0.020	0.020	8004459
F1 (C6-C10) - BTEX	mg/kg	<12	12	<12	12	<12	12	<12	12	8004459
F1 (C6-C10)	mg/kg	<12	12	<12	12	<12	12	<12	12	8004459
Surrogate Recovery (%)										
1,4-Difluorobenzene (sur.)	%	106		104		106		105		8004459
4-Bromofluorobenzene (sur.)	%	107		108		107		107		8004459
D10-ETHYLBENZENE (sur.)	%	103		101		100		103		8004459
D4-1,2-Dichloroethane (sur.)	%	121		123		123		125		8004459
O-TERPHENYL (sur.)	%	96		93		92		109		8005406

RDL = Reportable Detection Limit
(1) Detection limit raised due to interferent.

Maxxam Job #: B570599
Report Date: 2015/08/19

DILLON CONSULTING LTD.
Client Project #: CBA-FTA
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700330152
Sampler Initials: MH

AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		MX2255		
Sampling Date		2015/08/14		
COC Number		A158826		
	UNITS	**3-09-4M @ 1.0**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon				
F2 (C10-C16 Hydrocarbons)	mg/kg	310	10	8005406
F3 (C16-C34 Hydrocarbons)	mg/kg	220	50	8005406
F4 (C34-C50 Hydrocarbons)	mg/kg	<50	50	8005406
Reached Baseline at C50	mg/kg	Yes		8005406
Volatiles				
Benzene	mg/kg	3.7 (1)	0.0050	8004459
Toluene	mg/kg	15	0.020	8004459
Ethylbenzene	mg/kg	11	0.010	8004459
Xylenes (Total)	mg/kg	52	0.040	8004459
m & p-Xylene	mg/kg	39	0.040	8004459
o-Xylene	mg/kg	12	0.020	8004459
F1 (C6-C10) - BTEX	mg/kg	2500	12	8004459
F1 (C6-C10)	mg/kg	2600	12	8004459
Surrogate Recovery (%)				
1,4-Difluorobenzene (sur.)	%	104		8004459
4-Bromofluorobenzene (sur.)	%	114		8004459
D10-ETHYLBENZENE (sur.)	%	102		8004459
D4-1,2-Dichloroethane (sur.)	%	NC (2)		8004459
O-TERPHENYL (sur.)	%	99		8005406

RDL = Reportable Detection Limit
(1) Qualifying ion outside of acceptance criteria. Results are tentatively identified and potentially biased high.
(2) Surrogate recovery is non-calculable due to matrix interference.

Maxxam Job #: B570599
Report Date: 2015/08/19

DILLON CONSULTING LTD.
Client Project #: CBA-FTA
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700330152
Sampler Initials: MH

General Comments

Results relate only to the items tested.

DILLON CONSULTING LTD.
Attention: HEATHER FISHER
Client Project #: CBA-FTA
P.O. #: 700330152
Site Location: CAMBRIDGE BAY, NU

Quality Assurance Report

Maxxam Job Number: EYKB570599

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	UNITS	QC Limits
8004459 MZ	Matrix Spike	1,4-Difluorobenzene (sur.)	2015/08/18		103	%	60 - 140
		4-Bromofluorobenzene (sur.)	2015/08/18		109	%	60 - 140
		D10-ETHYLBENZENE (sur.)	2015/08/18		107	%	60 - 130
		D4-1,2-Dichloroethane (sur.)	2015/08/18		128	%	60 - 140
		Benzene	2015/08/18		126	%	60 - 140
		Toluene	2015/08/18		118	%	60 - 140
		Ethylbenzene	2015/08/18		114	%	60 - 140
		m & p-Xylene	2015/08/18		110	%	60 - 140
		o-Xylene	2015/08/18		112	%	60 - 140
		F1 (C6-C10)	2015/08/18		111	%	60 - 140
	Spiked Blank	1,4-Difluorobenzene (sur.)	2015/08/18		89	%	60 - 140
		4-Bromofluorobenzene (sur.)	2015/08/18		91	%	60 - 140
		D10-ETHYLBENZENE (sur.)	2015/08/18		91	%	60 - 130
		D4-1,2-Dichloroethane (sur.)	2015/08/18		112	%	60 - 140
		Benzene	2015/08/18		111	%	60 - 140
		Toluene	2015/08/18		102	%	60 - 140
		Ethylbenzene	2015/08/18		98	%	60 - 140
		m & p-Xylene	2015/08/18		94	%	60 - 140
		o-Xylene	2015/08/18		96	%	60 - 140
		F1 (C6-C10)	2015/08/18		109	%	60 - 140
	Method Blank	1,4-Difluorobenzene (sur.)	2015/08/18		105	%	60 - 140
		4-Bromofluorobenzene (sur.)	2015/08/18		106	%	60 - 140
		D10-ETHYLBENZENE (sur.)	2015/08/18		97	%	60 - 130
		D4-1,2-Dichloroethane (sur.)	2015/08/18		124	%	60 - 140
		Benzene	2015/08/18	<0.0050		mg/kg	
		Toluene	2015/08/18	<0.020		mg/kg	
		Ethylbenzene	2015/08/18	<0.010		mg/kg	
		Xylenes (Total)	2015/08/18	<0.040		mg/kg	
		m & p-Xylene	2015/08/18	<0.040		mg/kg	
		o-Xylene	2015/08/18	<0.020		mg/kg	
		F1 (C6-C10) - BTEX	2015/08/18	<12		mg/kg	
		F1 (C6-C10)	2015/08/18	<12		mg/kg	
	RPD	Benzene	2015/08/18	NC		%	50
		Toluene	2015/08/18	NC		%	50
		Ethylbenzene	2015/08/18	NC		%	50
		Xylenes (Total)	2015/08/18	NC		%	50
		m & p-Xylene	2015/08/18	NC		%	50
		o-Xylene	2015/08/18	NC		%	50
		F1 (C6-C10) - BTEX	2015/08/18	NC		%	50
		F1 (C6-C10)	2015/08/18	NC		%	50
8005406 MHF	Matrix Spike	O-TERPHENYL (sur.)	2015/08/18		100	%	50 - 130
		F2 (C10-C16 Hydrocarbons)	2015/08/18		122	%	50 - 130
		F3 (C16-C34 Hydrocarbons)	2015/08/18		125	%	50 - 130
		F4 (C34-C50 Hydrocarbons)	2015/08/18		120	%	50 - 130
	Spiked Blank	O-TERPHENYL (sur.)	2015/08/18		98	%	50 - 130
		F2 (C10-C16 Hydrocarbons)	2015/08/18		106	%	70 - 130
		F3 (C16-C34 Hydrocarbons)	2015/08/18		109	%	70 - 130
		F4 (C34-C50 Hydrocarbons)	2015/08/18		103	%	70 - 130
	Method Blank	O-TERPHENYL (sur.)	2015/08/18		110	%	50 - 130
		F2 (C10-C16 Hydrocarbons)	2015/08/18	<10		mg/kg	
		F3 (C16-C34 Hydrocarbons)	2015/08/18	<50		mg/kg	
		F4 (C34-C50 Hydrocarbons)	2015/08/18	<50		mg/kg	
	RPD	F2 (C10-C16 Hydrocarbons)	2015/08/18	NC		%	50
		F3 (C16-C34 Hydrocarbons)	2015/08/18	NC		%	50
		F4 (C34-C50 Hydrocarbons)	2015/08/18	NC		%	50

DILLON CONSULTING LTD.
Attention: HEATHER FISHER
Client Project #: CBA-FTA
P.O. #: 700330152
Site Location: CAMBRIDGE BAY, NU

Quality Assurance Report (Continued)

Maxxam Job Number: EYKB570599

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.
Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.
Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.
Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.
Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.
NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

Validation Signature Page

Maxxam Job #: B570599

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

Janet Gao, Supervisor

Luba Shymushovska, Organics – Senior Analyst

==========

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Your P.O. #: 700330152
Your Project #: CBA-FTA
Site Location: CAMBRIDGE BAY, NU
Your C.O.C. #: A158826

Attention:HEATHER FISHER

DILLON CONSULTING LTD.
1558 Willson Place
Winnipeg, MB
CANADA R3T 0Y4

Report Date: 2015/09/09
Report #: R2037572
Version: 3 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B570599
Received: 2015/08/16, 09:50

Sample Matrix: Soil
Samples Received: 5

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
BTEX/F1 by HS GC/MS/FID (MeOH extract) (1)	5	2015/08/18	2015/08/18	AB SOP-00039	CCME CWS/EPA 8260c m
Cation/EC Ratio (1)	1	N/A	2015/08/21	AB WI-00065	Auto Calc
Chloride (Soluble) (1)	1	2015/08/22	2015/08/22	AB SOP-00033 / AB SOP-00020	SM 22-4500-Cl G m
Conductivity @25C (Soluble) (1)	1	2015/08/20	2015/08/20	AB SOP-00033 / AB SOP-00004	SM 22 2510 B m
CCME Hydrocarbons (F2-F4 in soil) (1, 2)	5	2015/08/18	2015/08/18	AB SOP-00036 / AB SOP-00040	CCME PHC-CWS
Fraction of Organic Carbon (1)	1	N/A	2015/08/20	CAL SOP-00243	Auto Calc
Ion Balance (1)	1	N/A	2015/08/18	AB WI-00065	Auto Calc
Sum of Cations, Anions (1)	1	N/A	2015/08/21	AB WI-00065	Auto Calc
Moisture (1)	5	N/A	2015/08/18	AB SOP-00002	CCME PHC-CWS
Lead (1)	2	2015/08/20	2015/08/20	AB SOP-00001 / AB SOP-00043	EPA 200.8 R5.4 m
pH @25C (1:2 Calcium Chloride Extract) (1)	1	2015/08/20	2015/08/20	AB SOP-00033 / AB SOP-00006	SM 22 4500 H+B m
Sodium Adsorption Ratio (1)	1	N/A	2015/08/21	AB WI-00065	Auto Calc
Ca,Mg,Na,K,SO4 (Soluble) (1)	1	2015/08/20	2015/08/21	AB SOP-00033 / AB SOP-00042	EPA 200.7 CFR 2012 m
Soluble Paste (1)	1	2015/08/20	2015/08/20	AB SOP-00033	Carter 2nd ed 15.2 m
Soluble Ions Calculation (1)	1	N/A	2015/08/18	AB WI-00065	Auto Calc
Total Organic Carbon LECO Method (1)	1	2015/08/20	2015/08/20	AB SOP-00035 / CAL SOP-00243	LECO 203-821-170 m
Theoretical Gypsum Requirement (1, 3)	1	N/A	2015/08/21	AB WI-00065	Auto Calc

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 Calgary Environmental

(2) All CCME 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.

(3) Units for TGR have changed from tons/acre to tonnes/ha

Your P.O. #: 700330152
Your Project #: CBA-FTA
Site Location: CAMBRIDGE BAY, NU
Your C.O.C. #: A158826

Attention:HEATHER FISHER

DILLON CONSULTING LTD.
1558 Willson Place
Winnipeg, MB
CANADA R3T 0Y4

Report Date: 2015/09/09
Report #: R2037572
Version: 3 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B570599
Received: 2015/08/16, 09:50

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Linsay Sunderman, Project Manager
Email: LSunderman@maxxam.ca
Phone# (403)735-2237 Ext:2237

==========

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Maxxam Job #: B570599
Report Date: 2015/09/09

DILLON CONSULTING LTD.
Client Project #: CBA-FTA
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700330152
Sampler Initials: MH

RESULTS OF CHEMICAL ANALYSES OF SOIL

Maxxam ID		MX2251	MX2252	MX2253		
Sampling Date		2015/08/14	2015/08/14	2015/08/14		
COC Number		A158826	A158826	A158826		
	UNITS	**NW WALL SA1 @ 1.0**	**NW WALL SA2 @ 2.0**	**NW FLOOR SA1 @ 2.0**	**RDL**	**QC Batch**
Physical Properties						
Moisture	%	8.6	9.1	9.8	0.30	8006101
RDL = Reportable Detection Limit						

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Maxxam Job #: B570599
Report Date: 2015/09/09

DILLON CONSULTING LTD.
Client Project #: CBA-FTA
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700330152
Sampler Initials: MH

RESULTS OF CHEMICAL ANALYSES OF SOIL

Maxxam ID		MX2254	MX2255		
Sampling Date		2015/08/14	2015/08/14		
COC Number		A158826	A158826		
	UNITS	FIELD DUPLICATE-1	3-09-4M @ 1.0	RDL	QC Batch
Calculated Parameters					
Anion Sum	meq/L		18	N/A	8005908
Cation Sum	meq/L		20	N/A	8005908
Cation/EC Ratio	N/A		11	0.10	8005904
Ion Balance	N/A		1.1	0.010	8005907
Calculated Calcium (Ca)	mg/kg		25	0.44	8005910
Calculated Magnesium (Mg)	mg/kg		21	0.29	8005910
Calculated Sodium (Na)	mg/kg		55	0.73	8005910
Calculated Potassium (K)	mg/kg		20	0.38	8005910
Calculated Chloride (Cl)	mg/kg		98	1.5	8005910
Calculated Sulphate (SO4)	mg/kg		130	1.5	8005910
Misc. Inorganics					
Fraction of Organic Carbon	g/g		0.013	0.00020	8005906
Soluble Parameters					
Soluble Chloride (Cl)	mg/L		340	5.0	8011883
Soluble Conductivity	dS/m		1.8	0.020	8009656
Soluble (CaCl2) pH	pH		7.40	N/A	8008196
Sodium Adsorption Ratio	N/A		3.7	0.10	8005909
Soluble Calcium (Ca)	mg/L		86	1.5	8010559
Soluble Magnesium (Mg)	mg/L		71	1.0	8010559
Soluble Sodium (Na)	mg/L		190	2.5	8010559
Soluble Potassium (K)	mg/L		67	1.3	8010559
Saturation %	%		29	N/A	8008585
Soluble Sulphate (SO4)	mg/L		430	5.0	8010559
Theoretical Gypsum Requirement	tonnes/ha		<0.20	0.20	8005911
Physical Properties					
Moisture	%	7.3	11	0.30	8006101

RDL = Reportable Detection Limit
N/A = Not Applicable

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Maxxam Job #: B570599
Report Date: 2015/09/09

DILLON CONSULTING LTD.
Client Project #: CBA-FTA
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700330152
Sampler Initials: MH

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		MX2251	MX2252	MX2253	MX2254		
Sampling Date		2015/08/14	2015/08/14	2015/08/14	2015/08/14		
COC Number		A158826	A158826	A158826	A158826		
	UNITS	NW WALL SA1 @ 1.0	NW WALL SA2 @ 2.0	NW FLOOR SA1 @ 2.0	FIELD DUPLICATE-1	RDL	QC Batch
Ext. Pet. Hydrocarbon							
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	<10	<10	<10	10	8005406
F3 (C16-C34 Hydrocarbons)	mg/kg	<50	<50	<50	<50	50	8005406
F4 (C34-C50 Hydrocarbons)	mg/kg	<50	<50	<50	<50	50	8005406
Reached Baseline at C50	mg/kg	Yes	Yes	Yes	Yes		8005406
Surrogate Recovery (%)							
O-TERPHENYL (sur.)	%	96	93	92	109		8005406
RDL = Reportable Detection Limit							

Maxxam ID		MX2255		
Sampling Date		2015/08/14		
COC Number		A158826		
	UNITS	3-09-4M @ 1.0	RDL	QC Batch
Ext. Pet. Hydrocarbon				
F2 (C10-C16 Hydrocarbons)	mg/kg	310	10	8005406
F3 (C16-C34 Hydrocarbons)	mg/kg	220	50	8005406
F4 (C34-C50 Hydrocarbons)	mg/kg	<50	50	8005406
Reached Baseline at C50	mg/kg	Yes		8005406
Surrogate Recovery (%)				
O-TERPHENYL (sur.)	%	99		8005406
RDL = Reportable Detection Limit				

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Maxxam Job #: B570599
Report Date: 2015/09/09

DILLON CONSULTING LTD.
Client Project #: CBA-FTA
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700330152
Sampler Initials: MH

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		MX2252	MX2253		
Sampling Date		2015/08/14	2015/08/14		
COC Number		A158826	A158826		
	UNITS	**NW WALL SA2 @ 2.0**	**NW FLOOR SA1 @ 2.0**	**RDL**	**QC Batch**
Elements					
Total Lead (Pb)	mg/kg	5.3	4.4	0.50	8008628
RDL = Reportable Detection Limit					

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Maxxam Job #: B570599
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DILLON CONSULTING LTD.
Client Project #: CBA-FTA
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700330152
Sampler Initials: MH

VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		MX2251		MX2252		MX2253		
Sampling Date		2015/08/14		2015/08/14		2015/08/14		
COC Number		A158826		A158826		A158826		
	UNITS	NW WALL SA1 @ 1.0	RDL	NW WALL SA2 @ 2.0	RDL	NW FLOOR SA1 @ 2.0	RDL	QC Batch
Volatiles								
Benzene	mg/kg	<0.015 (1)	0.015	<0.0080 (1)	0.0080	<0.015 (1)	0.015	8004459
Toluene	mg/kg	<0.020	0.020	<0.020	0.020	<0.020	0.020	8004459
Ethylbenzene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	0.010	8004459
Xylenes (Total)	mg/kg	<0.040	0.040	<0.040	0.040	<0.040	0.040	8004459
m & p-Xylene	mg/kg	<0.040	0.040	<0.040	0.040	<0.040	0.040	8004459
o-Xylene	mg/kg	<0.020	0.020	<0.020	0.020	<0.020	0.020	8004459
F1 (C6-C10) - BTEX	mg/kg	<12	12	<12	12	<12	12	8004459
F1 (C6-C10)	mg/kg	<12	12	<12	12	<12	12	8004459
Surrogate Recovery (%)								
1,4-Difluorobenzene (sur.)	%	106		104		106		8004459
4-Bromofluorobenzene (sur.)	%	107		108		107		8004459
D10-ETHYLBENZENE (sur.)	%	103		101		100		8004459
D4-1,2-Dichloroethane (sur.)	%	121		123		123		8004459

RDL = Reportable Detection Limit
(1) Detection limit raised due to interferent.

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Maxxam Job #: B570599
Report Date: 2015/09/09

DILLON CONSULTING LTD.
Client Project #: CBA-FTA
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700330152
Sampler Initials: MH

VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		MX2254		MX2255		
Sampling Date		2015/08/14		2015/08/14		
COC Number		A158826		A158826		
	UNITS	**FIELD DUPLICATE-1**	**RDL**	**3-09-4M @ 1.0**	**RDL**	**QC Batch**
Volatiles						
Benzene	mg/kg	<0.0080 (1)	0.0080	3.7 (2)	0.0050	8004459
Toluene	mg/kg	<0.020	0.020	15	0.020	8004459
Ethylbenzene	mg/kg	<0.010	0.010	11	0.010	8004459
Xylenes (Total)	mg/kg	<0.040	0.040	52	0.040	8004459
m & p-Xylene	mg/kg	<0.040	0.040	39	0.040	8004459
o-Xylene	mg/kg	<0.020	0.020	12	0.020	8004459
F1 (C6-C10) - BTEX	mg/kg	<12	12	2500	12	8004459
F1 (C6-C10)	mg/kg	<12	12	2600	12	8004459
Surrogate Recovery (%)						
1,4-Difluorobenzene (sur.)	%	105		104		8004459
4-Bromofluorobenzene (sur.)	%	107		114		8004459
D10-ETHYLBENZENE (sur.)	%	103		102		8004459
D4-1,2-Dichloroethane (sur.)	%	125		NC (3)		8004459

RDL = Reportable Detection Limit

(1) Detection limit raised due to interferent.

(2) Qualifying ion outside of acceptance criteria. Results are tentatively identified and potentially biased high.

(3) Surrogate recovery is non-calculable due to matrix interference.

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Maxxam Job #: B570599
Report Date: 2015/09/09

DILLON CONSULTING LTD.
Client Project #: CBA-FTA
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700330152
Sampler Initials: MH

MISCELLANEOUS (SOIL)

Maxxam ID		MX2255		
Sampling Date		2015/08/14		
COC Number		A158826		
	UNITS	**3-09-4M @ 1.0**	**RDL**	**QC Batch**
Misc. Inorganics				
Total Organic Carbon (C)	%	1.3	0.020	8009054
RDL = Reportable Detection Limit				

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Maxxam Job #: B570599
Report Date: 2015/09/09

DILLON CONSULTING LTD.
Client Project #: CBA-FTA
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700330152
Sampler Initials: MH

GENERAL COMMENTS

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

Package 1	7.0°C

PFOS and PHOA Results are attached to this report. The reference number for these results from Maxxam Campobello is B5G5167.

Results relate only to the items tested.

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B570599
Report Date: 2015/09/09

QUALITY ASSURANCE REPORT

DILLON CONSULTING LTD.
Client Project #: CBA-FTA
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700330152
Sampler Initials: MH

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8004459	1,4-Difluorobenzene (sur.)	2015/08/18	103	60 - 140	89	60 - 140	105	%				
8004459	4-Bromofluorobenzene (sur.)	2015/08/18	109	60 - 140	91	60 - 140	106	%				
8004459	D10-ETHYLBENZENE (sur.)	2015/08/18	107	60 - 130	91	60 - 130	97	%				
8004459	D4-1,2-Dichloroethane (sur.)	2015/08/18	128	60 - 140	112	60 - 140	124	%				
8005406	O-TERPHENYL (sur.)	2015/08/18	100	50 - 130	98	50 - 130	110	%				
8004459	Benzene	2015/08/18	126	60 - 140	111	60 - 140	<0.0050	mg/kg	NC	50		
8004459	Ethylbenzene	2015/08/18	114	60 - 140	98	60 - 140	<0.010	mg/kg	NC	50		
8004459	F1 (C6-C10) - BTEX	2015/08/18					<12	mg/kg	NC	50		
8004459	F1 (C6-C10)	2015/08/18	111	60 - 140	109	60 - 140	<12	mg/kg	NC	50		
8004459	m & p-Xylene	2015/08/18	110	60 - 140	94	60 - 140	<0.040	mg/kg	NC	50		
8004459	o-Xylene	2015/08/18	112	60 - 140	96	60 - 140	<0.020	mg/kg	NC	50		
8004459	Toluene	2015/08/18	118	60 - 140	102	60 - 140	<0.020	mg/kg	NC	50		
8004459	Xylenes (Total)	2015/08/18					<0.040	mg/kg	NC	50		
8005406	F2 (C10-C16 Hydrocarbons)	2015/08/18	122	50 - 130	106	70 - 130	<10	mg/kg	NC	50		
8005406	F3 (C16-C34 Hydrocarbons)	2015/08/18	125	50 - 130	109	70 - 130	<50	mg/kg	NC	50		
8005406	F4 (C34-C50 Hydrocarbons)	2015/08/18	120	50 - 130	103	70 - 130	<50	mg/kg	NC	50		
8006101	Moisture	2015/08/18					<0.30	%	0	20		
8008196	Soluble (CaCl2) pH	2015/08/20			99	97 - 103			1.2	N/A	100	98 - 102
8008585	Saturation %	2015/08/20							0.23	12	103	75 - 125
8008628	Total Lead (Pb)	2015/08/20	115	75 - 125	104	75 - 125	<0.50	mg/kg	1.5	35	103	54 - 146
8009054	Total Organic Carbon (C)	2015/08/20			96	75 - 125	0.038, RDL=0.020	%	10	35	90	75 - 125
8009656	Soluble Conductivity	2015/08/20			101	90 - 110	<0.020	dS/m	5.2	35	111	75 - 125
8010559	Soluble Calcium (Ca)	2015/08/21	106	75 - 125	110	80 - 120	<1.5	mg/L	7.8	35	117	75 - 125
8010559	Soluble Magnesium (Mg)	2015/08/21	108	75 - 125	112	80 - 120	<1.0	mg/L	12	35	115	75 - 125
8010559	Soluble Potassium (K)	2015/08/21	106	75 - 125	110	80 - 120	<1.3	mg/L	NC	35	120	75 - 125
8010559	Soluble Sodium (Na)	2015/08/21	99	75 - 125	103	80 - 120	<2.5	mg/L	5.1	35	107	75 - 125
8010559	Soluble Sulphate (SO4)	2015/08/21					<5.0	mg/L	3.3	35	104	75 - 125

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Maxxam Job #: B570599
Report Date: 2015/09/09

QUALITY ASSURANCE REPORT(CONT'D)

DILLON CONSULTING LTD.
Client Project #: CBA-FTA
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700330152
Sampler Initials: MH

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8011883	Soluble Chloride (Cl)	2015/08/22	103	75 - 125	96	75 - 125	<5.0	mg/L	NC	35	106	75 - 125

N/A = Not Applicable

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

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

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

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

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

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (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 (one or both samples < 5x RDL).

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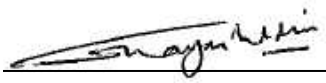
Maxxam Job #: B570599
Report Date: 2015/09/09

DILLON CONSULTING LTD.
Client Project #: CBA-FTA
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700330152
Sampler Initials: MH

VALIDATION SIGNATURE PAGE

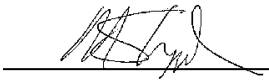
The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Ghayasuddin Khan, M.Sc., B.Ed., P.Chem, Scientific Specialist

Janet Gao, Supervisor

Luba Shymushovska, Organics – Senior Analyst



Michael Sheppard, Senior Scientific Specialist

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Chain of Custody A153826

Page: 1 of 2

Invoice To: C/O Report Address ☐	Report To: Same as Invoice ☐	Report Distribution (E-Mail):
Company: PWGSC		bfisher@dillon.ca
Contact: Natalie Robinson		mhopps@dillon.ca
Address: Suite 1650, 635 - 8th Ave SW		Natalie.Robinson@pwgsc-tpsgc.ca
Prov: Alberta City: Calgary	Prov: PC:	
Contact #s: Ph: 403-292-6882 Cell:	Ph: Cell:	

REGULATORY GUIDELINES:
☐ AT1
☐ CCME
☐ Regulated Drinking Water
☐ Other:

All samples are held for 60 calendar days after sample receipt, unless specified otherwise.

PO #: 700230152
Project # / Name: CBH - FTA
Site Location: Cambridge Bay, NU
Quote #: R.05189.00
Sampled By: M. Hopps

SERVICE REQUESTED: ☒ RUSH (Contact lab to reserve) Date Required: ☐ REGULAR (5 to 7 Days)

See reverse for package specifics

	Sample ID	Depth (unit)	Matrix GW / SW Soil	Date/Time Sampled YY/MM/DD 24:00	SOIL: BTEX F1-F4	Sieve (75 micron)	Regulated Metals (CCME / AT1)	Salinity 4	Assessment ICP Metals	Basic Class II Landfill	Lead in Soil	PFOS / PFOA	PH	WATER: ☐VOCs	☐BTEX F1	☐BTEX F1-F2	☐BTEX F1-F4	☐ Routine Water ☐ Turb ☐ F	☐ TOC ☐ DOC	Total	Regulated Metals (CCME / AT1) Dissolved	Mercury	☐ Total ☐ Dissolved	Other Analysis: Fraction of Organic Carbon	HOLD - Do not Analyze	# of Containers Submitted
1	NW Wall SA1	1.0	Soil	15/08/14	X																					
2	NW Wall SA2	2.0	Soil	15/08/14	X						X															
3	NW Floor SA1	2.0	Soil	15/08/14	X						X															
4	Field Duplicate-1		Soil	15/08/14	X																					
5	~~NW composite~~		Soil	~~15/08/14~~																						
6	3-09-4m 1.0m	1.0	Soil	16/08/14	X			X				X	X												X	
7	Field Duplicate-2											X														
8																										
9																										
10																										
11																										
12																										

17-Aug-15 17:00
Marnie Kolach
B570599
INS-0097

RECEIVED IN YELLOWKNIFE
By: Michelle Gwie
2015 -08- 16
09:50

Temp: 5 / 7 / 9

Please indicate Filtered, Preserved or Both (F, P, F/P) → F/P

Relinquished By (Signature/Print): Matthew Hopps Date (YY/MM/DD): 15/08/15 Time (24:00): 900
Relinquished By (Signature/Print): Date (YY/MM/DD): Time (24:00):

Special Instructions: Please contact Heather if there are detectable concentrations of lead in soil.

# of Jars Used & Not Submitted

LAB USE ONLY

Received By:	Date:	Time:	Maxxam Job #:		
Yuanpeng Liu	2015/08/17	17:00	Custody Seal	Temperature	Ice
Lab Comments:			Y	6.6.5	Y

AB FCD-00331 Rev3 2010/05

Maxxam Analytics International Corporation o/a Maxxam Analytics

Your P.O. #: 700330152
Your Project #: FTA-LTU
Site Location: Gordon Lake
Your C.O.C. #: A158827

Attention:HEATHER FISHER

DILLON CONSULTING LTD.
1558 Willson Place
Winnipeg, MB
CANADA R3T 0Y4

Report Date: 2015/08/19
Report #: R2027024
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B570766
Received: 2015/08/18, 09:45

Sample Matrix: Soil
Samples Received: 8

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
BTEX/F1 by HS GC/MS/FID (MeOH extract) (1)	8	2015/08/19	2015/08/19	AB SOP-00039	CCME CWS/EPA 8260c m
CCME Hydrocarbons (F2-F4 in soil) (1, 2)	8	2015/08/19	2015/08/19	AB SOP-00036 / AB SOP-00040	CCME PHC-CWS
Moisture (1)	8	N/A	2015/08/19	AB SOP-00002	CCME PHC-CWS
Lead (1)	2	2015/08/19	2015/08/19	AB SOP-00001 / AB SOP-00043	EPA 200.8 R5.4 m

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 Calgary Environmental

(2) All CCME 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.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Linsay Sunderman, Project Manager
Email: LSunderman@maxxam.ca
Phone# (403)735-2237 Ext:2237

==========

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Maxxam Job #: B570766
Report Date: 2015/08/19

DILLON CONSULTING LTD.
Client Project #: FTA-LTU
Site Location: Gordon Lake
Your P.O. #: 700330152
Sampler Initials: MH

RESULTS OF CHEMICAL ANALYSES OF SOIL

Maxxam ID		MX3157	MX3158		MX3159	MX3160		
Sampling Date		2015/08/16	2015/08/16		2015/08/16	2015/08/16		
COC Number		A158827	A158827		A158827	A158827		
	UNITS	NORTH WALL SA9	NORTH WALL SA10	QC Batch	NORTH WALL SA11	NORTH WALL SA12	RDL	QC Batch
Physical Properties								
Moisture	%	9.1	7.0	8007036	7.0	9.1	0.30	8007658
RDL = Reportable Detection Limit								

Maxxam ID		MX3161	MX3162	MX3163	MX3164		
Sampling Date		2015/08/16	2015/08/15	2015/08/16	2015/08/16		
COC Number		A158827	A158827	A158827	A158827		
	UNITS	FIELD DUPLICATE 3	WEST WALL SA6	NORTH FLOOR SA4	SOUTH FLOOR SA5	RDL	QC Batch
Physical Properties							
Moisture	%	8.5	8.4	8.7	10	0.30	8007658
RDL = Reportable Detection Limit							

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Maxxam Job #: B570766
Report Date: 2015/08/19

DILLON CONSULTING LTD.
Client Project #: FTA-LTU
Site Location: Gordon Lake
Your P.O. #: 700330152
Sampler Initials: MH

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		MX3157	MX3158	MX3159	MX3160		
Sampling Date		2015/08/16	2015/08/16	2015/08/16	2015/08/16		
COC Number		A158827	A158827	A158827	A158827		
	UNITS	NORTH WALL SA9	NORTH WALL SA10	NORTH WALL SA11	NORTH WALL SA12	RDL	QC Batch
Ext. Pet. Hydrocarbon							
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	<10	<10	<10	10	8007281
F3 (C16-C34 Hydrocarbons)	mg/kg	<50	<50	<50	<50	50	8007281
F4 (C34-C50 Hydrocarbons)	mg/kg	<50	<50	<50	<50	50	8007281
Reached Baseline at C50	mg/kg	Yes	Yes	Yes	Yes		8007281
Surrogate Recovery (%)							
O-TERPHENYL (sur.)	%	101	107	114	110		8007281
RDL = Reportable Detection Limit							

Maxxam ID		MX3161	MX3162	MX3163	MX3164		
Sampling Date		2015/08/16	2015/08/15	2015/08/16	2015/08/16		
COC Number		A158827	A158827	A158827	A158827		
	UNITS	FIELD DUPLICATE 3	WEST WALL SA6	NORTH FLOOR SA4	SOUTH FLOOR SA5	RDL	QC Batch
Ext. Pet. Hydrocarbon							
F2 (C10-C16 Hydrocarbons)	mg/kg	33	<10	45	15	10	8007281
F3 (C16-C34 Hydrocarbons)	mg/kg	<50	<50	<50	<50	50	8007281
F4 (C34-C50 Hydrocarbons)	mg/kg	<50	<50	<50	<50	50	8007281
Reached Baseline at C50	mg/kg	Yes	Yes	Yes	Yes		8007281
Surrogate Recovery (%)							
O-TERPHENYL (sur.)	%	121	109	121	127		8007281
RDL = Reportable Detection Limit							

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Maxxam Job #: B570766
Report Date: 2015/08/19

DILLON CONSULTING LTD.
Client Project #: FTA-LTU
Site Location: Gordon Lake
Your P.O. #: 700330152
Sampler Initials: MH

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		MX3160	MX3164		
Sampling Date		2015/08/16	2015/08/16		
COC Number		A158827	A158827		
	UNITS	**NORTH WALL SA12**	**SOUTH FLOOR SA5**	**RDL**	**QC Batch**
Elements					
Total Lead (Pb)	mg/kg	5.1	5.3	0.50	8007764
RDL = Reportable Detection Limit					

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Maxxam Job #: B570766
Report Date: 2015/08/19

DILLON CONSULTING LTD.
Client Project #: FTA-LTU
Site Location: Gordon Lake
Your P.O. #: 700330152
Sampler Initials: MH

VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		MX3157	MX3158	MX3159	MX3160		
Sampling Date		2015/08/16	2015/08/16	2015/08/16	2015/08/16		
COC Number		A158827	A158827	A158827	A158827		
	UNITS	NORTH WALL SA9	NORTH WALL SA10	NORTH WALL SA11	NORTH WALL SA12	RDL	QC Batch
Volatiles							
Benzene	mg/kg	<0.0050	0.012	0.011	<0.0050	0.0050	8007315
Toluene	mg/kg	0.059	0.10	0.10	<0.020	0.020	8007315
Ethylbenzene	mg/kg	0.018	0.049	0.047	<0.010	0.010	8007315
Xylenes (Total)	mg/kg	0.090	0.23	0.23	<0.040	0.040	8007315
m & p-Xylene	mg/kg	0.063	0.16	0.15	<0.040	0.040	8007315
o-Xylene	mg/kg	0.027	0.073	0.072	<0.020	0.020	8007315
F1 (C6-C10) - BTEX	mg/kg	<12	<12	<12	<12	12	8007315
F1 (C6-C10)	mg/kg	<12	<12	<12	<12	12	8007315
Surrogate Recovery (%)							
1,4-Difluorobenzene (sur.)	%	102	99	99	97		8007315
4-Bromofluorobenzene (sur.)	%	103	104	103	104		8007315
D10-ETHYLBENZENE (sur.)	%	128	118	120	121		8007315
D4-1,2-Dichloroethane (sur.)	%	109	110	109	112		8007315

RDL = Reportable Detection Limit

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Maxxam Job #: B570766
Report Date: 2015/08/19

DILLON CONSULTING LTD.
Client Project #: FTA-LTU
Site Location: Gordon Lake
Your P.O. #: 700330152
Sampler Initials: MH

VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		MX3161	MX3162	MX3163	MX3164		
Sampling Date		2015/08/16	2015/08/15	2015/08/16	2015/08/16		
COC Number		A158827	A158827	A158827	A158827		
	UNITS	FIELD DUPLICATE 3	WEST WALL SA6	NORTH FLOOR SA4	SOUTH FLOOR SA5	RDL	QC Batch
Volatiles							
Benzene	mg/kg	0.079 (1)	<0.0050	0.11 (1)	0.058	0.0050	8007315
Toluene	mg/kg	0.52	<0.020	0.77	0.11	0.020	8007315
Ethylbenzene	mg/kg	0.31	<0.010	0.41	0.20	0.010	8007315
Xylenes (Total)	mg/kg	2.8	<0.040	3.7	0.86	0.040	8007315
m & p-Xylene	mg/kg	2.0	<0.040	2.7	0.70	0.040	8007315
o-Xylene	mg/kg	0.73	<0.020	0.99	0.17	0.020	8007315
F1 (C6-C10) - BTEX	mg/kg	140	<12	160	31	12	8007315
F1 (C6-C10)	mg/kg	140	<12	160	32	12	8007315
Surrogate Recovery (%)							
1,4-Difluorobenzene (sur.)	%	98	99	98	97		8007315
4-Bromofluorobenzene (sur.)	%	103	103	105	105		8007315
D10-ETHYLBENZENE (sur.)	%	123	119	127	123		8007315
D4-1,2-Dichloroethane (sur.)	%	112	111	111	112		8007315

RDL = Reportable Detection Limit
(1) Qualifying ion outside of acceptance criteria. Results are tentatively identified and potentially biased high.

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Maxxam Job #: B570766
Report Date: 2015/08/19

DILLON CONSULTING LTD.
Client Project #: FTA-LTU
Site Location: Gordon Lake
Your P.O. #: 700330152
Sampler Initials: MH

GENERAL COMMENTS

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

Package 1	9.3°C

Results relate only to the items tested.

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B570766
Report Date: 2015/08/19

QUALITY ASSURANCE REPORT

DILLON CONSULTING LTD.
Client Project #: FTA-LTU
Site Location: Gordon Lake
Your P.O. #: 700330152
Sampler Initials: MH

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8007281	O-TERPHENYL (sur.)	2015/08/19	91	50 - 130	90	50 - 130	124	%				
8007315	1,4-Difluorobenzene (sur.)	2015/08/19	87	60 - 140	90	60 - 140	96	%				
8007315	4-Bromofluorobenzene (sur.)	2015/08/19	96	60 - 140	94	60 - 140	106	%				
8007315	D10-ETHYLBENZENE (sur.)	2015/08/19	110	60 - 130	104	60 - 130	121	%				
8007315	D4-1,2-Dichloroethane (sur.)	2015/08/19	106	60 - 140	101	60 - 140	105	%				
8007036	Moisture	2015/08/19					<0.30	%	5.0	20		
8007281	F2 (C10-C16 Hydrocarbons)	2015/08/19	103	50 - 130	98	70 - 130	<10	mg/kg	NC	50		
8007281	F3 (C16-C34 Hydrocarbons)	2015/08/19	106	50 - 130	100	70 - 130	<50	mg/kg	NC	50		
8007281	F4 (C34-C50 Hydrocarbons)	2015/08/19	102	50 - 130	99	70 - 130	<50	mg/kg	NC	50		
8007315	Benzene	2015/08/19	127	60 - 140	118	60 - 140	<0.0050	mg/kg	35	50		
8007315	Ethylbenzene	2015/08/19	117	60 - 140	109	60 - 140	<0.010	mg/kg	7.6	50		
8007315	F1 (C6-C10) - BTEX	2015/08/19					<12	mg/kg	NC	50		
8007315	F1 (C6-C10)	2015/08/19	92	60 - 140	118	60 - 140	<12	mg/kg	NC	50		
8007315	m & p-Xylene	2015/08/19	117	60 - 140	110	60 - 140	<0.040	mg/kg	16	50		
8007315	o-Xylene	2015/08/19	116	60 - 140	108	60 - 140	<0.020	mg/kg	0.47	50		
8007315	Toluene	2015/08/19	115	60 - 140	108	60 - 140	<0.020	mg/kg	NC	50		
8007315	Xylenes (Total)	2015/08/19					<0.040	mg/kg	13	50		
8007658	Moisture	2015/08/19					0.30, RDL=0.30	%	2.2	20		
8007764	Total Lead (Pb)	2015/08/19	102	75 - 125	100	75 - 125	<0.50	mg/kg	6.6	35	108	54 - 146

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

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

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

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

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

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (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 (one or both samples < 5x RDL).

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

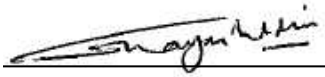
Maxxam Job #: B570766
Report Date: 2015/08/19

DILLON CONSULTING LTD.
Client Project #: FTA-LTU
Site Location: Gordon Lake
Your P.O. #: 700330152
Sampler Initials: MH

VALIDATION SIGNATURE PAGE

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

Dennis Ngondu, Organics – Supervisor



Ghayasuddin Khan, M.Sc., B.Ed., P.Chem, Scientific Specialist

Janet Gao, Supervisor

Veronica Falk, 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.

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam

Calgary: 4000 19st St. NE, T2E 6P8. Ph: (403) 291-3077, Fax: (403) 735-2240, Toll free: (800) 386-7247
Edmonton: 9331 - 48 Street, T6B 2R4. Ph: (780) 577-7100, Fax: (780) 450-4187, Toll free: (877) 465-8889
www.maxxamanalytics.com

Chain of Custody A158827

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Page: 1 of 1

Invoice To:	C/O Report Address ☐
Company:	PWGSC
Contact:	Natalie Robinson
Address:	Suite 1650, 635 - 8th Ave SW Alberta Calgary
Contact #s:	403-292-6882

Report To: (Same as Invoice) ☐
Prov: PC: Ph: Cell:

Report Distribution (E-Mail):
bfisher@dillon.ca
mhopps@dillon.ca
Natalie.Robinson@pwgsc-tpsgc.ca

REGULATORY GUIDELINES:
☐ AT1
☐ CCME
☐ Regulated Drinking Water
☐ Other:

All samples are held for 60 calendar days after sample receipt, unless specified otherwise.

PO #:	700330152
Project # / Name:	FTA - LTU
Site Location:	Cambridge Bay, NU
Quote #:	R.05169.005
Sampled By:	M. Hopps

SERVICE REQUESTED: ☒ RUSH (Contact lab to reserve) Date Required: Aug 19-20 ☐ REGULAR (5 to 7 Days)

See reverse for package specifics

#	Sample ID	Depth (unit)	Matrix GW / SW Soil	Date/Time Sampled YY/MM/DD 24:00	BTEX F1-F4 (CCME)	Lead in Soil / PFOS / PFOA	# of Containers Submitted
1	North Wall SA9	1.0	Soil	15/08/16	X		2
2	North Wall SA10	2.0	Soil	15/08/16	X		2
3	North Wall SA11	1.0	Soil	15/08/16	X		2
4	North Wall SA12	2.0	Soil	15/08/16	X	X	3
5	Field Duplicate 3	–	Soil	15/08/16	X		2
6	West Wall SA6	2.0	Soil	15/08/15	X		1
7	~~Field Dup 3~~						~~2~~
8	North Floor SA4	2.0	Soil	15/08/16	X		2
9	South Floor SA5	2.0	Soil	15/08/16	X	X	3
10							
11							
12							

Other column headings: SOIL: BTEX F1-F4; Sieve (75 micron); Regulated Metals (CCME / AT1); Salinity 4; Assessment ICP Metals; Basic Class II Landfill. WATER: ☐VOCs ☐BTEX F1; ☐BTEX F1-F4 ☐BTEX F1-F2; ☐Routine Water ☐Turb ☐F; ☐DOC ☐TOC; Regulated Metals (CCME / AT1) Total Dissolved; ☐Total ☐Dissolved Mercury. Other Analysis. HOLD - Do not Analyze.

18-Aug-15 09:45
Lisa Tycholiz
B570766 HF4

RECEIVED IN YELLOWKNIFE
By: M. Fule Michelle Fule 9:45
2015 -08- 18
Temp: 9 / 9 / 10

Please indicate Filtered, Preserved or Both (F, P, F/P)

Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):
Matthew Hopps	15/08/17	1000
Relinquished By (Signature/Print): Contact M. Hopps for questions 506 653 7680	Date (YY/MM/DD):	Time (24:00):

Special Instructions: Keep Cold → Contact Heather Fisher if lead is detected.

# of Jars Used & Not Submitted

LAB USE ONLY

Received By:	Date:	Maxxam Job #: B510766
David Friedeman	2015/08/19	
	Time: 07:15	

Custody Seal	Temperature	Ice
Y	1, 1, 2	Y

Lab Comments:

AB FCD-00331 Rev3 2012/05

Maxxam Analytics International Corporation o/a Maxxam Analytics

West Wall SA6 was missing from last shipment.

Maxxam

Calgary: 4000 19st St. NE, T2E 6P8. Ph: (403) 291-3077, Fax: (403) 735-2240, Toll free: (800) 386-7247
Edmonton: 9331 - 48 Street, T6B 2R4. Ph: (780) 577-7100, Fax: (780) 450-4187, Toll free: (877) 465-8889
www.maxxamanalytics.com

Chain of Custody A158831

715

Page: 1 of 1

	Invoice To: C/O Report Address ☐	Report To: Same as Invoice ☐	Report Distribution (E-Mail):
Company:	PWGSC		mhopps@dillon.ca
Contact:	Natalie Robinson		hfisher@dillon.ca
Address:	Suite 1650, 635 8th Ave		Natalie.Robinson@pwgsc-tpsgc.gc.ca
	Alberta Calgary	Prov: PC:	
Contact #s:	Ph: 403-292-6882	Ph: Cell:	

REGULATORY GUIDELINES:
- ☐ AT1
- ☐ CCME
- ☐ Regulated Drinking Water
- ☐ Other:

All samples are held for 60 calendar days after sample receipt, unless specified otherwise.

- PO #: 700330152
- Project # / Name: FTA LTU
- Site Location: Cambridge Bay, NU
- Quote #: R.05169.005
- Sampled By: M. Hopps

SERVICE REQUESTED:
- ☒ RUSH (Contact lab to reserve) ONLY BTEX Samples
- Date Required:
- ☐ REGULAR (5 to 7 Days)

See reverse for package specifics

	Sample ID	Depth (unit)	Matrix GW / SW Soil	Date/Time Sampled YY/MM/DD 24:00	BTEX F1-F4 (CCME)	Sieve (75 micron)	Regulated Metals (CCME / AT1)	Salinity 4	Assessment ICP Metals	Basic Class II Landfill	Lead	PFOS / PFOA	pH	☐VOCs	☐BTEX F1-F4	☐Routine Water ☐Turb ☐F	☐DOC	Regulated Metals (CCME / AT1) Total	Dissolved	☐Total ☐Dissolved Mercury	Fraction of Organic C	HOLD - Do not Analyze	# of Containers Submitted
1	North East Wall SA13	1.0 m	Soil	15/08/17	X																		2
2	North East Wall SA14	1.7 m	Soil	15/08/17	X			X				X	X								X		4
3	East Floor SA6	1.7m	Soil	15/08/17	X						X												3
4	East Wall SA15	1.0m	Soil	15/08/17	X																		2
5	East Wall SA16	1.7m	Soil	15/08/17	X																		2
6	Blank (For PFOS)	-	Soil	15/08/17								X											1
7																							
8																							
9																							
10																							
11																							
12																							

18-Aug-15 16:35
B571920
MAK INS-0104 DN7

RECEIVED IN YELLOWKNIFE
By: Angele Michelle-Hulke
2015-08-18 4:35
Temp: 6/6/7

Please indicate Filtered, Preserved or Both (F, P, F/P) F/P

Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):
Matthew Hopps	15/08/17	1100
Relinquished By (Signature/Print): Call M. Hopps for Question	Date (YY/MM/DD): 1-506	Time (24:00): 653-7680

Special Instructions: If there are concentrations of lead conduct full metals. Kept cold

# of Jars Used & Not Submitted

LAB USE ONLY

Received By:	Date:	Time:	Maxxam Job #:		
Harry	2015/08/20	15:59	Custody Seal	Temperature	Ice
Lab Comments:			y	5/5/5	y

Maxxam

Calgary: 4000 19st St. NE, T2E 6P8. Ph: (403) 291-3077, Fax: (403) 735-2240, Toll free: (800) 386-7247
Edmonton: 9331 - 48 Street, T6B 2R4. Ph: (780) 577-7100, Fax: (780) 450-4187, Toll free: (877) 465-8889
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Chain of Custody

A159257

784

Page: 1 of 2

	Invoice To: C/O Report Address ☐	Report To: Same as Invoice ☐	Report Distribution (E-Mail):
Company:	PWGSC		hfisher@dillon.ca mhopps@dillon.ca Natalie.Robinson@pwgsc-tpsgc.gc.ca mhamilton@dillon.ca
Contact:	Natalie Robinson		
Address:	Suite 1650, 635 - 8th Ave SW		
	Prov: Alberta City: Calgary	Prov: PC:	
Contact #s:	Ph: 403-292-6882 Cell:	Ph: Cell:	

REGULATORY GUIDELINES:
☐ AT1
☐ CCME
☐ Regulated Drinking Water
☐ Other:

All samples are held for 60 calendar days after sample receipt, unless specified otherwise.

PO #: 700320152
Project # / Name: CBA - FTA
Site Location: Cambridge Bay, NU
Quote #: R.05169.005
Sampled By: M. Hopps (506 653-7880)

SERVICE REQUESTED:
☒ RUSH (Contact lab to reserve)
Date Required: 24hrs after receiving Samples
☐ REGULAR (5 to 7 Days)

See reverse for package specifics

	Sample ID	Depth (unit)	Matrix GW / SW Soil	Date/Time Sampled YY/MM/DD 24:00	SOIL: BTEX F1-F4	Sieve (75 micron)	Regulated Metals (CCME / AT1)	Salinity 4	Assessment ICP Metals	Basic Class II Landfill	Lead	PH	PFOS	WATER: ☐VOCs	☐BTEX F1-F2	☐BTEX F1-F4	☐ Routine Water ☐ Turb ☐ F	☐ TOC ☐ DOC	Regulated Metals (CCME / AT1) Total	Regulated Metals (CCME / AT1) Dissolved	Mercury	☐ Total ☐ Dissolved	Other Analysis: Fraction of Organic Carbon	HOLD - Do not Analyze	# of Containers Submitted
1	South Wall SA24	1.7m	Soil	15/08/18	X			X			X	X	X											X		5
2	South Wall SA22	1.7m	Soil	15/08/18	X																					2
3	South Wall SA23	1.0m	Soil	15/08/18	X								X													3
4	South Wall SA21	1.0m	Soil	15/08/18	X						X															3
5	East Wall SA20	1.7m	Soil	15/08/18	X						X															3
6	South Floor SA8	1.7m	Soil	15/08/18	X						X															3
7	East Wall SA19	1.0m	Soil	15/08/18	X																					2
8	South Floor SA7	1.7m	Soil	15/08/18	X						X															3
9	South Wall SA17	1.0m	Soil	15/08/18	X						X															3
10	Field Dup - 4	—	Soil	15/08/18	X																					2
11	South Wall - SA8	1.7m	Soil	15/08/18	X																					2
12	South Wall - SA25	1.0m	Soil	15/08/19	X																					2

20-Aug-15 08:10
Mamie Kolach
B572411

RECEIVED IN YELLOWKNIFE
By: Michelle Burke 8:10
2015 -08- 19 20 18

Temp: 3 / 3 / 3

Please indicate Filtered, Preserved or Both (F, P, F/P)

Relinquished By (Signature/Print): Mark Hopps	Date (YY/MM/DD): 15/08/19	Time (24:00): 1000
Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):

Special Instructions: Rush ONLY the BTEX samples.

# of Jars Used & Not Submitted

LAB USE ONLY

Received By:	Date:	Time:	Maxxam Job #:		
Muhammad Akhter	2015/08/21	16:18	Custody Seal	Temperature	Ice
Lab Comments:			YES	3, 4, 3	YES

Maxxam

Calgary: 4000 19st St. NE, T2E 6P8. Ph: (403) 291-3077, Fax: (403) 735-2240, Toll free: (800) 386-7247
Edmonton: 9331 - 48 Street, T6B 2R4. Ph: (780) 577-7100, Fax: (780) 450-4187, Toll free: (877) 465-8889
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A158830

Page: 2 of 2

	Invoice To: C/O Report Address ☐	Report To: Same as Invoice ☐	Report Distribution (E-Mail):
Company:	PWGSC.		
Contact:			
Address:			
	Prov: PC:	Prov: PC:	
Contact #s:	Ph: Cell:	Ph: Cell:	

REGULATORY GUIDELINES:
☐ AT1
☐ CCME
☐ Regulated Drinking Water
☐ Other:

All samples are held for 60 calendar days after sample receipt, unless specified otherwise.

PO #: 7003805 2
Project # / Name: CBA FtA
Site Location:
Quote #:
Sampled By:

SERVICE REQUESTED:
☒ RUSH (Contact lab to reserve) Date Required: Rush BTEX
☐ REGULAR (5 to 7 Days)

See reverse for package specifics

	Sample ID	Depth (unit)	Matrix GW / SW Soil	Date/Time Sampled YY/MM/DD 24:00	SOIL: BTEX F1-F4	Sieve (75 micron)	Regulated Metals (CCME / AT1)	Salinity 4	Assessment ICP Metals	Basic Class II Landfill	Lead	WATER: ☐VOCs	☐BTEX F1-F2	☐BTEX F1-F4	☐Routine Water ☐Turb ☐F	☐TOC ☐DOC	Regulated Metals (CCME / AT1) Total	Dissolved	Mercury	☐Total ☐Dissolved	Other Analysis	HOLD - Do not Analyze	# of Containers Submitted
1	Southwall SA26	1.7M	Soil	15/08/19	X						X												3
2																							
3																							
4																							
5																							
6																							
7																							
8																							
9																							
10																							
11																							
12																							

RECEIVED IN YELLOWKNIFE
By: Michelle 8:10
2015 -08- 20

Temp: 3 / 3 / 3

Please indicate Filtered, Preserved or Both (F, P, F/P) → F/P

Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):
Matt Hopps	15/08/19	1000
Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):

Special Instructions: Rush BTEX samples ONLY.

# of Jars Used & Not Submitted:

LAB USE ONLY

Received By:	Date:	Time:	Maxxam Job #: B572411		
Muhammad Akuter	2015/08/21	16:18	Custody Seal	Temperature	Ice
Lab Comments:			YES	3.4.3	YES

Your P.O. #: 700380152
Your Project #: CBA-FTA
Site Location: CAMBRIDGE BAY, NU
Your C.O.C. #: A159257, A158830

Attention:HEATHER FISHER

DILLON CONSULTING LTD.
1558 Willson Place
Winnipeg, MB
CANADA R3T 0Y4

Report Date: 2015/08/24
Report #: R2029351
Version: 1 - Partial

CERTIFICATE OF ANALYSIS – PARTIAL RESULTS

MAXXAM JOB #: B572411
Received: 2015/08/20, 08:10

Sample Matrix: Soil
Samples Received: 13

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
BTEX/F1 by HS GC/MS/FID (MeOH extract)	13	2015/08/22	2015/08/23	AB SOP-00039	CCME CWS/EPA 8260c m
CCME Hydrocarbons (F2-F4 in soil) (1)	9	2015/08/22	2015/08/22	AB SOP-00036 / AB SOP-00040	CCME PHC-CWS
CCME Hydrocarbons (F2-F4 in soil) (1)	4	2015/08/22	2015/08/23	AB SOP-00036 / AB SOP-00040	CCME PHC-CWS
Moisture	13	N/A	2015/08/22	AB SOP-00002	CCME PHC-CWS

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) All CCME 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.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Linsay Sunderman, Project Manager
Email: LSunderman@maxxam.ca
Phone# (403)735-2237 Ext:2237

==========

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 #: B572411
Report Date: 2015/08/24

DILLON CONSULTING LTD.
Client Project #: CBA-FTA
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700380152
Sampler Initials: MH

AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		MY3183	MY3184	MY3185	MY3186		
Sampling Date		2015/08/18	2015/08/18	2015/08/18	2015/08/18		
COC Number		A159257	A159257	A159257	A159257		
	UNITS	SOUTH WALL SA24 @ 1.7M	SOUTH WALL SA22 @ 1.7M	SOUTH WALL SA23 @ 1.0M	SOUTH WALL SA21 @ 1.0M	RDL	QC Batch
Physical Properties							
Moisture	%	18	17	5.2	5.4	0.30	8011990
Ext. Pet. Hydrocarbon							
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	<10	<10	93	10	8011610
F3 (C16-C34 Hydrocarbons)	mg/kg	<50	<50	<50	98	50	8011610
F4 (C34-C50 Hydrocarbons)	mg/kg	<50	<50	<50	<50	50	8011610
Reached Baseline at C50	mg/kg	Yes	Yes	Yes	Yes		8011610
Volatiles							
Benzene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	8012052
Toluene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	8012052
Ethylbenzene	mg/kg	<0.010	<0.010	<0.010	<0.010	0.010	8012052
Xylenes (Total)	mg/kg	<0.040	<0.040	<0.040	<0.040	0.040	8012052
m & p-Xylene	mg/kg	<0.040	<0.040	<0.040	<0.040	0.040	8012052
o-Xylene	mg/kg	<0.020	0.032	<0.020	<0.020	0.020	8012052
F1 (C6-C10) - BTEX	mg/kg	<12	<12	<12	<12	12	8012052
F1 (C6-C10)	mg/kg	<12	<12	<12	<12	12	8012052
Surrogate Recovery (%)							
1,4-Difluorobenzene (sur.)	%	105	109	105	105		8012052
4-Bromofluorobenzene (sur.)	%	109	107	109	109		8012052
D10-ETHYLBENZENE (sur.)	%	109	103	102	103		8012052
D4-1,2-Dichloroethane (sur.)	%	140	136	135	135		8012052
O-TERPHENYL (sur.)	%	117	136 (1)	121	121		8011610

RDL = Reportable Detection Limit

(1) Surrogate recovery exceeds acceptance criteria (high recovery). As results are non-detect, there is no impact on data quality.

Maxxam Analytics International Corporation o/a Maxxam Analytics Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Maxxam Job #: B572411
Report Date: 2015/08/24

DILLON CONSULTING LTD.
Client Project #: CBA-FTA
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700380152
Sampler Initials: MH

AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		MY3187	MY3188	MY3189	MY3190		
Sampling Date		2015/08/18	2015/08/18	2015/08/18	2015/08/18		
COC Number		A159257	A159257	A159257	A159257		
	UNITS	EAST WALL SA20 @ 1.7M	SOUTH FLOOR SA8 @ 1.7M	EAST WALL SA19 @ 1.0M	SOUTH FLOOR SA7 @ 1.7M	RDL	QC Batch
Physical Properties							
Moisture	%	13	11	12	11	0.30	8011990
Ext. Pet. Hydrocarbon							
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	61	<10	140	10	8011610
F3 (C16-C34 Hydrocarbons)	mg/kg	<50	83	53	<50	50	8011610
F4 (C34-C50 Hydrocarbons)	mg/kg	<50	<50	<50	<50	50	8011610
Reached Baseline at C50	mg/kg	Yes	Yes	Yes	Yes		8011610
Volatiles							
Benzene	mg/kg	0.025	0.26	<0.0050	0.17	0.0050	8012052
Toluene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	8012052
Ethylbenzene	mg/kg	0.017	0.098	<0.010	0.050	0.010	8012052
Xylenes (Total)	mg/kg	<0.040	0.46	<0.040	0.22	0.040	8012052
m & p-Xylene	mg/kg	<0.040	0.43	<0.040	0.19	0.040	8012052
o-Xylene	mg/kg	<0.020	0.035	<0.020	0.033	0.020	8012052
F1 (C6-C10) - BTEX	mg/kg	<12	15	<12	25	12	8012052
F1 (C6-C10)	mg/kg	<12	16	<12	26	12	8012052
Surrogate Recovery (%)							
1,4-Difluorobenzene (sur.)	%	108	106	106	105		8012052
4-Bromofluorobenzene (sur.)	%	108	106	109	103		8012052
D10-ETHYLBENZENE (sur.)	%	100	103	104	105		8012052
D4-1,2-Dichloroethane (sur.)	%	134	136	135	135		8012052
O-TERPHENYL (sur.)	%	134 (1)	114	114	125		8011610

RDL = Reportable Detection Limit
(1) Surrogate recovery exceeds acceptance criteria (high recovery). As results are non-detect, there is no impact on data quality.

Maxxam Analytics International Corporation o/a Maxxam Analytics Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Maxxam Job #: B572411
Report Date: 2015/08/24

DILLON CONSULTING LTD.
Client Project #: CBA-FTA
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700380152
Sampler Initials: MH

AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		MY3191	MY3192	MY3193	MY3194	MY3195		
Sampling Date		2015/08/18	2015/08/18	2015/08/18	2015/08/19	2015/08/19		
COC Number		A159257	A159257	A159257	A159257	A158830		
	UNITS	SOUTH WALL SA17 @ 1.0M	FIELD DUP-4	SOUTH WALL SA18 @ 1.7M	SOUTH WALL SA25 @ 1.0M	SOUTH WALL SA26 @ 1.7M	RDL	QC Batch
Physical Properties								
Moisture	%	8.4	9.4	9.5	6.0	9.5	0.30	8011990
Ext. Pet. Hydrocarbon								
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	<10	<10	<10	<10	10	8011610
F3 (C16-C34 Hydrocarbons)	mg/kg	<50	<50	<50	70	<50	50	8011610
F4 (C34-C50 Hydrocarbons)	mg/kg	<50	<50	<50	<50	<50	50	8011610
Reached Baseline at C50	mg/kg	Yes	Yes	Yes	Yes	Yes		8011610
Volatiles								
Benzene	mg/kg	<0.0050	0.068	0.021	<0.0050	<0.0050	0.0050	8012052
Toluene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	8012052
Ethylbenzene	mg/kg	0.023	0.17	0.21	<0.010	<0.010	0.010	8012052
Xylenes (Total)	mg/kg	0.055	0.13	0.19	<0.040	<0.040	0.040	8012052
m & p-Xylene	mg/kg	0.055	0.13	0.19	<0.040	<0.040	0.040	8012052
o-Xylene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	8012052
F1 (C6-C10) - BTEX	mg/kg	<12	<12	<12	<12	<12	12	8012052
F1 (C6-C10)	mg/kg	<12	<12	<12	<12	<12	12	8012052
Surrogate Recovery (%)								
1,4-Difluorobenzene (sur.)	%	107	106	106	106	108		8012052
4-Bromofluorobenzene (sur.)	%	108	109	109	108	108		8012052
D10-ETHYLBENZENE (sur.)	%	104	105	104	104	105		8012052
D4-1,2-Dichloroethane (sur.)	%	137	134	134	133	135		8012052
O-TERPHENYL (sur.)	%	113	101	113	102	104		8011610

RDL = Reportable Detection Limit

Maxxam Analytics International Corporation o/a Maxxam Analytics Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Maxxam Job #: B572411
Report Date: 2015/08/24

DILLON CONSULTING LTD.
Client Project #: CBA-FTA
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700380152
Sampler Initials: MH

GENERAL COMMENTS

Results relate only to the items tested.

Maxxam Analytics International Corporation o/a Maxxam Analytics Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Maxxam Job #: B572411
Report Date: 2015/08/24

QUALITY ASSURANCE REPORT

DILLON CONSULTING LTD.
Client Project #: CBA-FTA
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700380152
Sampler Initials: MH

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8011610	O-TERPHENYL (sur.)	2015/08/22	97	50 - 130	87	50 - 130	129	%		
8012052	1,4-Difluorobenzene (sur.)	2015/08/23	107	60 - 140	105	60 - 140	110	%		
8012052	4-Bromofluorobenzene (sur.)	2015/08/23	106	60 - 140	110	60 - 140	107	%		
8012052	D10-ETHYLBENZENE (sur.)	2015/08/23	106	60 - 130	108	60 - 130	98	%		
8012052	D4-1,2-Dichloroethane (sur.)	2015/08/23	139	60 - 140	138	60 - 140	133	%		
8011610	F2 (C10-C16 Hydrocarbons)	2015/08/22	110	50 - 130	106	70 - 130	<10	mg/kg	NC	50
8011610	F3 (C16-C34 Hydrocarbons)	2015/08/22	115	50 - 130	110	70 - 130	<50	mg/kg	NC	50
8011610	F4 (C34-C50 Hydrocarbons)	2015/08/22	112	50 - 130	106	70 - 130	<50	mg/kg	NC	50
8011990	Moisture	2015/08/22					<0.30	%	2.3	20
8012052	Benzene	2015/08/23	128	60 - 140	126	60 - 140	<0.0050	mg/kg	17	50
8012052	Ethylbenzene	2015/08/23	112	60 - 140	112	60 - 140	<0.010	mg/kg	1.2	50
8012052	F1 (C6-C10) - BTEX	2015/08/23					<12	mg/kg	NC	50
8012052	F1 (C6-C10)	2015/08/23	112	60 - 140	113	60 - 140	<12	mg/kg	NC	50
8012052	m & p-Xylene	2015/08/23	104	60 - 140	104	60 - 140	<0.040	mg/kg	6.1	50
8012052	o-Xylene	2015/08/23	105	60 - 140	106	60 - 140	<0.020	mg/kg	NC	50
8012052	Toluene	2015/08/23	113	60 - 140	112	60 - 140	<0.020	mg/kg	NC	50
8012052	Xylenes (Total)	2015/08/23					<0.040	mg/kg	8.5	50

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

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

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

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

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Maxxam Job #: B572411
Report Date: 2015/08/24

DILLON CONSULTING LTD.
Client Project #: CBA-FTA
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700380152
Sampler Initials: MH

VALIDATION SIGNATURE PAGE

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

Luba Shymushovska, Organics – Senior Analyst

Jingyuan Song, Organics – Senior Analyst

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Maxxam Analytics International Corporation o/a Maxxam Analytics Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Your P.O. #: 700330152
Your Project #: CBA ETA
Site Location: CAMBRIDGE BAY
Your C.O.C. #: a158829

Attention:Natalie Robinson

PUBLIC WORKS & GOVERNMENT SERVICES CANADA
TELUS TOWER NORTH, 5th FLOOR
10025 JASPER AVENUE
EDMONTON, AB
CANADA T5J 1S6

Report Date: 2015/08/23
Report #: R2028833
Version: 1 - Partial

CERTIFICATE OF ANALYSIS – PARTIAL RESULTS

MAXXAM JOB #: B572551
Received: 2015/08/21, 16:00

Sample Matrix: Soil
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
BTEX/F1 by HS GC/MS/FID (MeOH extract)	1	2015/08/22	2015/08/23	AB SOP-00039	CCME CWS/EPA 8260c m
CCME Hydrocarbons (F2-F4 in soil) (1)	1	2015/08/22	2015/08/23	AB SOP-00036 / AB SOP-00040	CCME PHC-CWS
Moisture	1	N/A	2015/08/22	AB SOP-00002	CCME PHC-CWS

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) All CCME 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.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Linsay Sunderman, Project Manager
Email: LSunderman@maxxam.ca
Phone# (403)735-2237 Ext:2237

==========

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 #: B572551
Report Date: 2015/08/23

PUBLIC WORKS & GOVERNMENT SERVICES CANADA
Client Project #: CBA ETA
Site Location: CAMBRIDGE BAY
Your P.O. #: 700330152
Sampler Initials: MH

AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		MY4113		
Sampling Date		2015/08/20		
COC Number		a158829		
	UNITS	WESTWALL SA27	RDL	QC Batch
Physical Properties				
Moisture	%	6.6	0.30	8011992
Ext. Pet. Hydrocarbon				
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	10	8011721
F3 (C16-C34 Hydrocarbons)	mg/kg	<50	50	8011721
F4 (C34-C50 Hydrocarbons)	mg/kg	<50	50	8011721
Reached Baseline at C50	mg/kg	Yes		8011721
Volatiles				
Benzene	mg/kg	<0.0050	0.0050	8011634
Toluene	mg/kg	<0.020	0.020	8011634
Ethylbenzene	mg/kg	<0.010	0.010	8011634
Xylenes (Total)	mg/kg	<0.040	0.040	8011634
m & p-Xylene	mg/kg	<0.040	0.040	8011634
o-Xylene	mg/kg	<0.020	0.020	8011634
F1 (C6-C10) - BTEX	mg/kg	<12	12	8011634
F1 (C6-C10)	mg/kg	<12	12	8011634
Surrogate Recovery (%)				
1,4-Difluorobenzene (sur.)	%	99		8011634
4-Bromofluorobenzene (sur.)	%	101		8011634
D10-ETHYLBENZENE (sur.)	%	94		8011634
D4-1,2-Dichloroethane (sur.)	%	89		8011634
O-TERPHENYL (sur.)	%	85		8011721
RDL = Reportable Detection Limit				

Maxxam Analytics International Corporation o/a Maxxam Analytics Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Maxxam Job #: B572551
Report Date: 2015/08/23

PUBLIC WORKS & GOVERNMENT SERVICES CANADA
Client Project #: CBA ETA
Site Location: CAMBRIDGE BAY
Your P.O. #: 700330152
Sampler Initials: MH

GENERAL COMMENTS

Results relate only to the items tested.

Maxxam Analytics International Corporation o/a Maxxam Analytics Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Maxxam Job #: B572551
Report Date: 2015/08/23

QUALITY ASSURANCE REPORT

PUBLIC WORKS & GOVERNMENT SERVICES CANADA
Client Project #: CBA ETA
Site Location: CAMBRIDGE BAY
Your P.O. #: 700330152
Sampler Initials: MH

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8011634	1,4-Difluorobenzene (sur.)	2015/08/22	97	60 - 140	91	60 - 140	94	%		
8011634	4-Bromofluorobenzene (sur.)	2015/08/22	97	60 - 140	89	60 - 140	97	%		
8011634	D10-ETHYLBENZENE (sur.)	2015/08/22	91	60 - 130	85	60 - 130	99	%		
8011634	D4-1,2-Dichloroethane (sur.)	2015/08/22	95	60 - 140	89	60 - 140	99	%		
8011721	O-TERPHENYL (sur.)	2015/08/23	87	50 - 130	85	50 - 130	102	%		
8011634	Benzene	2015/08/22	109	60 - 140	98	60 - 140	<0.0050	mg/kg		
8011634	Ethylbenzene	2015/08/22	103	60 - 140	92	60 - 140	<0.010	mg/kg		
8011634	F1 (C6-C10) - BTEX	2015/08/22					<12	mg/kg	NC (1)	50
8011634	F1 (C6-C10)	2015/08/22	111	60 - 140	109	60 - 140	<12	mg/kg	NC (1)	50
8011634	m & p-Xylene	2015/08/22	103	60 - 140	92	60 - 140	<0.040	mg/kg		
8011634	o-Xylene	2015/08/22	101	60 - 140	90	60 - 140	<0.020	mg/kg		
8011634	Toluene	2015/08/22	100	60 - 140	89	60 - 140	<0.020	mg/kg		
8011634	Xylenes (Total)	2015/08/22					<0.040	mg/kg		
8011721	F2 (C10-C16 Hydrocarbons)	2015/08/23	NC	50 - 130	93	70 - 130	<10	mg/kg	4.9	50
8011721	F3 (C16-C34 Hydrocarbons)	2015/08/23	NC	50 - 130	94	70 - 130	<50	mg/kg	4.4	50
8011721	F4 (C34-C50 Hydrocarbons)	2015/08/23	NC	50 - 130	89	70 - 130	<50	mg/kg	4.4	50
8011992	Moisture	2015/08/22					<0.30	%	0.83	20

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 spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of 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 (one or both samples < 5x RDL).

(1) Detection limit raised due to high moisture content.

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Maxxam Job #: B572551
Report Date: 2015/08/23

PUBLIC WORKS & GOVERNMENT SERVICES CANADA
Client Project #: CBA ETA
Site Location: CAMBRIDGE BAY
Your P.O. #: 700330152
Sampler Initials: MH

VALIDATION SIGNATURE PAGE

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

Jingyuan Song, Organics – Senior Analyst

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Maxxam
A Bureau Veritas Group Company

Success Through Science®

Your P.O. #: 15-2309-2000
Your Project #: CBA-FTA
Site Location: CAMBRIDGE BAY
Your C.O.C. #: A159145

Attention:Heather Fisher

DILLON CONSULTING LTD.
1558 Willson Place
Winnipeg, MB
CANADA R3T 0Y4

Report Date: 2015/09/03
Report #: R2035486
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B574458
Received: 2015/08/26, 09:15

Sample Matrix: Soil
Samples Received: 7

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
BTEX/F1 by HS GC/MS/FID (MeOH extract) (1)	7	2015/08/28	2015/09/01	AB SOP-00039	CCME CWS/EPA 8260c m
CCME Hydrocarbons (F2-F4 in soil) (1, 2)	1	2015/08/28	2015/08/29	AB SOP-00036 / AB SOP-00040	CCME PHC-CWS
CCME Hydrocarbons (F2-F4 in soil) (1, 2)	2	2015/08/28	2015/08/30	AB SOP-00036 / AB SOP-00040	CCME PHC-CWS
CCME Hydrocarbons (F2-F4 in soil) (1, 2)	4	2015/08/28	2015/09/02	AB SOP-00036 / AB SOP-00040	CCME PHC-CWS
Elements by ICP -Soils (1)	7	2015/09/02	2015/09/02	AB SOP-00001 / AB SOP-00042	EPA 200.7 CFR 2012 m
Moisture (1)	7	N/A	2015/08/29	AB SOP-00002	CCME PHC-CWS
Benzo[a]pyrene Equivalency (1)	3	N/A	2015/08/30	AB SOP-00003	Auto Calc
Benzo[a]pyrene Equivalency (1)	4	N/A	2015/09/02	AB SOP-00003	Auto Calc
PAH in Soil by GC/MS (1)	3	2015/08/28	2015/08/29	AB SOP-00036 / AB SOP-00003	EPA 8270D m
PAH in Soil by GC/MS (1)	4	2015/08/28	2015/09/01	AB SOP-00036 / AB SOP-00003	EPA 8270D m
Phosphorus (Available by ICP) (1)	7	2015/09/02	2015/09/02	CAL SOP-00152 / AB SOP-00042	EPA 200.7 CFR 2012 m
pH @25C (1:2 Calcium Chloride Extract) (1)	2	2015/08/31	2015/08/31	AB SOP-00033 / AB SOP-00006	SM 22 4500 H+B m
pH @25C (1:2 Calcium Chloride Extract) (1)	5	2015/08/31	2015/09/01	AB SOP-00033 / AB SOP-00006	SM 22 4500 H+B m
Total Kjeldahl Nitrogen - Soil (1)	7	2015/09/02	2015/09/03	AB SOP-00008	EPA 351.1 R1978 m

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 Calgary Environmental

(2) All CCME 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.

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Your P.O. #: 15-2309-2000
Your Project #: CBA-FTA
Site Location: CAMBRIDGE BAY
Your C.O.C. #: A159145

Attention:Heather Fisher

DILLON CONSULTING LTD.
1558 Willson Place
Winnipeg, MB
CANADA R3T 0Y4

Report Date: 2015/09/03
Report #: R2035486
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B574458
Received: 2015/08/26, 09:15

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Lisa Tycholiz, Customer Service Specialist
Email: LTycholiz@maxxam.ca
Phone# (403)735-2280

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Maxxam Job #: B574458
Report Date: 2015/09/03

DILLON CONSULTING LTD.
Client Project #: CBA-FTA
Site Location: CAMBRIDGE BAY
Your P.O. #: 15-2309-2000
Sampler Initials: MM

RESULTS OF CHEMICAL ANALYSES OF SOIL

Maxxam ID		MZ5899	MZ5900		MZ5901		MZ5901		
Sampling Date		2015/08/24	2015/08/24		2015/08/24		2015/08/24		
COC Number		A159145	A159145		A159145		A159145		
	UNITS	**APRON LTU-SA1**	**APRON LTU-SA2**	**QC Batch**	**APRON LTU-SA3**	**RDL**	**APRON LTU-SA3 Lab-Dup**	**RDL**	**QC Batch**
Nutrients									
Available (NH4F) Phosphorus (P)	mg/kg	3.6	11	8024565	7.2	1.0	7.2	1.0	8024565
Total Kjeldahl Nitrogen	mg/kg	300 (1)	280 (1)	8025099	320 (1)	50	230	10	8025099
Soluble Parameters									
Soluble (CaCl2) pH	pH	7.95	8.07	8021802	7.06	N/A			8021676
Physical Properties									
Moisture	%	6.3	4.2	8020325	9.3	0.30			8020325

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

Maxxam ID		MZ5902	MZ5903	MZ5904		
Sampling Date		2015/08/24	2015/08/24	2015/08/24		
COC Number		A159145	A159145	A159145		
	UNITS	**APRON LTU-SA4**	**APRON LTU-SA5**	**APRON LTU-SA6**	**RDL**	**QC Batch**
Nutrients						
Available (NH4F) Phosphorus (P)	mg/kg	12	27	4.2	1.0	8024565
Total Kjeldahl Nitrogen	mg/kg	900 (1)	710 (1)	790 (1)	50	8025099
Soluble Parameters						
Soluble (CaCl2) pH	pH	7.93	8.11	7.42	N/A	8021802
Physical Properties						
Moisture	%	7.3	7.8	11	0.30	8020325

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

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B574458
Report Date: 2015/09/03

DILLON CONSULTING LTD.
Client Project #: CBA-FTA
Site Location: CAMBRIDGE BAY
Your P.O. #: 15-2309-2000
Sampler Initials: MM

RESULTS OF CHEMICAL ANALYSES OF SOIL

Maxxam ID		MZ5905		
Sampling Date		2015/08/24		
COC Number		A159145		
	UNITS	**APRON LTU-DUPLICATE**	**RDL**	**QC Batch**
Nutrients				
Available (NH4F) Phosphorus (P)	mg/kg	10	1.0	8024565
Total Kjeldahl Nitrogen	mg/kg	130	10	8025099
Soluble Parameters				
Soluble (CaCl2) pH	pH	7.02	N/A	8021676
Physical Properties				
Moisture	%	10	0.30	8020325

RDL = Reportable Detection Limit
N/A = Not Applicable

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B574458
Report Date: 2015/09/03

DILLON CONSULTING LTD.
Client Project #: CBA-FTA
Site Location: CAMBRIDGE BAY
Your P.O. #: 15-2309-2000
Sampler Initials: MM

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		MZ5899	MZ5900	MZ5900	MZ5901		
Sampling Date		2015/08/24	2015/08/24	2015/08/24	2015/08/24		
COC Number		A159145	A159145	A159145	A159145		
	UNITS	**APRON LTU-SA1**	**APRON LTU-SA2**	**APRON LTU-SA2 Lab-Dup**	**APRON LTU-SA3**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon							
F2 (C10-C16 Hydrocarbons)	mg/kg	560	680	680	2900	10	8019788
F3 (C16-C34 Hydrocarbons)	mg/kg	210	680	630	480	50	8019788
F4 (C34-C50 Hydrocarbons)	mg/kg	<50	260	230	<50	50	8019788
Reached Baseline at C50	mg/kg	Yes	Yes	Yes	Yes		8019788
Surrogate Recovery (%)							
O-TERPHENYL (sur.)	%	102	97	98	103		8019788

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

Maxxam ID		MZ5902	MZ5903	MZ5904	MZ5905		
Sampling Date		2015/08/24	2015/08/24	2015/08/24	2015/08/24		
COC Number		A159145	A159145	A159145	A159145		
	UNITS	**APRON LTU-SA4**	**APRON LTU-SA5**	**APRON LTU-SA6**	**APRON LTU-DUPLICATE**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon							
F2 (C10-C16 Hydrocarbons)	mg/kg	73	1600	48	2700	10	8019642
F3 (C16-C34 Hydrocarbons)	mg/kg	2200	540	1400	510	50	8019642
F4 (C34-C50 Hydrocarbons)	mg/kg	1500	93	870	<50	50	8019642
Reached Baseline at C50	mg/kg	Yes	Yes	Yes	Yes		8019642
Surrogate Recovery (%)							
O-TERPHENYL (sur.)	%	96	109	100	105		8019642

RDL = Reportable Detection Limit

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B574458
Report Date: 2015/09/03

DILLON CONSULTING LTD.
Client Project #: CBA-FTA
Site Location: CAMBRIDGE BAY
Your P.O. #: 15-2309-2000
Sampler Initials: MM

SEMIVOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		MZ5899	MZ5900	MZ5900	MZ5901		
Sampling Date		2015/08/24	2015/08/24	2015/08/24	2015/08/24		
COC Number		A159145	A159145	A159145	A159145		
	UNITS	**APRON LTU-SA1**	**APRON LTU-SA2**	**APRON LTU-SA2 Lab-Dup**	**APRON LTU-SA3**	**RDL**	**QC Batch**
Polycyclic Aromatics							
Acenaphthene	mg/kg	0.0088 (1)	0.0076 (1)	0.0095	0.068 (1)	0.0050	8019795
Benzo[a]pyrene equivalency	mg/kg	<0.10	<0.10		<0.10	0.10	8019159
Acenaphthylene	mg/kg	0.0095 (1)	0.0060 (1)	0.0066	0.050 (1)	0.0050	8019795
Acridine	mg/kg	0.019	0.036	0.033	0.074	0.010	8019795
Anthracene	mg/kg	<0.0040	<0.0040	<0.0040	<0.0040	0.0040	8019795
Benzo(a)anthracene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	8019795
Benzo(b&j)fluoranthene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	8019795
Benzo(k)fluoranthene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	8019795
Benzo(g,h,i)perylene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	8019795
Benzo(c)phenanthrene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	8019795
Benzo(a)pyrene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	8019795
Benzo[e]pyrene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	8019795
Chrysene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	8019795
Dibenz(a,h)anthracene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	8019795
Fluoranthene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	8019795
Fluorene	mg/kg	0.031	0.014 (1)	0.015	0.17	0.0050	8019795
Indeno(1,2,3-cd)pyrene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	8019795
2-Methylnaphthalene	mg/kg	0.043	<0.0050	<0.0050	1.5	0.0050	8019795
Naphthalene	mg/kg	0.033 (1)	0.029 (1)	0.028	0.35 (1)	0.0050	8019795
Phenanthrene	mg/kg	0.019	0.0068	0.0073	0.12	0.0050	8019795
Perylene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	8019795
Pyrene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	8019795
Quinoline	mg/kg	0.054 (1)	0.040 (1)	0.040	0.26 (1)	0.010	8019795
Surrogate Recovery (%)							
D10-ANTHRACENE (sur.)	%	98	99	95	92		8019795
D12-BENZO(A)PYRENE (sur.)	%	95	94	91	90		8019795
D8-ACENAPHTHYLENE (sur.)	%	100	101	97	94		8019795
TERPHENYL-D14 (sur.)	%	89	90	85	85		8019795

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate
(1) Qualifying ion outside of acceptance criteria. Results are tentatively identified and potentially biased high.

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Maxxam Job #: B574458
Report Date: 2015/09/03

DILLON CONSULTING LTD.
Client Project #: CBA-FTA
Site Location: CAMBRIDGE BAY
Your P.O. #: 15-2309-2000
Sampler Initials: MM

SEMIVOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		MZ5902	MZ5903	MZ5904	MZ5905		
Sampling Date		2015/08/24	2015/08/24	2015/08/24	2015/08/24		
COC Number		A159145	A159145	A159145	A159145		
	UNITS	**APRON LTU-SA4**	**APRON LTU-SA5**	**APRON LTU-SA6**	**APRON LTU-DUPLICATE**	**RDL**	**QC Batch**
Polycyclic Aromatics							
Acenaphthene	mg/kg	<0.0050	0.037	<0.0050	0.10	0.0050	8019679
Benzo[a]pyrene equivalency	mg/kg	<0.10	<0.10	<0.10	<0.10	0.10	8019159
Acenaphthylene	mg/kg	<0.0050	0.031 (1)	<0.0050	0.041 (1)	0.0050	8019679
Acridine	mg/kg	0.011	0.056	<0.010	0.064	0.010	8019679
Anthracene	mg/kg	<0.0040	<0.0040	<0.0040	<0.0040	0.0040	8019679
Benzo(a)anthracene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	8019679
Benzo(b&j)fluoranthene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	8019679
Benzo(k)fluoranthene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	8019679
Benzo(g,h,i)perylene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	8019679
Benzo(c)phenanthrene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	8019679
Benzo(a)pyrene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	8019679
Benzo[e]pyrene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	8019679
Chrysene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	8019679
Dibenz(a,h)anthracene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	8019679
Fluoranthene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	8019679
Fluorene	mg/kg	<0.0050	0.13	<0.0050	0.16	0.0050	8019679
Indeno(1,2,3-cd)pyrene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	8019679
2-Methylnaphthalene	mg/kg	0.030	2.8	0.0067	0.87	0.0050	8019679
Naphthalene	mg/kg	0.0059	0.67	<0.0050	0.20	0.0050	8019679
Phenanthrene	mg/kg	0.010	0.092	<0.0050	0.11	0.0050	8019679
Perylene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	8019679
Pyrene	mg/kg	0.0075	<0.0050	0.0085	<0.0050	0.0050	8019679
Quinoline	mg/kg	<0.010	0.17 (1)	<0.010	0.30 (1)	0.010	8019679
Surrogate Recovery (%)							
D10-ANTHRACENE (sur.)	%	97	91	92	93		8019679
D12-BENZO(A)PYRENE (sur.)	%	93	89	87	90		8019679
D8-ACENAPHTHYLENE (sur.)	%	98	95	90	99		8019679
TERPHENYL-D14 (sur.)	%	81	78	77	80		8019679

RDL = Reportable Detection Limit
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DILLON CONSULTING LTD.
Client Project #: CBA-FTA
Site Location: CAMBRIDGE BAY
Your P.O. #: 15-2309-2000
Sampler Initials: MM

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		MZ5899	MZ5900	MZ5901	MZ5901	MZ5902		
Sampling Date		2015/08/24	2015/08/24	2015/08/24	2015/08/24	2015/08/24		
COC Number		A159145	A159145	A159145	A159145	A159145		
	UNITS	**APRON LTU-SA1**	**APRON LTU-SA2**	**APRON LTU-SA3**	**APRON LTU-SA3 Lab-Dup**	**APRON LTU-SA4**	**RDL**	**QC Batch**
Elements								
Total Iron (Fe)	mg/kg	9900	10000	10000	10000	10000	10	8024404
Total Potassium (K)	mg/kg	1700	2000	1700	2000	1600	25	8024404

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

Maxxam ID		MZ5903	MZ5904	MZ5905		
Sampling Date		2015/08/24	2015/08/24	2015/08/24		
COC Number		A159145	A159145	A159145		
	UNITS	**APRON LTU-SA5**	**APRON LTU-SA6**	**APRON LTU-DUPLICATE**	**RDL**	**QC Batch**
Elements						
Total Iron (Fe)	mg/kg	9800	9600	10000	10	8024404
Total Potassium (K)	mg/kg	1800	1600	1800	25	8024404

RDL = Reportable Detection Limit

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Sampler Initials: MM

VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		MZ5899	MZ5900	MZ5901	MZ5902	MZ5903		
Sampling Date		2015/08/24	2015/08/24	2015/08/24	2015/08/24	2015/08/24		
COC Number		A159145	A159145	A159145	A159145	A159145		
	UNITS	**APRON LTU-SA1**	**APRON LTU-SA2**	**APRON LTU-SA3**	**APRON LTU-SA4**	**APRON LTU-SA5**	**RDL**	**QC Batch**
Volatiles								
Benzene	mg/kg	<0.0050	<0.0050	0.081 (1)	<0.0050	0.20 (1)	0.0050	8021608
Toluene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	8021608
Ethylbenzene	mg/kg	0.016	<0.010	0.070 (1)	<0.010	0.056 (1)	0.010	8021608
Xylenes (Total)	mg/kg	0.091	<0.040	0.18	<0.040	12	0.040	8021608
m & p-Xylene	mg/kg	0.049	<0.040	0.065 (1)	<0.040	0.76	0.040	8021608
o-Xylene	mg/kg	0.042	<0.020	0.11	<0.020	11	0.020	8021608
F1 (C6-C10) - BTEX	mg/kg	97	20	2400	19	2900	12	8021608
F1 (C6-C10)	mg/kg	97	20	2400	19	2900	12	8021608
Surrogate Recovery (%)								
1,4-Difluorobenzene (sur.)	%	99	138	116	108	137		8021608
4-Bromofluorobenzene (sur.)	%	84	82	106	99	90		8021608
D10-ETHYLBENZENE (sur.)	%	91	90	101	91	95		8021608
D4-1,2-Dichloroethane (sur.)	%	100	130	120	107	115		8021608

RDL = Reportable Detection Limit
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Sampler Initials: MM

VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		MZ5904	MZ5905		
Sampling Date		2015/08/24	2015/08/24		
COC Number		A159145	A159145		
	UNITS	**APRON LTU-SA6**	**APRON LTU-DUPLICATE**	**RDL**	**QC Batch**
Volatiles					
Benzene	mg/kg	<0.0050	0.055 (1)	0.0050	8021608
Toluene	mg/kg	<0.020	<0.020	0.020	8021608
Ethylbenzene	mg/kg	<0.010	0.067 (1)	0.010	8021608
Xylenes (Total)	mg/kg	<0.040	0.18	0.040	8021608
m & p-Xylene	mg/kg	<0.040	0.070 (1)	0.040	8021608
o-Xylene	mg/kg	<0.020	0.11	0.020	8021608
F1 (C6-C10) - BTEX	mg/kg	<12	2000	12	8021608
F1 (C6-C10)	mg/kg	<12	2000	12	8021608
Surrogate Recovery (%)					
1,4-Difluorobenzene (sur.)	%	99	103		8021608
4-Bromofluorobenzene (sur.)	%	81	116		8021608
D10-ETHYLBENZENE (sur.)	%	95	99		8021608
D4-1,2-Dichloroethane (sur.)	%	95	108		8021608

RDL = Reportable Detection Limit

(1) Qualifying ion outside of acceptance criteria. Results are tentatively identified and potentially biased high.

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GENERAL COMMENTS

Results relate only to the items tested.

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Sampler Initials: MM

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
8019642	DO1	Matrix Spike	O-TERPHENYL (sur.)	2015/09/01		105	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2015/09/01		105	%	50 - 130
			F3 (C16-C34 Hydrocarbons)	2015/09/01		114	%	50 - 130
			F4 (C34-C50 Hydrocarbons)	2015/09/01		110	%	50 - 130
8019642	DO1	Spiked Blank	O-TERPHENYL (sur.)	2015/09/01		114	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2015/09/01		115	%	70 - 130
			F3 (C16-C34 Hydrocarbons)	2015/09/01		125	%	70 - 130
			F4 (C34-C50 Hydrocarbons)	2015/09/01		121	%	70 - 130
8019642	DO1	Method Blank	O-TERPHENYL (sur.)	2015/09/01		117	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2015/09/01	<10		mg/kg	
			F3 (C16-C34 Hydrocarbons)	2015/09/01	<50		mg/kg	
			F4 (C34-C50 Hydrocarbons)	2015/09/01	<50		mg/kg	
8019642	DO1	RPD	F2 (C10-C16 Hydrocarbons)	2015/09/01	5.3		%	50
			F3 (C16-C34 Hydrocarbons)	2015/09/01	NC		%	50
			F4 (C34-C50 Hydrocarbons)	2015/09/01	NC		%	50
8019679	VP4	Matrix Spike	D10-ANTHRACENE (sur.)	2015/09/01		85	%	50 - 130
			D12-BENZO(A)PYRENE (sur.)	2015/09/01		80	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2015/09/01		85	%	50 - 130
			TERPHENYL-D14 (sur.)	2015/09/01		76	%	50 - 130
			Acenaphthene	2015/09/01		85	%	50 - 130
			Acenaphthylene	2015/09/01		74	%	50 - 130
			Acridine	2015/09/01		52	%	50 - 130
			Anthracene	2015/09/01		72	%	50 - 130
			Benzo(a)anthracene	2015/09/01		84	%	50 - 130
			Benzo(b&j)fluoranthene	2015/09/01		77	%	50 - 130
			Benzo(k)fluoranthene	2015/09/01		72	%	50 - 130
			Benzo(g,h,i)perylene	2015/09/01		69	%	50 - 130
			Benzo(c)phenanthrene	2015/09/01		79	%	50 - 130
			Benzo(a)pyrene	2015/09/01		74	%	50 - 130
			Benzo[e]pyrene	2015/09/01		78	%	50 - 130
			Chrysene	2015/09/01		79	%	50 - 130
			Dibenz(a,h)anthracene	2015/09/01		75	%	50 - 130
			Fluoranthene	2015/09/01		78	%	50 - 130
			Fluorene	2015/09/01		84	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2015/09/01		77	%	50 - 130
			2-Methylnaphthalene	2015/09/01		72	%	50 - 130
			Naphthalene	2015/09/01		72	%	50 - 130
			Phenanthrene	2015/09/01		71	%	50 - 130
			Perylene	2015/09/01		74	%	50 - 130
			Pyrene	2015/09/01		79	%	50 - 130
			Quinoline	2015/09/01		88	%	50 - 130
8019679	VP4	Spiked Blank	D10-ANTHRACENE (sur.)	2015/09/01		99	%	50 - 130
			D12-BENZO(A)PYRENE (sur.)	2015/09/01		96	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2015/09/01		99	%	50 - 130
			TERPHENYL-D14 (sur.)	2015/09/01		85	%	50 - 130
			Acenaphthene	2015/09/01		91	%	50 - 130
			Acenaphthylene	2015/09/01		89	%	50 - 130
			Acridine	2015/09/01		68	%	50 - 130
			Anthracene	2015/09/01		86	%	50 - 130
			Benzo(a)anthracene	2015/09/01		94	%	50 - 130
			Benzo(b&j)fluoranthene	2015/09/01		86	%	50 - 130

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Benzo(k)fluoranthene	2015/09/01		86	%	50 - 130
			Benzo(g,h,i)perylene	2015/09/01		86	%	50 - 130
			Benzo(c)phenanthrene	2015/09/01		90	%	50 - 130
			Benzo(a)pyrene	2015/09/01		90	%	50 - 130
			Benzo[e]pyrene	2015/09/01		92	%	50 - 130
			Chrysene	2015/09/01		94	%	50 - 130
			Dibenz(a,h)anthracene	2015/09/01		84	%	50 - 130
			Fluoranthene	2015/09/01		87	%	50 - 130
			Fluorene	2015/09/01		88	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2015/09/01		86	%	50 - 130
			2-Methylnaphthalene	2015/09/01		84	%	50 - 130
			Naphthalene	2015/09/01		86	%	50 - 130
			Phenanthrene	2015/09/01		87	%	50 - 130
			Perylene	2015/09/01		91	%	50 - 130
			Pyrene	2015/09/01		90	%	50 - 130
			Quinoline	2015/09/01		96	%	50 - 130
8019679	VP4	Method Blank	D10-ANTHRACENE (sur.)	2015/09/01		94	%	50 - 130
			D12-BENZO(A)PYRENE (sur.)	2015/09/01		89	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2015/09/01		93	%	50 - 130
			TERPHENYL-D14 (sur.)	2015/09/01		81	%	50 - 130
			Acenaphthene	2015/09/01	<0.0050		mg/kg	
			Acenaphthylene	2015/09/01	<0.0050		mg/kg	
			Acridine	2015/09/01	<0.010		mg/kg	
			Anthracene	2015/09/01	<0.0040		mg/kg	
			Benzo(a)anthracene	2015/09/01	<0.0050		mg/kg	
			Benzo(b&j)fluoranthene	2015/09/01	<0.0050		mg/kg	
			Benzo(k)fluoranthene	2015/09/01	<0.0050		mg/kg	
			Benzo(g,h,i)perylene	2015/09/01	<0.0050		mg/kg	
			Benzo(c)phenanthrene	2015/09/01	<0.0050		mg/kg	
			Benzo(a)pyrene	2015/09/01	<0.0050		mg/kg	
			Benzo[e]pyrene	2015/09/01	<0.0050		mg/kg	
			Chrysene	2015/09/01	<0.0050		mg/kg	
			Dibenz(a,h)anthracene	2015/09/01	<0.0050		mg/kg	
			Fluoranthene	2015/09/01	<0.0050		mg/kg	
			Fluorene	2015/09/01	<0.0050		mg/kg	
			Indeno(1,2,3-cd)pyrene	2015/09/01	<0.0050		mg/kg	
			2-Methylnaphthalene	2015/09/01	<0.0050		mg/kg	
			Naphthalene	2015/09/01	<0.0050		mg/kg	
			Phenanthrene	2015/09/01	<0.0050		mg/kg	
			Perylene	2015/09/01	<0.0050		mg/kg	
			Pyrene	2015/09/01	<0.0050		mg/kg	
			Quinoline	2015/09/01	<0.010		mg/kg	
8019679	VP4	RPD	Acenaphthene	2015/09/01	NC		%	50
			Acenaphthylene	2015/09/01	NC		%	50
			Acridine	2015/09/01	NC		%	50
			Anthracene	2015/09/01	NC		%	50
			Benzo(a)anthracene	2015/09/01	NC		%	50
			Benzo(b&j)fluoranthene	2015/09/01	NC		%	50
			Benzo(k)fluoranthene	2015/09/01	NC		%	50
			Benzo(g,h,i)perylene	2015/09/01	NC		%	50
			Benzo(c)phenanthrene	2015/09/01	NC		%	50

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Client Project #: CBA-FTA
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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Benzo(a)pyrene	2015/09/01	NC		%	50
			Benzo[e]pyrene	2015/09/01	NC		%	50
			Chrysene	2015/09/01	NC		%	50
			Dibenz(a,h)anthracene	2015/09/01	NC		%	50
			Fluoranthene	2015/09/01	4.1		%	50
			Fluorene	2015/09/01	0.84		%	50
			Indeno(1,2,3-cd)pyrene	2015/09/01	NC		%	50
			2-Methylnaphthalene	2015/09/01	NC		%	50
			Naphthalene	2015/09/01	NC		%	50
			Phenanthrene	2015/09/01	2.1		%	50
			Perylene	2015/09/01	NC		%	50
			Pyrene	2015/09/01	3.2		%	50
			Quinoline	2015/09/01	NC		%	50
8019788	JA7	Matrix Spike [MZ5900-02]	O-TERPHENYL (sur.)	2015/08/29		79	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2015/08/29		NC	%	50 - 130
			F3 (C16-C34 Hydrocarbons)	2015/08/29		NC	%	50 - 130
			F4 (C34-C50 Hydrocarbons)	2015/08/29		NC	%	50 - 130
8019788	JA7	Spiked Blank	O-TERPHENYL (sur.)	2015/08/29		86	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2015/08/29		105	%	70 - 130
			F3 (C16-C34 Hydrocarbons)	2015/08/29		108	%	70 - 130
			F4 (C34-C50 Hydrocarbons)	2015/08/29		101	%	70 - 130
8019788	JA7	Method Blank	O-TERPHENYL (sur.)	2015/08/29		104	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2015/08/29	<10		mg/kg	
			F3 (C16-C34 Hydrocarbons)	2015/08/29	<50		mg/kg	
			F4 (C34-C50 Hydrocarbons)	2015/08/29	<50		mg/kg	
8019788	JA7	RPD [MZ5900-02]	F2 (C10-C16 Hydrocarbons)	2015/08/29	0.49		%	50
			F3 (C16-C34 Hydrocarbons)	2015/08/29	7.7		%	50
			F4 (C34-C50 Hydrocarbons)	2015/08/29	NC		%	50
8019795	SJ1	Matrix Spike [MZ5900-02]	D10-ANTHRACENE (sur.)	2015/08/29		94	%	50 - 130
			D12-BENZO(A)PYRENE (sur.)	2015/08/29		91	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2015/08/29		98	%	50 - 130
			TERPHENYL-D14 (sur.)	2015/08/29		85	%	50 - 130
			Acenaphthene	2015/08/29		82	%	50 - 130
			Acenaphthylene	2015/08/29		85	%	50 - 130
			Acridine	2015/08/29		63	%	50 - 130
			Anthracene	2015/08/29		82	%	50 - 130
			Benzo(a)anthracene	2015/08/29		92	%	50 - 130
			Benzo(b&j)fluoranthene	2015/08/29		86	%	50 - 130
			Benzo(k)fluoranthene	2015/08/29		85	%	50 - 130
			Benzo(g,h,i)perylene	2015/08/29		85	%	50 - 130
			Benzo(c)phenanthrene	2015/08/29		86	%	50 - 130
			Benzo(a)pyrene	2015/08/29		86	%	50 - 130
			Benzo[e]pyrene	2015/08/29		90	%	50 - 130
			Chrysene	2015/08/29		87	%	50 - 130
			Dibenz(a,h)anthracene	2015/08/29		87	%	50 - 130
			Fluoranthene	2015/08/29		90	%	50 - 130
			Fluorene	2015/08/29		91	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2015/08/29		85	%	50 - 130
			2-Methylnaphthalene	2015/08/29		85	%	50 - 130

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Maxxam Job #: B574458
Report Date: 2015/09/03

DILLON CONSULTING LTD.
Client Project #: CBA-FTA
Site Location: CAMBRIDGE BAY
Your P.O. #: 15-2309-2000
Sampler Initials: MM

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Naphthalene	2015/08/29		80	%	50 - 130
			Phenanthrene	2015/08/29		81	%	50 - 130
			Perylene	2015/08/29		84	%	50 - 130
			Pyrene	2015/08/29		92	%	50 - 130
			Quinoline	2015/08/29		68	%	50 - 130
8019795	SJ1	Spiked Blank	D10-ANTHRACENE (sur.)	2015/08/29		97	%	50 - 130
			D12-BENZO(A)PYRENE (sur.)	2015/08/29		88	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2015/08/29		95	%	50 - 130
			TERPHENYL-D14 (sur.)	2015/08/29		85	%	50 - 130
			Acenaphthene	2015/08/29		85	%	50 - 130
			Acenaphthylene	2015/08/29		86	%	50 - 130
			Acridine	2015/08/29		63	%	50 - 130
			Anthracene	2015/08/29		82	%	50 - 130
			Benzo(a)anthracene	2015/08/29		88	%	50 - 130
			Benzo(b&j)fluoranthene	2015/08/29		84	%	50 - 130
			Benzo(k)fluoranthene	2015/08/29		88	%	50 - 130
			Benzo(g,h,i)perylene	2015/08/29		82	%	50 - 130
			Benzo(c)phenanthrene	2015/08/29		85	%	50 - 130
			Benzo(a)pyrene	2015/08/29		84	%	50 - 130
			Benzo[e]pyrene	2015/08/29		90	%	50 - 130
			Chrysene	2015/08/29		89	%	50 - 130
			Dibenz(a,h)anthracene	2015/08/29		80	%	50 - 130
			Fluoranthene	2015/08/29		91	%	50 - 130
			Fluorene	2015/08/29		88	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2015/08/29		74	%	50 - 130
			2-Methylnaphthalene	2015/08/29		82	%	50 - 130
			Naphthalene	2015/08/29		82	%	50 - 130
			Phenanthrene	2015/08/29		85	%	50 - 130
			Perylene	2015/08/29		84	%	50 - 130
			Pyrene	2015/08/29		91	%	50 - 130
			Quinoline	2015/08/29		95	%	50 - 130
8019795	SJ1	Method Blank	D10-ANTHRACENE (sur.)	2015/08/29		94	%	50 - 130
			D12-BENZO(A)PYRENE (sur.)	2015/08/29		76	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2015/08/29		87	%	50 - 130
			TERPHENYL-D14 (sur.)	2015/08/29		80	%	50 - 130
			Acenaphthene	2015/08/29	<0.0050		mg/kg	
			Acenaphthylene	2015/08/29	<0.0050		mg/kg	
			Acridine	2015/08/29	<0.010		mg/kg	
			Anthracene	2015/08/29	<0.0040		mg/kg	
			Benzo(a)anthracene	2015/08/29	<0.0050		mg/kg	
			Benzo(b&j)fluoranthene	2015/08/29	<0.0050		mg/kg	
			Benzo(k)fluoranthene	2015/08/29	<0.0050		mg/kg	
			Benzo(g,h,i)perylene	2015/08/29	<0.0050		mg/kg	
			Benzo(c)phenanthrene	2015/08/29	<0.0050		mg/kg	
			Benzo(a)pyrene	2015/08/29	<0.0050		mg/kg	
			Benzo[e]pyrene	2015/08/29	<0.0050		mg/kg	
			Chrysene	2015/08/29	<0.0050		mg/kg	
			Dibenz(a,h)anthracene	2015/08/29	<0.0050		mg/kg	
			Fluoranthene	2015/08/29	<0.0050		mg/kg	
			Fluorene	2015/08/29	<0.0050		mg/kg	
			Indeno(1,2,3-cd)pyrene	2015/08/29	<0.0050		mg/kg	

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Maxxam Job #: B574458
Report Date: 2015/09/03

DILLON CONSULTING LTD.
Client Project #: CBA-FTA
Site Location: CAMBRIDGE BAY
Your P.O. #: 15-2309-2000
Sampler Initials: MM

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			2-Methylnaphthalene	2015/08/29	<0.0050		mg/kg	
			Naphthalene	2015/08/29	<0.0050		mg/kg	
			Phenanthrene	2015/08/29	<0.0050		mg/kg	
			Perylene	2015/08/29	<0.0050		mg/kg	
			Pyrene	2015/08/29	<0.0050		mg/kg	
			Quinoline	2015/08/29	<0.010		mg/kg	
8019795	SJ1	RPD [MZ5900-02]	Acenaphthene	2015/08/29	NC		%	50
			Acenaphthylene	2015/08/29	NC		%	50
			Acridine	2015/08/29	NC		%	50
			Anthracene	2015/08/29	NC		%	50
			Benzo(a)anthracene	2015/08/29	NC		%	50
			Benzo(b&j)fluoranthene	2015/08/29	NC		%	50
			Benzo(k)fluoranthene	2015/08/29	NC		%	50
			Benzo(g,h,i)perylene	2015/08/29	NC		%	50
			Benzo(c)phenanthrene	2015/08/29	NC		%	50
			Benzo(a)pyrene	2015/08/29	NC		%	50
			Benzo[e]pyrene	2015/08/29	NC		%	50
			Chrysene	2015/08/29	NC		%	50
			Dibenz(a,h)anthracene	2015/08/29	NC		%	50
			Fluoranthene	2015/08/29	NC		%	50
			Fluorene	2015/08/29	NC		%	50
			Indeno(1,2,3-cd)pyrene	2015/08/29	NC		%	50
			2-Methylnaphthalene	2015/08/29	NC		%	50
			Naphthalene	2015/08/29	6.6		%	50
			Phenanthrene	2015/08/29	NC		%	50
			Perylene	2015/08/29	NC		%	50
			Pyrene	2015/08/29	NC		%	50
			Quinoline	2015/08/29	NC		%	50
8020325	AN0	Method Blank	Moisture	2015/08/29	<0.30		%	
8020325	AN0	RPD	Moisture	2015/08/29	5.6		%	20
8021608	RSU	Matrix Spike	1,4-Difluorobenzene (sur.)	2015/09/01		96	%	60 - 140
			4-Bromofluorobenzene (sur.)	2015/09/01		108	%	60 - 140
			D10-ETHYLBENZENE (sur.)	2015/09/01		92	%	60 - 130
			D4-1,2-Dichloroethane (sur.)	2015/09/01		97	%	60 - 140
			Benzene	2015/09/01		113	%	60 - 140
			Toluene	2015/09/01		95	%	60 - 140
			Ethylbenzene	2015/09/01		105	%	60 - 140
			m & p-Xylene	2015/09/01		103	%	60 - 140
			o-Xylene	2015/09/01		105	%	60 - 140
			F1 (C6-C10)	2015/09/01		97	%	60 - 140
8021608	RSU	Spiked Blank	1,4-Difluorobenzene (sur.)	2015/09/01		96	%	60 - 140
			4-Bromofluorobenzene (sur.)	2015/09/01		104	%	60 - 140
			D10-ETHYLBENZENE (sur.)	2015/09/01		92	%	60 - 130
			D4-1,2-Dichloroethane (sur.)	2015/09/01		97	%	60 - 140
			Benzene	2015/09/01		109	%	60 - 140
			Toluene	2015/09/01		126	%	60 - 140
			Ethylbenzene	2015/09/01		103	%	60 - 140
			m & p-Xylene	2015/09/01		102	%	60 - 140
			o-Xylene	2015/09/01		104	%	60 - 140
			F1 (C6-C10)	2015/09/01		112	%	60 - 140
8021608	RSU	Method Blank	1,4-Difluorobenzene (sur.)	2015/09/01		112	%	60 - 140

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Maxxam Job #: B574458
Report Date: 2015/09/03

DILLON CONSULTING LTD.
Client Project #: CBA-FTA
Site Location: CAMBRIDGE BAY
Your P.O. #: 15-2309-2000
Sampler Initials: MM

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			4-Bromofluorobenzene (sur.)	2015/09/01		95	%	60 - 140
			D10-ETHYLBENZENE (sur.)	2015/09/01		88	%	60 - 130
			D4-1,2-Dichloroethane (sur.)	2015/09/01		105	%	60 - 140
			Benzene	2015/09/01	<0.0050		mg/kg	
			Toluene	2015/09/01	<0.020		mg/kg	
			Ethylbenzene	2015/09/01	<0.010		mg/kg	
			Xylenes (Total)	2015/09/01	<0.040		mg/kg	
			m & p-Xylene	2015/09/01	<0.040		mg/kg	
			o-Xylene	2015/09/01	<0.020		mg/kg	
			F1 (C6-C10) - BTEX	2015/09/01	<12		mg/kg	
			F1 (C6-C10)	2015/09/01	<12		mg/kg	
8021608	RSU	RPD	Benzene	2015/09/01	NC		%	50
			Toluene	2015/09/01	NC		%	50
			Ethylbenzene	2015/09/01	NC		%	50
			Xylenes (Total)	2015/09/01	NC		%	50
			m & p-Xylene	2015/09/01	NC		%	50
			o-Xylene	2015/09/01	NC		%	50
			F1 (C6-C10) - BTEX	2015/09/01	NC		%	50
			F1 (C6-C10)	2015/09/01	NC		%	50
8021676	EH2	QC Standard	Soluble (CaCl2) pH	2015/08/31		99	%	98 - 102
8021676	EH2	Spiked Blank	Soluble (CaCl2) pH	2015/08/31		100	%	97 - 103
8021676	EH2	RPD	Soluble (CaCl2) pH	2015/08/31	0.64		%	N/A
8021802	EH2	QC Standard	Soluble (CaCl2) pH	2015/09/01		102	%	98 - 102
8021802	EH2	Spiked Blank	Soluble (CaCl2) pH	2015/09/01		99	%	97 - 103
8021802	EH2	RPD	Soluble (CaCl2) pH	2015/09/01	1.7		%	N/A
8024404	JHC	Matrix Spike [MZ5901-01]	Total Iron (Fe)	2015/09/02		NC	%	75 - 125
			Total Potassium (K)	2015/09/02		NC	%	75 - 125
8024404	JHC	QC Standard	Total Iron (Fe)	2015/09/02		107	%	61 - 139
			Total Potassium (K)	2015/09/02		85	%	60 - 140
8024404	JHC	Spiked Blank	Total Iron (Fe)	2015/09/02		95	%	75 - 125
			Total Potassium (K)	2015/09/02		88	%	75 - 125
8024404	JHC	Method Blank	Total Iron (Fe)	2015/09/02	<10		mg/kg	
			Total Potassium (K)	2015/09/02	<25		mg/kg	
8024404	JHC	RPD [MZ5901-01]	Total Iron (Fe)	2015/09/02	1.2		%	35
			Total Potassium (K)	2015/09/02	13		%	35
8024565	JHC	Spiked Blank	Available (NH4F) Phosphorus (P)	2015/09/02		101	%	80 - 120
8024565	JHC	Method Blank	Available (NH4F) Phosphorus (P)	2015/09/02	<1.0		mg/kg	
8024565	JHC	RPD [MZ5901-01]	Available (NH4F) Phosphorus (P)	2015/09/02	1.1		%	35
8025099	ZI	Matrix Spike [MZ5901-01]	Total Kjeldahl Nitrogen	2015/09/03		NC	%	75 - 125
8025099	ZI	QC Standard	Total Kjeldahl Nitrogen	2015/09/03		78	%	75 - 125
8025099	ZI	Spiked Blank	Total Kjeldahl Nitrogen	2015/09/03		115	%	75 - 125
8025099	ZI	Method Blank	Total Kjeldahl Nitrogen	2015/09/03	<10		mg/kg	

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DILLON CONSULTING LTD.
Client Project #: CBA-FTA
Site Location: CAMBRIDGE BAY
Your P.O. #: 15-2309-2000
Sampler Initials: MM

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
8025099	ZI	RPD [MZ5901-01]	Total Kjeldahl Nitrogen	2015/09/03	33		%	35

N/A = Not Applicable

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

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

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

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

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

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 spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of 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 (one or both samples < 5x RDL).

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Site Location: CAMBRIDGE BAY
Your P.O. #: 15-2309-2000
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NOTIFICATION LOG

No Reportable Regulation Exceedences Noted.

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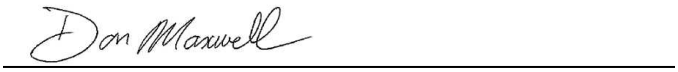
Client Project #: CBA-FTA
Site Location: CAMBRIDGE BAY
Your P.O. #: 15-2309-2000
Sampler Initials: MM

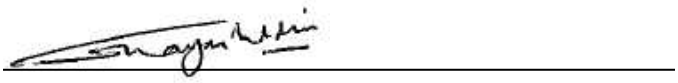
VALIDATION SIGNATURE PAGE

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

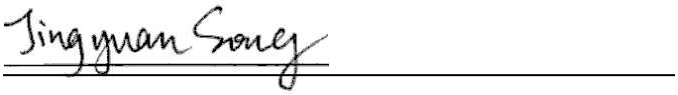


Don Maxwell, Senior Scientific Specialist

Dennis Ngondu, Organics – Supervisor



Ghayasuddin Khan, M.Sc., B.Ed., P.Chem, Scientific Specialist



Jingyuan Song, Organics – Senior Analyst

Veronica Falk, Scientific Specialist

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Maxxam

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6841
1072

Chain of Custody

A153145

Page: 1 of 1

Invoice To:	C/O Report Address ☐	Report To: Same as Invoice ☒	Report Distribution (E-Mail):	REGULATORY GUIDELINES:
Company:	Dillon Consulting LTD		Mhopps@dillon.CA	☐ AT1
Contact:	Heather Fisher		hfisher@dillon.CA	☐ CCME
Address:	1558 Wilson Place		MhAmiton@dillon.CA	☐ Regulated Drinking Water
	Prov: Manitoba PC:	Prov: PC:	MMoriarity@dillon.CA	☐ Other:
Contact #s:	Ph: 204-453-2353 Cell:	Ph: Cell:		

All samples are held for 60 calendar days after sample receipt, unless specified otherwise.

PO #: 15-2309-2000
Project # / Name: CBA-FTA
Site Location: Cambridge Bay
Quote #:
Sampled By: M. Moriarity

SERVICE REQUESTED:
☐ RUSH (Contact lab to reserve)
Date Required:
☒ REGULAR (5 to 7 Days)

See reverse for package specifics

#	Sample ID	Depth (unit)	Matrix GW / SW Soil	Date/Time Sampled YY/MM/DD 24:00	BTEX F1-F4	Sieve (75 micron)	Regulated Metals (CCME / AT1)	Salinity 4	Assessment ICP Metals	Basic Class II Landfill	PAHs	Total Iron, Available phosphate, potassium	pH, Total Kjeldahl Nitrogen	☐VOCs ☐BTEX F1	☐BTEX F1-F4 ☐BTEX F1-F2	☐ Routine Water ☐ Turb ☐ F	☐ DOC ☐ TOC	Regulated Metals (CCME / AT1) Total	Dissolved	☐ Total ☐ Dissolved Mercury	Other Analysis	HOLD - Do not Analyze	# of Containers Submitted
1	Apron LTU-SA1	0.30m	Soil	Aug 24/15	X						X	X	X										4
2	Apron LTU-SA2	0.30m	↓	↓	↓						↓	↓	↓										4
3	Apron LTU-SA3	0.30m	↓	↓	↓						↓	↓	↓										4
4	Apron LTU-SA4	0.30m	↓	↓	↓						↓	↓	↓										4
5	Apron LTU-SA5	0.30m	↓	↓	↓						↓	↓	↓										4
6	Apron LTU-SA6	0.30m	↓	↓	↓						↓	↓	↓										4
7	Apron LTU-Duplicate	0.30m	↓	↓	↓						↓	↓	↓										4
8																							
9																							
10																							
11																							
12																							

26-Aug-15 09:15
Janelle Kochan
B574458
HT4 INS-0067 FLF

RECEIVED IN YELLOWKNIFE
By: Michelle Guile 9:15
2015-08-26
Temp: 4 / 5 / 4

Please indicate Filtered, Preserved or Both (F, P, F/P) → F/P

Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):
Mark Moriarity	Aug 25/15	10:00
Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):

Special Instructions:

# of Jars Used & Not Submitted

LAB USE ONLY			
Received By: NAHIBE BLANQUICET	Date: 2015/08/27	Time: 16:48	Maxxam Job #:
Lab Comments:	Custody Seal: Yes	Temperature: 6, 7, 6	Ice: Yes

AB FCD-00331 Rev3 2010/05

Maxxam Analytics International Corporation o/a Maxxam Analytics

Success Through Science®

Your Project #: B567564
Your C.O.C. #: na

Attention:Linsay Sunderman

Maxxam Analytics
2021 41st Ave NE
Calgary, AB
T2E 6P2

Report Date: 2015/08/18
Report #: R3631562
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B5F8771
Received: 2015/08/11, 09:35

Sample Matrix: Water
Samples Received: 4

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
PFOS and PFOA in water	4	2015/08/13	2015/08/14	CAM SOP-00894	EPA 537 m

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Andrea Rieth, Project Manager
Email: ARieth@maxxam.ca
Phone# (905)817-5787 Ext:5787

==========

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Maxxam Job #: B5F8771
Report Date: 2015/08/18

Maxxam Analytics
Client Project #: B567564

RESULTS OF ANALYSES OF WATER

Maxxam ID		ATX712			ATX713	ATX713			
Sampling Date		2015/07/28			2015/07/28	2015/07/28			
COC Number		na			na	na			
	UNITS	MV5177\3-09-4M	RDL	MDL	MV5178\3-09-6M	MV5178\3-09-6M Lab-Dup	RDL	MDL	QC Batch
Miscellaneous Parameters									
Perfluorobutane Sulfonate (PFBS)	ug/L	44	0.80	0.16	2.6	2.6	0.80	0.16	4147793
Perfluorobutanoic acid	ug/L	38	0.80	0.12	4.9	4.5	0.80	0.12	4147793
Perfluorodecane Sulfonate	ug/L	<0.80	0.80	0.15	<0.80	<0.80	0.80	0.15	4147793
Perfluorodecanoic Acid (PFDA)	ug/L	<0.80	0.80	0.10	<0.80	<0.80	0.80	0.10	4147793
Perfluorododecanoic Acid (PFDoA)	ug/L	<0.80	0.80	0.23	<0.80	<0.80	0.80	0.23	4147793
Perfluoroheptanoic Acid (PFHpA)	ug/L	17	0.80	0.10	7.0	7.2	0.80	0.10	4147793
Perfluorohexane Sulfonate (PFHxS)	ug/L	260	8.0	2.4	72	60	8.0	2.4	4147793
Perfluorohexanoic Acid (PFHxA)	ug/L	190	8.0	0.88	23	23	0.80	0.088	4147793
Perfluoro-n-Octanoic Acid (PFOA)	ug/L	19	0.80	0.22	8.0	9.1	0.80	0.22	4147793
Perfluorononanoic Acid (PFNA)	ug/L	<0.80	0.80	0.16	1.1	1.2	0.80	0.16	4147793
Perfluorooctane Sulfonamide (PFOSA)	ug/L	<0.80	0.80	0.040	<0.80	<0.80	0.80	0.040	4147793
Perfluorooctane Sulfonate (PFOS)	ug/L	130	8.0	1.5	400	340	8.0	1.5	4147793
Perfluoropentanoic Acid (PFPeA)	ug/L	100	8.0	1.4	20	23	0.80	0.14	4147793
Perfluorotetradecanoic Acid	ug/L	<0.80	0.80	0.16	<0.80	<0.80 (1)	0.80	0.16	4147793
Perfluorotridecanoic Acid	ug/L	<0.80	0.80	0.22	<0.80	<0.80	0.80	0.22	4147793
Perfluoroundecanoic Acid (PFUnA)	ug/L	<0.80	0.80	0.22	<0.80	<0.80	0.80	0.22	4147793
Surrogate Recovery (%)									
13C4-Perfluorooctanesulfonate	%	86	N/A	N/A	109	117	N/A	N/A	4147793
13C4-Perfluorooctanoic acid	%	108	N/A	N/A	105	93	N/A	N/A	4147793
13C8-Perfluorooctanesulfonamide	%	105	N/A	N/A	91	99	N/A	N/A	4147793

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B5F8771
Report Date: 2015/08/18

Maxxam Analytics
Client Project #: B567564

RESULTS OF ANALYSES OF WATER

Maxxam ID		ATX714	ATX715			
Sampling Date		2015/07/28	2015/07/28			
COC Number		na	na			
	UNITS	MV5179\VCB-01	MV5180\FIELD DUPLICATE	RDL	MDL	QC Batch
Miscellaneous Parameters						
Perfluorobutane Sulfonate (PFBS)	ug/L	10	9.7	0.80	0.16	4147793
Perfluorobutanoic acid	ug/L	15	15	0.80	0.12	4147793
Perfluorodecane Sulfonate	ug/L	<0.80	<0.80	0.80	0.15	4147793
Perfluorodecanoic Acid (PFDA)	ug/L	<0.80	<0.80	0.80	0.10	4147793
Perfluorododecanoic Acid (PFDoA)	ug/L	<0.80	<0.80	0.80	0.23	4147793
Perfluoroheptanoic Acid (PFHpA)	ug/L	14	15	0.80	0.10	4147793
Perfluorohexane Sulfonate (PFHxS)	ug/L	250	210	8.0	2.4	4147793
Perfluorohexanoic Acid (PFHxA)	ug/L	96	81	8.0	0.88	4147793
Perfluoro-n-Octanoic Acid (PFOA)	ug/L	15	14	0.80	0.22	4147793
Perfluorononanoic Acid (PFNA)	ug/L	<0.80	<0.80	0.80	0.16	4147793
Perfluorooctane Sulfonamide (PFOSA)	ug/L	<0.80	<0.80	0.80	0.040	4147793
Perfluorooctane Sulfonate (PFOS)	ug/L	18	19	0.80	0.15	4147793
Perfluoropentanoic Acid (PFPeA)	ug/L	110	97	8.0	1.4	4147793
Perfluorotetradecanoic Acid	ug/L	<0.80	<0.80	0.80	0.16	4147793
Perfluorotridecanoic Acid	ug/L	<0.80	<0.80	0.80	0.22	4147793
Perfluoroundecanoic Acid (PFUnA)	ug/L	<0.80	<0.80	0.80	0.22	4147793
Surrogate Recovery (%)						
13C4-Perfluorooctanesulfonate	%	91	92	N/A	N/A	4147793
13C4-Perfluorooctanoic acid	%	103	100	N/A	N/A	4147793
13C8-Perfluorooctanesulfonamide	%	112	97	N/A	N/A	4147793

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

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Maxxam Job #: B5F8771
Report Date: 2015/08/18

Maxxam Analytics
Client Project #: B567564

TEST SUMMARY

Maxxam ID: ATX712
Sample ID: MV5177\3-09-4M
Matrix: Water

Collected: 2015/07/28
Shipped:
Received: 2015/08/11

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFOS and PFOA in water	LCMS	4147793	2015/08/13	2015/08/14	Colm McNamara

Maxxam ID: ATX713
Sample ID: MV5178\3-09-6M
Matrix: Water

Collected: 2015/07/28
Shipped:
Received: 2015/08/11

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFOS and PFOA in water	LCMS	4147793	2015/08/13	2015/08/14	Colm McNamara

Maxxam ID: ATX713 Dup
Sample ID: MV5178\3-09-6M
Matrix: Water

Collected: 2015/07/28
Shipped:
Received: 2015/08/11

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFOS and PFOA in water	LCMS	4147793	2015/08/13	2015/08/14	Colm McNamara

Maxxam ID: ATX714
Sample ID: MV5179\VCB-01
Matrix: Water

Collected: 2015/07/28
Shipped:
Received: 2015/08/11

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFOS and PFOA in water	LCMS	4147793	2015/08/13	2015/08/14	Colm McNamara

Maxxam ID: ATX715
Sample ID: MV5180\FIELD DUPLICATE
Matrix: Water

Collected: 2015/07/28
Shipped:
Received: 2015/08/11

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFOS and PFOA in water	LCMS	4147793	2015/08/13	2015/08/14	Colm McNamara

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Maxxam Job #: B5F8771
Report Date: 2015/08/18

Maxxam Analytics
Client Project #: B567564

GENERAL COMMENTS

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

Package 1	2.3°C

Sample ATX712-01 : Perfluorinated Compounds (PFCs): Due to high concentrations of the target analytes, sample required dilution. Detection limits were adjusted accordingly.

Sample ATX713-01 : Perfluorinated Compounds (PFCs): Due to high concentrations of the target analytes, sample required dilution. Detection limits were adjusted accordingly.

Sample ATX714-01 : Perfluorinated Compounds (PFCs): Due to high concentrations of the target analytes, sample required dilution. Detection limits were adjusted accordingly.

Sample ATX715-01 : Perfluorinated Compounds (PFCs): Due to high concentrations of the target analytes, sample required dilution. Detection limits were adjusted accordingly.

Results relate only to the items tested.

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Maxxam Job #: B5F8771
Report Date: 2015/08/18

Maxxam Analytics
Client Project #: B567564

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
4147793	CM5	Matrix Spike	13C4-Perfluorooctanesulfonate	2015/08/14		74	%	70 - 130
			13C4-Perfluorooctanoic acid	2015/08/14		92	%	70 - 130
			13C8-Perfluorooctanesulfonamide	2015/08/14		92	%	50 - 150
4147793	CM5	Matrix Spike(ATX713)	Perfluorobutane Sulfonate (PFBS)	2015/08/14		NC	%	70 - 130
			Perfluorobutanoic acid	2015/08/14		NC	%	70 - 130
			Perfluorodecane Sulfonate	2015/08/14		110	%	70 - 130
			Perfluoroheptanoic Acid (PFHpA)	2015/08/14		NC	%	70 - 130
			Perfluorohexane Sulfonate (PFHxS)	2015/08/14		NC	%	70 - 130
			Perfluorohexanoic Acid (PFHxA)	2015/08/14		NC	%	70 - 130
			Perfluorononanoic Acid (PFNA)	2015/08/14		NC	%	70 - 130
			Perfluorooctane Sulfonamide (PFOSA)	2015/08/14		109	%	70 - 130
			Perfluoropentanoic Acid (PFPeA)	2015/08/14		NC	%	70 - 130
			Perfluorotetradecanoic Acid	2015/08/14		96	%	70 - 130
			Perfluorotridecanoic Acid	2015/08/14		124	%	70 - 130
			Perfluoroundecanoic Acid (PFUnA)	2015/08/14		86	%	70 - 130
			Perfluorodecanoic Acid (PFDA)	2015/08/14		106	%	70 - 130
			Perfluorododecanoic Acid (PFDoA)	2015/08/14		112	%	70 - 130
			Perfluoro-n-Octanoic Acid (PFOA)	2015/08/14		NC	%	70 - 130
			Perfluorooctane Sulfonate (PFOS)	2015/08/14		NC	%	70 - 130
4147793	CM5	Spiked Blank	13C4-Perfluorooctanesulfonate	2015/08/14		87	%	70 - 130
			13C4-Perfluorooctanoic acid	2015/08/14		85	%	70 - 130
			13C8-Perfluorooctanesulfonamide	2015/08/14		96	%	50 - 150
			Perfluorobutane Sulfonate (PFBS)	2015/08/14		108	%	70 - 130
			Perfluorobutanoic acid	2015/08/14		116	%	70 - 130
			Perfluorodecane Sulfonate	2015/08/14		100	%	70 - 130
			Perfluoroheptanoic Acid (PFHpA)	2015/08/14		97	%	70 - 130
			Perfluorohexane Sulfonate (PFHxS)	2015/08/14		110	%	70 - 130
			Perfluorohexanoic Acid (PFHxA)	2015/08/14		109	%	70 - 130
			Perfluorononanoic Acid (PFNA)	2015/08/14		111	%	70 - 130
			Perfluorooctane Sulfonamide (PFOSA)	2015/08/14		97	%	70 - 130
			Perfluoropentanoic Acid (PFPeA)	2015/08/14		103	%	70 - 130
			Perfluorotetradecanoic Acid	2015/08/14		91	%	70 - 130
			Perfluorotridecanoic Acid	2015/08/14		108	%	70 - 130
			Perfluoroundecanoic Acid (PFUnA)	2015/08/14		98	%	70 - 130
			Perfluorodecanoic Acid (PFDA)	2015/08/14		102	%	70 - 130
			Perfluorododecanoic Acid (PFDoA)	2015/08/14		110	%	70 - 130
			Perfluoro-n-Octanoic Acid (PFOA)	2015/08/14		104	%	70 - 130
			Perfluorooctane Sulfonate (PFOS)	2015/08/14		99	%	70 - 130
4147793	CM5	Method Blank	13C4-Perfluorooctanesulfonate	2015/08/14		110	%	70 - 130
			13C4-Perfluorooctanoic acid	2015/08/14		116	%	70 - 130
			13C8-Perfluorooctanesulfonamide	2015/08/14		121	%	50 - 150
			Perfluorobutane Sulfonate (PFBS)	2015/08/14	<0.80		ug/L	
			Perfluorobutanoic acid	2015/08/14	<0.80		ug/L	
			Perfluorodecane Sulfonate	2015/08/14	<0.80		ug/L	
			Perfluoroheptanoic Acid (PFHpA)	2015/08/14	<0.80		ug/L	
			Perfluorohexane Sulfonate (PFHxS)	2015/08/14	<0.80		ug/L	
			Perfluorohexanoic Acid (PFHxA)	2015/08/14	<0.80		ug/L	
			Perfluorononanoic Acid (PFNA)	2015/08/14	<0.80		ug/L	
			Perfluorooctane Sulfonamide (PFOSA)	2015/08/14	<0.80		ug/L	
			Perfluoropentanoic Acid (PFPeA)	2015/08/14	<0.80		ug/L	
			Perfluorotetradecanoic Acid	2015/08/14	<0.80		ug/L	
			Perfluorotridecanoic Acid	2015/08/14	<0.80		ug/L	
			Perfluoroundecanoic Acid (PFUnA)	2015/08/14	<0.80		ug/L	
			Perfluorodecanoic Acid (PFDA)	2015/08/14	<0.80		ug/L	

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Maxxam Job #: B5F8771
Report Date: 2015/08/18

Maxxam Analytics
Client Project #: B567564

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			Perfluorododecanoic Acid (PFDoA)	2015/08/14	<0.80		ug/L	
			Perfluoro-n-Octanoic Acid (PFOA)	2015/08/14	<0.80		ug/L	
			Perfluorooctane Sulfonate (PFOS)	2015/08/14	<0.80		ug/L	
4147793	CM5	RPD - Sample/Sample Dup	Perfluorobutane Sulfonate (PFBS)	2015/08/14	NC		%	30
			Perfluorobutanoic acid	2015/08/14	7.9		%	30
			Perfluorodecane Sulfonate	2015/08/14	NC		%	30
			Perfluoroheptanoic Acid (PFHpA)	2015/08/14	3.1		%	30
			Perfluorohexane Sulfonate (PFHxS)	2015/08/14	18		%	30
			Perfluorohexanoic Acid (PFHxA)	2015/08/14	0.44		%	30
			Perfluorononanoic Acid (PFNA)	2015/08/14	NC		%	30
			Perfluorooctane Sulfonamide (PFOSA)	2015/08/14	NC		%	30
			Perfluoropentanoic Acid (PFPeA)	2015/08/14	15		%	30
			Perfluorotetradecanoic Acid	2015/08/14	NC		%	30
			Perfluorotridecanoic Acid	2015/08/14	NC		%	30
			Perfluoroundecanoic Acid (PFUnA)	2015/08/14	NC		%	30
			Perfluorodecanoic Acid (PFDA)	2015/08/14	NC		%	30
			Perfluorododecanoic Acid (PFDoA)	2015/08/14	NC		%	30
			Perfluoro-n-Octanoic Acid (PFOA)	2015/08/14	13		%	30
			Perfluorooctane Sulfonate (PFOS)	2015/08/14	17		%	30

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 spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of 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 (one or both samples < 5x RDL).

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Maxxam Job #: B5F8771
Report Date: 2015/08/18

Maxxam Analytics
Client Project #: B567564

VALIDATION SIGNATURE PAGE

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

Adam Robinson, Technical Service

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

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MAXXAM ANALYTICS
4000 19st N.E
Calgary, Alberta, T2E 6P8
Phone: (403) 291-3077
Fax: (403) 291-9468

11-Aug-15 09:35
Andrea Rieth
B5F8771

MK3 ENV-943

am

)UEST FORM

PUBLIC WORKS &
GOVERNMENT SERVICES
CANADA - EDMONTON
Maxxam PM Linsay Sunderman

To: Maxxam Ontario (From Calgary)

Job# B567564

☐ Yes ☐ No International Sample/BioHazard (if yes, add copy of Movement Cert., heat treat is required prior to disposal)
☐ Yes ☐ No Special Protocol (if yes, Protocol _____)

Sample ID	Matrix	Test(s) Required	Container	Date Sampled	Date Required
MV5177-01R \ 3-09-4M	WATER	Pefluorinated Compounds - Subcontract	2(CR3)	2015/07/28	2015/08/21
MV5178-01R \ 3-09-6M	WATER	Pefluorinated Compounds - Subcontract	2(CR3)	2015/07/28	2015/08/21
MV5179-01R \ VCB-01	WATER	Pefluorinated Compounds - Subcontract	1(CR3)	2015/07/28	2015/08/21
MV5180-01R \ FIELD DUPLICATE	WATER	Pefluorinated Compounds - Subcontract	1(CR3)	2015/07/28	2015/08/21

	Temp. 1	Temp. 2	Temp. 3			
Cooler #1	1	2	4	Custody Seal Present	YES ✓	NO
				Custody Seal Intact	YES ✓	NO
				Ice Present Upon Receipt	YES ✓	NO
Cooler #2				Custody Seal Present	YES	NO
				Custody Seal Intact	YES	NO
				Ice Present Upon Receipt	YES	NO
Cooler #3				Custody Seal Present	YES	NO
				Custody Seal Intact	YES	NO
				Ice Present Upon Receipt	YES	NO

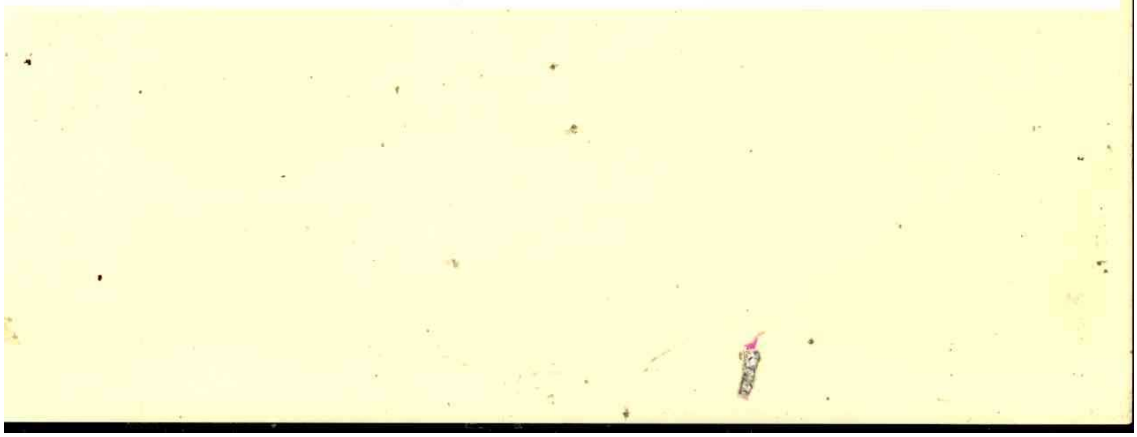
Receiving Maxxam Location: Maxxam Ontario (From Calgary) JOB #

Relinquished by (Sign) _____ (Print) Josh Kingsbury Date and Time 2015/08/10 13:45

Received by (Sign) Alex Vahidi (Print) Alex Vahidi Date and Time 2015/08/11 09:35

NOTES:
1) Please call us if due date cannot be met. Please reference Sample ID on your report.
2) Include copy of this completed form, Client COC & signed final report to

Reporting Requirements:
National:
Regional:



MAXXAM ANALYTICS
4000 19st N.E
Calgary, Alberta, T2E 6P8
Phone: (403) 291-3077
Fax: (403) 291-9468

Maxxam

SUBCONTRACTING REQUEST FORM

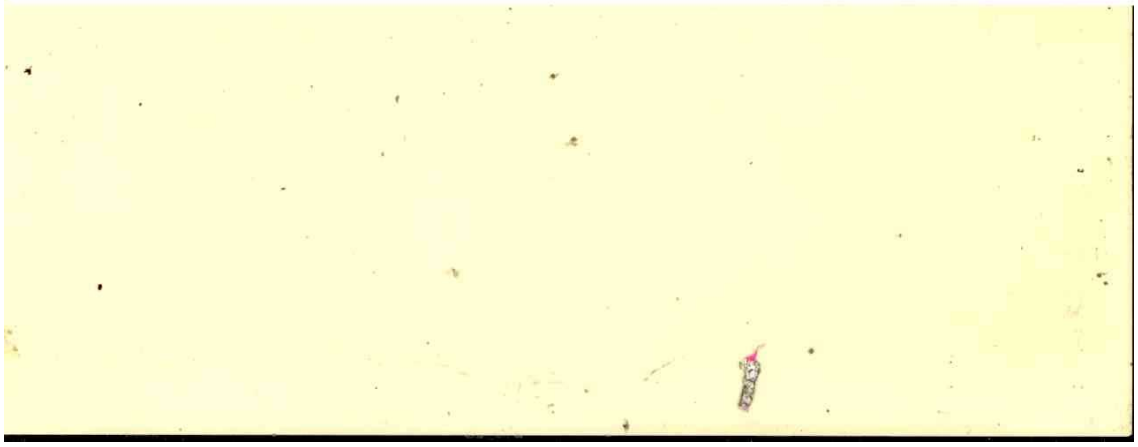
PUBLIC WORKS &
GOVERNMENT SERVICES
CANADA - EDMONTON
Maxxam PM Linsay Sunderman

SHIPPING INSTRUCTIONS

☐ Ship Immediately (highlight Yellow) ☐ Ship Cold
☐ Requires 9am ☐ Ship Room Temp
☐ Requires Sat. Delivery ☐ Ship Frozen
☐ Regular Ship next available day ☐ COC Must be Attached
Sender (Print) _____ Initial _____

SHIPPING DEPARTMENT CHECKLIST

☐ Correct Shipping location
☐ Correct Sample Ids (Paperwork vs Bottles)
☐ Yes ☐ No Special-Cooler, Ice, Tape-custody seal, Date&Sign
Date Shipped _____ Number of coolers _____
Shipper (Print) _____ Initial _____



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164 Chain of Custody

Page: 1 of 2

Invoice To:	C/O Report Address	Report To: Same as Invoice	Report Distribution (E-Mail):	REGULATORY GUIDELINES:
Company: PWGSC		mhopps@dillon.ca	Same	☐ AT1
Contact: Natalie Robinson		hfisher@dillon.ca		☐ CCME
Address:		Natalie.Robinson@pwgsc-tpsgc.gc.ca		☐ Regulated Drinking Water
Prov: PC:		Prov: Manitoba PC:		☐ Other:
Contact #s: Ph: 403-292-6884 Cell:		Ph: Cell:		

All samples are held for 60 calendar days after sample receipt, unless specified otherwise.

PO #: R 056014.005 / 700330152
Project # / Name: Cambridge Bay, NU
Site Location:
Quote #: PMSO E0276-123115
Sampled By: M. Hopps

SERVICE REQUESTED: ☐ RUSH (Contact lab to reserve) Date Required: ☒ REGULAR (5 to 7 Days)

	Sample ID	Depth (unit)	Matrix GW / SW Soil	Date/Time Sampled YY/MM/DD 24:00	PFOS / PFOA	# of Containers Submitted
1	3-09-4m		GW	15/07/28	X	2L
2	3-09-6m		GW	15/07/28	X	2L
3	YCB-01		GW	15/07/28	X	1L
4	Field Duplicate		GW	15/07/28	X	1L
5						
6						
7						
8						
9						
10						
11						
12						

Analysis columns: SOIL — BTEX F1-F4; Sieve (75 micron); Regulated Metals (CCME / AT1); Salinity 4; Assessment ICP Metals; Basic Class II Landfill. WATER — ☐ VOCs; ☐ BTEX F1 ☐ BTEX F1-F2 ☐ BTEX F1-F4; ☐ Routine Water ☐ Turb ☐ F; ☐ TOC ☐ DOC; Total / Dissolved Regulated Metals (CCME / AT1); Mercury ☐ Total ☐ Dissolved; PFOS / PFOA. Other Analysis. HOLD - Do not Analyze; # of Containers Submitted.

Please indicate Filtered, Preserved or Both (F, P, F/P)

05-Aug-15 10:45
Marnie Kolach
B567564
WL2 INS-0077

RECEIVED IN YELLOWKNIFE
By: [signature]
2015-08-05 10:45

Temp: 4/3/4

Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):	Received By:	Date:	Time:	Maxxam Job #:
Matthew Hopps	15/07/29		Jasbir Kaur / JASBIR KAUR	2015/08/06	16:17	
Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):	Lab Comments:			Custody Seal: YES / Temperature: 6/6/5 / Ice: YES

Special Instructions:

# of Jars Used & Not Submitted:

AB FCD-00331 Rev3 2010/05

Maxxam Analytics International Corporation o/a Maxxam Analytics

Success Through Science®

Your Project #: R.056019.005/7003301
Site Location: CAMBRIDGE BAY, NU
Your C.O.C. #: A158924

Attention:Natalie Robinson

PUBLIC WORKS & GOVERNMENT SERVICES CANADA
TELUS TOWER NORTH, 5th FLOOR
10025 JASPER AVENUE
EDMONTON, AB
CANADA T5J 1S6

Report Date: 2015/08/18
Report #: R2026154
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B567564
Received: 2015/08/05, 10:45

Sample Matrix: Water
Samples Received: 4

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Pefluorinated Compounds - Subcontract (1)	4	N/A	2015/08/18		

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 Ontario (From Calgary)

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Linsay Sunderman, Project Manager
Email: LSunderman@maxxam.ca
Phone# (403)735-2237 Ext:2237

==========

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 Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B567564
Report Date: 2015/08/18

PUBLIC WORKS & GOVERNMENT SERVICES CANADA
Client Project #: R.056019.005/7003301
Site Location: CAMBRIDGE BAY, NU

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		MV5177	MV5178	MV5179	MV5180	
Sampling Date		2015/07/28	2015/07/28	2015/07/28	2015/07/28	
COC Number		A158924	A158924	A158924	A158924	
	UNITS	**3-09-4M**	**3-09-6M**	**VCB-01**	**FIELD DUPLICATE**	**QC Batch**
Parameter						
Subcontract Parameter	ug/L	SEE ATTACH	SEE ATTACH	SEE ATTACH	SEE ATTACH	8006739

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B567564
Report Date: 2015/08/18

PUBLIC WORKS & GOVERNMENT SERVICES CANADA
Client Project #: R.056019.005/7003301
Site Location: CAMBRIDGE BAY, NU

GENERAL COMMENTS

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

Package 1	3.7°C

PFOS and PFOA Analysis results are attached to this report. The reference number for these results from Maxxam Campobello is B5F8771.

Results relate only to the items tested.

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B567564
Report Date: 2015/08/18

PUBLIC WORKS & GOVERNMENT SERVICES CANADA
Client Project #: R.056019.005/7003301
Site Location: CAMBRIDGE BAY, NU

VALIDATION SIGNATURE PAGE

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

Janet Gao, Supervisor

Michael Sheppard, Senior Scientific Specialist

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Maxxam

Calgary: 4000 19st St. NE, T2E 6P8. Ph: (403) 291-3077, Fax: (403) 735-2240, Toll free: (800) 386-7247
Edmonton: 9331 - 48 Street, T6B 2R4. Ph: (780) 577-7100, Fax: (780) 450-4187, Toll free: (877) 465-8889
www.maxxamanalytics.com

164 **Chain of Custody** A158924

Page: 1 of 7

	Invoice To: C/O Report Address ☐	Report To: Same as Invoice ☐	Report Distribution (E-Mail):
Company:	PWGSC	mhopps@dillon.ca	~~Same~~
Contact:	Natalie Robinson	nfisher@dillon.ca	
Address:		Natalie.Robinson@pwgsc-tpsgc.gc.ca	
	Prov: PC:	Prov: Manitoba PC:	
Contact #s:	Ph: 403-292-6882 Cell:	Ph: Cell:	

REGULATORY GUIDELINES:
☐ AT1
☐ CCME
☐ Regulated Drinking Water
☐ Other:

All samples are held for 60 calendar days after sample receipt, unless specified otherwise.

PO #: R.056019.005/700330152
Project # / Name: Cambridge Bay, NU.
Site Location:
Quote #: RMSO E0276-123115
Sampled By: M.Hopps

SERVICE REQUESTED: ☐ **RUSH** (Contact lab to reserve) **Date Required:** ☒ REGULAR (5 to 7 Days)

See reverse for package specifics

	Sample ID	Depth (unit)	Matrix GW / SW Soil	Date/Time Sampled YY/MM/DD 24:00	SOIL: BTEX F1-F4	Sieve (75 micron)	Regulated Metals (CCME / AT1)	Salinity 4	Assessment ICP Metals	Basic Class II Landfill	WATER: ☐VOCs ☐BTEX F1 ☐BTEX F2	☐BTEX F1-F4 ☐F1-F4	☐Routine Water ☐Turb ☐F	☐TOC ☐DOC	Regulated Metals (CCME / AT1) Total	Dissolved	Mercury	☐Total ☐Dissolved	Other Analysis	HOLD - Do not Analyze	# of Containers Submitted
1	3-09-4m		GW	15/07/28															X PFOS/PFOA		2 L
2	3-09-6m		GW	15/07/28															X		2 L
3	YCB-01		GW	15/07/28															X		1 L
4	Field Duplicate		GW	15/07/28															X		1 L
5																					
6																					
7																					
8																					
9																					
10																					
11																					
12																					

05-Aug-15 10:45
Marnie Kolach
B567564
WL2 INS-0077

RECEIVED IN YELLOWKNIFE
By: Jasbirjit Kaur
2015 -08- 05 10:43

Temp: 4/13/14

Please indicate Filtered, Preserved or Both (F, P, F/P)

Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):
Matthew Hopps	15/07/29	
Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):

Special Instructions: | **# of Jars Used & Not Submitted**

LAB USE ONLY

Received By:	Date:	Time:	Maxxam Job #:		
Jasbirjit Kaur	2015/08/06	16:17	Custody Seal	Temperature	Ice
JASBIRJIT KAUR			YES	6/6/5	YES

Lab Comments:

AB FCD-00331 Rev3 2010/05

Maxxam Analytics International Corporation o/a Maxxam Analytics

Success Through Science®

Your Project #: B570354
Your C.O.C. #: na

Attention:Linsay Sunderman

Maxxam Analytics
2021 41st Ave NE
Calgary, AB
T2E 6P2

Report Date: 2015/09/04
Report #: R3651663
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B5G6295
Received: 2015/08/20, 10:44

Sample Matrix: Soil
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Moisture	1	N/A	2015/08/21	CAM SOP-00445	Carter 2nd ed 51.2 m
PFOS and PFOA in soil	1	2015/08/26	2015/08/28	CAM SOP-00894	EPA537 m

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Andrea Rieth, Project Manager
Email: ARieth@maxxam.ca
Phone# (905)817-5787 Ext:5787
==========
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Maxxam Job #: B5G6295
Report Date: 2015/09/04

Maxxam Analytics
Client Project #: B570354

RESULTS OF ANALYSES OF SOIL

Maxxam ID		AVJ514		
Sampling Date		2015/08/15		
COC Number		na		
	UNITS	**MX0840\3-09-4M**	**RDL**	**QC Batch**
Inorganics				
Moisture	%	8.1	1.0	4159049
Miscellaneous Parameters				
Perfluorobutane Sulfonate (PFBS)	ug/kg	2.9	0.1	4167364
Perfluorobutanoic acid	ug/kg	2.7	0.1	4167364
Perfluorodecane Sulfonate	ug/kg	<5	5	4172659
Perfluorodecanoic Acid (PFDA)	ug/kg	<0.1	0.1	4167364
Perfluorododecanoic Acid (PFDoA)	ug/kg	<0.1	0.1	4167364
Perfluoroheptanoic Acid (PFHpA)	ug/kg	0.6	0.1	4167364
Perfluorohexane Sulfonate (PFHxS)	ug/kg	1.6	0.1	4167364
Perfluorohexanoic Acid (PFHxA)	ug/kg	10	5	4172659
Perfluoro-n-Octanoic Acid (PFOA)	ug/kg	0.5	0.1	4167364
Perfluorononanoic Acid (PFNA)	ug/kg	0.2	0.1	4167364
Perfluorooctane Sulfonamide (PFOSA)	ug/kg	0.3	0.1	4167364
Perfluorooctane Sulfonate (PFOS)	ug/kg	29	5	4172659
Perfluoropentanoic Acid (PFPeA)	ug/kg	3.4	0.1	4167364
Perfluorotetradecanoic Acid	ug/kg	<0.1	0.1	4167364
Perfluorotridecanoic Acid	ug/kg	<0.1	0.1	4167364
Perfluoroundecanoic Acid (PFUnA)	ug/kg	<0.1	0.1	4167364

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B5G6295
Report Date: 2015/09/04

Maxxam Analytics
Client Project #: B570354

TEST SUMMARY

Maxxam ID: AVJ514
Sample ID: MX0840\3-09-4M
Matrix: Soil

Collected: 2015/08/15
Shipped:
Received: 2015/08/20

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	4159049	N/A	2015/08/21	Jessy Mathew Vinod
PFOS and PFOA in soil	LCMS	4167364	2015/08/26	2015/08/28	Colm McNamara

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Maxxam Job #: B5G6295
Report Date: 2015/09/04

Maxxam Analytics
Client Project #: B570354

GENERAL COMMENTS

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

Package 1	5.0°C
Package 2	6.7°C

Sample AVJ514-01 : Perfluorinated Compounds (PFCs): Due to high concentrations of the target analytes, sample required dilution. Detection limits were adjusted accordingly.

Sample AVJ514, PFOS and PFOA in soil: Test repeated.

Results relate only to the items tested.

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Maxxam Job #: B5G6295
Report Date: 2015/09/04

Maxxam Analytics
Client Project #: B570354

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
4159049	BOP	RPD	Moisture	2015/08/21	0		%	20
4167364	CM5	Matrix Spike	Perfluorobutane Sulfonate (PFBS)	2015/08/28		92	%	70 - 130
			Perfluorobutanoic acid	2015/08/28		111	%	70 - 130
			Perfluorodecanoic Acid (PFDA)	2015/08/28		103	%	70 - 130
			Perfluorododecanoic Acid (PFDoA)	2015/08/28		102	%	70 - 130
			Perfluorononanoic Acid (PFNA)	2015/08/28		104	%	70 - 130
			Perfluorooctane Sulfonamide (PFOSA)	2015/08/28		105	%	70 - 130
			Perfluorotetradecanoic Acid	2015/08/28		97	%	70 - 130
			Perfluorotridecanoic Acid	2015/08/28		113	%	70 - 130
			Perfluoroundecanoic Acid (PFUnA)	2015/08/28		96	%	70 - 130
			Perfluoroheptanoic Acid (PFHpA)	2015/08/28		92	%	70 - 130
			Perfluorohexane Sulfonate (PFHxS)	2015/08/28		97	%	70 - 130
			Perfluoro-n-Octanoic Acid (PFOA)	2015/08/28		95	%	70 - 130
			Perfluoropentanoic Acid (PFPeA)	2015/08/28		95	%	70 - 130
4167364	CM5	RPD	Perfluorobutane Sulfonate (PFBS)	2015/08/28	4.6		%	30
			Perfluorobutanoic acid	2015/08/28	4.2		%	30
			Perfluorodecanoic Acid (PFDA)	2015/08/28	1.6		%	30
			Perfluorododecanoic Acid (PFDoA)	2015/08/28	7.3		%	30
			Perfluorononanoic Acid (PFNA)	2015/08/28	7.8		%	30
			Perfluorooctane Sulfonamide (PFOSA)	2015/08/28	1.9		%	25
			Perfluorotetradecanoic Acid	2015/08/28	11		%	30
			Perfluorotridecanoic Acid	2015/08/28	8.5		%	30
			Perfluoroundecanoic Acid (PFUnA)	2015/08/28	4.7		%	30
			Perfluoroheptanoic Acid (PFHpA)	2015/08/28	3.9		%	30
			Perfluorohexane Sulfonate (PFHxS)	2015/08/28	3.6		%	30
			Perfluoro-n-Octanoic Acid (PFOA)	2015/08/28	0.42		%	30
			Perfluoropentanoic Acid (PFPeA)	2015/08/28	7.7		%	30
			Perfluorobutane Sulfonate (PFBS)	2015/08/28	NC		%	30
			Perfluorononanoic Acid (PFNA)	2015/08/28	NC		%	30
			Perfluoroheptanoic Acid (PFHpA)	2015/08/28	NC		%	30
			Perfluorohexane Sulfonate (PFHxS)	2015/08/28	NC		%	30
			Perfluoro-n-Octanoic Acid (PFOA)	2015/08/28	NC		%	30
4167364	CM5	Spiked Blank	Perfluorobutane Sulfonate (PFBS)	2015/08/28		96	%	70 - 130
			Perfluorobutanoic acid	2015/08/28		105	%	70 - 130
			Perfluorodecanoic Acid (PFDA)	2015/08/28		94	%	70 - 130
			Perfluorododecanoic Acid (PFDoA)	2015/08/28		98	%	70 - 130
			Perfluorononanoic Acid (PFNA)	2015/08/28		103	%	70 - 130
			Perfluorooctane Sulfonamide (PFOSA)	2015/08/28		97	%	70 - 130
			Perfluorotetradecanoic Acid	2015/08/28		97	%	70 - 130
			Perfluorotridecanoic Acid	2015/08/28		99	%	70 - 130
			Perfluoroundecanoic Acid (PFUnA)	2015/08/28		102	%	70 - 130
			Perfluoroheptanoic Acid (PFHpA)	2015/08/28		96	%	70 - 130
			Perfluorohexane Sulfonate (PFHxS)	2015/08/28		99	%	70 - 130
			Perfluoro-n-Octanoic Acid (PFOA)	2015/08/28		100	%	70 - 130
			Perfluoropentanoic Acid (PFPeA)	2015/08/28		92	%	70 - 130
4167364	CM5	Method Blank	Perfluorobutane Sulfonate (PFBS)	2015/08/28	<0.1		ug/kg	
			Perfluorobutanoic acid	2015/08/28	<0.1		ug/kg	
			Perfluorodecanoic Acid (PFDA)	2015/08/28	<0.1		ug/kg	
			Perfluorododecanoic Acid (PFDoA)	2015/08/28	<0.1		ug/kg	
			Perfluorononanoic Acid (PFNA)	2015/08/28	<0.1		ug/kg	
			Perfluorooctane Sulfonamide (PFOSA)	2015/08/28	<0.1		ug/kg	
			Perfluorotetradecanoic Acid	2015/08/28	<0.1		ug/kg	
			Perfluorotridecanoic Acid	2015/08/28	<0.1		ug/kg	
			Perfluoroundecanoic Acid (PFUnA)	2015/08/28	<0.1		ug/kg	

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Maxxam Job #: B5G6295
Report Date: 2015/09/04

Maxxam Analytics
Client Project #: B570354

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Perfluoroheptanoic Acid (PFHpA)	2015/08/28	<0.1		ug/kg	
			Perfluorohexane Sulfonate (PFHxS)	2015/08/28	<0.1		ug/kg	
			Perfluoro-n-Octanoic Acid (PFOA)	2015/08/28	<0.1		ug/kg	
			Perfluoropentanoic Acid (PFPeA)	2015/08/28	<0.1		ug/kg	
4172659	CM5	Matrix Spike	Perfluorodecane Sulfonate	2015/09/02		105	%	70 - 130
			Perfluorohexanoic Acid (PFHxA)	2015/09/02		101	%	70 - 130
			Perfluorooctane Sulfonate (PFOS)	2015/09/02		NC	%	70 - 130
4172659	CM5	Spiked Blank	Perfluorodecane Sulfonate	2015/09/02		105	%	70 - 130
			Perfluorohexanoic Acid (PFHxA)	2015/09/02		102	%	70 - 130
			Perfluorooctane Sulfonate (PFOS)	2015/09/02		94	%	70 - 130
4172659	CM5	Method Blank	Perfluorodecane Sulfonate	2015/09/02	<5		ug/kg	
			Perfluorohexanoic Acid (PFHxA)	2015/09/02	<5		ug/kg	
			Perfluorooctane Sulfonate (PFOS)	2015/09/02	<5		ug/kg	
4172659	CM5	RPD	Perfluorodecane Sulfonate	2015/09/02	NC		%	30
			Perfluorohexanoic Acid (PFHxA)	2015/09/02	24		%	30
			Perfluorooctane Sulfonate (PFOS)	2015/09/02	23		%	30

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

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

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

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of 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 (one or both samples < 5x RDL).

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Maxxam Job #: B5G6295
Report Date: 2015/09/04

Maxxam Analytics
Client Project #: B570354

VALIDATION SIGNATURE PAGE

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

Adam Robinson, Technical Service

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

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RUSH

20-Aug-15 10:44
Andrea Rieth
B5G6295
M_P ENV-695

MAXXAM ANALYTICS
4000 19st N.E
Calgary, Alberta, T2E 6P8
Phone: (403) 291-3077
Fax: (403) 291-9468

PUBLIC WORKS &
GOVERNMENT SERVICES
CANADA - EDMONTON
Maxxam PM Linsay Sunderman

SUBCONTRACTING REQUEST FORM

To: Maxxam Ontario (From Calgary)

RUSH

Job# B570354

☐ Yes ☐ No International Sample/BioHazard (if yes, add copy of Movement Cert., heat treat is required prior to disposal)
☐ Yes ☐ No Special Protocol (if yes, Protocol _____).

Sample ID	Matrix	Test(s) Required	Container	Date Sampled	Date Required
MX0840-04R \ 3-09-4M	SOIL	Perfluorinated Compounds - Subcontract	1(COR2)	2015/08/15	2015/09/10

	Temp. 1	Temp. 2	Temp. 3			
Cooler #1	7	6	2	Custody Seal Present	YES ✓	NO
				Custody Seal Intact	YES ✓	NO
				Ice Present Upon Receipt	YES ✓	NO
Cooler #2	8	3	9	Custody Seal Present	YES ✓	NO
				Custody Seal Intact	YES ✓	NO
				Ice Present Upon Receipt	YES ✓	NO
Cooler #3				Custody Seal Present	YES	NO
				Custody Seal Intact	YES	NO
				Ice Present Upon Receipt	YES	NO

Receiving Maxxam Location: Maxxam Ontario (From Calgary) JOB # _____

Relinquished by (Sign) _____ (Print) Sean Kingsbury Date and Time 2015/08/19 10:15

Received by (Sign) Alex Vahdati (Print) Alex VAHDATI Date and Time 2015/08/20 10:44

NOTES:
1) Please call us if due date cannot be met. Please reference Sample ID on your report.
2) Include copy of this completed form, Client COC & signed final report to

Reporting Requirements:
National:
Regional:

SHIPPING INSTRUCTIONS

☐ Ship Immediately (highlight Yellow)
☐ Requires 9am
☐ Requires Sat. Delivery
☐ Regular Ship next available day
☐ Ship Cold
☐ Ship Room Temp
☐ Ship Frozen
☐ COC Must be Attached

Sender (Print) _____ Initial _____

SHIPPING DEPARTMENT CHECKLIST

☐ Correct Shipping location
☐ Correct Sample Ids (Paperwork vs Bottles)
☐ Yes ☐ No Special-Cooler, Ice, Tape-custody seal, Date&Sign
Date Shipped _____ Number of coolers _____
Shipper (Print) _____ Initial _____

Your Project #: B570599
Your C.O.C. #: na

Attention:Linsay Sunderman

Maxxam Analytics
2021 41st Ave NE
Calgary, AB
T2E 6P2

Report Date: 2015/09/04
Report #: R3651668
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B5G5167
Received: 2015/08/19, 10:10

Sample Matrix: Soil
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Moisture	2	N/A	2015/08/24	CAM SOP-00445	Carter 2nd ed 51.2 m
PFOS and PFOA in soil	2	2015/08/26	2015/08/28	CAM SOP-00894	EPA537 m

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Andrea Rieth, Project Manager
Email: ARieth@maxxam.ca
Phone# (905)817-5787 Ext:5787
==========
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Maxxam Job #: B5G5167
Report Date: 2015/09/04

Maxxam Analytics
Client Project #: B570599

RESULTS OF ANALYSES OF SOIL

Maxxam ID		AVE772			AVE773	AVE773		
Sampling Date		2015/08/14			2015/08/14	2015/08/14		
COC Number		na			na	na		
	UNITS	MX2255 \ 3-09-4M @ 1.0	RDL	QC Batch	MX2256 \ FIELD DUPLICATE-2	MX2256 \ FIELD DUPLICATE-2 Lab-Dup	RDL	QC Batch
Inorganics								
Moisture	%	12	1.0	4161538	10	N/A	1.0	4161538
Miscellaneous Parameters								
Perfluorobutane Sulfonate (PFBS)	ug/kg	20	5	4172659	12	11	5	4172659
Perfluorobutanoic acid	ug/kg	9	5	4172659	4.5	N/A	0.1	4167364
Perfluorodecane Sulfonate	ug/kg	<5	5	4172659	<5	<5	5	4172659
Perfluorodecanoic Acid (PFDA)	ug/kg	<0.1	0.1	4167364	<0.1	N/A	0.1	4167364
Perfluorododecanoic Acid (PFDoA)	ug/kg	<0.1	0.1	4167364	<0.1	N/A	0.1	4167364
Perfluoroheptanoic Acid (PFHpA)	ug/kg	10	5	4172659	4.7	N/A	0.1	4167364
Perfluorohexane Sulfonate (PFHxS)	ug/kg	480	50	4172659	210	170	5	4172659
Perfluorohexanoic Acid (PFHxA)	ug/kg	49	5	4172659	35	27	5	4172659
Perfluoro-n-Octanoic Acid (PFOA)	ug/kg	27	5	4172659	11	9	5	4172659
Perfluorononanoic Acid (PFNA)	ug/kg	<0.1	0.1	4167364	<0.1	N/A	0.1	4167364
Perfluorooctane Sulfonamide (PFOSA)	ug/kg	1.1	0.1	4167364	0.4	N/A	0.1	4167364
Perfluorooctane Sulfonate (PFOS)	ug/kg	45	5	4172659	96	120	5	4172659
Perfluoropentanoic Acid (PFPeA)	ug/kg	14	5	4172659	10	7	5	4172659
Perfluorotetradecanoic Acid	ug/kg	<0.1	0.1	4167364	<0.1	N/A	0.1	4167364
Perfluorotridecanoic Acid	ug/kg	<0.1	0.1	4167364	<0.1	N/A	0.1	4167364
Perfluoroundecanoic Acid (PFUnA)	ug/kg	<0.1	0.1	4167364	<0.1	N/A	0.1	4167364

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

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B5G5167
Report Date: 2015/09/04

Maxxam Analytics
Client Project #: B570599

TEST SUMMARY

Maxxam ID: AVE772
Sample ID: MX2255 \ 3-09-4M @ 1.0
Matrix: Soil

Collected: 2015/08/14
Shipped:
Received: 2015/08/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	4161538	N/A	2015/08/24	Shivani Desai
PFOS and PFOA in soil	LCMS	4172659	2015/09/01	2015/09/02	Colm McNamara

Maxxam ID: AVE773
Sample ID: MX2256 \ FIELD DUPLICATE-2
Matrix: Soil

Collected: 2015/08/14
Shipped:
Received: 2015/08/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	4161538	N/A	2015/08/24	Shivani Desai
PFOS and PFOA in soil	LCMS	4167364	2015/08/26	2015/08/28	Colm McNamara

Maxxam ID: AVE773 Dup
Sample ID: MX2256 \ FIELD DUPLICATE-2
Matrix: Soil

Collected: 2015/08/14
Shipped:
Received: 2015/08/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFOS and PFOA in soil	LCMS	4172659	2015/09/01	2015/09/02	Colm McNamara

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Maxxam Job #: B5G5167
Report Date: 2015/09/04

Maxxam Analytics
Client Project #: B570599

GENERAL COMMENTS

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

Package 1	7.3°C

Sample AVE772-01 : Perfluorinated Compounds (PFCs): Due to high concentrations of the target analytes, sample required dilution. Detection limits were adjusted accordingly.

Sample AVE773-01 : Perfluorinated Compounds (PFCs): Due to high concentrations of the target analytes, sample required dilution. Detection limits were adjusted accordingly.

Sample AVE772, PFOS and PFOA in soil: Test repeated.
Sample AVE773, PFOS and PFOA in soil: Test repeated.

Results relate only to the items tested.

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Maxxam Job #: B5G5167
Report Date: 2015/09/04

Maxxam Analytics
Client Project #: B570599

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
4161538	NS3	RPD	Moisture	2015/08/24	9.3		%	20
4167364	CM5	Matrix Spike	Perfluorobutanoic acid	2015/08/28		111	%	70 - 130
			Perfluorodecanoic Acid (PFDA)	2015/08/28		103	%	70 - 130
			Perfluorododecanoic Acid (PFDoA)	2015/08/28		102	%	70 - 130
			Perfluorononanoic Acid (PFNA)	2015/08/28		104	%	70 - 130
			Perfluorooctane Sulfonamide (PFOSA)	2015/08/28		105	%	70 - 130
			Perfluorotetradecanoic Acid	2015/08/28		97	%	70 - 130
			Perfluorotridecanoic Acid	2015/08/28		113	%	70 - 130
			Perfluoroundecanoic Acid (PFUnA)	2015/08/28		96	%	70 - 130
			Perfluoroheptanoic Acid (PFHpA)	2015/08/28		92	%	70 - 130
4167364	CM5	RPD	Perfluorobutanoic acid	2015/08/28	4.2		%	30
			Perfluorodecanoic Acid (PFDA)	2015/08/28	1.6		%	30
			Perfluorododecanoic Acid (PFDoA)	2015/08/28	7.3		%	30
			Perfluorononanoic Acid (PFNA)	2015/08/28	7.8		%	30
			Perfluorooctane Sulfonamide (PFOSA)	2015/08/28	1.9		%	25
			Perfluorotetradecanoic Acid	2015/08/28	11		%	30
			Perfluorotridecanoic Acid	2015/08/28	8.5		%	30
			Perfluoroundecanoic Acid (PFUnA)	2015/08/28	4.7		%	30
			Perfluoroheptanoic Acid (PFHpA)	2015/08/28	3.9		%	30
			Perfluorononanoic Acid (PFNA)	2015/08/28	NC		%	30
			Perfluoroheptanoic Acid (PFHpA)	2015/08/28	NC		%	30
4167364	CM5	Spiked Blank	Perfluorobutanoic acid	2015/08/28		105	%	70 - 130
			Perfluorodecanoic Acid (PFDA)	2015/08/28		94	%	70 - 130
			Perfluorododecanoic Acid (PFDoA)	2015/08/28		98	%	70 - 130
			Perfluorononanoic Acid (PFNA)	2015/08/28		103	%	70 - 130
			Perfluorooctane Sulfonamide (PFOSA)	2015/08/28		97	%	70 - 130
			Perfluorotetradecanoic Acid	2015/08/28		97	%	70 - 130
			Perfluorotridecanoic Acid	2015/08/28		99	%	70 - 130
			Perfluoroundecanoic Acid (PFUnA)	2015/08/28		102	%	70 - 130
			Perfluoroheptanoic Acid (PFHpA)	2015/08/28		96	%	70 - 130
4167364	CM5	Method Blank	Perfluorobutanoic acid	2015/08/28	<0.1		ug/kg	
			Perfluorodecanoic Acid (PFDA)	2015/08/28	<0.1		ug/kg	
			Perfluorododecanoic Acid (PFDoA)	2015/08/28	<0.1		ug/kg	
			Perfluorononanoic Acid (PFNA)	2015/08/28	<0.1		ug/kg	
			Perfluorooctane Sulfonamide (PFOSA)	2015/08/28	<0.1		ug/kg	
			Perfluorotetradecanoic Acid	2015/08/28	<0.1		ug/kg	
			Perfluorotridecanoic Acid	2015/08/28	<0.1		ug/kg	
			Perfluoroundecanoic Acid (PFUnA)	2015/08/28	<0.1		ug/kg	
			Perfluoroheptanoic Acid (PFHpA)	2015/08/28	<0.1		ug/kg	
4172659	CM5	Matrix Spike [AVE773-01]	Perfluorobutane Sulfonate (PFBS)	2015/09/02		106	%	70 - 130
			Perfluorobutanoic acid	2015/09/02		111	%	70 - 130
			Perfluorodecane Sulfonate	2015/09/02		105	%	70 - 130
			Perfluoroheptanoic Acid (PFHpA)	2015/09/02		100	%	70 - 130
			Perfluorohexane Sulfonate (PFHxS)	2015/09/02		NC	%	70 - 130
			Perfluorohexanoic Acid (PFHxA)	2015/09/02		101	%	70 - 130
			Perfluoro-n-Octanoic Acid (PFOA)	2015/09/02		97	%	70 - 130
			Perfluorooctane Sulfonate (PFOS)	2015/09/02		NC	%	70 - 130
			Perfluoropentanoic Acid (PFPeA)	2015/09/02		102	%	70 - 130
4172659	CM5	Spiked Blank	Perfluorobutane Sulfonate (PFBS)	2015/09/02		114	%	70 - 130
			Perfluorobutanoic acid	2015/09/02		115	%	70 - 130
			Perfluorodecane Sulfonate	2015/09/02		105	%	70 - 130
			Perfluoroheptanoic Acid (PFHpA)	2015/09/02		100	%	70 - 130
			Perfluorohexane Sulfonate (PFHxS)	2015/09/02		107	%	70 - 130
			Perfluorohexanoic Acid (PFHxA)	2015/09/02		102	%	70 - 130

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Maxxam Job #: B5G5167
Report Date: 2015/09/04

Maxxam Analytics
Client Project #: B570599

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Perfluoro-n-Octanoic Acid (PFOA)	2015/09/02		95	%	70 - 130
			Perfluorooctane Sulfonate (PFOS)	2015/09/02		94	%	70 - 130
			Perfluoropentanoic Acid (PFPeA)	2015/09/02		92	%	70 - 130
4172659	CM5	Method Blank	Perfluorobutane Sulfonate (PFBS)	2015/09/02	<5		ug/kg	
			Perfluorobutanoic acid	2015/09/02	<5		ug/kg	
			Perfluorodecane Sulfonate	2015/09/02	<5		ug/kg	
			Perfluoroheptanoic Acid (PFHpA)	2015/09/02	<5		ug/kg	
			Perfluorohexane Sulfonate (PFHxS)	2015/09/02	<5		ug/kg	
			Perfluorohexanoic Acid (PFHxA)	2015/09/02	<5		ug/kg	
			Perfluoro-n-Octanoic Acid (PFOA)	2015/09/02	<5		ug/kg	
			Perfluorooctane Sulfonate (PFOS)	2015/09/02	<5		ug/kg	
			Perfluoropentanoic Acid (PFPeA)	2015/09/02	<5		ug/kg	
4172659	CM5	RPD [AVE773-01]	Perfluorobutane Sulfonate (PFBS)	2015/09/02	NC		%	30
			Perfluorodecane Sulfonate	2015/09/02	NC		%	30
			Perfluorohexane Sulfonate (PFHxS)	2015/09/02	19		%	30
			Perfluorohexanoic Acid (PFHxA)	2015/09/02	24		%	30
			Perfluoro-n-Octanoic Acid (PFOA)	2015/09/02	NC		%	30
			Perfluorooctane Sulfonate (PFOS)	2015/09/02	23		%	30
			Perfluoropentanoic Acid (PFPeA)	2015/09/02	NC		%	30

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

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

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

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of 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 (one or both samples < 5x RDL).

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Maxxam Job #: B5G5167
Report Date: 2015/09/04

Maxxam Analytics
Client Project #: B570599

VALIDATION SIGNATURE PAGE

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

Adam Robinson, Technical Service

Cristina Carriere, Scientific Services

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

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Maxxam

Calgary: 4000 19st St. NE, T2E 6P8. Ph: (403) 291-3077, Fax: (403) 735-2240, Toll free: (800) 386-7247
Edmonton: 9331 - 48 Street, T6B 2R4. Ph: (780) 577-7100, Fax: (780) 450-4187, Toll free: (877) 465-8889
www.maxxamanalytics.com

564

Chain of Custody

A1[illegible]

Page: 1 of 2

	Invoice To: / C/O Report Address	Report To: (Same as Invoice)	Report Distribution (E-Mail):	REGULATORY GUIDELINES:
Company:	PWGSC		hfisher@dillon.ca	☐ AT1
Contact:	Natale Robinson		mhopps@dillon.ca	☐ CCME
Address:	Suite 1650, 635 - 8th Ave SW		Natalie.Robinson@pwgsc-tpsgc.ca	☐ Regulated Drinking Water
	Prov: Alberta Calgary	Prov: PC:		☐ Other:
Contact #s:	403-292-6882 Cell:	Ph: Cell:		

All samples are held for 60 calendar days after sample receipt, unless specified otherwise.

PO #: 70023O152
Project # / Name: CBA-FTA.
Site Location: Cambridge Bay, NU
Quote #: R.05169.OO5
Sampled By: M. Hopps

SERVICE REQUESTED: ☒ RUSH (Contact lab to reserve) Date Required: ☐ REGULAR (5 to 7 Days)

See reverse for package specifics

#	Sample ID	Depth (unit)	Matrix GW / SW Soil	Date/Time Sampled YY/MM/DD 24:00	SOIL: BTEX F1-F4	Sieve (75 micron)	Regulated Metals (CCME / AT1)	Salinity 4	Assessment ICP Metals	Basic Class II Landfill	Lead in Soil	PFOS / PFOA	PH	WATER: ☐BTEX F1 ☐VOCs	☐BTEX F1-F2 ☐BTEX F1-F4	☐ Routine Water ☐ Turb ☐ F	☐ TOC ☐ DOC	Regulated Metals (CCME / AT1) Total / Dissolved	Mercury ☐ Total ☐ Dissolved	Other Analysis: Fraction of Organic Carbon	HOLD - Do not Analyze	# of Containers Submitted
1	NW Wall SA1	1.0	Soil	15/08/14	X																	
2	NW Wall SA2	2.0	Soil	15/08/14	X						X											
3	NW Floor SA1	2.0	Soil	15/08/14	X						X											
4	Field Duplicate-1		Soil	15/08/14	X																	
5	~~NW Composite~~		~~Soil~~	~~15/08/14~~																		
6	3-09-4m 1.0m	1.0	Soil	16/08/14	X			X				X	X							X		
7	Field Duplicate -2											X										
8																						
9																						
10																						
11																						
12																						

17-Aug-15 17:00
Mamie Kolach
B570599
L5 INS-0097

RECEIVED IN YELLOWKNIFE
By Michelle Guile
2015-08-16 09:50

Temp: 5/7/9

Please indicate Filtered, Preserved or Both (F, P, F/P) → F/P

Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):
Matthew Hopps	15/08/15	900
Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):

Special Instructions: Please contact Heather if there are detectable concentrations of lead in soil.

# of Jars Used & Not Submitted

LAB USE ONLY					
Received By:	Date:	Time:	Maxxam Job #:		
Yuanpeng Liu	2015/08/17	17:00	Custody Seal	Temperature	Ice
Lab Comments:			Y	6.6.5	Y

AB FCD-00331 Rev3 2010/05

Maxxam Analytics International Corporation o/a Maxxam Analytics

RUSH

MAXXAM ANALYTICS
4000 19st N.E
Calgary, Alberta, T2E 6P8
Phone: (403) 291-3077
Fax: (403) 291-9468

19-Aug-15 10:10
Andrea Rieth
B5G5167
MAF ENV-713

EQUEST FORM

PUBLIC WORKS &
GOVERNMENT SERVICES
CANADA - EDMONTON
Maxxam PM Linsay Sunderman

To: Maxxam Ontario (From Calgary) RUSH Job# B570599

☐ Yes ☑ No International Sample/BioHazard (if yes, add copy of Movement Cert., heat treat is required prior to disposal)
☐ Yes ☑ No Special Protocol (if yes, Protocol _____)

Sample ID	Matrix	Test(s) Required	Container	Date Sampled	Date Required
MX2255-02R \ 3-09-4M @ 1.0	SOIL	Perfluorinated Compounds - Subcontract	1(CSIN)	2015/08/14	2015/09/08
MX2256-01R \ FIELD DUPLICATE-2	SOIL	Perfluorinated Compounds - Subcontract	1(CSIN)	2015/08/14	2015/09/08

	Temp. 1	Temp. 2	Temp. 3			
Cooler #1	8	7	7	Custody Seal Present	YES ✓	NO
				Custody Seal Intact	YES ✓	NO
				Ice Present Upon Receipt	YES ✓	NO
Cooler #2				Custody Seal Present	YES	NO
				Custody Seal Intact	YES	NO
				Ice Present Upon Receipt	YES	NO
Cooler #3				Custody Seal Present	YES	NO
				Custody Seal Intact	YES	NO
				Ice Present Upon Receipt	YES	NO

Receiving Maxxam Location: Maxxam Ontario (From Calgary) JOB # _____

Relinquished by (Sign) _____ (Print) Adalbert Tianyi Date and Time 2015/08/18 10:32

Received by (Sign) _____ (Print) ASAD BHATTI Date and Time 2015/08/19 10:10

NOTES:
1) Please call us if due date cannot be met. Please reference Sample ID on your report.
2) Include copy of this completed form, Client COC & signed final report to

Reporting Requirements:
National:
Regional:

SHIPPING INSTRUCTIONS

☐ Ship Immediately (highlight Yellow)
☐ Requires 9am
☐ Requires Sat. Delivery
☑ Regular Ship next available day
☐ Ship Cold
☐ Ship Room Temp
☐ Ship Frozen
☐ COC Must be Attached

Sender (Print) ADALBERT Initial AT8

SHIPPING DEPARTMENT CHECKLIST

☐ Correct Shipping location
☐ Correct Sample Ids (Paperwork vs Bottles)
☐ Yes ☐ No Special-Cooler, Ice, Tape-custody seal, Date&Sign
Date Shipped _____ Number of coolers _____
Shipper (Print) _____ Initial _____

Your P.O. #: 700330152
Your Project #: CBA-FTA
Site Location: CAMBRIDGE BAY, NU
Your C.O.C. #: A158826

Attention:HEATHER FISHER

DILLON CONSULTING LTD.
1558 Willson Place
Winnipeg, MB
CANADA R3T 0Y4

Report Date: 2015/09/09
Report #: R2037572
Version: 3 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B570599
Received: 2015/08/16, 09:50

Sample Matrix: Soil
Samples Received: 5

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
BTEX/F1 by HS GC/MS/FID (MeOH extract) (1)	5	2015/08/18	2015/08/18	AB SOP-00039	CCME CWS/EPA 8260c m
Cation/EC Ratio (1)	1	N/A	2015/08/21	AB WI-00065	Auto Calc
Chloride (Soluble) (1)	1	2015/08/22	2015/08/22	AB SOP-00033 / AB SOP-00020	SM 22-4500-Cl G m
Conductivity @25C (Soluble) (1)	1	2015/08/20	2015/08/20	AB SOP-00033 / AB SOP-00004	SM 22 2510 B m
CCME Hydrocarbons (F2-F4 in soil) (1, 2)	5	2015/08/18	2015/08/18	AB SOP-00036 / AB SOP-00040	CCME PHC-CWS
Fraction of Organic Carbon (1)	1	N/A	2015/08/20	CAL SOP-00243	Auto Calc
Ion Balance (1)	1	N/A	2015/08/18	AB WI-00065	Auto Calc
Sum of Cations, Anions (1)	1	N/A	2015/08/21	AB WI-00065	Auto Calc
Moisture (1)	5	N/A	2015/08/18	AB SOP-00002	CCME PHC-CWS
Lead (1)	2	2015/08/20	2015/08/20	AB SOP-00001 / AB SOP-00043	EPA 200.8 R5.4 m
pH @25C (1:2 Calcium Chloride Extract) (1)	1	2015/08/20	2015/08/20	AB SOP-00033 / AB SOP-00006	SM 22 4500 H+B m
Sodium Adsorption Ratio (1)	1	N/A	2015/08/21	AB WI-00065	Auto Calc
Ca,Mg,Na,K,SO4 (Soluble) (1)	1	2015/08/20	2015/08/21	AB SOP-00033 / AB SOP-00042	EPA 200.7 CFR 2012 m
Soluble Paste (1)	1	2015/08/20	2015/08/20	AB SOP-00033	Carter 2nd ed 15.2 m
Soluble Ions Calculation (1)	1	N/A	2015/08/18	AB WI-00065	Auto Calc
Total Organic Carbon LECO Method (1)	1	2015/08/20	2015/08/20	AB SOP-00035 / CAL SOP-00243	LECO 203-821-170 m
Theoretical Gypsum Requirement (1, 3)	1	N/A	2015/08/21	AB WI-00065	Auto Calc

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 Calgary Environmental

(2) All CCME 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.

(3) Units for TGR have changed from tons/acre to tonnes/ha

Your P.O. #: 700330152
Your Project #: CBA-FTA
Site Location: CAMBRIDGE BAY, NU
Your C.O.C. #: A158826

Attention:HEATHER FISHER

DILLON CONSULTING LTD.
1558 Willson Place
Winnipeg, MB
CANADA R3T 0Y4

Report Date: 2015/09/09
Report #: R2037572
Version: 3 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B570599
Received: 2015/08/16, 09:50

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Linsay Sunderman, Project Manager
Email: LSunderman@maxxam.ca
Phone# (403)735-2237 Ext:2237

==========

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 Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B570599
Report Date: 2015/09/09

DILLON CONSULTING LTD.
Client Project #: CBA-FTA
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700330152
Sampler Initials: MH

RESULTS OF CHEMICAL ANALYSES OF SOIL

Maxxam ID		MX2251	MX2252	MX2253		
Sampling Date		2015/08/14	2015/08/14	2015/08/14		
COC Number		A158826	A158826	A158826		
	UNITS	**NW WALL SA1 @ 1.0**	**NW WALL SA2 @ 2.0**	**NW FLOOR SA1 @ 2.0**	**RDL**	**QC Batch**
Physical Properties						
Moisture	%	8.6	9.1	9.8	0.30	8006101
RDL = Reportable Detection Limit						

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B570599
Report Date: 2015/09/09

DILLON CONSULTING LTD.
Client Project #: CBA-FTA
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700330152
Sampler Initials: MH

RESULTS OF CHEMICAL ANALYSES OF SOIL

Maxxam ID		MX2254	MX2255		
Sampling Date		2015/08/14	2015/08/14		
COC Number		A158826	A158826		
	UNITS	FIELD DUPLICATE-1	3-09-4M @ 1.0	RDL	QC Batch
Calculated Parameters					
Anion Sum	meq/L		18	N/A	8005908
Cation Sum	meq/L		20	N/A	8005908
Cation/EC Ratio	N/A		11	0.10	8005904
Ion Balance	N/A		1.1	0.010	8005907
Calculated Calcium (Ca)	mg/kg		25	0.44	8005910
Calculated Magnesium (Mg)	mg/kg		21	0.29	8005910
Calculated Sodium (Na)	mg/kg		55	0.73	8005910
Calculated Potassium (K)	mg/kg		20	0.38	8005910
Calculated Chloride (Cl)	mg/kg		98	1.5	8005910
Calculated Sulphate (SO4)	mg/kg		130	1.5	8005910
Misc. Inorganics					
Fraction of Organic Carbon	g/g		0.013	0.00020	8005906
Soluble Parameters					
Soluble Chloride (Cl)	mg/L		340	5.0	8011883
Soluble Conductivity	dS/m		1.8	0.020	8009656
Soluble (CaCl2) pH	pH		7.40	N/A	8008196
Sodium Adsorption Ratio	N/A		3.7	0.10	8005909
Soluble Calcium (Ca)	mg/L		86	1.5	8010559
Soluble Magnesium (Mg)	mg/L		71	1.0	8010559
Soluble Sodium (Na)	mg/L		190	2.5	8010559
Soluble Potassium (K)	mg/L		67	1.3	8010559
Saturation %	%		29	N/A	8008585
Soluble Sulphate (SO4)	mg/L		430	5.0	8010559
Theoretical Gypsum Requirement	tonnes/ha		<0.20	0.20	8005911
Physical Properties					
Moisture	%	7.3	11	0.30	8006101

RDL = Reportable Detection Limit
N/A = Not Applicable

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Maxxam Job #: B570599
Report Date: 2015/09/09

DILLON CONSULTING LTD.
Client Project #: CBA-FTA
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700330152
Sampler Initials: MH

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		MX2251	MX2252	MX2253	MX2254		
Sampling Date		2015/08/14	2015/08/14	2015/08/14	2015/08/14		
COC Number		A158826	A158826	A158826	A158826		
	UNITS	NW WALL SA1 @ 1.0	NW WALL SA2 @ 2.0	NW FLOOR SA1 @ 2.0	FIELD DUPLICATE-1	RDL	QC Batch
Ext. Pet. Hydrocarbon							
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	<10	<10	<10	10	8005406
F3 (C16-C34 Hydrocarbons)	mg/kg	<50	<50	<50	<50	50	8005406
F4 (C34-C50 Hydrocarbons)	mg/kg	<50	<50	<50	<50	50	8005406
Reached Baseline at C50	mg/kg	Yes	Yes	Yes	Yes		8005406
Surrogate Recovery (%)							
O-TERPHENYL (sur.)	%	96	93	92	109		8005406
RDL = Reportable Detection Limit							

Maxxam ID		MX2255		
Sampling Date		2015/08/14		
COC Number		A158826		
	UNITS	3-09-4M @ 1.0	RDL	QC Batch
Ext. Pet. Hydrocarbon				
F2 (C10-C16 Hydrocarbons)	mg/kg	310	10	8005406
F3 (C16-C34 Hydrocarbons)	mg/kg	220	50	8005406
F4 (C34-C50 Hydrocarbons)	mg/kg	<50	50	8005406
Reached Baseline at C50	mg/kg	Yes		8005406
Surrogate Recovery (%)				
O-TERPHENYL (sur.)	%	99		8005406
RDL = Reportable Detection Limit				

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Maxxam Job #: B570599
Report Date: 2015/09/09

DILLON CONSULTING LTD.
Client Project #: CBA-FTA
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700330152
Sampler Initials: MH

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		MX2252	MX2253		
Sampling Date		2015/08/14	2015/08/14		
COC Number		A158826	A158826		
	UNITS	**NW WALL SA2 @ 2.0**	**NW FLOOR SA1 @ 2.0**	**RDL**	**QC Batch**
Elements					
Total Lead (Pb)	mg/kg	5.3	4.4	0.50	8008628
RDL = Reportable Detection Limit					

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Maxxam Job #: B570599
Report Date: 2015/09/09

DILLON CONSULTING LTD.
Client Project #: CBA-FTA
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700330152
Sampler Initials: MH

VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		MX2251		MX2252		MX2253		
Sampling Date		2015/08/14		2015/08/14		2015/08/14		
COC Number		A158826		A158826		A158826		
	UNITS	NW WALL SA1 @ 1.0	RDL	NW WALL SA2 @ 2.0	RDL	NW FLOOR SA1 @ 2.0	RDL	QC Batch
Volatiles								
Benzene	mg/kg	<0.015 (1)	0.015	<0.0080 (1)	0.0080	<0.015 (1)	0.015	8004459
Toluene	mg/kg	<0.020	0.020	<0.020	0.020	<0.020	0.020	8004459
Ethylbenzene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	0.010	8004459
Xylenes (Total)	mg/kg	<0.040	0.040	<0.040	0.040	<0.040	0.040	8004459
m & p-Xylene	mg/kg	<0.040	0.040	<0.040	0.040	<0.040	0.040	8004459
o-Xylene	mg/kg	<0.020	0.020	<0.020	0.020	<0.020	0.020	8004459
F1 (C6-C10) - BTEX	mg/kg	<12	12	<12	12	<12	12	8004459
F1 (C6-C10)	mg/kg	<12	12	<12	12	<12	12	8004459
Surrogate Recovery (%)								
1,4-Difluorobenzene (sur.)	%	106		104		106		8004459
4-Bromofluorobenzene (sur.)	%	107		108		107		8004459
D10-ETHYLBENZENE (sur.)	%	103		101		100		8004459
D4-1,2-Dichloroethane (sur.)	%	121		123		123		8004459

RDL = Reportable Detection Limit
(1) Detection limit raised due to interferent.

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Maxxam Job #: B570599
Report Date: 2015/09/09

DILLON CONSULTING LTD.
Client Project #: CBA-FTA
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700330152
Sampler Initials: MH

VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		MX2254		MX2255		
Sampling Date		2015/08/14		2015/08/14		
COC Number		A158826		A158826		
	UNITS	**FIELD DUPLICATE-1**	**RDL**	**3-09-4M @ 1.0**	**RDL**	**QC Batch**
Volatiles						
Benzene	mg/kg	<0.0080 (1)	0.0080	3.7 (2)	0.0050	8004459
Toluene	mg/kg	<0.020	0.020	15	0.020	8004459
Ethylbenzene	mg/kg	<0.010	0.010	11	0.010	8004459
Xylenes (Total)	mg/kg	<0.040	0.040	52	0.040	8004459
m & p-Xylene	mg/kg	<0.040	0.040	39	0.040	8004459
o-Xylene	mg/kg	<0.020	0.020	12	0.020	8004459
F1 (C6-C10) - BTEX	mg/kg	<12	12	2500	12	8004459
F1 (C6-C10)	mg/kg	<12	12	2600	12	8004459
Surrogate Recovery (%)						
1,4-Difluorobenzene (sur.)	%	105		104		8004459
4-Bromofluorobenzene (sur.)	%	107		114		8004459
D10-ETHYLBENZENE (sur.)	%	103		102		8004459
D4-1,2-Dichloroethane (sur.)	%	125		NC (3)		8004459

RDL = Reportable Detection Limit

(1) Detection limit raised due to interferent.

(2) Qualifying ion outside of acceptance criteria. Results are tentatively identified and potentially biased high.

(3) Surrogate recovery is non-calculable due to matrix interference.

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Maxxam Job #: B570599
Report Date: 2015/09/09

DILLON CONSULTING LTD.
Client Project #: CBA-FTA
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700330152
Sampler Initials: MH

MISCELLANEOUS (SOIL)

Maxxam ID		MX2255		
Sampling Date		2015/08/14		
COC Number		A158826		
	UNITS	**3-09-4M @ 1.0**	**RDL**	**QC Batch**
Misc. Inorganics				
Total Organic Carbon (C)	%	1.3	0.020	8009054
RDL = Reportable Detection Limit				

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Maxxam Job #: B570599
Report Date: 2015/09/09

DILLON CONSULTING LTD.
Client Project #: CBA-FTA
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700330152
Sampler Initials: MH

GENERAL COMMENTS

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

Package 1	7.0°C

PFOS and PHOA Results are attached to this report. The reference number for these results from Maxxam Campobello is B5G5167.

Results relate only to the items tested.

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Maxxam Job #: B570599
Report Date: 2015/09/09

QUALITY ASSURANCE REPORT

DILLON CONSULTING LTD.
Client Project #: CBA-FTA
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700330152
Sampler Initials: MH

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8004459	1,4-Difluorobenzene (sur.)	2015/08/18	103	60 - 140	89	60 - 140	105	%				
8004459	4-Bromofluorobenzene (sur.)	2015/08/18	109	60 - 140	91	60 - 140	106	%				
8004459	D10-ETHYLBENZENE (sur.)	2015/08/18	107	60 - 130	91	60 - 130	97	%				
8004459	D4-1,2-Dichloroethane (sur.)	2015/08/18	128	60 - 140	112	60 - 140	124	%				
8005406	O-TERPHENYL (sur.)	2015/08/18	100	50 - 130	98	50 - 130	110	%				
8004459	Benzene	2015/08/18	126	60 - 140	111	60 - 140	<0.0050	mg/kg	NC	50		
8004459	Ethylbenzene	2015/08/18	114	60 - 140	98	60 - 140	<0.010	mg/kg	NC	50		
8004459	F1 (C6-C10) - BTEX	2015/08/18					<12	mg/kg	NC	50		
8004459	F1 (C6-C10)	2015/08/18	111	60 - 140	109	60 - 140	<12	mg/kg	NC	50		
8004459	m & p-Xylene	2015/08/18	110	60 - 140	94	60 - 140	<0.040	mg/kg	NC	50		
8004459	o-Xylene	2015/08/18	112	60 - 140	96	60 - 140	<0.020	mg/kg	NC	50		
8004459	Toluene	2015/08/18	118	60 - 140	102	60 - 140	<0.020	mg/kg	NC	50		
8004459	Xylenes (Total)	2015/08/18					<0.040	mg/kg	NC	50		
8005406	F2 (C10-C16 Hydrocarbons)	2015/08/18	122	50 - 130	106	70 - 130	<10	mg/kg	NC	50		
8005406	F3 (C16-C34 Hydrocarbons)	2015/08/18	125	50 - 130	109	70 - 130	<50	mg/kg	NC	50		
8005406	F4 (C34-C50 Hydrocarbons)	2015/08/18	120	50 - 130	103	70 - 130	<50	mg/kg	NC	50		
8006101	Moisture	2015/08/18					<0.30	%	0	20		
8008196	Soluble (CaCl2) pH	2015/08/20			99	97 - 103			1.2	N/A	100	98 - 102
8008585	Saturation %	2015/08/20							0.23	12	103	75 - 125
8008628	Total Lead (Pb)	2015/08/20	115	75 - 125	104	75 - 125	<0.50	mg/kg	1.5	35	103	54 - 146
8009054	Total Organic Carbon (C)	2015/08/20			96	75 - 125	0.038, RDL=0.020	%	10	35	90	75 - 125
8009656	Soluble Conductivity	2015/08/20			101	90 - 110	<0.020	dS/m	5.2	35	111	75 - 125
8010559	Soluble Calcium (Ca)	2015/08/21	106	75 - 125	110	80 - 120	<1.5	mg/L	7.8	35	117	75 - 125
8010559	Soluble Magnesium (Mg)	2015/08/21	108	75 - 125	112	80 - 120	<1.0	mg/L	12	35	115	75 - 125
8010559	Soluble Potassium (K)	2015/08/21	106	75 - 125	110	80 - 120	<1.3	mg/L	NC	35	120	75 - 125
8010559	Soluble Sodium (Na)	2015/08/21	99	75 - 125	103	80 - 120	<2.5	mg/L	5.1	35	107	75 - 125
8010559	Soluble Sulphate (SO4)	2015/08/21					<5.0	mg/L	3.3	35	104	75 - 125

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Maxxam Job #: B570599
Report Date: 2015/09/09

QUALITY ASSURANCE REPORT(CONT'D)

DILLON CONSULTING LTD.
Client Project #: CBA-FTA
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700330152
Sampler Initials: MH

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8011883	Soluble Chloride (Cl)	2015/08/22	103	75 - 125	96	75 - 125	<5.0	mg/L	NC	35	106	75 - 125

N/A = Not Applicable

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

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

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

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

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

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (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 (one or both samples < 5x RDL).

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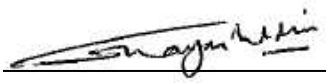
Maxxam Job #: B570599
Report Date: 2015/09/09

DILLON CONSULTING LTD.
Client Project #: CBA-FTA
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700330152
Sampler Initials: MH

VALIDATION SIGNATURE PAGE

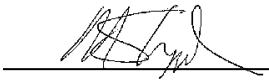
The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Ghayasuddin Khan, M.Sc., B.Ed., P.Chem, Scientific Specialist

Janet Gao, Supervisor

Luba Shymushovska, Organics – Senior Analyst



Michael Sheppard, Senior Scientific Specialist

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Maxxam

Calgary: 4000 19st St. NE, T2E 6P8. Ph: (403) 291-3077, Fax: (403) 735-2240, Toll free: (800) 386-7247
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564

Chain of Custody A153826

Page: 1 of 2

Invoice To: C/O Report Address ☐	Report To: Same as Invoice ☐	Report Distribution (E-Mail):
Company: PWGSC		bfisher@dillon.ca
Contact: Natalie Robinson		mhopps@dillon.ca
Address: Suite 1650, 635 - 8th Ave SW		Natalie.Robinson@pwgsc-tpsgc.ca
Prov: Alberta City: Calgary	Prov: PC:	
Contact #s: Ph: 403-292-6882 Cell:	Ph: Cell:	

REGULATORY GUIDELINES:
☐ AT1
☐ CCME
☐ Regulated Drinking Water
☐ Other:

All samples are held for 60 calendar days after sample receipt, unless specified otherwise.

PO #: 700230152
Project # / Name: CBH - FTA
Site Location: Cambridge Bay, NU
Quote #: R.05189.00
Sampled By: M. Hopps

SERVICE REQUESTED: ☒ RUSH (Contact lab to reserve) Date Required: ☐ REGULAR (5 to 7 Days)

See reverse for package specifics

	Sample ID	Depth (unit)	Matrix GW / SW Soil	Date/Time Sampled YY/MM/DD 24:00	SOIL: BTEX F1-F4	Sieve (75 micron)	Regulated Metals (CCME / AT1)	Salinity 4	Assessment ICP Metals	Basic Class II Landfill	Lead in Soil	PFOS / PFOA	PH	WATER: ☐VOCs	☐BTEX F1	☐BTEX F1-F2	☐BTEX F1-F4	☐ Routine Water ☐ Turb ☐ F	☐ TOC ☐ DOC	Total	Regulated Metals (CCME / AT1) Dissolved	Mercury	☐ Total ☐ Dissolved	Other Analysis: Fraction of Organic Carbon	HOLD - Do not Analyze	# of Containers Submitted
1	NW Wall SA1	1.0	Soil	15/08/14	X																					
2	NW Wall SA2	2.0	Soil	15/08/14	X						X															
3	NW Floor SA1	2.0	Soil	15/08/14	X						X															
4	Field Duplicate-1		Soil	15/08/14	X																					
5	~~NW composite~~		Soil	~~15/08/14~~																						
6	3-09-4m 1.0m	1.0	Soil	16/08/14	X			X				X	X												X	
7	Field Duplicate-2											X														
8																										
9																										
10																										
11																										
12																										

17-Aug-15 17:00
Marnie Kolach
B570599
INS-0097

RECEIVED IN YELLOWKNIFE
By: Michelle Gwie
2015 -08- 16
09:50

Temp: 5 / 7 / 9

Please indicate Filtered, Preserved or Both (F, P, F/P) → F/P

Relinquished By (Signature/Print): Matthew Hopps Date (YY/MM/DD): 15/08/15 Time (24:00): 900
Relinquished By (Signature/Print): Date (YY/MM/DD): Time (24:00):

Special Instructions: Please contact Heather if there are detectable concentrations of lead in soil.

# of Jars Used & Not Submitted

LAB USE ONLY

Received By:	Date:	Time:	Maxxam Job #:		
Yuanpeng Liu	2015/08/17	17:00	Custody Seal	Temperature	Ice
Lab Comments:			Y	6.6.5	Y

AB FCD-00331 Rev3 2010/05

Maxxam Analytics International Corporation o/a Maxxam Analytics

Your Project #: B571920
Your C.O.C. #: na

Attention:Linsay Sunderman

Maxxam Analytics
2021 41st Ave NE
Calgary, AB
T2E 6P2

Report Date: 2015/09/04
Report #: R3651675
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B5G8601
Received: 2015/08/22, 09:55

Sample Matrix: Soil
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Moisture	2	N/A	2015/08/25	CAM SOP-00445	Carter 2nd ed 51.2 m
PFOS and PFOA in soil	2	2015/08/26	2015/08/28	CAM SOP-00894	EPA537 m

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Andrea Rieth, Project Manager
Email: ARieth@maxxam.ca
Phone# (905)817-5787 Ext:5787
==========
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Maxxam Job #: B5G8601
Report Date: 2015/09/04

Maxxam Analytics
Client Project #: B571920

RESULTS OF ANALYSES OF SOIL

Maxxam ID		AVU468			AVU469		
Sampling Date		2015/08/17			2015/08/17		
COC Number		na			na		
	UNITS	MY0125 \ NORTH EAST WALL SA14 @1.7M	RDL	QC Batch	MY0129 \ BLANK (FOR PFOS)	RDL	QC Batch
Inorganics							
Moisture	%	12	1.0	4163482	2.6	1.0	4163482
Miscellaneous Parameters							
Perfluorobutane Sulfonate (PFBS)	ug/kg	0.6	0.1	4167364	<0.1	0.1	4167364
Perfluorobutanoic acid	ug/kg	0.6	0.1	4167364	<0.1	0.1	4167364
Perfluorodecane Sulfonate	ug/kg	<0.1	0.1	4167364	<0.1	0.1	4167364
Perfluorodecanoic Acid (PFDA)	ug/kg	<0.1	0.1	4167364	<0.1	0.1	4167364
Perfluorododecanoic Acid (PFDoA)	ug/kg	<0.1	0.1	4167364	<0.1	0.1	4167364
Perfluoroheptanoic Acid (PFHpA)	ug/kg	0.2	0.1	4167364	<0.1	0.1	4167364
Perfluorohexane Sulfonate (PFHxS)	ug/kg	3.8	0.1	4167364	<0.1	0.1	4167364
Perfluorohexanoic Acid (PFHxA)	ug/kg	2.3	0.1	4167364	<0.1	0.1	4167364
Perfluoro-n-Octanoic Acid (PFOA)	ug/kg	0.5	0.1	4167364	<0.1	0.1	4167364
Perfluorononanoic Acid (PFNA)	ug/kg	<0.1	0.1	4167364	<0.1	0.1	4167364
Perfluorooctane Sulfonamide (PFOSA)	ug/kg	<0.1	0.1	4167364	<0.1	0.1	4167364
Perfluorooctane Sulfonate (PFOS)	ug/kg	14 (1)	5	4172659	0.2	0.1	4167364
Perfluoropentanoic Acid (PFPeA)	ug/kg	1.6	0.1	4167364	<0.1	0.1	4167364
Perfluorotetradecanoic Acid	ug/kg	<0.1	0.1	4167364	<0.1	0.1	4167364
Perfluorotridecanoic Acid	ug/kg	<0.1	0.1	4167364	<0.1	0.1	4167364
Perfluoroundecanoic Acid (PFUnA)	ug/kg	<0.1	0.1	4167364	<0.1	0.1	4167364

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

(1) Due to high concentration of the target analyte, sample required dilution. Detection limit was adjusted accordingly.

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B5G8601
Report Date: 2015/09/04

Maxxam Analytics
Client Project #: B571920

TEST SUMMARY

Maxxam ID: AVU468
Sample ID: MY0125 \ NORTH EAST WALL SA14 @1.7M
Matrix: Soil

Collected: 2015/08/17
Shipped:
Received: 2015/08/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	4163482	N/A	2015/08/25	Valentina Kaftani
PFOS and PFOA in soil	LCMS	4167364	2015/08/26	2015/08/28	Colm McNamara

Maxxam ID: AVU469
Sample ID: MY0129 \ BLANK (FOR PFOS)
Matrix: Soil

Collected: 2015/08/17
Shipped:
Received: 2015/08/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	4163482	N/A	2015/08/25	Valentina Kaftani
PFOS and PFOA in soil	LCMS	4167364	2015/08/26	2015/08/28	Colm McNamara

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B5G8601
Report Date: 2015/09/04

Maxxam Analytics
Client Project #: B571920

GENERAL COMMENTS

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

Package 1	3.3°C

Sample AVU468, PFOS and PFOA in soil: Test repeated.

Results relate only to the items tested.

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Maxxam Job #: B5G8601
Report Date: 2015/09/04

Maxxam Analytics
Client Project #: B571920

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
4163482	DEE	RPD	Moisture	2015/08/25	NC		%	20
4167364	CM5	Matrix Spike	Perfluorobutane Sulfonate (PFBS)	2015/08/28		92	%	70 - 130
			Perfluorobutanoic acid	2015/08/28		111	%	70 - 130
			Perfluorodecane Sulfonate	2015/08/28		97	%	70 - 130
			Perfluorodecanoic Acid (PFDA)	2015/08/28		103	%	70 - 130
			Perfluorododecanoic Acid (PFDoA)	2015/08/28		102	%	70 - 130
			Perfluorononanoic Acid (PFNA)	2015/08/28		104	%	70 - 130
			Perfluorooctane Sulfonamide (PFOSA)	2015/08/28		105	%	70 - 130
			Perfluorotetradecanoic Acid	2015/08/28		97	%	70 - 130
			Perfluorotridecanoic Acid	2015/08/28		113	%	70 - 130
			Perfluoroundecanoic Acid (PFUnA)	2015/08/28		96	%	70 - 130
			Perfluoroheptanoic Acid (PFHpA)	2015/08/28		92	%	70 - 130
			Perfluorohexane Sulfonate (PFHxS)	2015/08/28		97	%	70 - 130
			Perfluorohexanoic Acid (PFHxA)	2015/08/28		101	%	70 - 130
			Perfluoro-n-Octanoic Acid (PFOA)	2015/08/28		95	%	70 - 130
			Perfluorooctane Sulfonate (PFOS)	2015/08/28		98	%	70 - 130
			Perfluoropentanoic Acid (PFPeA)	2015/08/28		95	%	70 - 130
4167364	CM5	RPD	Perfluorobutane Sulfonate (PFBS)	2015/08/28	4.6		%	30
			Perfluorobutanoic acid	2015/08/28	4.2		%	30
			Perfluorodecane Sulfonate	2015/08/28	6.0		%	30
			Perfluorodecanoic Acid (PFDA)	2015/08/28	1.6		%	30
			Perfluorododecanoic Acid (PFDoA)	2015/08/28	7.3		%	30
			Perfluorononanoic Acid (PFNA)	2015/08/28	7.8		%	30
			Perfluorooctane Sulfonamide (PFOSA)	2015/08/28	1.9		%	25
			Perfluorotetradecanoic Acid	2015/08/28	11		%	30
			Perfluorotridecanoic Acid	2015/08/28	8.5		%	30
			Perfluoroundecanoic Acid (PFUnA)	2015/08/28	4.7		%	30
			Perfluoroheptanoic Acid (PFHpA)	2015/08/28	3.9		%	30
			Perfluorohexane Sulfonate (PFHxS)	2015/08/28	3.6		%	30
			Perfluorohexanoic Acid (PFHxA)	2015/08/28	2.0		%	30
			Perfluoro-n-Octanoic Acid (PFOA)	2015/08/28	0.42		%	30
			Perfluorooctane Sulfonate (PFOS)	2015/08/28	2.8		%	30
			Perfluoropentanoic Acid (PFPeA)	2015/08/28	7.7		%	30
			Perfluorobutane Sulfonate (PFBS)	2015/08/28	NC		%	30
			Perfluorononanoic Acid (PFNA)	2015/08/28	NC		%	30
			Perfluoroheptanoic Acid (PFHpA)	2015/08/28	NC		%	30
			Perfluorohexane Sulfonate (PFHxS)	2015/08/28	NC		%	30
			Perfluoro-n-Octanoic Acid (PFOA)	2015/08/28	NC		%	30
			Perfluorooctane Sulfonate (PFOS)	2015/08/28	NC		%	30
4167364	CM5	Spiked Blank	Perfluorobutane Sulfonate (PFBS)	2015/08/28		96	%	70 - 130
			Perfluorobutanoic acid	2015/08/28		105	%	70 - 130
			Perfluorodecane Sulfonate	2015/08/28		97	%	70 - 130
			Perfluorodecanoic Acid (PFDA)	2015/08/28		94	%	70 - 130
			Perfluorododecanoic Acid (PFDoA)	2015/08/28		98	%	70 - 130
			Perfluorononanoic Acid (PFNA)	2015/08/28		103	%	70 - 130
			Perfluorooctane Sulfonamide (PFOSA)	2015/08/28		97	%	70 - 130
			Perfluorotetradecanoic Acid	2015/08/28		97	%	70 - 130
			Perfluorotridecanoic Acid	2015/08/28		99	%	70 - 130
			Perfluoroundecanoic Acid (PFUnA)	2015/08/28		102	%	70 - 130
			Perfluoroheptanoic Acid (PFHpA)	2015/08/28		96	%	70 - 130
			Perfluorohexane Sulfonate (PFHxS)	2015/08/28		99	%	70 - 130
			Perfluorohexanoic Acid (PFHxA)	2015/08/28		98	%	70 - 130
			Perfluoro-n-Octanoic Acid (PFOA)	2015/08/28		100	%	70 - 130
			Perfluorooctane Sulfonate (PFOS)	2015/08/28		98	%	70 - 130

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Maxxam Job #: B5G8601
Report Date: 2015/09/04

Maxxam Analytics
Client Project #: B571920

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Perfluoropentanoic Acid (PFPeA)	2015/08/28		92	%	70 - 130
4167364	CM5	Method Blank	Perfluorobutane Sulfonate (PFBS)	2015/08/28	<0.1		ug/kg	
			Perfluorobutanoic acid	2015/08/28	<0.1		ug/kg	
			Perfluorodecane Sulfonate	2015/08/28	<0.1		ug/kg	
			Perfluorodecanoic Acid (PFDA)	2015/08/28	<0.1		ug/kg	
			Perfluorododecanoic Acid (PFDoA)	2015/08/28	<0.1		ug/kg	
			Perfluorononanoic Acid (PFNA)	2015/08/28	<0.1		ug/kg	
			Perfluorooctane Sulfonamide (PFOSA)	2015/08/28	<0.1		ug/kg	
			Perfluorotetradecanoic Acid	2015/08/28	<0.1		ug/kg	
			Perfluorotridecanoic Acid	2015/08/28	<0.1		ug/kg	
			Perfluoroundecanoic Acid (PFUnA)	2015/08/28	<0.1		ug/kg	
			Perfluoroheptanoic Acid (PFHpA)	2015/08/28	<0.1		ug/kg	
			Perfluorohexane Sulfonate (PFHxS)	2015/08/28	<0.1		ug/kg	
			Perfluorohexanoic Acid (PFHxA)	2015/08/28	<0.1		ug/kg	
			Perfluoro-n-Octanoic Acid (PFOA)	2015/08/28	<0.1		ug/kg	
			Perfluorooctane Sulfonate (PFOS)	2015/08/28	<0.1		ug/kg	
			Perfluoropentanoic Acid (PFPeA)	2015/08/28	<0.1		ug/kg	
4172659	CM5	Matrix Spike	Perfluorooctane Sulfonate (PFOS)	2015/09/02		NC	%	70 - 130
4172659	CM5	Spiked Blank	Perfluorooctane Sulfonate (PFOS)	2015/09/02		94	%	70 - 130
4172659	CM5	Method Blank	Perfluorooctane Sulfonate (PFOS)	2015/09/02	<5		ug/kg	
4172659	CM5	RPD	Perfluorooctane Sulfonate (PFOS)	2015/09/02	23		%	30

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

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

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

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of 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 (one or both samples < 5x RDL).

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Maxxam Job #: B5G8601
Report Date: 2015/09/04

Maxxam Analytics
Client Project #: B571920

VALIDATION SIGNATURE PAGE

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

Adam Robinson, Technical Service

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

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

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Maxxam

Calgary: 4000 19st St. NE, T2E 6P8. Ph: (403) 291-3077, Fax: (403) 735-2240, Toll free: (800) 386-7247
Edmonton: 9331 - 48 Street, T6B 2R4. Ph: (780) 577-7100, Fax: (780) 450-4187, Toll free: (877) 465-8889
www.maxxamanalytics.com

Chain of Custody 715

Page: 1 of 1

	Invoice To:	C/O Report Address ☐	Report To:	Same as Invoice ☐	Report Distribution (E-Mail):	REGULATORY GUIDELINES:
Company:	PWGSC				mhopps@dillon.ca	☐ AT1
Contact:	Natalie Robinson				hfisher@dillon.ca	☐ CCME
Address:	Suite 1650 635 8th Ave				Natalie.Robinson@pwgsc-tpsgc.ca	☐ Regulated Drinking Water
	Alberta Calgary		Prov:	PC:		☐ Other:
Contact #s:	Ph: 403-292-6882		Ph:	Cell:		

All samples are held for 60 calendar days after sample receipt, unless specified otherwise.

PO #: 700330152
Project # / Name: FTA LTU
Site Location: Cambridge Bay, NU
Quote #: R.05169.005
Sampled By: m.Hopps

SERVICE REQUESTED: ☒ RUSH (Contact lab to reserve) ONLY BTEX Samples
Date Required:
☐ REGULAR (5 to 7 Days)

See reverse for package specifics — CCME

#	Sample ID	Depth (unit)	Matrix GW / SW Soil	Date/Time Sampled YY/MM/DD 24:00	BTEX F1-F4	Sieve (75 micron)	Regulated Metals (CCME / AT1)	Salinity 4	Assessment ICP Metals	Basic Class II Landfill	Lead	PFOS / PFOA	PH	☐VOCs ☐BTEX F1	☐BTEX F1-F4 ☐BTEX F1-F2	☐Routine Water ☐Turb ☐F	☐DOC ☐TOC	Regulated Metals (CCME / AT1) Total	Dissolved	☐Total ☐Dissolved Mercury	Fraction of Organic C.	HOLD - Do not Analyze	# of Containers Submitted
1	North East Wall SA13	1.0 m	Soil	15/08/17	X																		3
2	North East Wall SA14	1.7 m	Soil	15/08/17	X			X				X	X								X		4
3	East Floor SA6	1.7m	Soil	15/08/17	X						X												3
4	East Wall SA15	1.0m	Soil	15/08/17	X																		2
5	East Wall SA16	1.7m	Soil	15/08/17	X																		2
6	Blank (For PFOS)	-	Soil	15/08/17								X											1
7																							
8																							
9																							
10																							
11																							
12																							

18-Aug-15 16:35
B571920
MAK INS-0104 DN7

RECEIVED IN YELLOWKNIFE
By: Michele Tulk
2015-08-18 4:35
Temp: 6/6/7

Please indicate Filtered, Preserved or Both (F, P, F/P) → F/P

Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):
Matthew Hopps	15/08/17	1100
Relinquished By (Signature/Print): Call M. Hopps for Question 1-506 653-7680	Date (YY/MM/DD):	Time (24:00):

Special Instructions: If there are concentrations of lead conduct full metals. Kept cold

# of Jars Used & Not Submitted

LAB USE ONLY			
Received By:	Date:	Time:	Maxxam Job #:
Harry	2015/08/20	15:59	
Lab Comments:	Custody Seal	Temperature	Ice
	Y	5/5/5	Y

AB FCD-00331 Rev3 2010/05

Maxxam Analytics International Corporation o/a Maxxam Analytics

Name: Entry

Job #: B571920

National Client: 982, PWGSC RMSO EW699-113372/001/EDM

lient: PUBLIC WORKS & GOVERNMENT SERV
TELUS TOWER NORTH, 5th FLOOR
10025 JASPER AVENUE ,
EDMONTON AB
CANADA T5J 1S6

Inv Attn: Natalie Robinson

Task Order:
Line Item:

Report: same

Attention: Natalie Robinson
PHONE: (403) 292 - 6882Ext:
FAX: (780) 982 - 1887
EMAIL: natalie.robinson@pwgsc-tpsgc.gc.ca

Project Coordinator: LD1

Printed: 2015/08/20 Version 4
Reception Date: 2015/08/18
Reception Time: 16:35
Login Date: 2015/08/20
REQUIRED DATE: 2015/09/14, 18:00
Quote Number: B11534

P.O. Number: 700330152
PROJECT NUMBER: FTA LTU
Site Location: CAMBRIDGE BAY, NU
Site #:
Client Number: 2597
Rpt Address #:
Q.C. Samples: No

****** RUSH ******

Maxxam Number	Client Sample ID/Report ID	Cont's	Store Code	Recd. OK	Sampling Date	Matrix	Test Codes
MY0124-01R	NORTH EAST WALL SA13 @ 1. NORTH EAST WALL SA13 @ 1.0M	1-CSIN	N/A-INS-0	Yes	2015/08/17	SOIL	ARCHIVE, DISPOSAL, SSHIPC
MY0124-02R	NORTH EAST WALL SA13 @ 1. NORTH EAST WALL SA13 @ 1.0M	2-COR2	N/A-INS-0	Yes	2015/08/17	SOIL	BTEXHSAB-S, CCMEPREP-S F24FIDE-S, F4GRVE-S, MOIST-S VOLPREPE-S
MY0125-01R	NORTH EAST WALL SA14 @ 1. NORTH EAST WALL SA14 @ 1.7M	1-CSIN	N/A-INS-0	Yes	2015/08/17	SOIL	CACL, CATEC-S, CLAC-SOL, EC-SOL IONBAL-S, IONSUM-S, PH-CACL SAR-S, SARSOL, SOL, SOLIONS-C TGR, DISPOSAL, FOC-S, TCLECO-S
MY0125-02R	NORTH EAST WALL SA14 @ 1. NORTH EAST WALL SA14 @ 1.7M	2-COR2	N/A-INS-0	Yes	2015/08/17	SOIL	BTEXHSAB-S, CCMEPREP-S F24FIDE-S, F4GRVE-S, MOIST-S VOLPREPE-S
MY0125-03R	NORTH EAST WALL SA14 @ 1. NORTH EAST WALL SA14 @ 1.	1-COR2	N/A-INS-0	Yes	2015/08/17	SOIL	ESUBPFOX-S
MY0126-01R	EAST FLOOR SA6 @ 1.7M EAST FLOOR SA6 @ 1.7M	1-CSIN	N/A-INS-0	Yes	2015/08/17	SOIL	DISPOSAL, PB-S
MY0126-02R	EAST FLOOR SA6 @ 1.7M EAST FLOOR SA6 @ 1.7M	2-COR2	N/A-INS-0	Yes	2015/08/17	SOIL	BTEXHSAB-S, CCMEPREP-S F24FIDE-S, F4GRVE-S, MOIST-S VOLPREPE-S
MY0127-01R	EAST WALL SA15 @ 1.0M EAST WALL SA15 @ 1.0M	2-COR2	N/A-INS-0	Yes	2015/08/17	SOIL	BTEXHSAB-S, CCMEPREP-S F24FIDE-S, F4GRVE-S, MOIST-S VOLPREPE-S, DISPOSAL
MY0128-01R	EAST WALL SA16 @ 1.7M EAST WALL SA16 @ 1.7M	2-COR2	N/A-INS-0	Yes	2015/08/17	SOIL	BTEXHSAB-S, CCMEPREP-S F24FIDE-S, F4GRVE-S, MOIST-S VOLPREPE-S, DISPOSAL
MY0129-01R	BLANK (FOR PFOS) BLANK (FOR PFOS)	1-CSIN	N/A-INS-0	Yes	2015/08/17	SOIL	DISPOSAL, ESUBPFOX-S

Remarks: jk4

Quote Remarks:

BENTHIC INVERTEBRATE ID samples are to be shipped to:
Border Cargo Services, Inc.
Attn: Scott Freeman
c/o Intercon
#11-7550 River Road
Delta, BC V4G 1C8
Ph: (360) 332-2900

Once BENTHIC INVERTEBRATE samples are shipped to Border Cargo, the following information needs to be forwarded to Mike Glennon (Ph: (604) 210-1141 or mglennon@ecoanalysts.com):
-tracking number and courier name
-estimated date of delivery to Delta
-approximate total volume of sample material and type and volume of preservative in the shipment.
The single metal price for PWGSC is $19.25 as per Jennifer Ferquharson 2012/08/16 IS

National Client: 982, PWGSC RMSO EW699-113372/001/EDM

Maxxam Number	Client Sample ID/Report ID	Cont's	Store Reed. Code	OK	Sampling Date	Matrix	Test Codes

Quote Remarks: Continued...

Organics TCLP extraction: $41.25 if you use EPA Method 1311, $55 if zero headspace, $35.75 if you use Tclp modified from EPA1312 as per Marnie Kolach 2012/11/13 IS

Inspected by: MAK
Date: 2015/08/20
Time: 16:08

Approved by: JK4
Date: 2015/08/20
Time: 17:54

Date of Sample Disposal:
Disposal by:

Continued...

RUSH

MAXXAM ANALYTICS
4000 19st N.E
Calgary, Alberta, T2E 6P8
Phone: (403) 291-3077
Fax: (403) 291-9468

22-Aug-15 09:55
Andrea Rieth
B5G8601
MAF ENV-635

Ma

SUBCONTRA

PUBLIC WORKS &
GOVERNMENT SERVICES
CANADA - EDMONTON
Maxxam PM Linsay Sunderman

To: Maxxam Ontario (From Calgary) RUSH Job# B571920

☐ Yes ☐ No International Sample/BioHazard (if yes, add copy of Movement Cert., heat treat is required prior to disposal)
☐ Yes ☐ No Special Protocol (if yes, Protocol _____)

Sample ID	Matrix	Test(s) Required	Container	Date Sampled	Date Required
MY0125-03R \ NORTH EAST WALL SA14 @ 1.	SOIL	Perfluorinated Compounds - Subcontract	1(COR2)	2015/08/17	2015/09/14
MY0129-01R \ BLANK (FOR PFOS)	SOIL	Perfluorinated Compounds - Subcontract	1(CSIN)	2015/08/17	2015/09/14

	Temp. 1	Temp. 2	Temp. 3			
Cooler #1	3	3	2	Custody Seal Present	YES ✓	NO
				Custody Seal Intact	YES ✓	NO
				Ice Present Upon Receipt	YES ✓	NO
Cooler #2				Custody Seal Present	YES	NO
				Custody Seal Intact	YES	NO
				Ice Present Upon Receipt	YES	NO
Cooler #3				Custody Seal Present	YES	NO
				Custody Seal Intact	YES	NO
				Ice Present Upon Receipt	YES	NO

Receiving Maxxam Location: Maxxam Ontario (From Calgary) JOB # _____

Relinquished by (Sign) _____ (Print) JOSH KINGSBURY Date and Time 2015/08/20 17:59

Received by (Sign) _____ (Print) MAGDALENA CAP Date and Time 2015/08/22 09:55

NOTES:
1) Please call us if due date cannot be met. Please reference Sample ID on your report.
2) Include copy of this completed form, Client COC & signed final report to

Reporting Requirements:
National:
Regional:

SHIPPING INSTRUCTIONS
☐ Ship Immediately (highlight Yellow) ☐ Ship Cold
☐ Requires 9am ☐ Ship Room Temp
☐ Requires Sat. Delivery ☐ Ship Frozen
☐ Regular Ship next available day ☐ COC Must be Attached
Sender (Print) _____ Initial _____

SHIPPING DEPARTMENT CHECKLIST
☐ Correct Shipping location
☐ Correct Sample Ids (Paperwork vs Bottles)
☐ Yes ☐ No Special-Cooler, Ice, Tape-custody seal, Date&Sign
Date Shipped _____ Number of coolers _____
Shipper (Print) _____ Initial _____

Your P.O. #: 700330152
Your Project #: FTA LTU
Site Location: CAMBRIDGE BAY, NU
Your C.O.C. #: A158831

Attention:HEATHER FISHER

DILLON CONSULTING LTD.
1558 Willson Place
Winnipeg, MB
CANADA R3T 0Y4

Report Date: 2015/09/14
Report #: R2040632
Version: 2 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B571920
Received: 2015/08/18, 16:35

Sample Matrix: Soil
Samples Received: 5

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
BTEX/F1 by HS GC/MS/FID (MeOH extract) (1)	5	2015/08/20	2015/08/21	AB SOP-00039	CCME CWS/EPA 8260c m
Cation/EC Ratio (1)	1	N/A	2015/08/25	AB WI-00065	Auto Calc
Chloride (Soluble) (1)	1	2015/08/25	2015/08/26	AB SOP-00033 / AB SOP-00020	SM 22-4500-Cl G m
Conductivity @25C (Soluble) (1)	1	2015/08/25	2015/08/25	AB SOP-00033 / AB SOP-00004	SM 22 2510 B m
CCME Hydrocarbons (F2-F4 in soil) (1, 2)	5	2015/08/20	2015/08/21	AB SOP-00036 / AB SOP-00040	CCME PHC-CWS
Fraction of Organic Carbon (1)	1	N/A	2015/08/25	CAL SOP-00243	Auto Calc
Ion Balance (1)	1	N/A	2015/08/21	AB WI-00065	Auto Calc
Sum of Cations, Anions (1)	1	N/A	2015/08/25	AB WI-00065	Auto Calc
Moisture (1)	5	N/A	2015/08/21	AB SOP-00002	CCME PHC-CWS
Lead (1)	1	2015/08/22	2015/08/22	AB SOP-00001 / AB SOP-00043	EPA 200.8 R5.4 m
pH @25C (1:2 Calcium Chloride Extract) (1)	1	2015/08/24	2015/08/25	AB SOP-00033 / AB SOP-00006	SM 22 4500 H+B m
Sodium Adsorption Ratio (1)	1	N/A	2015/08/25	AB WI-00065	Auto Calc
Ca,Mg,Na,K,SO4 (Soluble) (1)	1	2015/08/25	2015/08/25	AB SOP-00033 / AB SOP-00042	EPA 200.7 CFR 2012 m
Soluble Paste (1)	1	2015/08/25	2015/08/25	AB SOP-00033	Carter 2nd ed 15.2 m
Soluble Ions Calculation (1)	1	N/A	2015/08/21	AB WI-00065	Auto Calc
Total Organic Carbon LECO Method (1)	1	2015/08/21	2015/08/25	AB SOP-00035 / CAL SOP-00243	LECO 203-821-170 m
Theoretical Gypsum Requirement (1, 3)	1	N/A	2015/08/25	AB WI-00065	Auto Calc

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 Calgary Environmental

(2) All CCME 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.

(3) Units for TGR have changed from tons/acre to tonnes/ha

Your P.O. #: 700330152
Your Project #: FTA LTU
Site Location: CAMBRIDGE BAY, NU
Your C.O.C. #: A158831

Attention:HEATHER FISHER

DILLON CONSULTING LTD.
1558 Willson Place
Winnipeg, MB
CANADA R3T 0Y4

Report Date: 2015/09/14
Report #: R2040632
Version: 2 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B571920
Received: 2015/08/18, 16:35

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Linsay Sunderman, Project Manager
Email: LSunderman@maxxam.ca
Phone# (403)735-2237 Ext:2237

==========

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 #: B571920
Report Date: 2015/09/14

DILLON CONSULTING LTD.
Client Project #: FTA LTU
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700330152
Sampler Initials: MH

RESULTS OF CHEMICAL ANALYSES OF SOIL

Maxxam ID		MY0124	MY0125	MY0126		
Sampling Date		2015/08/17	2015/08/17	2015/08/17		
COC Number		A158831	A158831	A158831		
	UNITS	NORTH EAST WALL SA13 @ 1.0M	NORTH EAST WALL SA14 @ 1.7M	EAST FLOOR SA6 @ 1.7M	RDL	QC Batch
Calculated Parameters						
Anion Sum	meq/L		110		N/A	8009719
Cation Sum	meq/L		110		N/A	8009719
Cation/EC Ratio	N/A		10		0.10	8009714
Ion Balance	N/A		1.0		0.010	8009718
Calculated Calcium (Ca)	mg/kg		48		0.46	8009722
Calculated Magnesium (Mg)	mg/kg		55		0.30	8009722
Calculated Sodium (Na)	mg/kg		540		0.76	8009722
Calculated Potassium (K)	mg/kg		58		0.40	8009722
Calculated Chloride (Cl)	mg/kg		920		7.6	8009722
Calculated Sulphate (SO4)	mg/kg		300		1.5	8009722
Misc. Inorganics						
Fraction of Organic Carbon	g/g		0.00089		0.00020	8009382
Soluble Parameters						
Soluble Chloride (Cl)	mg/L		3000 (1)		25	8016143
Soluble Conductivity	dS/m		10		0.020	8015163
Soluble (CaCl2) pH	pH		7.63		N/A	8012985
Sodium Adsorption Ratio	N/A		23		0.10	8009721
Soluble Calcium (Ca)	mg/L		160		1.5	8015139
Soluble Magnesium (Mg)	mg/L		180		1.0	8015139
Soluble Sodium (Na)	mg/L		1800		2.5	8015139
Soluble Potassium (K)	mg/L		190		1.3	8015139
Saturation %	%		30		N/A	8012405
Soluble Sulphate (SO4)	mg/L		970		5.0	8015139
Theoretical Gypsum Requirement	tonnes/ha		37		0.20	8009723
Physical Properties						
Moisture	%	9.6	17	13	0.30	8009913

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

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Maxxam Job #: B571920
Report Date: 2015/09/14

DILLON CONSULTING LTD.
Client Project #: FTA LTU
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700330152
Sampler Initials: MH

RESULTS OF CHEMICAL ANALYSES OF SOIL

Maxxam ID		MY0127	MY0128		
Sampling Date		2015/08/17	2015/08/17		
COC Number		A158831	A158831		
	UNITS	**EAST WALL SA15 @ 1.0M**	**EAST WALL SA16 @ 1.7M**	**RDL**	**QC Batch**
Physical Properties					
Moisture	%	8.5	11	0.30	8009913
RDL = Reportable Detection Limit					

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Maxxam Job #: B571920
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Client Project #: FTA LTU
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700330152
Sampler Initials: MH

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		MY0124	MY0125	MY0126	MY0127		
Sampling Date		2015/08/17	2015/08/17	2015/08/17	2015/08/17		
COC Number		A158831	A158831	A158831	A158831		
	UNITS	NORTH EAST WALL SA13 @ 1.0M	NORTH EAST WALL SA14 @ 1.7M	EAST FLOOR SA6 @ 1.7M	EAST WALL SA15 @ 1.0M	RDL	QC Batch
Ext. Pet. Hydrocarbon							
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	<10	<10	<10	10	8009831
F3 (C16-C34 Hydrocarbons)	mg/kg	<50	<50	<50	<50	50	8009831
F4 (C34-C50 Hydrocarbons)	mg/kg	<50	<50	<50	<50	50	8009831
Reached Baseline at C50	mg/kg	Yes	Yes	Yes	Yes		8009831
Surrogate Recovery (%)							
O-TERPHENYL (sur.)	%	111	109	96	121		8009831
RDL = Reportable Detection Limit							

Maxxam ID		MY0128		
Sampling Date		2015/08/17		
COC Number		A158831		
	UNITS	EAST WALL SA16 @ 1.7M	RDL	QC Batch
Ext. Pet. Hydrocarbon				
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	10	8009831
F3 (C16-C34 Hydrocarbons)	mg/kg	<50	50	8009831
F4 (C34-C50 Hydrocarbons)	mg/kg	<50	50	8009831
Reached Baseline at C50	mg/kg	Yes		8009831
Surrogate Recovery (%)				
O-TERPHENYL (sur.)	%	111		8009831
RDL = Reportable Detection Limit				

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Maxxam Job #: B571920
Report Date: 2015/09/14

DILLON CONSULTING LTD.
Client Project #: FTA LTU
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700330152
Sampler Initials: MH

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		MY0126		
Sampling Date		2015/08/17		
COC Number		A158831		
	UNITS	**EAST FLOOR SA6 @ 1.7M**	**RDL**	**QC Batch**
Elements				
Total Lead (Pb)	mg/kg	2.3	0.50	8011499
RDL = Reportable Detection Limit				

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Report Date: 2015/09/14

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Client Project #: FTA LTU
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700330152
Sampler Initials: MH

VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		MY0124	MY0125	MY0126	MY0127		
Sampling Date		2015/08/17	2015/08/17	2015/08/17	2015/08/17		
COC Number		A158831	A158831	A158831	A158831		
	UNITS	NORTH EAST WALL SA13 @ 1.0M	NORTH EAST WALL SA14 @ 1.7M	EAST FLOOR SA6 @ 1.7M	EAST WALL SA15 @ 1.0M	RDL	QC Batch
Volatiles							
Benzene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	8009957
Toluene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	8009957
Ethylbenzene	mg/kg	<0.010	<0.010	<0.010	<0.010	0.010	8009957
Xylenes (Total)	mg/kg	<0.040	<0.040	<0.040	<0.040	0.040	8009957
m & p-Xylene	mg/kg	<0.040	<0.040	<0.040	<0.040	0.040	8009957
o-Xylene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	8009957
F1 (C6-C10) - BTEX	mg/kg	<12	<12	<12	<12	12	8009957
F1 (C6-C10)	mg/kg	<12	<12	<12	<12	12	8009957
Surrogate Recovery (%)							
1,4-Difluorobenzene (sur.)	%	107	107	109	108		8009957
4-Bromofluorobenzene (sur.)	%	107	108	107	106		8009957
D10-ETHYLBENZENE (sur.)	%	106	110	109	104		8009957
D4-1,2-Dichloroethane (sur.)	%	126	128	129	128		8009957

RDL = Reportable Detection Limit

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Maxxam Job #: B571920
Report Date: 2015/09/14

DILLON CONSULTING LTD.
Client Project #: FTA LTU
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700330152
Sampler Initials: MH

VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		MY0128		
Sampling Date		2015/08/17		
COC Number		A158831		
	UNITS	**EAST WALL SA16 @ 1.7M**	**RDL**	**QC Batch**
Volatiles				
Benzene	mg/kg	<0.0050	0.0050	8009957
Toluene	mg/kg	<0.020	0.020	8009957
Ethylbenzene	mg/kg	<0.010	0.010	8009957
Xylenes (Total)	mg/kg	<0.040	0.040	8009957
m & p-Xylene	mg/kg	<0.040	0.040	8009957
o-Xylene	mg/kg	<0.020	0.020	8009957
F1 (C6-C10) - BTEX	mg/kg	<12	12	8009957
F1 (C6-C10)	mg/kg	<12	12	8009957
Surrogate Recovery (%)				
1,4-Difluorobenzene (sur.)	%	107		8009957
4-Bromofluorobenzene (sur.)	%	107		8009957
D10-ETHYLBENZENE (sur.)	%	109		8009957
D4-1,2-Dichloroethane (sur.)	%	126		8009957
RDL = Reportable Detection Limit				

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Maxxam Job #: B571920
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DILLON CONSULTING LTD.
Client Project #: FTA LTU
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700330152
Sampler Initials: MH

MISCELLANEOUS (SOIL)

Maxxam ID		MY0125		
Sampling Date		2015/08/17		
COC Number		A158831		
	UNITS	**NORTH EAST WALL SA14 @ 1.7M**	**RDL**	**QC Batch**
Misc. Inorganics				
Total Organic Carbon (C)	%	0.089	0.020	8010538
RDL = Reportable Detection Limit				

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Maxxam Job #: B571920
Report Date: 2015/09/14

DILLON CONSULTING LTD.
Client Project #: FTA LTU
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700330152
Sampler Initials: MH

GENERAL COMMENTS

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

Package 1	6.3°C

PFOS and PHOA Results are attached to this report. The reference number for these results from Maxxam Campobello is B5G8601.

Results relate only to the items tested.

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Maxxam Job #: B571920
Report Date: 2015/09/14

QUALITY ASSURANCE REPORT

DILLON CONSULTING LTD.
Client Project #: FTA LTU
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700330152
Sampler Initials: MH

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8009831	O-TERPHENYL (sur.)	2015/08/21	89	50 - 130	99	50 - 130	107	%				
8009957	1,4-Difluorobenzene (sur.)	2015/08/21	106	60 - 140	90	60 - 140	109	%				
8009957	4-Bromofluorobenzene (sur.)	2015/08/21	108	60 - 140	93	60 - 140	106	%				
8009957	D10-ETHYLBENZENE (sur.)	2015/08/21	114	60 - 130	95	60 - 130	105	%				
8009957	D4-1,2-Dichloroethane (sur.)	2015/08/21	136	60 - 140	113	60 - 140	127	%				
8009831	F2 (C10-C16 Hydrocarbons)	2015/08/21	98	50 - 130	104	70 - 130	<10	mg/kg	NC	50		
8009831	F3 (C16-C34 Hydrocarbons)	2015/08/21	99	50 - 130	104	70 - 130	<50	mg/kg	NC	50		
8009831	F4 (C34-C50 Hydrocarbons)	2015/08/21	96	50 - 130	101	70 - 130	<50	mg/kg	NC	50		
8009913	Moisture	2015/08/21					<0.30	%	5.5	20		
8009957	Benzene	2015/08/21	138	60 - 140	111	60 - 140	<0.0050	mg/kg	NC	50		
8009957	Ethylbenzene	2015/08/21	122	60 - 140	99	60 - 140	<0.010	mg/kg	NC	50		
8009957	F1 (C6-C10) - BTEX	2015/08/21					<12	mg/kg	NC	50		
8009957	F1 (C6-C10)	2015/08/21	127	60 - 140	121	60 - 140	<12	mg/kg	NC	50		
8009957	m & p-Xylene	2015/08/21	116	60 - 140	94	60 - 140	<0.040	mg/kg	NC	50		
8009957	o-Xylene	2015/08/21	117	60 - 140	95	60 - 140	<0.020	mg/kg	NC	50		
8009957	Toluene	2015/08/21	124	60 - 140	101	60 - 140	<0.020	mg/kg	NC	50		
8009957	Xylenes (Total)	2015/08/21					<0.040	mg/kg	NC	50		
8010538	Total Organic Carbon (C)	2015/08/25			92	75 - 125	0.033, RDL=0.020	%	0.54	35	88	75 - 125
8011499	Total Lead (Pb)	2015/08/22	95	75 - 125	98	75 - 125	<0.50	mg/kg	NC	35	108	54 - 146
8012405	Saturation %	2015/08/25							4.9	12	97	75 - 125
8012985	Soluble (CaCl2) pH	2015/08/25			100	97 - 103			0.62	N/A	99	98 - 102
8015139	Soluble Calcium (Ca)	2015/08/25	107	75 - 125	105	80 - 120	<1.5	mg/L			109	75 - 125
8015139	Soluble Magnesium (Mg)	2015/08/25	115	75 - 125	113	80 - 120	<1.0	mg/L			113	75 - 125
8015139	Soluble Potassium (K)	2015/08/25	115	75 - 125	114	80 - 120	<1.3	mg/L			121	75 - 125
8015139	Soluble Sodium (Na)	2015/08/25	108	75 - 125	107	80 - 120	<2.5	mg/L			112	75 - 125
8015139	Soluble Sulphate (SO4)	2015/08/25					<5.0	mg/L			109	75 - 125
8015163	Soluble Conductivity	2015/08/25			101	90 - 110	<0.020	dS/m			105	75 - 125

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Maxxam Job #: B571920
Report Date: 2015/09/14

QUALITY ASSURANCE REPORT(CONT'D)

DILLON CONSULTING LTD.
Client Project #: FTA LTU
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700330152
Sampler Initials: MH

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8016143	Soluble Chloride (Cl)	2015/08/26	101	75 - 125	99	75 - 125	7.3, RDL=5.0	mg/L	9.6	35	120	75 - 125

N/A = Not Applicable

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

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

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

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

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

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (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 (one or both samples < 5x RDL).

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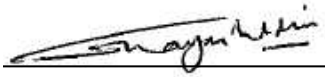
Maxxam Job #: B571920
Report Date: 2015/09/14

DILLON CONSULTING LTD.
Client Project #: FTA LTU
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700330152
Sampler Initials: MH

VALIDATION SIGNATURE PAGE

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

Dennis Ngondu, Organics – Supervisor



Ghayasuddin Khan, M.Sc., B.Ed., P.Chem, Scientific Specialist

Janet Gao, Supervisor

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Maxxam

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www.maxxamanalytics.com

Chain of Custody A158831

715

Page: 1 of 1

Invoice To:	C/O Report Address ☐
Company:	PWGSC
Contact:	Natalie Robinson
Address:	Suite 1650 635 8th Ave / Alberta Calgary
Contact #s:	Ph: 403 - 292 - 6882

Report To:	Same as Invoice ☐
Prov:	PC:
Ph:	Cell:

Report Distribution (E-Mail):
mhopps@dillon.ca
hfisher@dillon.ca
Natalie.Robinson@pwgsc-tpsgc.gc.ca

REGULATORY GUIDELINES:
- ☐ AT1
- ☐ CCME
- ☐ Regulated Drinking Water
- ☐ Other:

All samples are held for 60 calendar days after sample receipt, unless specified otherwise.

PO #:	700330152
Project # / Name:	FTA LTU
Site Location:	Cambridge Bay, NU
Quote #:	R.05169.005
Sampled By:	M. Hopps

SERVICE REQUESTED: ☒ RUSH (Contact lab to reserve) ONLY BTEX samples XX; Date Required: ; ☐ REGULAR (5 to 7 Days)

See reverse for package specifics

#	Sample ID	Depth (unit)	Matrix GW / SW Soil	Date/Time Sampled YY/MM/DD 24:00	BTEX F1-F4 (CCME XX)	Salinity 4	Lead	PFOS / PFOA	PH	Fraction of Organic C	HOLD - Do not Analyze	# of Containers Submitted
1	North East Wall SA13	1.0 m	Soil	15/08/17	X							2
2	North East Wall SA14	1.7 m	Soil	15/08/17	X	X		X	X	X		4
3	East Floor SA6	1.7 m	Soil	15/08/17	X		X					3
4	East Wall SA15	1.0 m	Soil	15/08/17	X							2
5	East Wall SA16	1.7 m	Soil	15/08/17	X							2
6	Blank (For PFOS)	—	Soil	15/08/17				X				1
7												
8												
9												
10												
11												
12												

Other printed analysis columns (unmarked): SOIL — Sieve (75 micron), Regulated Metals (CCME / AT1), Assessment ICP Metals, Basic Class II Landfill; WATER — ☐VOCs, ☐BTEX F1, ☐BTEX F1-F4, ☐BTEX F1-F2, ☐Routine Water ☐Turb ☐F, ☐TOC ☐DOC, Regulated Metals (CCME / AT1) Total / Dissolved, Mercury ☐Total ☐Dissolved; Other Analysis.

18-Aug-15 16:35
B571920
INS-0104 DN7
MAK

RECEIVED IN YELLOWKNIFE
By: Michelle Huika
2015-08-18 4:35
Temp: 6 / 6 / 7

Please indicate Filtered, Preserved or Both (F, P, F/P) → F/P

Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):
Matthew Hopps	15/08/17	1100
Relinquished By (Signature/Print): Call M. Hopps for question 1-506 653-7680	Date (YY/MM/DD):	Time (24:00):

Special Instructions: If there are concentrations of lead conduct full metals. Kept cold

# of Jars Used & Not Submitted

LAB USE ONLY

Received By:	Date:	Time:	Maxxam Job #:		
Harry [illegible]	2015/08/20	15:59	Custody Seal	Temperature	Ice
Lab Comments:			Y	5/5/5	Y

AB FCD-00331 Rev3 2010/05

Maxxam Analytics International Corporation o/a Maxxam Analytics

Your Project #: B572411
Your C.O.C. #: na

Attention:Linsay Sunderman

Maxxam Analytics
2021 41st Ave NE
Calgary, AB
T2E 6P2

Report Date: 2015/09/04
Report #: R3651669
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B5G9715
Received: 2015/08/25, 09:00

Sample Matrix: Soil
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Moisture	2	N/A	2015/09/02	CAM SOP-00445	Carter 2nd ed 51.2 m
PFOS and PFOA in soil	2	2015/09/01	2015/09/02	CAM SOP-00894	EPA537 m

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Andrea Rieth, Project Manager
Email: ARieth@maxxam.ca
Phone# (905)817-5787 Ext:5787
==========
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 #: B5G9715
Report Date: 2015/09/04

Maxxam Analytics
Client Project #: B572411

RESULTS OF ANALYSES OF SOIL

Maxxam ID		AWB236		AWB237		
Sampling Date		2015/08/18		2015/08/18		
COC Number		na		na		
	UNITS	MY3183 \ SOUTH WALL SA24 @ 1.7M	RDL	MY3185 \ SOUTH WALL SA23 @ 1.0M	RDL	QC Batch
Inorganics						
Moisture	%	13	1.0	4.7	1.0	4175051
Miscellaneous Parameters						
Perfluorobutane Sulfonate (PFBS)	ug/kg	<5	5	<5	5	4172659
Perfluorobutanoic acid	ug/kg	<5	5	<5	5	4172659
Perfluorodecane Sulfonate	ug/kg	<5	5	<5	5	4172659
Perfluorodecanoic Acid (PFDA)	ug/kg	<5	5	<5	5	4172659
Perfluorododecanoic Acid (PFDoA)	ug/kg	<5	5	<5	5	4172659
Perfluoroheptanoic Acid (PFHpA)	ug/kg	<5	5	<5	5	4172659
Perfluorohexane Sulfonate (PFHxS)	ug/kg	53	5	<5	5	4172659
Perfluorohexanoic Acid (PFHxA)	ug/kg	13	5	<5	5	4172659
Perfluoro-n-Octanoic Acid (PFOA)	ug/kg	6	5	<5	5	4172659
Perfluorononanoic Acid (PFNA)	ug/kg	<5	5	<5	5	4172659
Perfluorooctane Sulfonamide (PFOSA)	ug/kg	<5	5	<5	5	4172659
Perfluorooctane Sulfonate (PFOS)	ug/kg	220	5	430	25	4172659
Perfluoropentanoic Acid (PFPeA)	ug/kg	10	5	<5	5	4172659
Perfluorotetradecanoic Acid	ug/kg	<5	5	<5	5	4172659
Perfluorotridecanoic Acid	ug/kg	<5	5	<5	5	4172659
Perfluoroundecanoic Acid (PFUnA)	ug/kg	<5	5	<5	5	4172659

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B5G9715
Report Date: 2015/09/04

Maxxam Analytics
Client Project #: B572411

TEST SUMMARY

Maxxam ID: AWB236
Sample ID: MY3183 \ SOUTH WALL SA24 @ 1.7M
Matrix: Soil

Collected: 2015/08/18
Shipped:
Received: 2015/08/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	4175051	N/A	2015/09/02	Shivani Desai
PFOS and PFOA in soil	LCMS	4172659	2015/09/01	2015/09/02	Colm McNamara

Maxxam ID: AWB237
Sample ID: MY3185 \ SOUTH WALL SA23 @ 1.0M
Matrix: Soil

Collected: 2015/08/18
Shipped:
Received: 2015/08/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	4175051	N/A	2015/09/02	Shivani Desai
PFOS and PFOA in soil	LCMS	4172659	2015/09/01	2015/09/02	Colm McNamara

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Maxxam Job #: B5G9715
Report Date: 2015/09/04

Maxxam Analytics
Client Project #: B572411

GENERAL COMMENTS

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

Package 1	4.7°C

Sample AWB236-01 : Perfluorinated Compounds (PFCs): Due to high concentrations of the target analytes, sample required dilution. Detection limits were adjusted accordingly.

Sample AWB237-01 : Perfluorinated Compounds (PFCs): Due to high concentrations of the target analytes, sample required dilution. Detection limits were adjusted accordingly.

Results relate only to the items tested.

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Maxxam Job #: B5G9715
Report Date: 2015/09/04

Maxxam Analytics
Client Project #: B572411

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
4172659	CM5	Matrix Spike	Perfluorobutane Sulfonate (PFBS)	2015/09/02		106	%	70 - 130
			Perfluorobutanoic acid	2015/09/02		111	%	70 - 130
			Perfluorodecane Sulfonate	2015/09/02		105	%	70 - 130
			Perfluorodecanoic Acid (PFDA)	2015/09/02		103	%	70 - 130
			Perfluorododecanoic Acid (PFDoA)	2015/09/02		108	%	70 - 130
			Perfluorononanoic Acid (PFNA)	2015/09/02		102	%	70 - 130
			Perfluorooctane Sulfonamide (PFOSA)	2015/09/02		98	%	70 - 130
			Perfluorotetradecanoic Acid	2015/09/02		105	%	70 - 130
			Perfluorotridecanoic Acid	2015/09/02		115	%	70 - 130
			Perfluoroundecanoic Acid (PFUnA)	2015/09/02		92	%	70 - 130
			Perfluoroheptanoic Acid (PFHpA)	2015/09/02		100	%	70 - 130
			Perfluorohexane Sulfonate (PFHxS)	2015/09/02		NC	%	70 - 130
			Perfluorohexanoic Acid (PFHxA)	2015/09/02		101	%	70 - 130
			Perfluoro-n-Octanoic Acid (PFOA)	2015/09/02		97	%	70 - 130
			Perfluorooctane Sulfonate (PFOS)	2015/09/02		NC	%	70 - 130
			Perfluoropentanoic Acid (PFPeA)	2015/09/02		102	%	70 - 130
4172659	CM5	Spiked Blank	Perfluorobutane Sulfonate (PFBS)	2015/09/02		114	%	70 - 130
			Perfluorobutanoic acid	2015/09/02		115	%	70 - 130
			Perfluorodecane Sulfonate	2015/09/02		105	%	70 - 130
			Perfluorodecanoic Acid (PFDA)	2015/09/02		100	%	70 - 130
			Perfluorododecanoic Acid (PFDoA)	2015/09/02		98	%	70 - 130
			Perfluorononanoic Acid (PFNA)	2015/09/02		108	%	70 - 130
			Perfluorooctane Sulfonamide (PFOSA)	2015/09/02		102	%	70 - 130
			Perfluorotetradecanoic Acid	2015/09/02		97	%	70 - 130
			Perfluorotridecanoic Acid	2015/09/02		107	%	70 - 130
			Perfluoroundecanoic Acid (PFUnA)	2015/09/02		98	%	70 - 130
			Perfluoroheptanoic Acid (PFHpA)	2015/09/02		100	%	70 - 130
			Perfluorohexane Sulfonate (PFHxS)	2015/09/02		107	%	70 - 130
			Perfluorohexanoic Acid (PFHxA)	2015/09/02		102	%	70 - 130
			Perfluoro-n-Octanoic Acid (PFOA)	2015/09/02		95	%	70 - 130
			Perfluorooctane Sulfonate (PFOS)	2015/09/02		94	%	70 - 130
			Perfluoropentanoic Acid (PFPeA)	2015/09/02		92	%	70 - 130
4172659	CM5	Method Blank	Perfluorobutane Sulfonate (PFBS)	2015/09/02	<5		ug/kg	
			Perfluorobutanoic acid	2015/09/02	<5		ug/kg	
			Perfluorodecane Sulfonate	2015/09/02	<5		ug/kg	
			Perfluorodecanoic Acid (PFDA)	2015/09/02	<5		ug/kg	
			Perfluorododecanoic Acid (PFDoA)	2015/09/02	<5		ug/kg	
			Perfluorononanoic Acid (PFNA)	2015/09/02	<5		ug/kg	
			Perfluorooctane Sulfonamide (PFOSA)	2015/09/02	<5		ug/kg	
			Perfluorotetradecanoic Acid	2015/09/02	<5		ug/kg	
			Perfluorotridecanoic Acid	2015/09/02	<5		ug/kg	
			Perfluoroundecanoic Acid (PFUnA)	2015/09/02	<5		ug/kg	
			Perfluoroheptanoic Acid (PFHpA)	2015/09/02	<5		ug/kg	
			Perfluorohexane Sulfonate (PFHxS)	2015/09/02	<5		ug/kg	
			Perfluorohexanoic Acid (PFHxA)	2015/09/02	<5		ug/kg	
			Perfluoro-n-Octanoic Acid (PFOA)	2015/09/02	<5		ug/kg	
			Perfluorooctane Sulfonate (PFOS)	2015/09/02	<5		ug/kg	
			Perfluoropentanoic Acid (PFPeA)	2015/09/02	<5		ug/kg	
4172659	CM5	RPD	Perfluorobutane Sulfonate (PFBS)	2015/09/02	NC		%	30
			Perfluorodecane Sulfonate	2015/09/02	NC		%	30
			Perfluorohexane Sulfonate (PFHxS)	2015/09/02	19		%	30
			Perfluorohexanoic Acid (PFHxA)	2015/09/02	24		%	30
			Perfluoro-n-Octanoic Acid (PFOA)	2015/09/02	NC		%	30
			Perfluorooctane Sulfonate (PFOS)	2015/09/02	23		%	30

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Maxxam Job #: B5G9715
Report Date: 2015/09/04

Maxxam Analytics
Client Project #: B572411

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Perfluoropentanoic Acid (PFPeA)	2015/09/02	NC		%	30
4175051	SB1	RPD	Moisture	2015/09/02	1.5		%	20

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 spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of 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 (one or both samples < 5x RDL).

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Maxxam Job #: B5G9715
Report Date: 2015/09/04

Maxxam Analytics
Client Project #: B572411

VALIDATION SIGNATURE PAGE

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

Adam Robinson, Technical Service

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

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

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Entry

Job #: B572411

Page #: 1

National Client: 982, PWGSC RMSO EW699-113372/001/EDM

PUBLIC WORKS & GOVERNMENT SERV
TELUS TOWER NORTH, 5th FLOOR
10025 JASPER AVENUE
EDMONTON AB
CANADA T5J 1S6

Inv Attn: Natalie Robinson

Task Order:
Line Item:

Printed: 2015/08/22 Version 4
Reception Date: 2015/08/20
Reception Time: 08:10
Login Date: 2015/08/21
REQUIRED DATE: 2015/09/08, 18:00
Quote Number: B11534

Report: same

Attention: Natalie Robinson
PHONE: (403) 292 - 6882Ext:
FAX: (780) 982 - 1887
EMAIL: natalie.robinson@pwgsc-tpsgc.gc.ca

P.O. Number: 700380152
PROJECT NUMBER: CBA-FTA
Site Location: CAMBRIDGE BAY, NU
Site #:
Client Number: 2597
Rpt Address #:
Q.C. Samples: No

Project Coordinator: LD1

****** RUSH ******

Maxxam Number	Client Sample ID/Report ID	Cont's	Store Code	Recd. OK	Sampling Date	Matrix	Test Codes
MY3183-01R	SOUTH WALL SA24 @ 1.7M SOUTH WALL SA24 @ 1.7M	2-COR2	N/A-INS-0	Yes	2015/08/18	SOIL	BTEXHSAB-S, CCMEPREP-S F24FIDE-S, F4GRVE-S, MOIST-S VOLPREPE-S, DISPOSAL, FOC-S TCLECO-S
MY3183-02R	SOUTH WALL SA24 @ 1.7M SOUTH WALL SA24 @ 1.7M	2-CSIN	N/A-INS-0	Yes	2015/08/18	SOIL	CACL, CATEC-S, CLAC-SOL, EC-SOL IONBAL-S, IONSUM-S, PH-CACL SAR-S, SARSOL, SOL, SOLIONS-C TGR, PB-S
MY3183-03R	SOUTH WALL SA24 @ 1.7M SOUTH WALL SA24 @ 1.7M	1-COR2	N/A-INS-0	Yes	2015/08/18	SOIL	ESUBPFOX-S
MY3184-01R	SOUTH WALL SA22 @ 1.7M SOUTH WALL SA22 @ 1.7M	2-COR2	N/A-INS-0	Yes	2015/08/18	SOIL	BTEXHSAB-S, CCMEPREP-S F24FIDE-S, F4GRVE-S, MOIST-S VOLPREPE-S, DISPOSAL
MY3185-01R	SOUTH WALL SA23 @ 1.0M SOUTH WALL SA23 @ 1.0M	1-COR2	N/A-INS-0	Yes	2015/08/18	SOIL	BTEXHSAB-S, CCMEPREP-S F24FIDE-S, F4GRVE-S, MOIST-S VOLPREPE-S, DISPOSAL
MY3185-02R	SOUTH WALL SA23 @ 1.0M SOUTH WALL SA23 @ 1.0M	1-CSIN	N/A-INS-0	Yes	2015/08/18	SOIL	ARCHIVE
MY3185-03R	SOUTH WALL SA23 @ 1.0M SOUTH WALL SA23 @ 1.0M	1-COR2	N/A-INS-0	Yes	2015/08/18	SOIL	ESUBPFOX-S
MY3186-01R	SOUTH WALL SA21 @ 1.0M SOUTH WALL SA21 @ 1.0M	2-COR2	N/A-INS-0	Yes	2015/08/18	SOIL	BTEXHSAB-S, CCMEPREP-S F24FIDE-S, F4GRVE-S, MOIST-S VOLPREPE-S, DISPOSAL
MY3186-02R	SOUTH WALL SA21 @ 1.0M SOUTH WALL SA21 @ 1.0M	1-CSIN	N/A-INS-0	Yes	2015/08/18	SOIL	PB-S
MY3187-01R	EAST WALL SA20 @ 1.7M EAST WALL SA20 @ 1.7M	2-COR2	N/A-INS-0	Yes	2015/08/18	SOIL	BTEXHSAB-S, CCMEPREP-S F24FIDE-S, F4GRVE-S, MOIST-S VOLPREPE-S, DISPOSAL
MY3187-02R	EAST WALL SA20 @ 1.7M EAST WALL SA20 @ 1.7M	1-CSIN	N/A-INS-0	Yes	2015/08/18	SOIL	PB-S
MY3188-01R	SOUTH FLOOR SA8 @ 1.7M SOUTH FLOOR SA8 @ 1.7M	2-COR2	N/A-INS-0	Yes	2015/08/18	SOIL	BTEXHSAB-S, CCMEPREP-S F24FIDE-S, F4GRVE-S, MOIST-S VOLPREPE-S, DISPOSAL
MY3188-02R	SOUTH FLOOR SA8 @ 1.7M SOUTH FLOOR SA8 @ 1.7M	1-CSIN	N/A-INS-0	Yes	2015/08/18	SOIL	PB-S
MY3189-01R	EAST WALL SA19 @ 1.0M EAST WALL SA19 @ 1.0M	2-COR2	N/A-INS-0	Yes	2015/08/18	SOIL	BTEXHSAB-S, CCMEPREP-S F24FIDE-S, F4GRVE-S, MOIST-S VOLPREPE-S, DISPOSAL
MY3190-01R	SOUTH FLOOR SA7 @ 1.7M SOUTH FLOOR SA7 @ 1.7M	2-COR2	N/A-INS-0	Yes	2015/08/18	SOIL	BTEXHSAB-S, CCMEPREP-S F24FIDE-S, F4GRVE-S, MOIST-S VOLPREPE-S, DISPOSAL

Continued...

Report Name: Entry

Job #: B572411

National Client: 982, PWGSC RMSO EW699-113372/001/EDM

Maxxam Number	Client Sample ID/Report ID	Cont's	Store Code	Recd. OK	Sampling Date	Matrix	Test Codes
MY3190-02R	SOUTH FLOOR SA7 @ 1.7M SOUTH FLOOR SA7 @ 1.7M	1-CSIN	N/A-INS-0	Yes	2015/08/18	SOIL	PB-S
MY3191-01R	SOUTH WALL SA17 @ 1.0M SOUTH WALL SA17 @ 1.0M	2-COR2	N/A-INS-0	Yes	2015/08/18	SOIL	BTEXHSAB-S, CCMEPREP-S F24FIDE-S, F4GRVE-S, MOIST-S VOLPREPE-S, DISPOSAL
MY3191-02R	SOUTH WALL SA17 @ 1.0M SOUTH WALL SA17 @ 1.0M	1-CSIN	N/A-INS-0	Yes	2015/08/18	SOIL	PB-S
MY3192-01R	FIELD DUP-4 FIELD DUP-4	2-COR2	N/A-INS-0	Yes	2015/08/18	SOIL	BTEXHSAB-S, CCMEPREP-S F24FIDE-S, F4GRVE-S, MOIST-S VOLPREPE-S, DISPOSAL
MY3193-01R	SOUTH WALL SA18 @ 1.7M SOUTH WALL SA18 @ 1.7M	2-COR2	N/A-INS-0	Yes	2015/08/18	SOIL	BTEXHSAB-S, CCMEPREP-S F24FIDE-S, F4GRVE-S, MOIST-S VOLPREPE-S, DISPOSAL
MY3194-01R	SOUTH WALL SA25 @ 1.0M SOUTH WALL SA25 @ 1.0M	2-COR2	N/A-INS-0	Yes	2015/08/19	SOIL	BTEXHSAB-S, CCMEPREP-S F24FIDE-S, F4GRVE-S, MOIST-S VOLPREPE-S, DISPOSAL
MY3195-01R	SOUTH WALL SA26 SOUTH WALL SA26	2-COR2	N/A-INS-0	Yes	2015/08/19	SOIL	BTEXHSAB-S, CCMEPREP-S F24FIDE-S, F4GRVE-S, MOIST-S VOLPREPE-S, DISPOSAL
MY3195-02R	SOUTH WALL SA26 SOUTH WALL SA26	1-CSIN	N/A-INS-0	Yes	2015/08/19	SOIL	PB-S

Remarks: hd0
mcal 3/4/3
2x 125 J TO ONTC

Quote Remarks:

BENTHIC INVERTEBRATE ID samples are to be shipped to:
Border Cargo Services, Inc.
Attn: Scott Freeman
c/o Intercon
#11-7550 River Road
Delta, BC V4G 1C8
Ph: (360) 332-2900

Once BENTHIC INVERTEBRATE samples are shipped to Border Cargo, the following information needs to be forwarded to Mike Glennon (Ph: (604) 210-1141 or mglennon@ecoanalysts.com):
-tracking number and courier name
-estimated date of delivery to Delta
-approximate total volume of sample material and type and volume of preservative in the shipment.
The single metal price for PWGSC is $19.25 as per Jennifer Ferquharson 2012/08/16 IS
Axial metals = $70/sample as per Marnie K. 2012/08/27 IS

Organics TCLP extraction: $41.25 if you use EPA Method 1311, $55 if zero headspace, $35.75 if you use Tclp modified from EPA1312 as per Marnie Kolach 2012/11/13 IS

Inspected by: FL5
Date: 2015/08/21
Time: 17:58

Approved by: HD0
Date: 2015/08/22
Time: 10:16

Date of Sample Disposal:
Disposal by:

Continued...

Maxxam

Calgary: 4000 19st St. NE, T2E 6P8, Ph: (403) 291-3077, Fax: (403) 735-2240, Toll free: (800) 386-7247
Edmonton: 9331 - 48 Street, T6B 2R4, Ph: (780) 577-7100, Fax: (780) 450-4187, Toll free: (877) 465-8889
www.maxxamanalytics.com

Chain of Custody 784

Page: 1 of 2

Invoice To:	C/O Report Address ☐
Company:	PWGSC
Contact:	Natalie Robinson
Address:	Suite 1650, 635-8th Ave SW, Alberta Calgary
Contact #s:	403-292-6982

Report To:	Same as Invoice ☐
Prov:	PC:
Ph:	Cell:

Report Distribution (E-Mail):
- hfisher@dillon.ca
- mhopps@dillon.ca
- Natalie.Robinson@pwgsc-tpsgc.gc.ca
- mhamilton@dillon.ca

REGULATORY GUIDELINES:
- ☐ AT1
- ☐ CCME
- ☐ Regulated Drinking Water
- ☐ Other:

All samples are held for 60 calendar days after sample receipt, unless specified otherwise.

PO #: 700380152
Project # / Name: CBA-FTA
Site Location: Cambridge Bay, NU
Quote #: R.05169.005
Sampled By: M. Hopps (506 653-7680)

SERVICE REQUESTED:
- ☒ RUSH (Contact lab to reserve)
- Date Required: 24 hrs after receiving samples
- ☐ REGULAR (5 to 7 Days)

See reverse for package specifics

#	Sample ID	Depth (unit)	Matrix GW / SW Soil	Date/Time Sampled YY/MM/DD 24:00	SOIL: BTEX F1-F4	Sieve (75 micron)	Regulated Metals (CCME / AT1)	Salinity 4	Assessment ICP Metals	Basic Class II Landfill	Lead	pH	PFOS?	WATER: ☐VOCs ☐BTEX F1	☐BTEX F1-F4 ☐BTEX F1-F2	☐ Routine Water ☐ Turb ☐ F	☐ TOC ☐ DOC	Regulated Metals (CCME / AT1) Total	Dissolved	☐ Total ☐ Dissolved Mercury	Other Analysis: Fraction of Organic Carbon						HOLD - Do not Analyze	# of Containers Submitted
1	South Wall SA24	1.7m	Soil	15/08/18	X			X			X	X	X								X							5
2	South Wall SA22	1.7m	Soil	15/08/18	X																							2
3	South wall SA23	1.0m	Soil	15/08/18	X								X															3
4	South wall SA21	1.0m	Soil	15/08/18	X						X																	3
5	East wall SA20	1.7m	Soil	15/08/18	X						X																	3
6	South Floor SA8	1.7m	Soil	15/08/18	X						X																	2
7	East Wall SA19	1.0m	Soil	15/08/18	X																							3
8	South Floor SA7	1.7m	Soil	15/08/18	X						X																	3
9	South wall SA17	1.0m	Soil	15/08/18	X						X																	2
10	Field Dup-4	—	Soil	15/08/18	X																							2
11	South Wall-SA18	1.7m	Soil	15/08/18	X																							2
12	South Wall-SA25	1.0m	Soil	15/08/19	X																							2

20-Aug-15 08:10
Mamie Kolach
B572411
LW2

RECEIVED IN YELLOWKNIFE
By: Michelle [illegible] 8:10
2015-08-18/20

Temp: 3/3/3

Please indicate Filtered, Preserved or Both (F, P, F/P)

Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):
Mark Hopps	15/08/19	1000
Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):

Special Instructions:
Rush ONLY the BTEX samples.

# of Jars Used & Not Submitted

LAB USE ONLY

Received By:	Date:	Time:	Maxxam Job #:
Muhammad Akhter	2015/08/21	16:18	

Lab Comments:

Custody Seal	Temperature	Ice
YES	3, 4, 3	YES

AB FCD-00331 Rev3 2010/05

® Maxxam Analytics International Corporation o/a Maxxam Analytics

Maxxam

Calgary: 4000 19th St. NE, T2E 6P8, Ph: (403) 291-3077, Fax: (403) 735-2240, Toll free: (800) 386-7247
Edmonton: 9331 - 48 Street, T6B 2R4, Ph: (780) 577-7100, Fax: (780) 450-4187, Toll free: (877) 465-8889
www.maxxamanalytics.com

Chain of Custody 784

Page: 2 of 2

	Invoice To: C/O Report Address ☐	Report To: Same as Invoice ☐	Report Distribution (E-Mail):	REGULATORY GUIDELINES:
Company:	PWGSC.			☐ AT1
Contact:				☐ CCME
Address:	Prov: PC:	Prov: PC:		☐ Regulated Drinking Water
Contact #s:	Ph: Cell:	Ph: Cell:		☐ Other:

All samples are held for 60 calendar days after sample receipt, unless specified otherwise.

PO #: 70038052
Project # / Name: CBA FTA
Site Location:
Quote #:
Sampled By:

SERVICE REQUESTED: ☒ RUSH (Contact lab to reserve) Date Required: Just BTEX ☐ REGULAR (5 to 7 Days)

Analysis columns — SOIL: BTEX F1-F4; Sieve (75 micron); Regulated Metals (CCME / AT1); Salinity 4; Assessment ICP Metals; Basic Class II Landfill; Lead. WATER: ☐BTEX F1 ☐VOCs; ☐BTEX F1-F2 ☐BTEX F1-F4; ☐Routine Water ☐Turb ☐F; ☐TOC ☐DOC; Total / Dissolved Regulated Metals (CCME / AT1); Mercury ☐Total ☐Dissolved. Other Analysis. HOLD - Do not Analyze; # of Containers Submitted. (See reverse for package specifics)

	Sample ID	Depth (unit)	Matrix GW / SW Soil	Date/Time Sampled YY/MM/DD 24:00	BTEX F1-F4	Lead	# of Containers Submitted
1	Southwall SA26	1.7M	Soil	15/08/19	X	X	3
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

RECEIVED IN YELLOWKNIFE
By: Michelle Cole 8:10
2015-08-20
Temp: 3/3/3

Please indicate Filtered, Preserved or Both (F, P, F/P)

Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):
Matthew	15/08/19	1000
Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):

Special Instructions: Rush BTEX samples ONLY

# of Jars Used & Not Submitted

LAB USE ONLY

Received By:	Date:	Time:	Maxxam Job #: B5F2411		
Muhammad Nketer	2015/08/21	16:18	Custody Seal	Temperature	Ice
Lab Comments:			YES	3,4,3	YES

AB FCD-00331 Rev3 2010/05

Maxxam Analytics International Corporation o/a Maxxam Analytics

RUSH

MAXXAM ANALYTI
4000 19st N.E
Calgary, Alberta, T2E 6
Phone: (403) 291-3077
Fax: (403) 291-9468

25-Aug-15 09:00
Andrea Rieth
B5G9715
MAF ENV-873

NG REQUEST FORM

PUBLIC WORKS &
GOVERNMENT SERVICES
CANADA - EDMONTON
Maxxam PM Linsay Sunderman

To: Maxxam Ontario (From Calgary) RUSH Job# B572411

☐ Yes ☑ No International Sample/BioHazard (if yes, add copy of Movement Cert., heat treat is required prior to disposal)
☐ Yes ☐ No Special Protocol (if yes, Protocol _____)

Sample ID	Matrix	Test(s) Required	Container	Date Sampled	Date Required
MY3183-03R \ SOUTH WALL SA24 @ 1.7M	SOIL	Perfluorinated Compounds - Subcontract	1(COR2)	2015/08/18	2015/09/07
MY3185-03R \ SOUTH WALL SA23 @ 1.0M	SOIL	Perfluorinated Compounds - Subcontract	1(COR2)	2015/08/18	2015/09/07

	Temp. 1	Temp. 2	Temp. 3			
Cooler #1	4	3	3	Custody Seal Present	YES ✓	NO
				Custody Seal Intact	YES ✓	NO
				Ice Present Upon Receipt	YES ✓	NO
Cooler #2				Custody Seal Present	YES	NO
				Custody Seal Intact	YES	NO
				Ice Present Upon Receipt	YES	NO
Cooler #3				Custody Seal Present	YES	NO
				Custody Seal Intact	YES	NO
				Ice Present Upon Receipt	YES	NO

Receiving Maxxam Location: Maxxam Ontario (From Calgary) JOB # _____

Relinquished by (Sign) _____ (Print) Helen Day Date and Time 2015/08/24

Received by (Sign) _____ (Print) [illegible] Date and Time 2015/08/25 09:00

NOTES:
1) Please call us if due date cannot be met. Please reference Sample ID on your report.
2) Include copy of this completed form, Client COC & signed final report to **calgarycustomerservice@maxxamanalytics.com**

Reporting Requirements:
National:
Regional:

SHIPPING INSTRUCTIONS
☐ Ship Immediately (highlight Yellow) ☐ Ship Cold
☐ Requires 9am ☐ Ship Room Temp
☐ Requires Sat. Delivery ☐ Ship Frozen
☐ Regular Ship next available day ☐ COC Must be Attached
Sender (Print) _____ Initial _____

SHIPPING DEPARTMENT CHECKLIST
☐ Correct Shipping location
☐ Correct Sample Ids (Paperwork vs Bottles)
☐ Yes ☐ No Special-Cooler, Ice, Tape-custody seal, Date&Sign
Date Shipped _____ Number of coolers _____
Shipper (Print) _____ Initial _____

Your Project #: B572411
Your C.O.C. #: na

Attention:Linsay Sunderman

Maxxam Analytics
2021 41st Ave NE
Calgary, AB
T2E 6P2

Report Date: 2015/09/04
Report #: R3651669
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B5G9715
Received: 2015/08/25, 09:00

Sample Matrix: Soil
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Moisture	2	N/A	2015/09/02	CAM SOP-00445	Carter 2nd ed 51.2 m
PFOS and PFOA in soil	2	2015/09/01	2015/09/02	CAM SOP-00894	EPA537 m

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Andrea Rieth, Project Manager
Email: ARieth@maxxam.ca
Phone# (905)817-5787 Ext:5787
==========
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 #: B5G9715
Report Date: 2015/09/04

Maxxam Analytics
Client Project #: B572411

RESULTS OF ANALYSES OF SOIL

Maxxam ID		AWB236		AWB237		
Sampling Date		2015/08/18		2015/08/18		
COC Number		na		na		
	UNITS	MY3183 \ SOUTH WALL SA24 @ 1.7M	RDL	MY3185 \ SOUTH WALL SA23 @ 1.0M	RDL	QC Batch
Inorganics						
Moisture	%	13	1.0	4.7	1.0	4175051
Miscellaneous Parameters						
Perfluorobutane Sulfonate (PFBS)	ug/kg	<5	5	<5	5	4172659
Perfluorobutanoic acid	ug/kg	<5	5	<5	5	4172659
Perfluorodecane Sulfonate	ug/kg	<5	5	<5	5	4172659
Perfluorodecanoic Acid (PFDA)	ug/kg	<5	5	<5	5	4172659
Perfluorododecanoic Acid (PFDoA)	ug/kg	<5	5	<5	5	4172659
Perfluoroheptanoic Acid (PFHpA)	ug/kg	<5	5	<5	5	4172659
Perfluorohexane Sulfonate (PFHxS)	ug/kg	53	5	<5	5	4172659
Perfluorohexanoic Acid (PFHxA)	ug/kg	13	5	<5	5	4172659
Perfluoro-n-Octanoic Acid (PFOA)	ug/kg	6	5	<5	5	4172659
Perfluorononanoic Acid (PFNA)	ug/kg	<5	5	<5	5	4172659
Perfluorooctane Sulfonamide (PFOSA)	ug/kg	<5	5	<5	5	4172659
Perfluorooctane Sulfonate (PFOS)	ug/kg	220	5	430	25	4172659
Perfluoropentanoic Acid (PFPeA)	ug/kg	10	5	<5	5	4172659
Perfluorotetradecanoic Acid	ug/kg	<5	5	<5	5	4172659
Perfluorotridecanoic Acid	ug/kg	<5	5	<5	5	4172659
Perfluoroundecanoic Acid (PFUnA)	ug/kg	<5	5	<5	5	4172659

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B5G9715
Report Date: 2015/09/04

Maxxam Analytics
Client Project #: B572411

TEST SUMMARY

Maxxam ID: AWB236
Sample ID: MY3183 \ SOUTH WALL SA24 @ 1.7M
Matrix: Soil

Collected: 2015/08/18
Shipped:
Received: 2015/08/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	4175051	N/A	2015/09/02	Shivani Desai
PFOS and PFOA in soil	LCMS	4172659	2015/09/01	2015/09/02	Colm McNamara

Maxxam ID: AWB237
Sample ID: MY3185 \ SOUTH WALL SA23 @ 1.0M
Matrix: Soil

Collected: 2015/08/18
Shipped:
Received: 2015/08/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	4175051	N/A	2015/09/02	Shivani Desai
PFOS and PFOA in soil	LCMS	4172659	2015/09/01	2015/09/02	Colm McNamara

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Maxxam Job #: B5G9715
Report Date: 2015/09/04

Maxxam Analytics
Client Project #: B572411

GENERAL COMMENTS

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

Package 1	4.7°C

Sample AWB236-01 : Perfluorinated Compounds (PFCs): Due to high concentrations of the target analytes, sample required dilution. Detection limits were adjusted accordingly.

Sample AWB237-01 : Perfluorinated Compounds (PFCs): Due to high concentrations of the target analytes, sample required dilution. Detection limits were adjusted accordingly.

Results relate only to the items tested.

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Maxxam Job #: B5G9715
Report Date: 2015/09/04

Maxxam Analytics
Client Project #: B572411

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
4172659	CM5	Matrix Spike	Perfluorobutane Sulfonate (PFBS)	2015/09/02		106	%	70 - 130
			Perfluorobutanoic acid	2015/09/02		111	%	70 - 130
			Perfluorodecane Sulfonate	2015/09/02		105	%	70 - 130
			Perfluorodecanoic Acid (PFDA)	2015/09/02		103	%	70 - 130
			Perfluorododecanoic Acid (PFDoA)	2015/09/02		108	%	70 - 130
			Perfluorononanoic Acid (PFNA)	2015/09/02		102	%	70 - 130
			Perfluorooctane Sulfonamide (PFOSA)	2015/09/02		98	%	70 - 130
			Perfluorotetradecanoic Acid	2015/09/02		105	%	70 - 130
			Perfluorotridecanoic Acid	2015/09/02		115	%	70 - 130
			Perfluoroundecanoic Acid (PFUnA)	2015/09/02		92	%	70 - 130
			Perfluoroheptanoic Acid (PFHpA)	2015/09/02		100	%	70 - 130
			Perfluorohexane Sulfonate (PFHxS)	2015/09/02		NC	%	70 - 130
			Perfluorohexanoic Acid (PFHxA)	2015/09/02		101	%	70 - 130
			Perfluoro-n-Octanoic Acid (PFOA)	2015/09/02		97	%	70 - 130
			Perfluorooctane Sulfonate (PFOS)	2015/09/02		NC	%	70 - 130
			Perfluoropentanoic Acid (PFPeA)	2015/09/02		102	%	70 - 130
4172659	CM5	Spiked Blank	Perfluorobutane Sulfonate (PFBS)	2015/09/02		114	%	70 - 130
			Perfluorobutanoic acid	2015/09/02		115	%	70 - 130
			Perfluorodecane Sulfonate	2015/09/02		105	%	70 - 130
			Perfluorodecanoic Acid (PFDA)	2015/09/02		100	%	70 - 130
			Perfluorododecanoic Acid (PFDoA)	2015/09/02		98	%	70 - 130
			Perfluorononanoic Acid (PFNA)	2015/09/02		108	%	70 - 130
			Perfluorooctane Sulfonamide (PFOSA)	2015/09/02		102	%	70 - 130
			Perfluorotetradecanoic Acid	2015/09/02		97	%	70 - 130
			Perfluorotridecanoic Acid	2015/09/02		107	%	70 - 130
			Perfluoroundecanoic Acid (PFUnA)	2015/09/02		98	%	70 - 130
			Perfluoroheptanoic Acid (PFHpA)	2015/09/02		100	%	70 - 130
			Perfluorohexane Sulfonate (PFHxS)	2015/09/02		107	%	70 - 130
			Perfluorohexanoic Acid (PFHxA)	2015/09/02		102	%	70 - 130
			Perfluoro-n-Octanoic Acid (PFOA)	2015/09/02		95	%	70 - 130
			Perfluorooctane Sulfonate (PFOS)	2015/09/02		94	%	70 - 130
			Perfluoropentanoic Acid (PFPeA)	2015/09/02		92	%	70 - 130
4172659	CM5	Method Blank	Perfluorobutane Sulfonate (PFBS)	2015/09/02	<5		ug/kg	
			Perfluorobutanoic acid	2015/09/02	<5		ug/kg	
			Perfluorodecane Sulfonate	2015/09/02	<5		ug/kg	
			Perfluorodecanoic Acid (PFDA)	2015/09/02	<5		ug/kg	
			Perfluorododecanoic Acid (PFDoA)	2015/09/02	<5		ug/kg	
			Perfluorononanoic Acid (PFNA)	2015/09/02	<5		ug/kg	
			Perfluorooctane Sulfonamide (PFOSA)	2015/09/02	<5		ug/kg	
			Perfluorotetradecanoic Acid	2015/09/02	<5		ug/kg	
			Perfluorotridecanoic Acid	2015/09/02	<5		ug/kg	
			Perfluoroundecanoic Acid (PFUnA)	2015/09/02	<5		ug/kg	
			Perfluoroheptanoic Acid (PFHpA)	2015/09/02	<5		ug/kg	
			Perfluorohexane Sulfonate (PFHxS)	2015/09/02	<5		ug/kg	
			Perfluorohexanoic Acid (PFHxA)	2015/09/02	<5		ug/kg	
			Perfluoro-n-Octanoic Acid (PFOA)	2015/09/02	<5		ug/kg	
			Perfluorooctane Sulfonate (PFOS)	2015/09/02	<5		ug/kg	
			Perfluoropentanoic Acid (PFPeA)	2015/09/02	<5		ug/kg	
4172659	CM5	RPD	Perfluorobutane Sulfonate (PFBS)	2015/09/02	NC		%	30
			Perfluorodecane Sulfonate	2015/09/02	NC		%	30
			Perfluorohexane Sulfonate (PFHxS)	2015/09/02	19		%	30
			Perfluorohexanoic Acid (PFHxA)	2015/09/02	24		%	30
			Perfluoro-n-Octanoic Acid (PFOA)	2015/09/02	NC		%	30
			Perfluorooctane Sulfonate (PFOS)	2015/09/02	23		%	30

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Maxxam Job #: B5G9715
Report Date: 2015/09/04

Maxxam Analytics
Client Project #: B572411

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Perfluoropentanoic Acid (PFPeA)	2015/09/02	NC		%	30
4175051	SB1	RPD	Moisture	2015/09/02	1.5		%	20

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 spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of 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 (one or both samples < 5x RDL).

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Maxxam Job #: B5G9715
Report Date: 2015/09/04

Maxxam Analytics
Client Project #: B572411

VALIDATION SIGNATURE PAGE

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

Adam Robinson, Technical Service

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

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Entry

Job #: B572411

Page #: 1

National Client: 982, PWGSC RMSO EW699-113372/001/EDM

PUBLIC WORKS & GOVERNMENT SERV
TELUS TOWER NORTH, 5th FLOOR
10025 JASPER AVENUE
EDMONTON AB
CANADA T5J 1S6

Inv Attn: Natalie Robinson

Task Order:
Line Item:

Printed: 2015/08/22 Version 4
Reception Date: 2015/08/20
Reception Time: 08:10
Login Date: 2015/08/21
REQUIRED DATE: 2015/09/08, 18:00
Quote Number: B11534

Report: same

Attention: Natalie Robinson
PHONE: (403) 292 - 6882Ext:
FAX: (780) 982 - 1887
EMAIL: natalie.robinson@pwgsc-tpsgc.gc.ca

P.O. Number: 700380152
PROJECT NUMBER: CBA-FTA
Site Location: CAMBRIDGE BAY, NU
Site #:
Client Number: 2597
Rpt Address #:
Q.C. Samples: No

Project Coordinator: LD1

****** RUSH ******

Maxxam Number	Client Sample ID/Report ID	Cont's	Store Code	Recd. OK	Sampling Date	Matrix	Test Codes
MY3183-01R	SOUTH WALL SA24 @ 1.7M SOUTH WALL SA24 @ 1.7M	2-COR2	N/A-INS-0	Yes	2015/08/18	SOIL	BTEXHSAB-S, CCMEPREP-S F24FIDE-S, F4GRVE-S, MOIST-S VOLPREPE-S, DISPOSAL, FOC-S TCLECO-S
MY3183-02R	SOUTH WALL SA24 @ 1.7M SOUTH WALL SA24 @ 1.7M	2-CSIN	N/A-INS-0	Yes	2015/08/18	SOIL	CACL, CATEC-S, CLAC-SOL, EC-SOL IONBAL-S, IONSUM-S, PH-CACL SAR-S, SARSOL, SOL, SOLIONS-C TGR, PB-S
MY3183-03R	SOUTH WALL SA24 @ 1.7M SOUTH WALL SA24 @ 1.7M	1-COR2	N/A-INS-0	Yes	2015/08/18	SOIL	ESUBPFOX-S
MY3184-01R	SOUTH WALL SA22 @ 1.7M SOUTH WALL SA22 @ 1.7M	2-COR2	N/A-INS-0	Yes	2015/08/18	SOIL	BTEXHSAB-S, CCMEPREP-S F24FIDE-S, F4GRVE-S, MOIST-S VOLPREPE-S, DISPOSAL
MY3185-01R	SOUTH WALL SA23 @ 1.0M SOUTH WALL SA23 @ 1.0M	1-COR2	N/A-INS-0	Yes	2015/08/18	SOIL	BTEXHSAB-S, CCMEPREP-S F24FIDE-S, F4GRVE-S, MOIST-S VOLPREPE-S, DISPOSAL
MY3185-02R	SOUTH WALL SA23 @ 1.0M SOUTH WALL SA23 @ 1.0M	1-CSIN	N/A-INS-0	Yes	2015/08/18	SOIL	ARCHIVE
MY3185-03R	SOUTH WALL SA23 @ 1.0M SOUTH WALL SA23 @ 1.0M	1-COR2	N/A-INS-0	Yes	2015/08/18	SOIL	ESUBPFOX-S
MY3186-01R	SOUTH WALL SA21 @ 1.0M SOUTH WALL SA21 @ 1.0M	2-COR2	N/A-INS-0	Yes	2015/08/18	SOIL	BTEXHSAB-S, CCMEPREP-S F24FIDE-S, F4GRVE-S, MOIST-S VOLPREPE-S, DISPOSAL
MY3186-02R	SOUTH WALL SA21 @ 1.0M SOUTH WALL SA21 @ 1.0M	1-CSIN	N/A-INS-0	Yes	2015/08/18	SOIL	PB-S
MY3187-01R	EAST WALL SA20 @ 1.7M EAST WALL SA20 @ 1.7M	2-COR2	N/A-INS-0	Yes	2015/08/18	SOIL	BTEXHSAB-S, CCMEPREP-S F24FIDE-S, F4GRVE-S, MOIST-S VOLPREPE-S, DISPOSAL
MY3187-02R	EAST WALL SA20 @ 1.7M EAST WALL SA20 @ 1.7M	1-CSIN	N/A-INS-0	Yes	2015/08/18	SOIL	PB-S
MY3188-01R	SOUTH FLOOR SA8 @ 1.7M SOUTH FLOOR SA8 @ 1.7M	2-COR2	N/A-INS-0	Yes	2015/08/18	SOIL	BTEXHSAB-S, CCMEPREP-S F24FIDE-S, F4GRVE-S, MOIST-S VOLPREPE-S, DISPOSAL
MY3188-02R	SOUTH FLOOR SA8 @ 1.7M SOUTH FLOOR SA8 @ 1.7M	1-CSIN	N/A-INS-0	Yes	2015/08/18	SOIL	PB-S
MY3189-01R	EAST WALL SA19 @ 1.0M EAST WALL SA19 @ 1.0M	2-COR2	N/A-INS-0	Yes	2015/08/18	SOIL	BTEXHSAB-S, CCMEPREP-S F24FIDE-S, F4GRVE-S, MOIST-S VOLPREPE-S, DISPOSAL
MY3190-01R	SOUTH FLOOR SA7 @ 1.7M SOUTH FLOOR SA7 @ 1.7M	2-COR2	N/A-INS-0	Yes	2015/08/18	SOIL	BTEXHSAB-S, CCMEPREP-S F24FIDE-S, F4GRVE-S, MOIST-S VOLPREPE-S, DISPOSAL

Continued...

Report Name: Entry

Job #: B572411

National Client: 982, PWGSC RMSO EW699-113372/001/EDM

Maxxam Number	Client Sample ID/Report ID	Cont's	Store Code	Recd. OK	Sampling Date	Matrix	Test Codes
MY3190-02R	SOUTH FLOOR SA7 @ 1.7M SOUTH FLOOR SA7 @ 1.7M	1-CSIN	N/A-INS-0	Yes	2015/08/18	SOIL	PB-S
MY3191-01R	SOUTH WALL SA17 @ 1.0M SOUTH WALL SA17 @ 1.0M	2-COR2	N/A-INS-0	Yes	2015/08/18	SOIL	BTEXHSAB-S, CCMEPREP-S F24FIDE-S, F4GRVE-S, MOIST-S VOLPREPE-S, DISPOSAL
MY3191-02R	SOUTH WALL SA17 @ 1.0M SOUTH WALL SA17 @ 1.0M	1-CSIN	N/A-INS-0	Yes	2015/08/18	SOIL	PB-S
MY3192-01R	FIELD DUP-4 FIELD DUP-4	2-COR2	N/A-INS-0	Yes	2015/08/18	SOIL	BTEXHSAB-S, CCMEPREP-S F24FIDE-S, F4GRVE-S, MOIST-S VOLPREPE-S, DISPOSAL
MY3193-01R	SOUTH WALL SA18 @ 1.7M SOUTH WALL SA18 @ 1.7M	2-COR2	N/A-INS-0	Yes	2015/08/18	SOIL	BTEXHSAB-S, CCMEPREP-S F24FIDE-S, F4GRVE-S, MOIST-S VOLPREPE-S, DISPOSAL
MY3194-01R	SOUTH WALL SA25 @ 1.0M SOUTH WALL SA25 @ 1.0M	2-COR2	N/A-INS-0	Yes	2015/08/19	SOIL	BTEXHSAB-S, CCMEPREP-S F24FIDE-S, F4GRVE-S, MOIST-S VOLPREPE-S, DISPOSAL
MY3195-01R	SOUTH WALL SA26 SOUTH WALL SA26	2-COR2	N/A-INS-0	Yes	2015/08/19	SOIL	BTEXHSAB-S, CCMEPREP-S F24FIDE-S, F4GRVE-S, MOIST-S VOLPREPE-S, DISPOSAL
MY3195-02R	SOUTH WALL SA26 SOUTH WALL SA26	1-CSIN	N/A-INS-0	Yes	2015/08/19	SOIL	PB-S

Remarks: hd0
mcal 3/4/3
2x 125 J TO ONTC

Quote Remarks:

BENTHIC INVERTEBRATE ID samples are to be shipped to:
Border Cargo Services, Inc.
Attn: Scott Freeman
c/o Intercon
#11-7550 River Road
Delta, BC V4G 1C8
Ph: (360) 332-2900

Once BENTHIC INVERTEBRATE samples are shipped to Border Cargo, the following information needs to be forwarded to Mike Glennon (Ph: (604) 210-1141 or mglennon@ecoanalysts.com):
-tracking number and courier name
-estimated date of delivery to Delta
-approximate total volume of sample material and type and volume of preservative in the shipment.
The single metal price for PWGSC is $19.25 as per Jennifer Ferquharson 2012/08/16 IS
Axial metals = $70/sample as per Marnie K. 2012/08/27 IS

Organics TCLP extraction: $41.25 if you use EPA Method 1311, $55 if zero headspace, $35.75 if you use Tclp modified from EPA1312 as per Marnie Kolach 2012/11/13 IS

Inspected by: FL5
Date: 2015/08/21
Time: 17:58

Approved by: HD0
Date: 2015/08/22
Time: 10:16

Date of Sample Disposal:
Disposal by:

Continued...

Maxxam

Calgary: 4000 19st St. NE, T2E 6P8. Ph: (403) 291-3077. Fax: (403) 735-2240. Toll free: (800) 386-7247
Edmonton: 9331 - 48 Street, T6B 2R4. Ph: (780) 577-7100. Fax: (780) 450-4187. Toll free: (877) 465-8889
www.maxxamanalytics.com

Chain of Custody 784

Page: 1 of 2

Invoice To:	C/O Report Address ☐
Company:	PWGSC
Contact:	Natalie Robinson
Address:	Suite 1650, 635 - 8th Ave SW, Alberta Calgary
Contact #s:	Ph: 403-292-6982

Report To: Same as Invoice ☐
Prov: PC:
Ph: Cell:

Report Distribution (E-Mail):
hfisher@dillon.ca
mhopps@dillon.ca
Natalie.Robinson@pwgsc-tpsgc.gc.ca
mhamilton@dillon.ca

REGULATORY GUIDELINES:
☐ AT1
☐ CCME
☐ Regulated Drinking Water
☐ Other:

All samples are held for 60 calendar days after sample receipt, unless specified otherwise.

PO #: 70030152
Project # / Name: CBA-FTA
Site Location: Cambridge Bay, NU
Quote #: R.05169.005
Sampled By: M. Hopps (506 653-7680)

SERVICE REQUESTED:
☒ RUSH (Contact lab to reserve)
Date Required: 24 hrs after receiving samples
☐ REGULAR (5 to 7 Days)

See reverse for package specifics

20-Aug-15 08:10
Marnie Kolach
B572411
LW2

#	Sample ID	Depth (unit)	Matrix GW / SW Soil	Date/Time Sampled YY/MM/DD 24:00	SOIL: BTEX F1-F4	Sieve (75 micron)	Regulated Metals (CCME / AT1)	Salinity 4	Assessment ICP Metals	Basic Class II Landfill	Lead	pH	PFOS	WATER: ☐VOCs ☐BTEX F1	☐BTEX F1-F2 ☐BTEX F1-F4	☐ Routine Water ☐ Turb ☐ F	☐ TOC ☐ DOC	Regulated Metals (CCME / AT1) Total	Dissolved	Mercury ☐ Total ☐ Dissolved	Other Analysis: Fraction of Organic Carbon	HOLD - Do not Analyze	# of Containers Submitted
1	South Wall SA24	1.7m	Soil	15/08/18	X			X			X	X	X								X		5
2	South Wall SA22	1.7m	Soil	15/08/18	X																		2
3	South Wall SA23	1.0m	Soil	15/08/18	X								X										3
4	South Wall SA21	1.0m	Soil	15/08/18	X						X												3
5	East Wall SA20	1.7m	Soil	15/08/18	X						X												3
6	South Floor SA8	1.7m	Soil	15/08/18	X						X												2
7	East Wall SA19	1.0m	Soil	15/08/18	X																		3
8	South Floor SA7	1.7m	Soil	15/08/18	X						X												3
9	South Wall SA17	1.0m	Soil	15/08/18	X						X												2
10	Field Dup - 4	—	Soil	15/08/18	X																		2
11	South Wall - SA18	1.7m	Soil	15/08/18	X																		2
12	South Wall - SA25	1.0m	Soil	15/08/19	X																		2

Please indicate Filtered, Preserved or Both (F, P, F/P) →

RECEIVED IN YELLOWKNIFE
By: Michelle Coyle 8:10
2015-08-18/20
Temp: 3/3/3

Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):
Mark Hopps	15/08/19	1000
Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):

Special Instructions: Rush ONLY the BTEX samples.

# of Jars Used & Not Submitted:

LAB USE ONLY

Received By:	Date:	Time:	Maxxam Job #:
Muhammad Akhter	2015/08/21	16:18	

Lab Comments:

Custody Seal	Temperature	Ice
YES	3, 4, 3	YES

AB FCD-00331 Rev3 2010/05

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Calgary: 4000 19st St. NE, T2E 6P8, Ph: (403) 291-3077, Fax: (403) 735-2240, Toll free: (800) 386-7247

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Chain of Custody

784

Page: 2 of 2

	Invoice To: C/O Report Address ☐	Report To: Same as Invoice ☐	Report Distribution (E-Mail):	REGULATORY GUIDELINES:
Company:	PWGSC.			☐ AT1
Contact:				☐ CCME
Address:				☐ Regulated Drinking Water
	Prov: PC:	Prov: PC:		☐ Other:
Contact #s:	Ph: Cell:	Ph: Cell:		

All samples are held for 60 calendar days after sample receipt, unless specified otherwise.

PO #: 70038052
Project # / Name: CBA FTA
Site Location:
Quote #:
Sampled By:

SERVICE REQUESTED:
☒ RUSH (Contact lab to reserve)
Date Required: Just BTEX
☐ REGULAR (5 to 7 Days)

See reverse for package specifics

	Sample ID	Depth (unit)	Matrix GW / SW Soil	Date/Time Sampled YY/MM/DD 24:00	SOIL: BTEX F1-F4	SOIL: Sieve (75 micron)	SOIL: Regulated Metals (CCME / AT1)	SOIL: Salinity 4	SOIL: Assessment ICP Metals	SOIL: Basic Class II Landfill	SOIL: Lead	WATER: ☐BTEX F1 ☐VOCs	WATER: ☐BTEX F1-F2 ☐BTEX F1-F4	WATER: ☐ Routine Water ☐ Turb ☐ F	WATER: ☐ TOC ☐ DOC	WATER: Regulated Metals (CCME / AT1) Total	WATER: Dissolved	WATER: Mercury ☐ Total ☐ Dissolved	Other Analysis	HOLD - Do not Analyze	# of Containers Submitted
1	Southwall SA26	1.7M	Soil	15/08/19	X						X										3
2																					
3																					
4																					
5																					
6																					
7																					
8																					
9																					
10																					
11																					
12																					

RECEIVED IN YELLOWKNIFE
By: Michelle Cole 8:10
2015-08-20
Temp: 3/3/3

Please indicate Filtered, Preserved or Both (F, P, F/P) → F/P

Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):
Matt Hopps	15/08/19	1000
Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):

Special Instructions: Rush BTEX samples ONLY

# of Jars Used & Not Submitted:

LAB USE ONLY

Received By:	Date:	Time:	Maxxam Job #: B5F2411		
Muhammad Nexter	2015/08/21	16:18	Custody Seal	Temperature	Ice
Lab Comments:			Yes	3,4,3	Yes

AB FCD-00331 Rev3 2010/05

Maxxam Analytics International Corporation o/a Maxxam Analytics

RUSH

MAXXAM ANALYTI
4000 19st N.E
Calgary, Alberta, T2E 6
Phone: (403) 291-3077
Fax: (403) 291-9468

25-Aug-15 09:00
Andrea Rieth
B5G9715
MAF ENV-873

NG REQUEST FORM

PUBLIC WORKS &
GOVERNMENT SERVICES
CANADA - EDMONTON
Maxxam PM Linsay Sunderman

To: Maxxam Ontario (From Calgary) RUSH Job# B572411

☐ Yes ☑ No International Sample/BioHazard (if yes, add copy of Movement Cert., heat treat is required prior to disposal)
☐ Yes ☐ No Special Protocol (if yes, Protocol _____)

Sample ID	Matrix	Test(s) Required	Container	Date Sampled	Date Required
MY3183-03R \ SOUTH WALL SA24 @ 1.7M	SOIL	Perfluorinated Compounds - Subcontract	1(COR2)	2015/08/18	2015/09/07
MY3185-03R \ SOUTH WALL SA23 @ 1.0M	SOIL	Perfluorinated Compounds - Subcontract	1(COR2)	2015/08/18	2015/09/07

	Temp. 1	Temp. 2	Temp. 3			
Cooler #1	4	3	3	Custody Seal Present	YES ✓	NO
				Custody Seal Intact	YES ✓	NO
				Ice Present Upon Receipt	YES ✓	NO
Cooler #2				Custody Seal Present	YES	NO
				Custody Seal Intact	YES	NO
				Ice Present Upon Receipt	YES	NO
Cooler #3				Custody Seal Present	YES	NO
				Custody Seal Intact	YES	NO
				Ice Present Upon Receipt	YES	NO

Receiving Maxxam Location: Maxxam Ontario (From Calgary) JOB # _____

Relinquished by (Sign) _____ (Print) Helen Day Date and Time 2015/08/24

Received by (Sign) _____ (Print) [illegible] Date and Time 2015/08/25 09:00

NOTES:
1) Please call us if due date cannot be met. Please reference Sample ID on your report.
2) Include copy of this completed form, Client COC & signed final report to **calgarycustomerservice@maxxamanalytics.com**

Reporting Requirements:
National:
Regional:

SHIPPING INSTRUCTIONS
☐ Ship Immediately (highlight Yellow) ☐ Ship Cold
☐ Requires 9am ☐ Ship Room Temp
☐ Requires Sat. Delivery ☐ Ship Frozen
☐ Regular Ship next available day ☐ COC Must be Attached
Sender (Print) _____ Initial _____

SHIPPING DEPARTMENT CHECKLIST
☐ Correct Shipping location
☐ Correct Sample Ids (Paperwork vs Bottles)
☐ Yes ☐ No Special-Cooler, Ice, Tape-custody seal, Date&Sign
Date Shipped _____ Number of coolers _____
Shipper (Print) _____ Initial _____

Your Project #: B572551
Your C.O.C. #: na

Attention:Linsay Sunderman

Maxxam Analytics
2021 41st Ave NE
Calgary, AB
T2E 6P2

Report Date: 2015/09/04
Report #: R3651683
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B5G9705
Received: 2015/08/25, 09:00

Sample Matrix: Soil
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Moisture	1	N/A	2015/09/02	CAM SOP-00445	Carter 2nd ed 51.2 m
PFOS and PFOA in soil	1	2015/09/02	2015/09/03	CAM SOP-00894	EPA537 m

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Andrea Rieth, Project Manager
Email: ARieth@maxxam.ca
Phone# (905)817-5787 Ext:5787
==========
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 #: B5G9705
Report Date: 2015/09/04

Maxxam Analytics
Client Project #: B572551

RESULTS OF ANALYSES OF SOIL

Maxxam ID		AWB186	AWB186		
Sampling Date		2015/08/19	2015/08/19		
COC Number		na	na		
	UNITS	MY4112 \ SOUTH FLOOR SA8	MY4112 \ SOUTH FLOOR SA8 Lab-Dup	RDL	QC Batch
Inorganics					
Moisture	%	11	N/A	1.0	4174912
Miscellaneous Parameters					
Perfluorobutane Sulfonate (PFBS)	ug/kg	1.6	1.4	0.1	4175096
Perfluorobutanoic acid	ug/kg	0.9	1.0	0.1	4175096
Perfluorodecane Sulfonate	ug/kg	<0.1	<0.1	0.1	4175096
Perfluorodecanoic Acid (PFDA)	ug/kg	<0.1	<0.1	0.1	4175096
Perfluorododecanoic Acid (PFDoA)	ug/kg	<0.1	<0.1	0.1	4175096
Perfluoroheptanoic Acid (PFHpA)	ug/kg	0.3	0.3	0.1	4175096
Perfluorohexane Sulfonate (PFHxS)	ug/kg	2.5	2.3	0.1	4175096
Perfluorohexanoic Acid (PFHxA)	ug/kg	3.8	3.7	0.1	4175096
Perfluoro-n-Octanoic Acid (PFOA)	ug/kg	0.3	0.2	0.1	4175096
Perfluorononanoic Acid (PFNA)	ug/kg	<0.1	<0.1	0.1	4175096
Perfluorooctane Sulfonamide (PFOSA)	ug/kg	<0.1	<0.1	0.1	4175096
Perfluorooctane Sulfonate (PFOS)	ug/kg	0.5	3.6 (1)	0.1	4175096
Perfluoropentanoic Acid (PFPeA)	ug/kg	1.2	1.2	0.1	4175096
Perfluorotetradecanoic Acid	ug/kg	<0.1	<0.1	0.1	4175096
Perfluorotridecanoic Acid	ug/kg	<0.1	<0.1	0.1	4175096
Perfluoroundecanoic Acid (PFUnA)	ug/kg	<0.1	<0.1	0.1	4175096

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
(1) Elevated duplicate RPD for Perfluorooctane Sulfonate (PFOS) is due to sample matrix effects and is specific to sample AWB186. All other parameters are within acceptable duplicate RPD limits.

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B5G9705
Report Date: 2015/09/04

Maxxam Analytics
Client Project #: B572551

TEST SUMMARY

Maxxam ID: AWB186
Sample ID: MY4112 \ SOUTH FLOOR SA8
Matrix: Soil

Collected: 2015/08/19
Shipped:
Received: 2015/08/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	4174912	N/A	2015/09/02	Valentina Kaftani
PFOS and PFOA in soil	LCMS	4175096	2015/09/02	2015/09/03	Sin Chii Chia

Maxxam ID: AWB186 Dup
Sample ID: MY4112 \ SOUTH FLOOR SA8
Matrix: Soil

Collected: 2015/08/19
Shipped:
Received: 2015/08/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFOS and PFOA in soil	LCMS	4175096	2015/09/02	2015/09/03	Sin Chii Chia

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B5G9705
Report Date: 2015/09/04

Maxxam Analytics
Client Project #: B572551

GENERAL COMMENTS

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

Package 1	4.7°C

Results relate only to the items tested.

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Maxxam Job #: B5G9705
Report Date: 2015/09/04

Maxxam Analytics
Client Project #: B572551

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
4174912	NS3	RPD	Moisture	2015/09/02	0.88		%	20
4175096	SCH	Matrix Spike [AWB186-01]	Perfluorobutane Sulfonate (PFBS)	2015/09/03		NC	%	70 - 130
			Perfluorobutanoic acid	2015/09/03		111	%	70 - 130
			Perfluorodecane Sulfonate	2015/09/03		80	%	70 - 130
			Perfluorodecanoic Acid (PFDA)	2015/09/03		100	%	70 - 130
			Perfluorododecanoic Acid (PFDoA)	2015/09/03		92	%	70 - 130
			Perfluorononanoic Acid (PFNA)	2015/09/03		95	%	70 - 130
			Perfluorooctane Sulfonamide (PFOSA)	2015/09/03		109	%	70 - 130
			Perfluorotetradecanoic Acid	2015/09/03		101	%	70 - 130
			Perfluorotridecanoic Acid	2015/09/03		84	%	70 - 130
			Perfluoroundecanoic Acid (PFUnA)	2015/09/03		94	%	70 - 130
			Perfluoroheptanoic Acid (PFHpA)	2015/09/03		96	%	70 - 130
			Perfluorohexane Sulfonate (PFHxS)	2015/09/03		NC	%	70 - 130
			Perfluorohexanoic Acid (PFHxA)	2015/09/03		NC	%	70 - 130
			Perfluoro-n-Octanoic Acid (PFOA)	2015/09/03		93	%	70 - 130
			Perfluorooctane Sulfonate (PFOS)	2015/09/03		109	%	70 - 130
			Perfluoropentanoic Acid (PFPeA)	2015/09/03		88	%	70 - 130
4175096	SCH	Spiked Blank	Perfluorobutane Sulfonate (PFBS)	2015/09/03		98	%	70 - 130
			Perfluorobutanoic acid	2015/09/03		110	%	70 - 130
			Perfluorodecane Sulfonate	2015/09/03		97	%	70 - 130
			Perfluorodecanoic Acid (PFDA)	2015/09/03		102	%	70 - 130
			Perfluorododecanoic Acid (PFDoA)	2015/09/03		97	%	70 - 130
			Perfluorononanoic Acid (PFNA)	2015/09/03		97	%	70 - 130
			Perfluorooctane Sulfonamide (PFOSA)	2015/09/03		103	%	70 - 130
			Perfluorotetradecanoic Acid	2015/09/03		127	%	70 - 130
			Perfluorotridecanoic Acid	2015/09/03		106	%	70 - 130
			Perfluoroundecanoic Acid (PFUnA)	2015/09/03		100	%	70 - 130
			Perfluoroheptanoic Acid (PFHpA)	2015/09/03		93	%	70 - 130
			Perfluorohexane Sulfonate (PFHxS)	2015/09/03		99	%	70 - 130
			Perfluorohexanoic Acid (PFHxA)	2015/09/03		99	%	70 - 130
			Perfluoro-n-Octanoic Acid (PFOA)	2015/09/03		98	%	70 - 130
			Perfluorooctane Sulfonate (PFOS)	2015/09/03		96	%	70 - 130
			Perfluoropentanoic Acid (PFPeA)	2015/09/03		91	%	70 - 130
4175096	SCH	Method Blank	Perfluorobutane Sulfonate (PFBS)	2015/09/03	<0.1		ug/kg	
			Perfluorobutanoic acid	2015/09/03	<0.1		ug/kg	
			Perfluorodecane Sulfonate	2015/09/03	<0.1		ug/kg	
			Perfluorodecanoic Acid (PFDA)	2015/09/03	<0.1		ug/kg	
			Perfluorododecanoic Acid (PFDoA)	2015/09/03	<0.1		ug/kg	
			Perfluorononanoic Acid (PFNA)	2015/09/03	<0.1		ug/kg	
			Perfluorooctane Sulfonamide (PFOSA)	2015/09/03	<0.1		ug/kg	
			Perfluorotetradecanoic Acid	2015/09/03	<0.1		ug/kg	
			Perfluorotridecanoic Acid	2015/09/03	<0.1		ug/kg	
			Perfluoroundecanoic Acid (PFUnA)	2015/09/03	<0.1		ug/kg	
			Perfluoroheptanoic Acid (PFHpA)	2015/09/03	<0.1		ug/kg	
			Perfluorohexane Sulfonate (PFHxS)	2015/09/03	<0.1		ug/kg	
			Perfluorohexanoic Acid (PFHxA)	2015/09/03	<0.1		ug/kg	
			Perfluoro-n-Octanoic Acid (PFOA)	2015/09/03	<0.1		ug/kg	
			Perfluorooctane Sulfonate (PFOS)	2015/09/03	<0.1		ug/kg	
			Perfluoropentanoic Acid (PFPeA)	2015/09/03	<0.1		ug/kg	
4175096	SCH	RPD [AWB186-01]	Perfluorobutane Sulfonate (PFBS)	2015/09/03	8.7		%	30
			Perfluorobutanoic acid	2015/09/03	11		%	30
			Perfluorodecane Sulfonate	2015/09/03	NC		%	30
			Perfluorodecanoic Acid (PFDA)	2015/09/03	NC		%	30

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Maxxam Job #: B5G9705
Report Date: 2015/09/04

Maxxam Analytics
Client Project #: B572551

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Perfluorododecanoic Acid (PFDoA)	2015/09/03	NC		%	30
			Perfluorononanoic Acid (PFNA)	2015/09/03	NC		%	30
			Perfluorooctane Sulfonamide (PFOSA)	2015/09/03	NC		%	25
			Perfluorotetradecanoic Acid	2015/09/03	NC		%	30
			Perfluorotridecanoic Acid	2015/09/03	NC		%	30
			Perfluoroundecanoic Acid (PFUnA)	2015/09/03	NC		%	30
			Perfluoroheptanoic Acid (PFHpA)	2015/09/03	NC		%	30
			Perfluorohexane Sulfonate (PFHxS)	2015/09/03	7.8		%	30
			Perfluorohexanoic Acid (PFHxA)	2015/09/03	3.2		%	30
			Perfluoro-n-Octanoic Acid (PFOA)	2015/09/03	NC		%	30
			Perfluorooctane Sulfonate (PFOS)	2015/09/03	149 (1)		%	30
			Perfluoropentanoic Acid (PFPeA)	2015/09/03	5.8		%	30

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

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

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

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of 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 (one or both samples < 5x RDL).

(1) Elevated duplicate RPD for Perfluorooctane Sulfonate (PFOS) is due to sample matrix effects and is specific to sample AWB186. All other parameters are within acceptable duplicate RPD limits.

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B5G9705
Report Date: 2015/09/04

Maxxam Analytics
Client Project #: B572551

VALIDATION SIGNATURE PAGE

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

Adam Robinson, Technical Service

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

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RUSH

MAXXAM ANALYTICS
4000 19st N.E
Calgary, Alberta, T2E 6P8
Phone: (403) 291-3077
Fax: (403) 291-9468

25-Aug-15 09:00
Andrea Rieth
B5G9705
MAF ENV-873

PUBLIC WORKS &
GOVERNMENT SERVICES
CANADA - EDMONTON
Maxxam PM Linsay Sunderman

To: Maxxam Ontario (From Calgary)

RUSH

Job# B572551

☐ Yes ☐ No International Sample/BioHazard (if yes, add copy of Movement Cert., heat treat is required prior to disposal)
☐ Yes ☐ No Special Protocol (if yes, Protocol _____)

Sample ID	Matrix	Test(s) Required	Container	Date Sampled	Date Required
MY4112-03R \ SOUTH FLOOR SA8	SOIL	Perfluorinated Compounds - Subcontract	1(COR2)	2015/08/19	2015/09/15

	Temp. 1	Temp. 2	Temp. 3			
Cooler #1	8	3	3	Custody Seal Present	YES ✓	NO
				Custody Seal Intact	YES ✓	NO
				Ice Present Upon Receipt	YES ✓	NO
Cooler #2				Custody Seal Present	YES	NO
				Custody Seal Intact	YES	NO
				Ice Present Upon Receipt	YES	NO
Cooler #3				Custody Seal Present	YES	NO
				Custody Seal Intact	YES	NO
				Ice Present Upon Receipt	YES	NO

Receiving Maxxam Location: Maxxam Ontario (From Calgary) JOB # _____

Relinquished by (Sign) _____ (Print) HARRY TOOR Date and Time 2015/08/22 15:45

Received by (Sign) _____ (Print) ASAD BHATTI Date and Time 2015/08/25 09:00

NOTES:
1) Please call us if due date cannot be met. Please reference Sample ID on your report.
2) Include copy of this completed form, Client COC & signed final report to

Reporting Requirements:
National:
Regional:

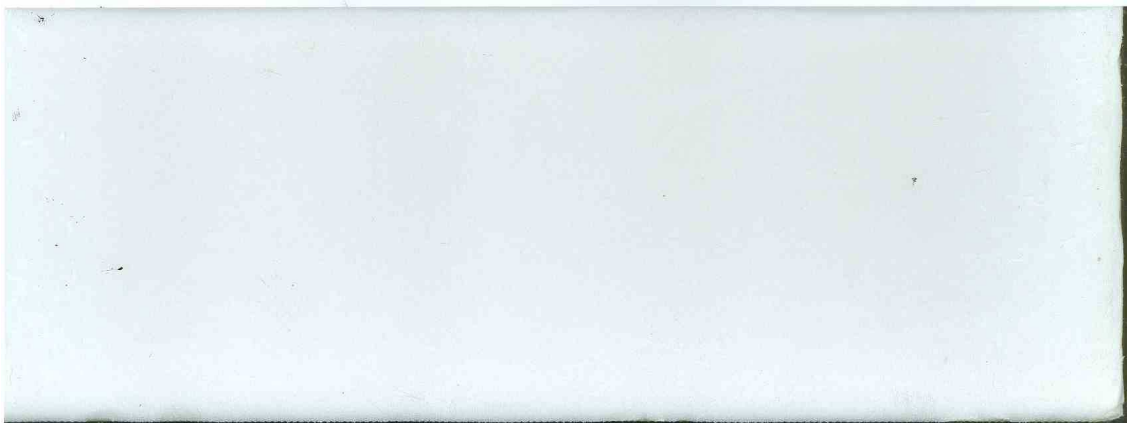
SHIPPING INSTRUCTIONS

☐ Ship Immediately (highlight Yellow)
☐ Requires 9am
☐ Requires Sat. Delivery
☐ Regular Ship next available day
☐ Ship Cold
☐ Ship Room Temp
☐ Ship Frozen
☐ COC Must be Attached

Sender (Print) _____ Initial _____

SHIPPING DEPARTMENT CHECKLIST

☐ Correct Shipping location
☐ Correct Sample Ids (Paperwork vs Bottles)
☐ Yes ☐ No Special-Cooler, Ice, Tape-custody seal, Date&Sign
Date Shipped _____ Number of coolers _____
Shipper (Print) _____ Initial _____



Your P.O. #: 700330152
Your Project #: CBA ETA
Site Location: CAMBRIDGE BAY, NU
Your C.O.C. #: A158829

Attention:HEATHER FISHER

DILLON CONSULTING LTD.
1558 Willson Place
Winnipeg, MB
CANADA R3T 0Y4

Report Date: 2015/09/15
Report #: R2041117
Version: 2 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B572551
Received: 2015/08/21, 16:00

Sample Matrix: Soil
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
BTEX/F1 by HS GC/MS/FID (MeOH extract) (1)	1	2015/08/22	2015/08/23	AB SOP-00039	CCME CWS/EPA 8260c m
Cation/EC Ratio (1)	1	N/A	2015/08/28	AB WI-00065	Auto Calc
Chloride (Soluble) (1)	1	2015/08/27	2015/08/28	AB SOP-00033 / AB SOP-00020	SM 22-4500-Cl G m
Conductivity @25C (Soluble) (1)	1	2015/08/27	2015/08/28	AB SOP-00033 / AB SOP-00004	SM 22 2510 B m
CCME Hydrocarbons (F2-F4 in soil) (1, 2)	1	2015/08/22	2015/08/23	AB SOP-00036 / AB SOP-00040	CCME PHC-CWS
Fraction of Organic Carbon (1)	1	N/A	2015/08/26	CAL SOP-00243	Auto Calc
Ion Balance (1)	1	N/A	2015/08/24	AB WI-00065	Auto Calc
Sum of Cations, Anions (1)	1	N/A	2015/08/28	AB WI-00065	Auto Calc
Moisture (1)	1	N/A	2015/08/22	AB SOP-00002	CCME PHC-CWS
pH @25C (1:2 Calcium Chloride Extract) (1)	1	2015/08/24	2015/08/24	AB SOP-00033 / AB SOP-00006	SM 22 4500 H+B m
pH @25C (Soluble) (1)	1	2015/08/27	2015/08/27	AB SOP-00033 / AB SOP-00006	SM 22 4500 H+B m
Sodium Adsorption Ratio (1)	1	N/A	2015/08/28	AB WI-00065	Auto Calc
Ca,Mg,Na,K,SO4 (Soluble) (1)	1	2015/08/27	2015/08/28	AB SOP-00033 / AB SOP-00042	EPA 200.7 CFR 2012 m
Soluble Paste (1)	1	2015/08/27	2015/08/27	AB SOP-00033	Carter 2nd ed 15.2 m
Soluble Ions Calculation (1)	1	N/A	2015/08/24	AB WI-00065	Auto Calc
Total Organic Carbon LECO Method (1)	1	2015/08/26	2015/08/26	AB SOP-00035 / CAL SOP-00243	LECO 203-821-170 m
Theoretical Gypsum Requirement (1, 3)	1	N/A	2015/08/28	AB WI-00065	Auto Calc

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 Calgary Environmental

(2) All CCME 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.

(3) Units for TGR have changed from tons/acre to tonnes/ha

Your P.O. #: 700330152
Your Project #: CBA ETA
Site Location: CAMBRIDGE BAY, NU
Your C.O.C. #: A158829

Attention:HEATHER FISHER

DILLON CONSULTING LTD.
1558 Willson Place
Winnipeg, MB
CANADA R3T 0Y4

Report Date: 2015/09/15
Report #: R2041117
Version: 2 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B572551
Received: 2015/08/21, 16:00

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Linsay Sunderman, Project Manager
Email: LSunderman@maxxam.ca
Phone# (403)735-2237 Ext:2237

==========

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 #: B572551
Report Date: 2015/09/15

DILLON CONSULTING LTD.
Client Project #: CBA ETA
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700330152
Sampler Initials: MH

RESULTS OF CHEMICAL ANALYSES OF SOIL

Maxxam ID		MY4112	MY4113		
Sampling Date		2015/08/19	2015/08/20		
COC Number		A158829	A158829		
	UNITS	SOUTH FLOOR SA8	WESTWALL SA27	RDL	QC Batch
Calculated Parameters					
Anion Sum	meq/L	110		N/A	8011733
Cation Sum	meq/L	110		N/A	8011733
Cation/EC Ratio	N/A	10		0.10	8011730
Ion Balance	N/A	1.0		0.010	8011732
Calculated Calcium (Ca)	mg/kg	76		0.48	8011736
Calculated Magnesium (Mg)	mg/kg	74		0.32	8011736
Calculated Sodium (Na)	mg/kg	560		0.81	8011736
Calculated Potassium (K)	mg/kg	60		0.42	8011736
Calculated Chloride (Cl)	mg/kg	750		3.2	8011736
Calculated Sulphate (SO4)	mg/kg	640		1.6	8011736
Misc. Inorganics					
Fraction of Organic Carbon	g/g	0.00058		0.00020	8011628
Soluble Parameters					
Soluble Chloride (Cl)	mg/L	2300 (1)		10	8019173
Soluble Conductivity	dS/m	11		0.020	8018808
Soluble pH	pH	7.89		N/A	8018593
Soluble (CaCl2) pH	pH	7.77		N/A	8012550
Sodium Adsorption Ratio	N/A	19		0.10	8011734
Soluble Calcium (Ca)	mg/L	240		1.5	8018888
Soluble Magnesium (Mg)	mg/L	230		1.0	8018888
Soluble Sodium (Na)	mg/L	1700		2.5	8018888
Soluble Potassium (K)	mg/L	180		1.3	8018888
Saturation %	%	32		N/A	8018478
Soluble Sulphate (SO4)	mg/L	2000		5.0	8018888
Theoretical Gypsum Requirement	tonnes/ha	36		0.20	8011738
Physical Properties					
Moisture	%		6.6	0.30	8011992

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

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Maxxam Job #: B572551
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DILLON CONSULTING LTD.
Client Project #: CBA ETA
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700330152
Sampler Initials: MH

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		MY4113		
Sampling Date		2015/08/20		
COC Number		A158829		
	UNITS	**WESTWALL SA27**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon				
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	10	8011721
F3 (C16-C34 Hydrocarbons)	mg/kg	<50	50	8011721
F4 (C34-C50 Hydrocarbons)	mg/kg	<50	50	8011721
Reached Baseline at C50	mg/kg	Yes		8011721
Surrogate Recovery (%)				
O-TERPHENYL (sur.)	%	85		8011721
RDL = Reportable Detection Limit				

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DILLON CONSULTING LTD.
Client Project #: CBA ETA
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700330152
Sampler Initials: MH

VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		MY4113		
Sampling Date		2015/08/20		
COC Number		A158829		
	UNITS	**WESTWALL SA27**	**RDL**	**QC Batch**
Volatiles				
Benzene	mg/kg	<0.0050	0.0050	8011634
Toluene	mg/kg	<0.020	0.020	8011634
Ethylbenzene	mg/kg	<0.010	0.010	8011634
Xylenes (Total)	mg/kg	<0.040	0.040	8011634
m & p-Xylene	mg/kg	<0.040	0.040	8011634
o-Xylene	mg/kg	<0.020	0.020	8011634
F1 (C6-C10) - BTEX	mg/kg	<12	12	8011634
F1 (C6-C10)	mg/kg	<12	12	8011634
Surrogate Recovery (%)				
1,4-Difluorobenzene (sur.)	%	99		8011634
4-Bromofluorobenzene (sur.)	%	101		8011634
D10-ETHYLBENZENE (sur.)	%	94		8011634
D4-1,2-Dichloroethane (sur.)	%	89		8011634
RDL = Reportable Detection Limit				

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Maxxam Job #: B572551
Report Date: 2015/09/15

DILLON CONSULTING LTD.
Client Project #: CBA ETA
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700330152
Sampler Initials: MH

MISCELLANEOUS (SOIL)

Maxxam ID		MY4112		
Sampling Date		2015/08/19		
COC Number		A158829		
	UNITS	**SOUTH FLOOR SA8**	**RDL**	**QC Batch**
Misc. Inorganics				
Total Organic Carbon (C)	%	0.058	0.020	8014411
RDL = Reportable Detection Limit				

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Maxxam Job #: B572551
Report Date: 2015/09/15

DILLON CONSULTING LTD.
Client Project #: CBA ETA
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700330152
Sampler Initials: MH

GENERAL COMMENTS

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

Package 1	7.0°C

PFOS and PHOA Results are attached to this report. The reference number for these results from Maxxam Campobello is B5G9705.

Results relate only to the items tested.

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Maxxam Job #: B572551
Report Date: 2015/09/15

QUALITY ASSURANCE REPORT

DILLON CONSULTING LTD.
Client Project #: CBA ETA
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700330152
Sampler Initials: MH

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8011634	1,4-Difluorobenzene (sur.)	2015/08/22	97	60 - 140	91	60 - 140	94	%				
8011634	4-Bromofluorobenzene (sur.)	2015/08/22	97	60 - 140	89	60 - 140	97	%				
8011634	D10-ETHYLBENZENE (sur.)	2015/08/22	91	60 - 130	85	60 - 130	99	%				
8011634	D4-1,2-Dichloroethane (sur.)	2015/08/22	95	60 - 140	89	60 - 140	99	%				
8011721	O-TERPHENYL (sur.)	2015/08/23	87	50 - 130	85	50 - 130	102	%				
8011634	Benzene	2015/08/22	109	60 - 140	98	60 - 140	<0.0050	mg/kg				
8011634	Ethylbenzene	2015/08/22	103	60 - 140	92	60 - 140	<0.010	mg/kg				
8011634	F1 (C6-C10) - BTEX	2015/08/22					<12	mg/kg	NC (1)	50		
8011634	F1 (C6-C10)	2015/08/22	111	60 - 140	109	60 - 140	<12	mg/kg	NC (1)	50		
8011634	m & p-Xylene	2015/08/22	103	60 - 140	92	60 - 140	<0.040	mg/kg				
8011634	o-Xylene	2015/08/22	101	60 - 140	90	60 - 140	<0.020	mg/kg				
8011634	Toluene	2015/08/22	100	60 - 140	89	60 - 140	<0.020	mg/kg				
8011634	Xylenes (Total)	2015/08/22					<0.040	mg/kg				
8011721	F2 (C10-C16 Hydrocarbons)	2015/08/23	NC	50 - 130	93	70 - 130	<10	mg/kg	4.9	50		
8011721	F3 (C16-C34 Hydrocarbons)	2015/08/23	NC	50 - 130	94	70 - 130	<50	mg/kg	4.4	50		
8011721	F4 (C34-C50 Hydrocarbons)	2015/08/23	NC	50 - 130	89	70 - 130	<50	mg/kg	4.4	50		
8011992	Moisture	2015/08/22					<0.30	%	0.83	20		
8012550	Soluble (CaCl2) pH	2015/08/24			100	97 - 103			0.95	N/A	100	98 - 102
8014411	Total Organic Carbon (C)	2015/08/26			93	75 - 125	<0.020	%	7.1	35	91	75 - 125
8018478	Saturation %	2015/08/27							1.6	12	99	75 - 125
8018593	Soluble pH	2015/08/27			100	97 - 103			0.76	N/A	99	98 - 102
8018808	Soluble Conductivity	2015/08/28			98	90 - 110	<0.020	dS/m	6.0	35	101	75 - 125
8018888	Soluble Calcium (Ca)	2015/08/28	99	75 - 125	108	80 - 120	<1.5	mg/L	12	35	100	75 - 125
8018888	Soluble Magnesium (Mg)	2015/08/28	98	75 - 125	105	80 - 120	<1.0	mg/L	8.8	35	97	75 - 125
8018888	Soluble Potassium (K)	2015/08/28	98	75 - 125	103	80 - 120	<1.3	mg/L	1.2	35	101	75 - 125
8018888	Soluble Sodium (Na)	2015/08/28	NC	75 - 125	100	80 - 120	<2.5	mg/L	3.5	35	95	75 - 125
8018888	Soluble Sulphate (SO4)	2015/08/28					<5.0	mg/L	6.3	35	97	75 - 125

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Maxxam Job #: B572551
Report Date: 2015/09/15

QUALITY ASSURANCE REPORT(CONT'D)

DILLON CONSULTING LTD.
Client Project #: CBA ETA
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700330152
Sampler Initials: MH

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8019173	Soluble Chloride (Cl)	2015/08/28	NC	75 - 125	106	75 - 125	7.6, RDL=5.0	mg/L	1.7	35	97	75 - 125

N/A = Not Applicable

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

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

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

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

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

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of 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 (one or both samples < 5x RDL).

(1) Detection limit raised due to high moisture content.

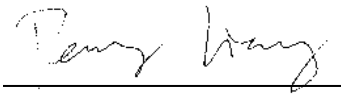
Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B572551
Report Date: 2015/09/15

DILLON CONSULTING LTD.
Client Project #: CBA ETA
Site Location: CAMBRIDGE BAY, NU
Your P.O. #: 700330152
Sampler Initials: MH

VALIDATION SIGNATURE PAGE

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



Harry (Peng) Liang, Senior Analyst

Jingyuan Song, Organics – Senior Analyst

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

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Maxxam

Calgary: 4000 19st St. NE, T2E 6P8. Ph: (403) 291-3077, Fax: (403) 735-2240, Toll free: (800) 386-7247
Edmonton: 9331 - 48 Street, T6B 2R4. Ph: (780) 577-7100, Fax: (780) 450-4187, Toll free: (877) 465-8889
www.maxxamanalytics.com

Chain of Custody

841

A158829

Page: 1 of 1

	Invoice To: C/O Report Address ☐	Report To: Same as Invoice ☐
Company:	PWGSC	
Contact:	Natalie Robinson	
Address:	Suite 1650 635-8th Ave SW	
	Prov: Alberta PC: T2P 3M3	Prov: PC:
Contact #s:	Ph: 403-292-6888	Ph: Cell:

Report Distribution (E-Mail): hdisher@dillon.ca; mhopps@dillon.ca; Natalie.Robinson@pwgsc-tpsgc.ca

REGULATORY GUIDELINES: ☐ AT1 ☐ CCME ☐ Regulated Drinking Water ☐ Other:

All samples are held for 60 calendar days after sample receipt, unless specified otherwise.

PO #: 700330152
Project # / Name: CSA ETA
Site Location: Cambridge Bay
Quote #: R.05169.005
Sampled By: M. Hopps

SERVICE REQUESTED: ☒ RUSH (Contact lab to reserve) BTEX Date Required: Aug. 23/15 ☒ REGULAR (5 to 7 Days) PFOS

See reverse for package specifics

	Sample ID	Depth (unit)	Matrix GW / SW Soil	Date/Time Sampled YY/MM/DD 24:00	SOIL: BTEX F1-F4	Sieve (75 micron)	Regulated Metals (CCME / AT1)	Salinity 4	Assessment ICP Metals	Basic Class II Landfill	PAH	PFOS	Total Fraction of Organic Carbon	WATER: ☐VOCs ☐BTEX F1	☐BTEX F1-F2	☐BTEX F1-F4	☐ Routine Water ☐ Turb ☐ F	☐ TOC ☐ DOC	Regulated Metals (CCME/AT1) Total	Dissolved	☐ Total ☐ Dissolved Mercury	Other Analysis	HOLD - Do not Analyze	# of Containers Submitted
1	South Floor SA8	1.7-2.0	So.	15/08/19				X			X	X	X											
2																								
3	West wall SA27	1.0m	So.	15/08/20	X																			
4																								
5																								
6																								
7																								
8																								
9																								
10																								
11																								
12																								

21-Aug-15 16:00
Marnie Kolach
B572551
HT4 INS-0050
JLT

RECEIVED IN YELLOWKNIFE
BY: Michelle Guibe
2015 -08- 21

Temp: 6 / 4 / 3

F/P

Please indicate Filtered, Preserved or Both (F, P, F/P)

Relinquished By (Signature/Print): Matthew Hopps Date (YY/MM/DD): 15/08/20 Time (24:00): 1000
Relinquished By (Signature/Print): Date (YY/MM/DD): Time (24:00):

Special Instructions: Keep Cold — Fragile.

# of Jars Used & Not Submitted

LAB USE ONLY

Received By: Date: 2015/08/22 Time: 1450
Lab Comments:

Maxxam Job #:

Custody Seal	Temperature	Ice
Y	7.6 / 8	Y

Appendix E

NCSC Worksheets

CCME National Classification System for Contaminated Sites (2008, 2010 v 1.2)
Pre-Screening Checklist

	Question	Response (yes / no)	Comment
1	Are **Radioactive material**, **Bacterial contamination** or **Biological hazards** likely to be present at the site?	No	If yes, do not proceed through the NCSCS. Contact applicable regulatory agency immediately.
2	Are there **no contamination exceedances** (known or suspected)? Determination of exceedances may be based on: 1) CCME environmental quality guidelines; 2) equivalent provincial guidelines/standards if no CCME guideline exists for a specific chemical in a relevant medium; or 3) toxicity benchmarks derived from the literature for chemicals not covered by CCME or provincial guidelines/standards.	No	If yes (i.e., there are no exceedances), do not proceed through the NCSCS.
3	Have **partial/incompleted or no environmental site investigations** been conducted for the Site?	No	If yes, do not proceed through the NCSCS.
4	Is there direct and signficant evidence of **impacts to humans** at the site, or off-site due to migration of contaminants from the site?	No	If yes, automatically rate the site as Class 1, a priority for remediation or risk management, regardless of the total score obtained should one be calculated (e.g., for comparison with other Class 1 sites).
5	Is there direct and significant evidence of **impacts to ecological receptors** at the site, or off-site due to migration of contaminants from the site?	No	Some low levels of impact to ecological receptors are considered acceptable, particularly on commercial and industrial land uses. However, if ecological effects are considered to be severe, the site may be categorized as Class 1, regardless of the numerical total NCSCS score. For the purpose of application of the NCSCS, effects that would be considered severe include observed effects on survival, growth or reproduction which could threaten the viability of a population of ecological receptors at the site. Other evidence that qualifies as severe adverse effects may be determined based on professional judgement and in consultation with the relevant jurisdiction.
6	Are there indicators of significant **adverse effects in the exposure zone** (i.e., the zone in which receptors may come into contact with contaminants)? Some examples are as follows: -Hydrocarbon sheen or NAPL in the exposure zone -Severely stressed biota or devoid of biota; -Presence of material at ground surface or sediment with suspected high concentration of contaminants such as ore tailings, sandblasting grit, slag, and coal tar.	No	If yes, automatically rate the site as Class 1, a priority for remediation or risk management, regardless of the total score obtained should one be calculated (e.g., for comparison with other Class 1 sites).
7	Do measured concentrations of volatiles or unexploded ordnances represent an **explosion hazard**?	No	If yes, automatically rate the site as Class 1, a priority for remediation or risk management, and do not continue until the safety risks have been addressed. Consult your jurisdiction's occupational health and safety guidance or legislation on exposive hazards and measurement of lower explosive limits.

If none of the above applies, proceed with the NCSCS scoring.

CCME National Classification System (2008, 2010 v 1.2)

(I) Contaminant Characteristics

Cambridge Bay Airport Fire Training Area

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method of Evaluation	Notes
1. Residency Media (replaces physical state)				
Which of the following residency media are known (or strongly suspected) to have one or more exceedances of the applicable CCME guidelines? **yes** = has an exceedance or strongly suspected to have an exceedance **no** = does not have an exceedance or strongly suspected not to have an exceedance		Soils: PHCs exceed guideline for F1 in one location. PFOS exceed guideline in 2 locations. Soil Exceedences are documented in these reports: 1. Site Activities Report, Cambridge Bay Airport FTA, March 2015 Final Report, Dillon Consulting Limited (Final Sidewall 6 @0.6m with F1 concentration of 920 mg/kg) 2. Closure Report, Cambridge Bay Airport FTA, November 2015, Dillon Consulting Ltd. (PFOS in soil and groundwater above Interim Federal PFOS guidelines, October 2015) Sediments: Not assessed Surface Water: Limited, not assessed	The overall score is calculated by adding the individual scores from each residency media (having one or more exceedance of the most conservative media specific and land-use appropriate CCME guideline). Summary tables of the Canadian Environmental Quality Guidelines for soil, water (aquatic life, non-potable groundwater environments, and agricultural water uses) and sediment are available on the CCME website at http://www.ccme.ca/publications/cegg_rcqe.html?category_id=124. For potable groundwater environments, guidelines for Canadian Drinking Water Quality (for comparison with groundwater monitoring data) are available on the Health Canada website at http://www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/doc_sup-appui/sum_guide-res_recom/index_e.html.	An increasing number of residency media containing chemical exceedances often equates to a greater potential risk due to an increase in the number of potential exposure pathways.
A. Soil	Yes			
Yes No Do Not Know				
B. Groundwater	Yes			
Yes No Do Not Know				
C. Surface water	No			
Yes No Do Not Know				
D. Sediment	Do Not Know			
Yes No Do Not Know				
"Known" -score	4			
"Potential" - score	1			
2. Chemical Hazard				
What is the relative degree of chemical hazard of the contaminant in the list of hazard rankings proposed by the Federal Contaminated Sites Action Plan (FCSAP)?	High	PHC F1 is listed as 'high' on the list of hazard rankings proposed by FCSAP. PFOS is not listed on the list of hazard rankings proposed by FCSAP.	The relative degree of chemical hazard should be selected based on the most hazardous contaminant known or suspected to be present at the site. The degree of hazard has been defined by the Federal Contaminated Sites Action Plan (FCSAP) and a list of substances with their associated hazard (Low, Medium and High) has been provided as a separate sheet in this file. *See Attached Reference Material for Contaminant Hazard Rankings.*	Hazard as defined in the revised NCS pertains to the physical properties of a chemical which can cause harm. Properties can include toxic potency, propensity to biomagnify, persistence in the environment, etc. Although there is some overlap between hazard and contaminant exceedance factor below, it will not be possible to derive contaminant exceedance factors for many substances which have a designated chemical hazard designation, but don't have a CCME guideline. The purpose of this category is to avoid missing a measure of toxic potential.
High Medium Low Do Not Know				
"Known" -score	8			
"Potential" - score	---			
3. Contaminant Exceedence Factor				
What is the ratio between the measured contaminant concentration and the applicable CCME guidelines (or other "standards")?	Low (1x to 10x	Highest exceedance factor PHC F1, 2.89X CCME PHC CWS Highest exceedance factor PFOS, 6.7X Interim Federal Guidelines for PFOS	Ranking of contaminant "exceedance" is determined by comparing contaminant concentrations with the *most conservative media-specific and land-use appropriate CCME* environmental quality guidelines. **Ranking should be based on contaminant with greatest exceedance of CCME guidelines.** Ranking of contaminant hazard as high, medium and low is as follows: High = One or more measured contaminant concentration is greater than 100 X appropriate CCME guidelines Medium = One or more measured contaminant concentration is 10 - 99.99 X appropriate CCME guidelines Low = One or more measured contaminant concentration is 1 - 9.99 X appropriate CCME guidelines Mobile NAPL = Contaminant is a non-aqueous phase liquid (i.e., due to its low solubility, it does not dissolve in water, but remains as a separate liquid) and is present at a sufficiently high saturation (i.e., greater than residual NAPL saturation) such that there is significant potential for mobility either downwards or laterally. Other standards may include local background concentration or published toxicity benchmarks. Results of toxicity testing with site samples can be used as an alternative. This approach is only relevant for contaminants that do not biomagnify in the food web, since toxicity tests would not indicate potential effects at higher trophic levels. High = lethality observed. Medium = no lethality, but sub lethal effects observed. Low = neither lethal nor sub lethal effects observed.	In the event that elevated levels of a material with no associated CCME guidelines are present, check provincial and USEPA environmental criteria. Hazard Quotients (sometimes referred to as a screening quotient in risk assessments) refer to the ratio of measured concentration to the concentration believed to be the threshold for toxicity. A similar calculation is used here to determine the contaminant exceedance factor (CEF). Concentrations greater than one times the applicable CCME guideline (i.e., CEF=>1) indicate that risks are possible. Mobile NAPL has the highest associated score (8) because of its highly concentrated nature and potential for increase in the size of the impacted zone.
Mobile NAPL High (>100x) Medium (10x to 100x) Low (1x to 10x) Do Not Know				
"Known" -score	2			
"Potential" - score	---			

CCME National Classification System (2008, 2010 v 1.2)

(I) Contaminant Characteristics

Cambridge Bay Airport Fire Training Area

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method of Evaluation	Notes
4. Contaminant Quantity (known or strongly suspected)				
What is the known or strongly suspected quantity of all contaminants? >10 hectare (ha) or 5000 m^3 2 to 10 ha or 1000 to 5000 m^3 <2 ha or 1000 m^3 Do Not Know	<2 ha or 1000 m3	PHC F1 exceedance is a single occurance, isolated and not at surface level. PFOS impacts have not been fully delineated in soil or groundwater south of the FTA.	Measure or estimate the area or quantity of total contamination (i.e, all contaminants known or strongly suspected to be present on the site). The "Area of Contamination" is defined as the area or volume of contaminated media (soil, sediment, groundwater, surface water) exceeding appropriate environmental criteria.	A larger quantity of a potentially toxic substance can result in a larger frequency of exposure as well as a greater probability of migration, therefore, larger quantities of these substances earn a higher score.
"Known" -score	2			
"Potential" - score	---			
5. Modifying Factors				
Does the chemical fall in the class of persistent chemicals based on its behavior in the environment? Yes No Do Not Know	Yes	PFOS is not listed herein however; is known to not degrade in the environment	Persistent chemicals, e.g., PCBs, chlorinated pesticides etc. either do not degrade or take longer to degrade, and therefore may be available to cause effects for a longer period of time. Canadian Environmental Protection Act (CEPA) classifies a chemical as persistent when it has at least one of the following characteristics: (a) in air, (i) its half-life is equal to or greater than 2 days, or (ii) it is subject to atmospheric transport from its source to a remote area; (b) in water, its half-life is equal to or greater than 182 days; (c) in sediments, its half-life is equal to or greater than 365 days; or (d) in soil, its half-life is equal to or greater than 182 days. This list does not include metals or metalloids, which in their elemental form do not degrade. However metals and metalloids form chemical species in the environment, many of which are not readily bioavailable.	*Examples of Persistent Substances are provided in attached Reference Materials*
Are there contaminants present that could cause damage to utilities and infrastructure, either now or in the future, given their location? Yes No Do Not Know	No	Thtere are no utilities or infrastructure on site that could be damaged by the presence of PFOS in groundwater.		Some contaminants may react or absorb into underground utilities and infrastructure. For example, organic solvents may degrade some plastics, and salts could cause corrosion of metal.
How many different contaminant classes have representative CCME guideline exceedances? one two to four five or more Do Not Know	two to four	Light extractable petroleum hydrocarbons and PFOS	For the purposes of the revised NCS ranking system, the following chemicals represent distinct chemical "classes": inorganic substances (including metals), volatile petroleum hydrocarbons, light extractable petroleum hydrocarbons, heavy extractable petroleum hydrocarbons, PAHs, phenolic substances, chlorinated hydrocarbons, halogenated methanes, phthalate esters, pesticides.	*Refer to the Reference Material sheet for a list of example substances that fall under the various chemical classes.*
"Known" - Score	4			
"Potential" - Score	---			

Contaminant Characteristic Total

Raw Total Scores- "Known"	20
Raw Total Scores- "Potential"	1
Raw Combined Total Scores	21
Total Score (Raw Combined / 40 * 33)	**17.3**

(II) Migration Potential (Evaluation of contaminant migration pathways)

Cambridge Bay Airport Fire Training Area

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method Of Evaluation	Notes
1. Groundwater Movement				
A. Known COPC exceedances and an operable groundwater pathway within and/or beyond the property boundary.				
i) For **potable groundwater environments**, 1) groundwater concentrations exceed background concentrations and 1X the Guideline for Canadian Drinking Water Quality (GCDWQ) or 2) there is known contact of contaminants with groundwater, based on physical evidence of groundwater contamination. For **non-potable environments** (typically urban environments with municipal services), 1) groundwater concentrations exceed 1X the applicable non potable guidelines or modified generic guidelines (which exclude ingestion of drinking water pathway) or 2) there is known contact of contaminants with groundwater, based on physical evidence of groundwater impacts.	12	Groundwater has PFOS impacts. Groundwater is seasonal (melted permafrost active layer). Non-potable. Marine aquatic receptors within 100 m of site. (Cambridge Bay is located approximately 100 m downgradient). No drinking water quality guidelines for PFOS.	Review chemical data and evaluate groundwater quality. The evaluation method concentrates on 1) a potable or non-potable groundwater environment; 2) the groundwater flow system and its potential to be an exposure pathway to known or potential receptors An aquifer is defined as a geologic unit that yields groundwater in usable quantities and drinking water quality. The aquifer can currently be used as a potable water supply or could have the potential for use in the future. Non-potable groundwater environments are defined as areas that are serviced with a reliable alternative water supply (most commonly provided in urban areas). The evaluation of a non-potable environment will be based on a site specific basis. Physical evidence includes significant sheens, liquid phase contamination, or contaminant saturated soils. Seeps and springs are considered part of the groundwater pathway. In Arctic environments, the potability and evaluation of the seasonal active layer (above the permafrost) as a groundwater exposure pathway will be considered on a site-specific basis.	The 1992 NCS rationale evaluated the off-site migration as a regulatory issue. The exposure assessment and classification of hazards should be evaluated regardless of the property boundaries. Someone experienced must provide a thorough description of the sources researched to determine the presence/absence of a groundwater supply source in the vicinity of the contaminated site. This information must be documented in the NCS Site Classification Worksheet including contact names, phone numbers, e-mail correspondence and/or reference maps/reports and other resources such as internet links. Note that for potable groundwater that also daylights into a nearby surface water body, the more stringent guidelines for both drinking water and protection of aquatic life should be considered. **Selected References** Potable Environments Guidelines for Canadian Drinking Water Quality: www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/doc_sup-appui/sum_guide-res_recom/index_e.html Non-Potable Environments Canadian Water Quality Guidelines for Protection of Aquatic Life. CCME. 1999 www.ccme.ca Compilation and Review of Canadian Remediation Guidelines, Standards and Regulations. Science Applications International Corporation (SAIC Canada), report to Environment Canada, January 4, 2002.
ii) Same as (i) except the information is not known but strongly suspected based on indirect observations.	9			
iii) Meets GCDWQ for **potable environments**; meets non-potable criteria or modified generic criteria (excludes ingestion of drinking water pathway) for **non-potable environments** **or** Absence of groundwater exposure pathway (i.e., there is no aquifer (see definition at right) at the site or there is an adequate isolating layer between the aquifer and the contamination, and within 5 km of the site there are no aquatic receiving environments and the groundwater does not daylight).	0			
	12			
Score	12			
NOTE: If a score is assigned here for Known COPC Exceedances, then you can skip Part B (Potential for groundwater pathway) and go to Section 2 (Surface Water Pathway)				
B. Potential for groundwater pathway.				
a. Relative Mobility High Moderate Low Insignificant Do Not Know			Organics Koc (L/kg) / Metals with higher mobility at acidic conditions / Metals with higher mobility at alkaline conditions Koc < 500 (i.e., log Koc < 2.7) — pH < 5 — pH > 8.5 Koc = 500 to 5000 (i.e., log Koc = 2.7 to 3.7) — pH = 5 to 6 — pH = 7.5 to 8.5 Koc = 5,000 to 100,000 (i.e., log Koc = 3.7 to 5) — pH > 6 — pH < 7.5 Koc > 100,000 (i.e., log Koc > 5)	Reference: US EPA Soil Screening Guidance (Part 5 - Table 39) If a score of zero is assigned for relative mobility, it is still recommended that the following sections on potential for groundwater pathway be evaluated and scored. Although the Koc of an individual contaminant may suggest that it will be relatively immobile, it is possible that, with complex mixtures, there could be enhanced mobility due to co-solvent effects. Therefore, the Koc cannot be relied on solely as a measure of mobility. An evaluation of other factors such as containment, thickness of confining layer, hydraulic conductivities and precipitation infiltration rate are still useful in predicting potential for groundwater migration, even if a contaminant is expected to have insignificant mobility based on its chemistry alone.
Score	2			
b. Presence of engineered sub-surface containment? No containment Partial containment Full containment Do Not Know			Review the existing engineered systems or natural attenuation processes for the site and determine if full or partial containment is achieved. Full containment is defined as an engineered system or natural attenuation processes, monitored as being effective, which provide for full capture and/or treatment of contaminants. All chemicals of concern must be contained for "Full Containment" scoring. Natural attenuation must have sufficient data, and reports cited with monitoring data to support steady state conditions and the attenuation processes. If there is no containment or insufficient natural attenuation process, this category is evaluated as high. If there is less than full containment or if uncertain, then evaluate as medium. In Arctic environments, permafrost will be evaluated, as appropriate, based on detailed evaluations, effectiveness and reliability to contain/control contaminant migration.	Someone experienced must provide a thorough description of the sources researched to determine the containment of the source at the contaminated site. This information must be documented in the NCS Site Classification Worksheet including contact names, phone numbers, e-mail correspondence and/or reference maps, geotechnical reports or natural attenuation studies and other resources such as internet links. **Selected Resources:** United States Environmental Protection Agency (USEPA) 1998. Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Groundwater. EPA/600/R-98/128. Environment Canada – Ontario Region – Natural Attenuation Technical Assistance Bulletins (TABS) Number 19 –21.
Score	1.5			
c. Thickness of confining layer over aquifer of concern or groundwater exposure pathway 3 m or less including no confining layer or discontinuous confining layer 3 to 10 m > 10 m Do Not Know			The term "confining layer" refers to geologic material with little or no permeability or hydraulic conductivity (such as unfractured clay); water does not pass through this layer or the rate of movement is extremely slow. Measure the thickness and extent of materials that will impede the migration of contaminants to the groundwater exposure pathway. The evaluation of this category is based on: 1) The presence and thickness of saturated subsurface materials that impede the vertical migration of contaminants to lower aquifer units which can or are used as drinking water sources or 2) The presence and thickness of unsaturated subsurface materials that impede the vertical migration of contaminants from the source location to the saturated zone (e.g., water table aquifer, first hydrostratigraphic unit or other groundwater pathway).	
Score	0.5			
d. Hydraulic conductivity of confining layer >10^{-4} cm/s or no confining layer 10^{-4} to 10^{-6} cm/s <10^{-6} cm/s Do Not Know			Determine the nature of geologic materials and estimate hydraulic conductivity from published material (or use "Range of Values of Hydraulic Conductivity and Permeability" figure in the Reference Material sheet). Unfractured clays should be scored low. Silts should be scored medium. Sand, gravel should be scored high. The evaluation of this category is based on: 1) The presence and hydraulic conductivity ("K") of saturated subsurface materials that impede the vertical migration of contaminants to lower aquifer units which can or are used as a drinking water source, groundwater exposure pathway or 2) The presence and permeability ("K") of unsaturated subsurface materials that impede the vertical migration of contaminants from the source location to the saturated water table aquifer, first hydrostratigraphic unit or other groundwater pathway.	
Score	0.5			

(II) Migration Potential (Evaluation of contaminant migration pathways)

Cambridge Bay Airport Fire Training Area

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method Of Evaluation	Notes
B. Potential for groundwater pathway.				
e. Precipitation infiltration rate (Annual precipitation factor x surface soil relative permeability factor) High Moderate Low Very Low None Do Not Know Score	0.4		Precipitation Refer to Environment Canada precipitation records for relevant areas. Divide annual precipitation by 1000 and round to nearest tenth (e.g., 667 mm = 0.7 score). Permeability For surface soil relative permeability (i.e., infiltration) assume: gravel (1), sand (0.6), loam (0.3) and pavement or clay (0). Multiply the surface soil relative permeability factor with precipitation factor to obtain the score for precipitation infiltration rate.	
f. Hydraulic conductivity of aquifer >10^{-2} cm/s 10^{-2} to 10^{-4} cm/s <10^{-4} cm/s Do Not Know Score	1		Determine the nature of geologic materials and estimate hydraulic conductivity of all aquifers of concern from published material (refer to "Range of Values of Hydraulic Conductivity and Permeability" in the Reference Material sheet).	
Potential groundwater pathway total	5.9			
Allowed Potential score	---	Note: If a "known" score is provided, the "potential" score is disallowed.		
Groundwater pathway total	**12**			
2. Surface Water Movement				
A. Demonstrated migration of COPC in surface water above background conditions				
Known concentrations of surface water: i) Concentrations exceed background concentrations and exceed CCME CWQG for protection of aquatic life, irrigation, livestock water, and/or recreation (whichever uses are applicable at the site) by >1 X; or There is known contact of contaminants with surface water based on site observations. or In the absence of CWQG, chemicals have been proven to be toxic based on site specific testing (e.g. toxicity testing; or other indicator testing of exposure).	12	Some surface water was observed on-site. Nearest surface water receptor supporting aquatic life is approx. 100 m south (Cambridge Bay). Strongly anticipated that groundwater impacts reach surface waters, surface water impacts unknown.	Collect all available information on quality of surface water near to site. Evaluate available data against Canadian Water Quality Guidelines (select appropriate guidelines based on local water use, e.g., recreation, irrigation, aquatic life, livestock watering, etc.). The evaluation method concentrates on the surface water flow system and its potential to be an exposure pathway. Contamination is present on the surface (above ground) and has the potential to impact surface water bodies. Surface water is defined as a water body that supports one of the following uses: recreation, irrigation, livestock watering, aquatic life.	General Notes: Someone experienced must provide a thorough description of the sources researched to classify the surface water body in the vicinity of the contaminated site. This information must be documented in the NCS Site Classification Worksheet including contact names, phone numbers, e-mail correspondence and/or reference maps/reports and other resource such as internet links. Selected References: CCME. 1999. Canadian Water Quality Guidelines for the Protection of Aquatic Life www.ccme.ca CCME. 1999. Canadian Water Quality Guidelines for the Protection of Agricultural Water Uses (Irrigation and Livestock Water) www.ccme.ca Health and Welfare Canada. 1992. Guidelines for Canadian Recreational Water Quality.
ii) Same as (i) except the information is not known but strongly suspected based on indirect observations.	8			
iii) Meets CWQG or absence of surface water exposure pathway (i.e., Distance to nearest surface water is > 5 km.)	0			
Score	Go to Potential ---			
NOTE: If a score is assigned here for Demonstrated Migration in Surface Water, then you can skip Part B (Potential for migration of COPCs in surface water) and go to Section 3 (Surface Soils)				
B. Potential for migration of COPCs in surface water				
a. Presence of containment No containment Partial containment Full containment Do Not Know Score	No containment 5	There is no containment present on site.	Review the existing engineered systems and relate these structures to site conditions and proximity to surface water and determine if full containment is achieved: score low if there is full containment such as capping, berms, dikes; score medium if there is partial containment such as natural barriers, trees, ditches, sedimentation ponds; score high if there are no intervening barriers between the site and nearby surface water. Full containment must include containment of all chemicals.	
b. Distance to Surface Water 0 to <100 m 100 - 300 m >300 m Do Not Know Score	0 to <100 m 3	West arm of Cambridge Bay is approx. 100 m downgradient from site	Review available mapping and survey data to determine distance to nearest surface water bodies.	
c. Topography Contaminants above ground level and slope is steep Contaminants at or below ground level and slope is steep Contaminants above ground level and slope is intermediate Contaminants at or below ground level and slope is Contaminants above ground level and slope is flat Contaminants at or below ground level and slope is flat Do Not Know Score	At/below and flat 0	Site is relatively flat.	Review engineering documents on the topography of the site and the slope of surrounding terrain. Steep slope = >50% Intermediate slope = between 5 and 50% Flat slope = < 5% Note: Type of fill placement (e.g., trench, above ground, etc.).	
d. Run-off potential High (rainfall run-off score > 0.6) Moderate (0.4 < rainfall run-off score <0.6) Low (0.2 < rainfall run-off score <0.4) Very Low (0 < rainfall run-off score < 0.2) None (rainfall run-off score = 0) Do Not Know		Closest Environment Canada to the site is Cambridge Bay Airport, NU. Average total precipitation = 170 mm = 0.17, Silty Gravel = 0.2 Run off potential = 0.17 x 0.2 = 0.03	Rainfall Refer to Environment Canada precipitation records for relevant areas. Divide rainfall by 1000 and round to nearest tenth (e.g., 667 mm = 0.7 score). The former definition of "annual rainfall" did not include the precipitation as snow. This minor adjustment has been made. The second modification was the inclusion of permeability of surface materials as an evaluation factor.	Selected Sources: Environment Canada web page link: www.msc.ec.gc.ca Snow to rainfall conversion apply ratio of 15 (snow):1(water)

(II) Migration Potential (Evaluation of contaminant migration pathways)

Cambridge Bay Airport Fire Training Area

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method Of Evaluation	Notes
Score	Very Low 0.2		Permeability For infiltration assume: gravel (0), sand (0.3), loam (0.6) and pavement or clay (1). Multiply the infiltration factor with precipitation factor to obtain rainfall run off score.	
e. Flood potential 1 in 2 years 1 in 10 years 1 in 50 years Not in floodplain Do Not Know	1 in 2 years	The Site is not in a flood plain. Annual spring freshet considered annual flood event, 1 in 2 year.	Review published data such as flood plain mapping or flood potential (e.g., spring or mountain run-off) and Conservation Authority records to evaluate flood potential of nearby water courses both up and down gradient. Rate zero if site not in flood plain.	
Score	1			
Potential surface water pathway total	9.2			
Allowed Potential score	9.2	Note: If a "known" score is provided, the "potential" score is disallowed.		
Surface water pathway total	**9.2**			
3. Surface Soils (potential for dust, dermal and ingestion exposure)				
A. Demonstrated concentrations of COPC in surface soils (top 1.5 m)				
COPCs measured in surface soils exceed the CCME soil quality guideline. Strongly suspected that soils exceed guidelines COPCs in surface soils does not exceed the CCME soil quality guideline or is not present (i.e., bedrock).	12 9 0	Exceedances were noted in surficial soils (< 1.5 m bgs) in one location for PHC F1 and one location for PFOS.	Collect all available information on quality of surface soils (i.e., top 1.5 metres) at the site. Evaluate available data against Canadian Soil Quality Guidelines. Select appropriate guidelines based on current (or proposed future) land use (i.e, agricultural, residential/parkland, commercial, or industrial), and soil texture if applicable (i.e., coarse or fine).	Selected References: CCME. 1999. Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health www.ccme.ca
	12			
Score	12			
NOTE: If a score is assigned here for Demonstrated Concentrations in Surface Soils, then you can skip Part B (Potential for a surface soils migration pathway) and go to Section 4 (Vapour)				
B. Potential for a surface soils (top 1.5 m) migration pathway				
a. Are the soils in question covered? Exposed Vegetated Landscaped Paved Do Not Know			Consult engineering or risk assessment reports for the site. Alternatively, review photographs or perform a site visit. Landscaped surface soils must include a minimum of 0.5 m of topsoil.	The possibility of contaminants in blowing snow have not been included in the revised NCS as it is difficult to assess what constitutes an unacceptable concentration and secondly, spills to snow or ice are most efficiently mitigated while freezing conditions remain.
Score	0			
b. For what proportion of the year does the site remain covered by snow? 0 to 10% of the year 10 to 30% of the year More than 30% of the year Do Not Know			Consult climatic information for the site. The increments represent the full span from soils which are always wet or covered with snow (and therefore less likely to generate dust) to those soils which are predominantly dry and not covered by snow (and therefore are more likely to generate dust).	
Score	3			
Potential surface soil pathway total	3			
Allowed Potential score	---	**Note: If a "known" score is provided, the "potential" score is disallowed.**		
Soil pathway total	**12**			
4. Vapour				
A. Demonstrated COPCs in vapour.				
Vapour has been measured (indoor or outdoor) in concentrations exceeding risk based concentrations. Strongly suspected (based on observations and/or modelling) Vapour has not been measured and volatile hydrocarbons have not been found in site soils or groundwater.	12 9 0	Neither indoor or outdoor vapours have been assessed at the site. Soil vapour headspace screening has been conducted for the site. Risk-based calculations have not been performed.	Consult previous investigations, including human health risk assessments, for reports of vapours detected.	
	Go to Potential			
Score	---			
NOTE: If a score is assigned here for Demonstrated COPCs in Vapour, then you can skip Part B (Potential for COPCs in vapour) and go to Section 5 (Sediment)				
B. Potential for COPCs in vapour				
a. Relative Volatility based on Henry's Law Constant, H' (dimensionless) High (H' > 1.0E-1) Moderate (H' = 1.0E-1 to 1.0E-3) Low (H' < 1.0E-3) Not Volatile Do Not Know		Henry's Law Constant for PHCs are low.	Reference: US EPA Soil Screening Guidance (Part 5 - Table 36) *Provided in Attached Reference Materials*	If the Henry's Law Constant for a substance indicates that it is not volatile, and a score of zero is assigned here for relative volatility, then the other three questions in this section on Potential for COPCs will be automatically assigned scores of zero and you can skip to section 5.
	Low			
Score	1			
b. What is the soil grain size? Fine Coarse Do Not Know		Soil on site is coarse. Particle size distribution evaluated (Dillon, 2015).	Review soil permeability data in engineering reports. The greater the permeability of soils, the greater the possible movement of vapours. Fine-grained soils are defined as those which contain greater than 50% by mass particles less than 75 µm mean diameter (D50 < 75 µm). Coarse-grained soils are defined as those which contain greater than 50% by mass particles greater than 75 µm mean diameter (D50 > 75 µm).	
	Coarse			
Score	4			
c. Is the depth to the source less than 10m? Yes No Do Not Know		Permafrost occurs 1.0 to 2.0 m. Active layer meltwater (seasonal groundwater) observed at depths less than 10 m. Localized, surficial impacts observed at depths less than 10 m (Dillon, 2014, 2015).	Review groundwater depths below grade for the site.	

(II) Migration Potential (Evaluation of contaminant migration pathways)

Cambridge Bay Airport Fire Training Area

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method Of Evaluation	Notes
	Yes			
Score	2			
d. Are there any preferential pathways? Yes No Do Not Know	No	There were no observed preferential pathways for vapour migration.	Visit the site during dry summer conditions and/or review available photographs. Where bedrock is present, fractures would likely act as preferential pathyways.	Preferential pathways refer to areas where vapour migration is more likely to occur because there is lower resistance to flow than in the surrounding materials. For example, underground conduits such as sewer and utility lines, drains, or septic systems may serve as preferential pathways. Features of the building itself that may also be preferential pathways include earthen floors, expansion joints, wall cracks, or foundation perforations for subsurface features such as utility pipes, sumps, and drains.
Score	0			
Potential vapour pathway total	7			
Allowed Potential score	7	Note: If a "known" score is provided, the "potential" score is disallowed.		
Vapour pathway total	**7**			
5. Sediment Movement				
A. Demonstrated migration of sediments containing COPCs				
There is evidence to suggest that sediments originally deposited to the site (exceeding the CCME sediment quality guidelines) have migrated.	12	Strongly suspect PFOS in sediment however; not tested.	Review sediment assessment reports. Evidence of migration of contaminants in sediments must be reported by someone experienced in this area.	Usually not considered a significant concern in lakes/marine environments, but could be very important in rivers where transport downstream could be significant.
Strongly suspected (based on observations and/or modelling)	9			
Sediments have been contained and there is no indication that sediments will migrate in future. **or** Absence of sediment exposure pathway (i.e., within 5 km of the site there are no aquatic receiving environments, and therefore no sediments).	0			
	9			
Score	9			
NOTE: If a score is assigned here for Demonstrated Migration of Sediments, then you can skip Part B (Potential for Sediment Migration) and go to Section 6 (Modifying Factors)				
B. Potential for sediment migration				
a. Are the sediments having COPC exceedances capped with sediments having no exceedances ("clean sediments")? Yes No Do Not Know	Do Not Know 2		Review existing sediment assessments. If sediment coring has been completed, it may indicate that historically contaminated sediments have been covered over by newer "clean" sediments. This assessment will require that cores collected demonstrate a low concentration near the top and higher concentration with sediment depth.	
b. For lakes and marine habitats, are the contaminated sediments in shallow water and therefore likely to be affected by tidal action, wave action or propeller wash? Yes No Do Not Know	Do Not Know 2		Review existing sediment assessments. If the sediments present at the site are in a river, select "no" for this question.	
c. For rivers, are the contaminated sediments in an area prone to sediment scouring? Yes No Do Not Know	Do Not Know 2		Review existing sediment assessments. It is important that the assessment is made under worst case flows (high yearly flows). Under high yearly flows, areas which are commonly depositional may	
Potential sediment pathway total	6			
Allowed Potential score	---	Note: If a "known" score is provided, the "potential" score is disallowed.		
Sediment pathway total	**9**			
6. Modifying Factors				
Are there subsurface utility conduits in the area affected by contamination? Yes No Do Not Know	No	No utility corridors	Consult existing engineering reports. Subsurface utilities can act as conduits for contaminant migration.	
Known	0			
Potential	0			

Migration Potential Total		
Raw "known" total	33	
Raw "potential" total	16.2	
Raw combined total	49.2	Note: If "Known" and "Potential" scores are provided, the checklist defaults to known. Therefore, the total "Potential" Score may not reflect the sum of the individual "Potential" scores.
Total (max 33)	**25.4**	

CCME National Classification System (2008, 2010 v 1.2)

(III) Exposure (Demonstrates the presence of an exposure pathway and receptors)

Cambridge Bay Airport Fire Training Area

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method Of Evaluation	Notes
1. Human				
A. Known exposure				
Documented adverse impact or high quantified exposure which has or will result in an adverse effect, injury or harm or impairment of the safety to humans as a result of the contaminated site. (Class 1 Site*)	22	No HHRA performed, go to potential.	*Where adverse effects on humans are documented, the site should be automatically designated as a Class 1 site (i.e., action required). There is no need to proceed through the NCS in this case. However, a scoring guideline (22) is provided in case a numerical score for the site is still desired (e.g., for comparison with other Class 1 sites). This category can be based on the outcomes of risk assessments and applies to studies which have reported Hazard Quotients >1 for noncarcinogenic chemicals and incremental cancer risks that exceed acceptable levels defined by the jurisdiction for carcinogenic chemicals (for most jurisdictions this is typically either $>10^{-5}$ or $>10^{-6}$). Known impacts can also be evaluated based on blood testing (e.g. blood lead >10 ug/dL) or other health based testing. This category can be based on the outcomes of risk assessments and applies to studies which have reported Hazard Quotients of less than 0.2 for non-carcinogenic chemicals and incremental lifetime cancer risks for carcinogenic chemicals that are within acceptable levels as defined by the jurisdiction (for most jurisdictions this is less than either 10^{-6} or 10^{-5}).	Known adverse impact includes domestic and traditional food sources. Adverse effects based on food chain transfer to humans and/or animals can be scored in this category. However, the weight of evidence must show a direct link of a contaminated food source/supply and subsequent ingestion/transfer to humans. Any associated adverse effects to the environment are scored separately later in this worksheet. Someone experienced must provide a thorough description of the sources researched to evaluate and determine the quantified exposure/impact (adverse effect) in the vicinity of the contaminated site. **Selected References:** Health Canada – Federal Contaminated Site Risk Assessment in Canada Parts 1 and 2 Guidance on Human Heath Screening Level Risk Assessments (www.hc-sc.gc.ca/ewh-semt/pubs/contamsite/index_e.html) United States Environmental Protection Agency, Integrated Risk Information System (IRIS) – http://toxnet.nml.nih.gov
Same as above, but "Strongly Suspected" based on observations or indirect evidence.	10			
No quantified or suspected exposures/impacts in humans.	0			
	Go to Potential			
Score	---			
NOTE: If a score is assigned here for Known Exposure, then you can skip Part B (Potential for Human Exposure) and go to Section 2 (Human Exposure Modifying Factors)				
B. Potential for human exposure				
a) Land use (provides an indication of potential human exposure scenarios) Agricultural Residential / Parkland Commercial Industrial Do Not Know	Commercial		Review zoning and land use maps over the distances indicated. If the proposed future land use is more "sensitive" than the current land use, evaluate this factor assuming the proposed future use is in place. Agricultural land use is defined as uses of land where the activities are related to the productive capability of the land or facility (e.g., greenhouse) and are agricultural in nature, or activities related to the feeding and housing of animals as livestock. Residential/Parkland land uses are defined as uses of land on which dwelling on a permanent, temporary, or seasonal basis is the activity (residential), as well as uses on which the activities are recreational in nature and require the natural or human designed capability of the land to sustain that activity (parkland). Commercial/Industrial land uses are defined as land on which the activities are related to the buying, selling, or trading of merchandise or services (commercial), as well as land uses which are related to the production, manufacture, or storage of materials (industrial).	This is the main "receptor" factor used in site scoring. A higher score implies a greater exposure and/or exposure of more sensitive human receptors (e.g., children).
Score	1			
b. Indicate the level of accessibility to the contaminated portion of the site (e.g., the potential for coming in contact with contamination) Limited barriers to prevent site access; contamination not covered Moderate access or no intervening barriers, contaminants are covered. Remote locations in which contaminants not covered. Controlled access or remote location and contaminants are covered Do Not Know	Controlled or remote	Limited access by public. Limited access to potentially impacted groundwaters. Groundwater not used for drinking water.	Review location and structures and contaminants at the site and determine if there are intervening barriers between the site and humans. A low rating should be assigned to a (covered) site surrounded by a fence or in a remote location, whereas a high score should be assigned to a site that has no cover, fence, natural barriers or buffer.	
Score	0			
B. Potential for human exposure				
c) Potential for intake of contaminated soil, water, sediment or foods for operable or potentially operable pathways, as identified in Worksheet II (Migration Potential). i) direct contact Is dermal contact with contaminated surface water, groundwater, sediments or soils anticipated? Yes No Do Not Know	No	Not anticipated as commercial site	If soils or potable groundwater are present exceeding their respective CCME guidelines, dermal contact is assumed. Exposure to surface water, non-potable groundwater or sediments exceeding their respective CCME guidelines will depend on the site. Select "Yes" if dermal exposure to surface water, non-potable groundwater or sediments is expected. For instance, dermal contact with sediments would not be expected in an active port. Only soils in the top 1.5 m are defined by CCME (2003) as surface soils. If contaminated soils are only located deeper than 1.5 m, direct contact with soils is not anticipated to be an operable contaminant exposure pathway.	Exposure via the skin is generally believed to be a minor exposure route. However for some organic contaminants, skin exposure can play a very important component of overall exposure. Dermal exposure can occur while swimming in contaminated waters, bathing with contaminated surface water/groundwater and digging in contaminated dirt, etc.
Score	0			
ii) inhalation (i.e., inhalation of dust, vapour) Vapour - Are there inhabitable buildings on the site within 30 m of soils or groundwater with volatile contamination as determined in Worksheet II (Migration Potential)? Yes No Do Not Know	No	No inhabitable buildings on-site	If inhabitable buildings are on the site within 30 m of soils or groundwater exceeding their respective guidelines for volatile chemicals, there is a potential of risk to human health (Health Canada, 2004). Review site investigations for location of soil samples (having exceedances of volatile substances) relative to buildings. Refer to (II) Migration Potential worksheet, 4B.a), *Potential for COPCs in Vapour* for a definition of volatility.	Exposure via the lungs (inhalation) can be a very important exposure pathway. Inhalation can be via both particulates (dust) and gas (vapours). Vapours can be a problem where buildings have been built on former industrial sites or where volatile contaminants have migrated below buildings resulting in the potential for vapour intrusion. Assesses the potential for humans to be exposed to vapours originating from site soils. The closer the receptor is to a source of volatile chemicals in soil, the greater the potential of exposure. Also, coarser-grained soil will convey vapour much more efficiently in the soil than finer grained material such as clays and silts. General Notes; Someone experienced must provide a thorough description of the sources researched to determine the presence/absence of a vapour migration and/or dust generation in the vicinity of the contaminated site. This information must be documented in the NCS Site Classification Worksheet including contact names, phone numbers, e-mail correspondence and/or reference maps/reports and other resource such as internet links. Selected References; Canadian Council of Ministers of the Environment (CCME). 2006. Protocol for the Derivation of Environmental and Human Health Soil Quality Guidelines. PN 1332. www.ccme.ca Golder, 2004. Soil Vapour Intrusion Guidance for Health Canada Screening Level Risk Assessment (SLRA) Submitted to Health Canada, Burnaby, BC
Score	0			
Dust - If there is contaminated surface soil (e.g. top 1.5 m) , indicate whether the soil is fine or coarse textured. If it is known that surface soil is not contaminated, enter a score of zero. Fine Coarse Surface soil is not contaminated or absent Do Not Know Texture	Coarse	Soil is coarse. Surficial impacts observed (< 1.5 m bgs, Dillon, 2014, 2015)	Consult grain size data for the site. If soils (containing exceedances of the CCME soil quality guidelines) predominantly consist of fine material (having a median grain size of 75 microns; as defined by CCME (2006)) then these soils are more likely to generate dusts.	
Score	1			
inhalation total	1			

CCME National Classification System (2008, 2010 v 1.2)

(III) Exposure (Demonstrates the presence of an exposure pathway and receptors)

Cambridge Bay Airport Fire Training Area

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method Of Evaluation	Notes
B. Potential for human exposure				
iii) Ingestion (i.e., ingestion of food items, water and soils [for children]), including traditional foods.		Water Lake is the drinking water source for Cambridge Bay, and is located > 1 km from the site. There is the potential for ingestion of traditional foods (fish). Cambridge Bay is located approx. 100 m from the site.	Review available site data to determine if drinking water (groundwater, surface water, private, commercial or municipal supply) is known or suspected to be contaminated above Guidelines for Canadian Drinking Water Quality. If drinking water supply is known to be contaminated, some immediate action (e.g., provision of alternate drinking water supply) should be initiated to reduce or eliminate exposure. The evaluation of significant potential for exceedances of the water supply in the future may be based on the capture zones of the drinking water wells; contaminant travel times; computer modelling of flow and contaminant transport.	**Selected References:** Guidelines for Canadian Drinking Water Quality: www.hc-sc.gc.ca/hecs-sesc/water/publications/drinking_water_quality_guidelines/toc.htm Drinking water can be an extremely important exposure pathway to humans. If site groundwater or surface water is not used for drinking, then this pathway is considered to be inoperable. Consider both wild foods such as salmon, venison, caribou, as well as agricultural sources of food items if the contaminated site is on or adjacent to agricultural land uses.
Drinking Water: Choose a score based on the proximity to a drinking water supply, to indicate the potential for contamination (present or future).				
0 to 100 m 100 to 300 m 300 m to 1 km 1 to 5 km No drinking water present Do Not Know				
	100 to 300 m			
Score	2.5			
Is an alternative water supply readily available?		Multiple freshwater lakes in vicinity.		
Yes No Do Not Know	Yes			
Score	0			
Is human ingestion of contaminated soils possible?		Site is not directly used for hunting or traditional land use.	If contaminated soils are located within the top 1.5 m, it is assumed that ingestion of soils is an operable exposure pathway. Exposure to soils deeper than 1.5 m is possible, but less likely, and the duration is shorter. Refer to human health risk assessment reports for the site in question.	
Yes No Do Not Know	No			
Score	0			
Are food items consumed by people, such as plants, domestic animals or wildlife harvested from the contaminated land and its surroundings?		Site is not directly used for hunting or traditional land use.	Use human health risk assessment reports (or others) to determine if there is significant reliance on traditional food sources associated with the site. Is the food item in question going to spend a large proportion of its time at the site (e.g., large mammals may spend a very small amount of time at a small contaminated site)? Human health risk assessment reports for the site in question will also provide information on potential bioaccumulation of the COPC in question.	
Yes No Do Not Know	No			
Score	0			
Ingestion total	2.5			
Human Health Total "Potential" Score	4.5	Note if a "Known" Human Health score is provided, the "Potential" score is disallowed.		
Allowed "Potential" Score	4.5			
2. Human Exposure Modifying Factors				
a) Strong reliance of local people on natural resources for survival (i.e., food, water, shelter, etc.)	Yes	Strong reliance of local people on natural resources for survival. Local residents fish and hunt (i.e. seal, whales).		
Yes No Do Not Know				
Known	6			
Potential	---			
Raw Human "known" total	6			
Raw Human "potential" total	4.5			
Raw Human Exposure Total Score	10.5			
Human Health Total (max 22)	**10.5**			
3. Ecological				
A. Known exposure				
Documented adverse impact or high quantified exposure which has or will result in an adverse effect, injury or harm or impairment of the safety to terrestrial or aquatic organisms as a result of the contaminated site.	18	No ERA for PFOS. Go to potential.	Some low levels of impact to ecological receptors are considered acceptable, particularly on commercial and industrial land uses. However, if ecological effects are deemed to be severe, the site may be categorized as class one (i.e., a priority for remediation or risk management), regardless of the numerical total NCS score. For the purpose of application of the NCS, effects that would be considered severe include observed effects on survival, growth or reproduction which could threaten the viability of a population of ecological receptors at the site. Other evidence that qualifies as severe adverse effects may be determined based on professional judgement and in consultation with the relevant jurisdiction. If ecological effects are determined to be severe and an automatic Class 1 is assigned, there is no need to proceed through the NCS. However, a scoring guideline (18) is provided in case a numerical score for the site is still desired (e.g., for comparison with other Class 1 sites).	CCME, 1999: Canadian Water Quality Guidelines for the Protection of Aquatic Life. www.ccme.ca CCME, 1999: Canadian Water Quality Guidelines for the Protection of Agricultural Water Uses. www.ccme.ca Sensitive receptors- review: Canadian Council on Ecological Areas; www.ccea.org. Ecological effects should be evaluated at a population or community level, as opposed to at the level of individuals. For example, population-level effects could include reduced reproduction, growth or survival in a species. Community-level effects could include reduced species diversity or relative abundances. Further discussion of ecological assessment endpoints is provided in *A Framework for Ecological Risk Assessment: General Guidance* (CCME 1996). Notes: Someone experienced must provide a thorough description of the sources researched to classify the environmental receptors in the vicinity of the contaminated site. This information must be documented in the NCS Site Classification Worksheet including contact names, phone numbers, e-mail correspondence and/or reference maps/reports and other resource such as internet links.
Same as above, but "Strongly Suspected" based on observations or indirect evidence.	12		This category can be based on the outcomes of risk assessments and applies to studies which have reported Hazard Quotients >1. Alternatively, known impacts can also be evaluated based on a weight of evidence assessment involving a combination of site observations, tissue testing, toxicity testing and quantitative community assessments. Scoring of adverse effects on individual rare or endangered species will be completed on a case-by-case basis with full scientific justification.	
No quantified or suspected exposures/impacts in terrestrial or aquatic organisms	0		This category can be based on the outcomes of risk assessments and applies to studies which have reported Hazard Quotients of less than 1 and no other observable or measurable sign of impacts. Alternatively, it can be based on a combination of other lines of evidence showing no adverse effects, such as site observations, tissue testing, toxicity testing and quantitative community assessments.	
	Go to Potential			
Score	---			
NOTE: If a score is assigned here for Known Exposure, then you can skip Part B (Potential for Ecological Exposure) and go to Section 4 (Ecological Exposure Modifying Factors)				

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method Of Evaluation	Notes
B. Potential for ecological exposure (for the contaminated portion of the site)				
a) Terrestrial			Review zoning and land use maps. If the proposed future land use is more "sensitive" than the current land use, evaluate this factor assuming the proposed future use is in place (indicate in the worksheet that future land use is the consideration).	
i) Land use				
Agricultural (or Wild lands) Residential/Parkland Commercial Industrial Do Not Know			Agricultural land use is defined as uses of land where the activities are related to the productive capability of the land or facility (e.g., greenhouse) and are agricultural in nature, or activities related to the feeding and housing of animals as livestock. Wild lands are grouped with agricultural land due to the similarities in receptors that would be expected to occur there (e.g., herbivorous mammals and birds) and the similar need for a high level of protection to ensure ecological functioning. Residential/Parkland land uses are defined as uses of land on which dwelling on a permanent, temporary, or seasonal basis is the activity (residential), as well as uses on which the activities are recreational in nature and require the natural or human designed capability of the land to sustain that activity (parkland). Commercial/Industrial land uses are defined as land on which the activities are related to the buying, selling, or trading of merchandise or services (commercial), as well as land uses which are related to the production, manufacture, or storage of materials (industrial).	
	Commercial			
Score	1			
ii) Uptake potential		Surficial soils impacted (Dillon, 2014, 2015)		
Direct Contact - Are plants and/or soil invertebrates likely exposed to contaminated soils at the site?	Yes		If contaminated soils are located within the top 1.5 m, it is assumed that direct contact of soils with plants and soil invertebrates is an operable exposure pathway. Exposure to soils deeper than 1.5 m is possible, but less likely.	
Yes No Do Not Know				
Score	1			
iii) Ingestion (i.e., wildlife or domestic animals ingesting contaminated food items, soils or water)		Unlikely.		
Are terrestrial animals likely to be ingesting contaminated water at the site?			Refer to an Ecological Risk Assessment for the site. If there is contaminated surface water at the site, assume that terrestrial organisms will ingest it.	
Yes No Do Not Know	Do Not Know			
Score	0.5			
Are terrestrial animals likely to be ingesting contaminated soils at the site?		Impacts not at surface for animal uptake.	Refer to an Ecological Risk Assessment report. Most animals will co-ingest some soil while eating plant matter or soil invertebrates.	
Yes No Do Not Know	No			
Score	0			
Can the contamination identified bioaccumulate?		Yes, PFOS bioaccumulates.	Bioaccumulation of contaminants within food items is considered possible if: 1) The Log(Kow) of the contaminant is greater than 4 (as per the chemical characteristics work sheet) and concentrations in soils exceed the most conservative CCME soil quality guideline for the intended land use, or 2) The contaminant in collected tissue samples exceeds the Canadian Tissue Residue Guidelines.	
Yes No Do Not Know	Yes			
Score	1			
Distance to sensitive terrestrial ecological area		Approx. 100 m to Cambridge Bay.	It is considered that within 300 m of a site, there is a concern for contamination. Therefore an environmental receptor located within this area of the site will be subject to further evaluations. It is also considered that any environmental receptor located greater than 5 km will not be a concern for evaluation. Review Conservation Authority mapping and literature including Canadian Council on Ecological Areas link: www.ccea.org.	Environmental receptors include: local, regional or provincial species of interest or significance; arctic environments (on a site specific basis); nature preserves, habitats for species at risk, sensitive forests, natural parks or forests.
0 to 300 m 300 m to 1 km 1 to 5 km > 5 km Do Not Know				
	0 to 300 m			
Score	3			
Raw Terrestrial Total Potential	6.5	Note if a "Known" Ecological Effects score is provided, the "Potential" score is disallowed.		
Allowed Terrestrial Total Potential	6.5			
B. Potential for ecological exposure (for the contaminated portion of the site)				
b) Aquatic		No known sensitive ecological areas in immediate vicinity.	"Sensitive aquatic environments" include those in or adjacent to shellfish or fish harvesting areas, marine parks, ecological reserves and fish migration paths. Also includes those areas deemed to have ecological significance such as for fish food resources, spawning areas or having rare or endangered species.	
i) Classification of aquatic environment				
Sensitive Typical Not Applicable (no aquatic environment Do Not Know			"Typical aquatic environments" include those in areas other than those listed above.	
	Typical			
Score	1			
ii) Uptake potential		Groundwater pathways not assessed at water's edge		
Does groundwater daylighting to an aquatic environment exceed the CCME water quality guidelines for the protection of aquatic life at the point of contact?			Groundwater concentrations of contaminants at the point of contact with an aquatic receiving environment can be estimated in three ways: 1) by comparing collected nearshore groundwater concentrations to the CCME water quality guidelines (this will be a conservative comparison, as contaminant concentrations in groundwater often decrease between nearshore wells and the point of discharge). 2) by conducting groundwater modeling to estimate the concentration of groundwater immediately before discharge. 3) by installing water samplers, "peepers", in the sediments in the area of daylighting groundwater.	
Yes No (or Not Applicable) Do Not Know	Do Not Know			
Score	0.5			
Distance from the contaminated site to an important surface water resource		Cambridge Bay approx. 100 m distance from the site.		Environmental receptors include: local, regional or provincial species of interest or significance, sensitive wetlands and fens and other aquatic environments.
0 to 300 m 300 m to 1 km 1 to 5 km > 5 km Do Not Know			It is considered that within 300 m of a site, there is a concern for contamination. Therefore an environmental receptor or important water resource located within this area of the site will be subject to further evaluation. It is also considered that any environmental receptor located greater than 5 km away will not be a concern for evaluation. Review Conservation Authority mapping and literature including Canadian Council on Ecological Areas link: www.ccea.org.	
	0 to 300 m			
Score	3			
			Bioaccumulation of food items is possible if:	

(III) Exposure (Demonstrates the presence of an exposure pathway and receptors)

Cambridge Bay Airport Fire Training Area

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method Of Evaluation	Notes
Are aquatic species (i.e., forage fish, invertebrates or plants) that are consumed by predatory fish or wildlife consumers, such as mammals and birds, likely to accumulate contaminants in their tissues?		Concentrations in biological tissues not known; however, PFOS bioaccumulates	1) The Log(Kow) of the contaminant is greater than 4 (as per the chemical characteristics work sheet) and concentrations in sediments exceed the CCME ISQGs. 2) The contaminant in collected tissue samples exceeds the CCME tissue quality guidelines.	
Yes				
No				
Do Not Know	Yes			
Score	1			
Raw Aquatic Total Potential	5.5	Note if a "Known" Ecological Effects score is provided, the "Potential" score is disallowed.		
Allowed Aquatic Total Potential	5.5			
4. Ecological Exposure Modifying Factors				
a) Known occurrence of a species at risk.		Unlikely, but may occur in the general area (> 1 km distance)	Consult any ecological risk assessment reports. If information is not present, utilize on-line databases such as Eco Explorer. Regional, Provincial (Environment Ministries), or Federal staff (Fisheries and Oceans or Environment Canada) should be able to provide some guidance.	Species at risk include those that are extirpated, endangered, threatened, or of special concern. For a list of species at risk, consult Schedule 1 of the federal Species at Risk Act (http://www.sararegistry.gc.ca/species/schedules_e.cfm?id=1). Many provincial governments may also provide regionally applicable lists of species at risk. For example, in British Columbia, consult: BCMWLAP. 2005. Endangered Species and Ecosystems in British Columbia. Provincial red and blue lists. Ministry of Sustainable Resource Management and Water, Land and Air Protection. http://srmwww.gov.bc.ca/atrisk/red-blue.htm
Is there a potential for a species at risk to be present at the site?				
Yes				
No				
Do Not Know	Yes			
	2			
Score	---			
b) Potential impact of aesthetics (e.g., enrichment of a lake or tainting of food flavor).		Not observed during site visit.		
Is there evidence of aesthetic impact to receiving water bodies?	No		Documentation may consist of environmental investigation reports, press articles, petitions or other records.	This Item will require some level of documentation by user, including contact names, addresses, phone numbers, e-mail addresses. Evidence of changes must be documented, please attach copy of report containing relevant information.
Yes				
No	0			
Do Not Know	---			
Is there evidence of olfactory impact (i.e., unpleasant smell)?	No		Examples of olfactory change can include the smell of a COPC or an increase in the rate of decay in an aquatic habitat.	
Yes				
No	0			
Do Not Know	---			
Is there evidence of increase in plant growth in the lake or water body?	No		A distinct increase of plant growth in an aquatic environment may suggest enrichment. Nutrients e.g., nitrogen or phosphorous releases to an aquatic body can act as a fertilizer.	
Yes				
No	0			
Do Not Know	---			
Is there evidence that fish or meat taken from or adjacent to the site smells or tastes different?	No		Some contaminants can result in a distinctive change in the way food gathered from the site tastes or smells.	
Yes	0			
No	---			
Do Not Know				
Ecological Modifying Factors Total - Known	**2**			
Ecological Modifying Factors Total - Potential	**---**			
Raw Ecological Total - Known	2			
Raw Ecological Total - Potential	12			
Raw Ecological Total	14			
Ecological Total (Max 18)	**14.0**			
5. Other Potential Contaminant Receptors				
a) Exposure of permafrost (leading to erosion and structural concerns)		Site is located in an Arctic environment. Permafrost is present.		Plants and lichens provide a natural insulating layer which will help prevent thawing of the permafrost during the summer. Plants and lichens may also absorb less solar radiation. Solar radiation is turned into heat which can also cause underlying permafrost to melt.
Are there improvements (roads, buildings) at the site dependant upon the permafrost for structural integrity?	Yes		Consult engineering reports, site plans or air photos of the site. When permafrost melts, the stability of the soil decreases, leading to erosion. Human structures, such as roads and/or buildings are often dependent on the stability that the permafrost provides.	
Yes				
No	4			
Do Not Know	---			
Is there a physical pathway which can transport soils released by damaged permafrost to a nearby aquatic environment?	Do Not Know	Unsure	Melting permafrost leads to a decreased stability of underlying soils. Wind or surface run-off erosion can carry soils into nearby aquatic habitats. The increased soil loadings into a river can cause an increase in total dissolved solids and a resulting decrease in aquatic habitat quality. In addition, the erosion can bring contaminants from soils to aquatic environments.	
Yes				
No	---			
Do Not Know	1			
Other Potential Receptors Total - Known	**4**			
Other Potential Receptors Total - Potential	**1**			

Exposure Total		
Raw Human Health + Ecological Total - Known	12	Only includes "Allowed potential" - if a "Known" score was supplied under a given category then the "Potential" score was not included.
Raw Human Health + Ecological Total - Potential	17.5	
Raw Total	29.5	
Exposure Total (max 34)	**21.8**	

CCME National Classification System (2008, 2010 v 1.2)
Score Summary

Scores from individual worksheets are tallied in this worksheet.
Refer to this sheet after filling out the revised NCS completely.

I. Contaminant Characteristics	Known	Potential
1. Residency Media	4	1
2. Chemical Hazard	8	---
3. Contaminant Exceedance Factor	2	---
4. Contaminant Quantity	2	---
5. Modifying Factors	4	---
Raw Total Score	20	1
Raw Total Score (Known + Potential)	21	
Adjusted Total Score (Raw Total / 40 *33)	**17.3**	(max 33)

II. Migration Potential	Known	Potential
1. Groundwater Movement	12	---
2. Surface Water Movement	---	9.2
3. Soil	12	---
4. Vapour	---	7
5. Sediment Movement	9	---
6. Modifying Factors	0	0
Raw Total Score	33	16.2
Raw Total Score (Known + Potential)	49.2	
Adjusted Total Score (Raw Total / 64 * 33)	**25.4**	(max 33)

III. Exposure	Known	Potential
1. Human Receptors		
A. Known Impact	---	
B Potential		
a. Land Use		1
b. Accessibility		0
c. Exposure Route		
i. Direct Contact		0
ii. Inhalation		1
iii. Ingestion		2.5
2. Human Receptors Modifying Factors	6	---
Raw Total Human Score	6	4.5
Raw Total Human Score (Known + Potential)	10.5	
Adjusted Total Human Score	10.5	(maximum 22)
3. Ecological Receptors		
A. Known Impact	---	
B. Potential		
a. Terrestrial		6.5
b. Aquatic		5.5
4. Ecological Receptors Modifying Factors	2	---
Raw Total Ecological Score	2	12
Raw Total Ecological Score (Known + Potential)	14	
Adjusted Total Ecological Score	14.0	(maximum 18)
5. Other Receptors	4	1
Total Other Receptors Score (Known + Potential)	5	
Total Exposure Score (Human + Ecological + Other)	**29.5**	
Adjusted Total Exposure Score (Total Exposure / 46 * 34)	**21.8**	(max 34)

Site Score

Cambridge Bay Airport Fire Training Area

Site Letter Grade	**B**
Certainty Percentage	**75%**
% Responses that are "Do Not Know"	**-7%**
Total NCSCS Score for site	**64.5**
Site Classification Category	**2**

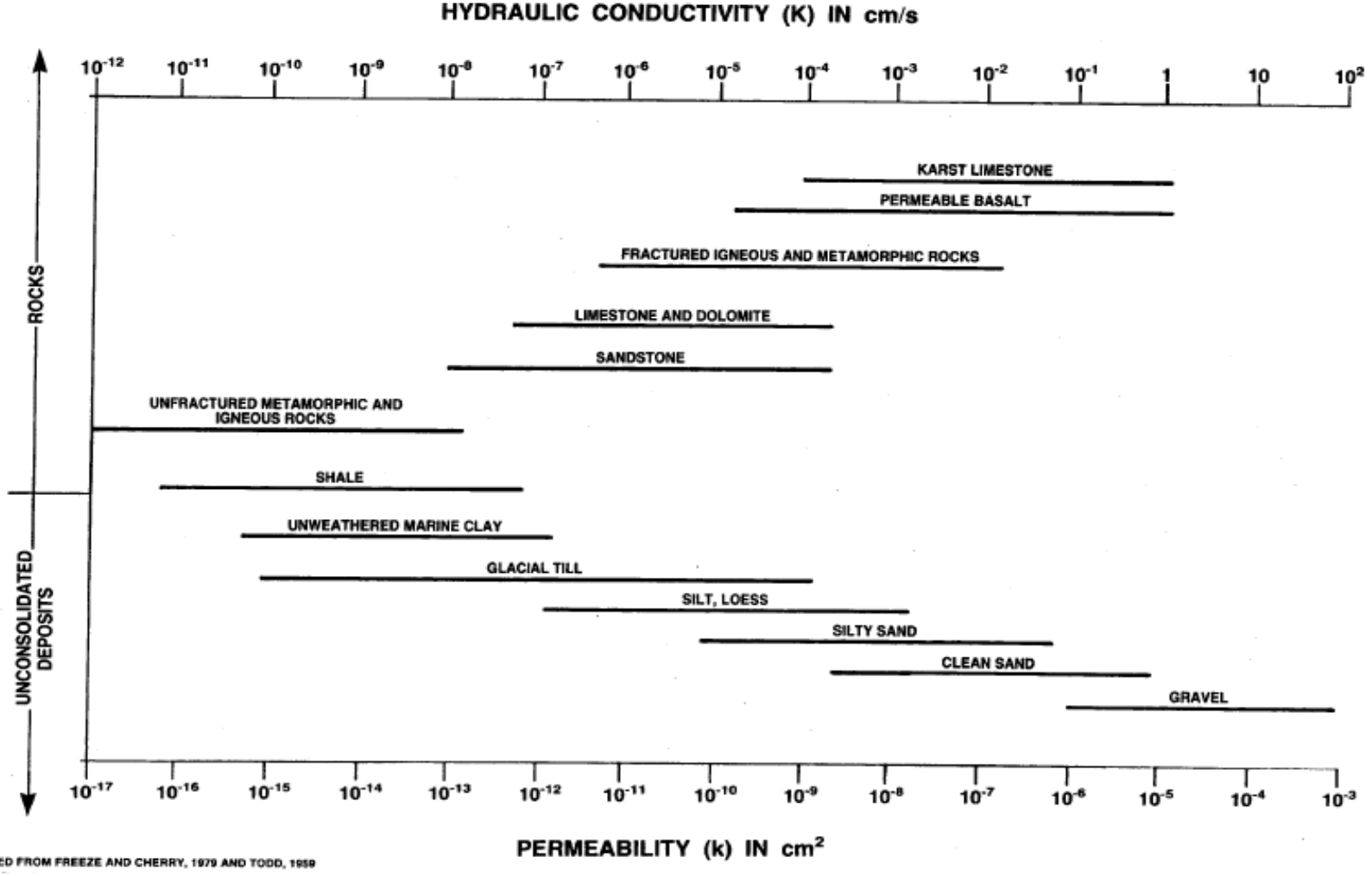
Site Classification Categories*:

Class 1 - High Priority for Action (Total NCS Score >70)
Class 2 - Medium Priority for Action (Total NCS Score 50 - 69.9)
Class 3 - Low Priority for Action (Total NCS Score 37 - 49.9)
Class N - Not a Priority for Action (Total NCS Score <37)
Class INS - Insufficient Information (>15% of responses are "Do Not Know")

* NOTE: The term "action" in the above categories does not necessarily refer to remediation, but could also include risk assessment, risk management or further site characterization and data collection.

RANGE OF VALUES OF HYDRAULIC CONDUCTIVITY AND PERMEABILITY

The information on Koc is used in Sheet II (Migration Potential), section 1,B,f (Hydraulic Conductivity)



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