2018 Site Remedial Activities Supervision and Environmental Monitoring Program – Cambridge Bay Airport, Fire Training Area Land Treatment Unit

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Prepared for:

Public Services and Procurement Canada
for Transport Canada

Prepared by:

Stantec Consulting Ltd.

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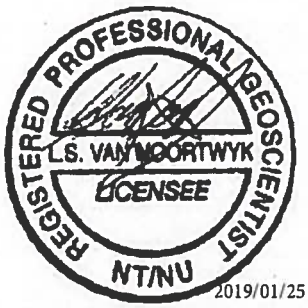
Sign-off Sheet

This document entitled 2018 Site Remedial Activities Supervision and Environmental Monitoring Program – Cambridge Bay Airport, Fire Training Area Land Treatment Unit was prepared by Stantec Consulting Ltd. ("Stantec") for the account of Public Services and Procurement Canada for Transport Canada (the "Client").



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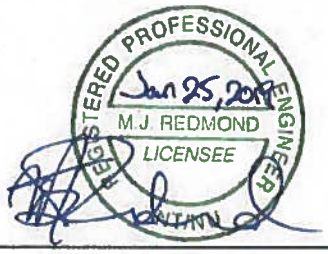

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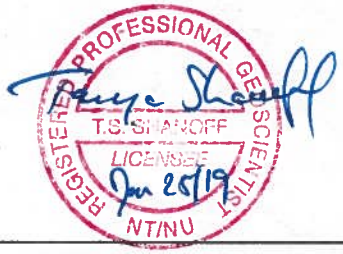

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Executive Summary

Stantec Consulting Ltd. (Stantec) completed the 2018 Site Remedial Activities supervision and Environmental Monitoring Program (the Program) at the Fire Training Area (FTA) Land Treatment Unit (LTU) located at the south west portion of the Cambridge Bay Airport in Cambridge Bay, Victoria Island, Nunavut (NU). The LTU is approximately 67 metres (m) x 240 m in dimension and contains approximately 4550 m^3 of impacted soil. The field program was conducted between August 8 to 17, 2018. The Program was completed with the authorization of Public Services and Procurement Canada (PSPC) on behalf of Transport Canada (TC).

The remedial activities consisted of tilling and aerating the impacted soil in the FTA LTU to increase water absorption and conducting dewatering activities. The environmental monitoring program consisted of collecting soil and groundwater samples to satisfy the Nunavut Water Board (NWB) licence requirements (Licence No. 1BR-FTA1828). Only one soil sampling event was conducted as no active soil treatment is occurring at the LTU. Only one of the 11 groundwater monitoring wells had sufficient groundwater to allow for monitoring and sampling.

Remedial Activities Supervision

Aeration of the LTU was conducted between August 11 and 12, 2018 by Kitnuna of Cambridge Bay, NU (Kitnuna), a subcontractor engaged by Stantec. Aeration was completed using a dozer with a disk harrow attachment to till the soil. The disk harrow attachment was dragged by the dozer across the surface of the LTU three times in a circular pattern to disturb surface soil and to encourage an increase of water absorption.

Accumulated water from the southeast and northwest LTU sumps was fully de-watered onto the soil contained within the FTA LTU. De-watering activities were completed between August 13 and 17, 2018. Based on field measurements, approximately 135 m^3 of water was removed from the NW sump and approximately 50 m^3 of water was removed from the SE sump.

Stantec monitored 11 groundwater monitoring wells associated with the FTA LTU and excavation area. During the monitoring portion of the Program, MW15-8 was the only monitoring well that contained sufficient water for sample collection. The well was located hydraulically downgradient of, and immediately adjacent to, the FTA excavated area. The remaining monitoring wells did not contain sufficient water to allow for monitoring or sampling, or they were frozen. The depth to water (or ice) in the 11 monitoring wells ranged from 1.896 metres below top of casing (mBTOC) in MW15-1 to 2.483 mBTOC in MW15-4.

The groundwater sample collected from MW15-8 and its corresponding field duplicate sample were submitted for analysis of dissolved total metals, routine parameters, polycyclic aromatic hydrocarbons (PAHs), PFAS, oil and grease, phenols, petroleum hydrocarbons (PHCs) including benzene, toluene, ethylbenzene, and xylenes (BTEX) and PHC fractions F1 and F2. (Part J, Item 7 of the licence).

The reported concentrations of dissolved BTEX and PHC Fractions F1 and F2, PAHs, and oil and grease parameters analyzed were below the laboratory reportable detection limits. The laboratory reported concentrations of the parameters analyzed satisfied the applicable and referenced guidelines with the exception of the parameters summarized in Table A, below.

Table A Parameters Exceeding Applicable Guidelines

Parameter Category	Individual Parameter	Applicable Guideline Exceeded
Total Metals	Total iron, copper, silver	CWQG The copper concentration was one order of magnitude greater than the applicable guideline. The iron and silver concentrations were within the same order of magnitude of the applicable guidelines.
Routine	Dissolved chloride	CWQG The dissolved chloride concentration was within the same order of magnitude as the applicable guideline.
PFAS	Perfluoroheptanoic Acid (PFHpA), Perfluorohexane Sulfonate (PFHxS), Perfluorohexanoic Acid (PFHxA), Perfluoro-n-Octanoic Acid (PFOA), Perfluoropentanoic Acid (PFPeA), Perfluorononanoic Acid (PFNA) (reportable detection limit)	HC drinking water screening value. The concentrations ranged from one to two orders of magnitude greater than guidelines.
PFAS	Perfluorooctane Sulfonate (PFOS)	Effluent guideline per the NWB Licence, HC drinking water screening value, and the ECC guideline. The PFOS concentration was one to two orders of magnitude greater than the applicable guidelines.

Soil samples were collected from a depth of approximately 0.0-0.3 m below ground surface (BGS) within the FTA LTU. Six soil samples and one field duplicate were collected and analyzed for PHC including BTEX and PHC fractions F1-F4, and lead as required by the NWB Licence in Part J, Table 1. TC confirmed that analysis for PCBs, which is also listed in the NWB Licence in Part J, Table 1, was not required. The PHC soil concentrations were below the laboratory detection limit with the exception of PHC F2 (FTA S01, S04, S05, and S06), F3 (all six samples) and F4 (S01 and S03). Detectable lead soil concentrations were measured in the six soil samples. The laboratory analytical results indicated that the concentrations of the parameters were below the applicable and referenced guidelines.

Quality Assurance / Quality Control

In general, the data quality objective for the Program was considered to have been met; however, due to unexpected complications with shipping which resulted in the laboratory hold times for soil analysis of BTEX and PHC F1 parameters being exceeded, the reported BTEX and PHC F1 concentrations in soil may be biased low. As the reported concentrations were less than the laboratory RDLs, the bias did not impact the findings of the Program.

Limitations

The statements made in the Executive Summary are subject to the same limitations included in the Limitations Section 7.0 and are to be read in conjunction with the remainder of this report.

1.0 INTRODUCTION

Stantec Consulting Ltd. (Stantec) completed the 2018 Site Remedial Activities supervision and Environmental Monitoring Program (the Program) at the Fire Training Area (FTA) Land Treatment Unit (LTU) located at the Cambridge Bay Airport in Cambridge Bay, Victoria Island, Nunavut. The Program was completed under the authorization of Public Services and Procurement Canada (PSPC) on behalf of Transport Canada (TC).

The Site location is presented in Figure 1 of **Appendix A.**

1.1 OBJECTIVES

The objectives of the Program were as follows:

- Complete an environmental monitoring program to satisfy the Nunavut Water Board (NWB) licence requirements (Licence No. 1BR-FTA1828)
- Modify soil sampling requirements to one sampling event as no active soil treatment is occurring
- Till / aerate the FTA LTU to increase water absorption
- Conduct dewatering activities

1.2 BACKGROUND

The FTA was identified as an area of environmental concern (AEC) as part of an operations transfer agreement between Transport Canada (TC) and the Government of Nunavut (GN). Previous investigations confirmed the presence of petroleum hydrocarbon (PHC) and metals impacted soil in the FTA.

The following environmental reports were reviewed by Stantec prior to undertaking the field work program:

- Arcadis Canada Inc. January 5, 2017. Site Remedial Activities Supervision and Monitoring Program at the FTA, Cambridge Bay Airport, Victoria Island, Nunavut. File No. 12089-001.
- Arcadis Canada Inc. February 22, 2018. 2017 Environmental Monitoring Program – FTA LTU, Cambridge Bay Airport, Victoria Island, Nunavut. File No. 12089-002.
- Dillon Consulting. January 2016. Closure Report, Cambridge Bay Fire Training Area, Victoria Island, NU, PWGSC Project No. R.056019.005.

The environmental reports listed above indicated that approximately 4,260 cubic metres (m^3) of impacted soil was excavated in 2014 and 2015 and transferred to the FTA LTU which was constructed immediately north of the excavated area to contain and treat the impacted soil. The FTA LTU, measuring approximately 67 metres (m) x 240 m, was constructed with a geomembrane liner covered by a 0.25 m thick granular base layer and a berm. Impacted soil occupies approximately 75% of the LTU. An additional 290 m^3 of soil was later transferred to the FTA LTU from the adjacent Apron LTU.

Four groundwater monitoring wells (MW15-1 through MW15-4) were installed around the FTA LTU, and seven groundwater monitoring wells (MW15-5 through MW15-11) were installed in the vicinity of the FTA excavated area (five are located within the excavated area and two are located hydraulically downgradient on the south side of the south airport access road).

Two sumps are located within the FTA LTU (in the northwest and southeast corners, respectively).

Previous soil, sump, and groundwater sampling events indicated the presence of poly- and perfluoroalkyl substances (PFAS) in soil and groundwater, for which a national strategy has not been determined; therefore, remediation efforts were put on hold. As the water within the sumps of the LTU contained concentrations of PFAS above the Health Canada Drinking Water Screening Values, the sump water cannot be discharged to the environment, and was spread over the impacted soil in the LTU.

Ongoing monitoring of the soil and water associated with the FTA is required per the Nunavut Water Board (NBW) Licence No. 1BR-FTA1828.

The Site layout and monitoring well locations are shown on Figure 2, **Appendix A**.

1.3 SCOPE OF WORK

The scope of work of the Program is outlined in the sections below.

1.3.1 Task 1 – Health and Safety

- Prepare a site-specific health and safety plan to identify and address site specific hazards

1.3.2 Task 2 – Remedial Activities Supervision

- Engage, manage, administer, and provide review of the work carried out by a contractor to till / aerate the FTA LTU, to dewater the sumps, and to discharge the sump water onto the FTA LTU
  - Provision quality control to mitigate potential damage to the LTU
- Report on site activities and work done in compliance with regulatory licenses
- Review available project documentation, drawings, licenses, permits, and other supporting documents to become familiar with the goals of the project and allow for a good working knowledge of the site and issues that pertain to the site in the context of completing the remedial work
- Provide consultant on-site supervision services for the duration of key components of the remedial work
- Submit daily field reports to the PSPC Project Manager and the TC Project Manager during field activities
- Preside over onsite meetings
- Review, track, and provide feedback on the project schedule
- Manage / coordinate the transportation to the respective testing facilities of samples collected
- Prepare a report for submission to the NWB

1.3.3 Task 3 – Environmental Monitoring

- Upon completion of the tilling /aeration of the LTU by a third-party, and prior to sump de-watering, divide the LTU into six sections and collect six soil samples using hand tools and one field duplicate sample from the top 0.30 m of the LTU.
- Georeference sample locations with easting and northing UTM coordinates based on NAD 83 system.
- Monitor the existing groundwater monitoring wells (MW15-1 through MW15-11) for depth to liquid petroleum hydrocarbons (if present) and depth to water.
- Purge the existing monitoring wells and collect 11 groundwater samples and two field duplicate samples.
- Submit the samples to Maxxam Analytics International Corporation (Maxxam) of Yellowknife, NT for analysis of the parameters specified in the NWB Licence (and Section 3.2.3 of this report).

- Provide a letter from Maxxam confirming review of quality control sampling plan.

1.3.4 Deviations from Scope of Work

- Only one groundwater sample and one field duplicate sample were collected from one of the existing monitoring wells (MW15-8) as the remaining monitoring wells were either frozen or contained insufficient water to allow for sample collection.

2.0 REGULATORY FRAMEWORK

Soil remediation requirements were determined by NWB Licence NO. 1BR-FTA-1828, Part J, Table 1 (updated October 31, 2018). The soil remediation requirements were derived from the Canadian Council of Ministers of the Environment (CCME) 2008 Canada-Wide Standards for Petroleum Hydrocarbons (PHC) in Soil and the Government of Nunavut 2009 Environmental Guideline for Site Remediation. Per the licence, the soil analytical results were compared to the Remediation Requirements for Industrial land use and coarse-grained soil. As the Site is not considered potable, the guidelines for protection of potable groundwater were excluded.

Groundwater analytical results were compared to effluent guidelines provided in NWB Licence No. 1-B-FTA-1828, Part E, Item 5 as well as the CCME Canadian Water Quality Guidelines (CWQG) for the protection of aquatic life (freshwater), the Environment and Climate Change Canada (ECCC) 2017 Federal Environmental Quality Guidelines for Perfluorooctanoic Sulfonate (PFOS) (ECCC guidelines), and the Health Canada 2018 Drinking Water Screening Values: Perfluoroalkylated Substances (Health Canada guidelines).

The NWB directed TC to use the Ontario Ministry of Environment and Climate Change (now referred to as the Ontario Ministry of the Environment, Conservation, and Parks) 2016 Soil, Groundwater, and Sediment Standards for use under Part X.V.1 of the Environmental Protection Act (MECP 2016) for parameters in groundwater where CWQG and effluent guidelines were not available.

3.0 METHODOLOGY

3.1 REMEDIAL ACTIVITIES SUPERVISION

Aeration of the LTU was conducted between August 11 and 12, 2018 by Kitnuna of Cambridge Bay, NU (Kitnuna). Aeration was completed using a dozer with a disk harrow attachment to till the soil. The disk harrow was dragged by the dozer across the surface of the LTU three times in a circular pattern to disturb surface soil and to encourage an increase of water absorption.

Upon completion of soil sampling (as summarized in Section 3.2.2), Kitnuna pumped accumulated water from the southeast and northwest LTU sumps using two-inch diameter hoses spread over the soil contained within the FTA LTU. Stantec monitored the depth of water in each sump during the de-watering process using an interface probe to monitor de-watering progress and water absorption. De-watering activities were completed between August 13 and 17, 2018. The sump locations were georeferenced using a hand-held GPS.

3.2 ENVIRONMENTAL MONITORING

3.2.1 Groundwater Monitoring and Sampling

The groundwater monitoring and sampling portion of the Program was completed on August 8, 2018. Eleven (11) existing groundwater monitoring wells (MW15-1 through MW15-11) in the vicinity of the FTA LTU and excavation area were monitored for depth to liquid petroleum hydrocarbons (if present) and depth to water using an interface probe, CHV and IHV using an RKI Eagle 2™ and, where groundwater was present, the wells were also monitored for field temperature, pH, redox potential, electrical conductivity, and dissolved oxygen using a YSI Multi Parameter Water Quality Metre.

MW15-8 was the only monitoring well that contained sufficient water for sample collection. The well is located hydraulically downgradient of, and immediately adjacent to, the FTA excavated area. MW15-8 was purged in general accordance with Stantec's groundwater monitoring and sampling SOPs which are consistent with the CCME Guidance Manual (Volume 1). Because it did not recover sufficiently, MW15-8 was purged dry three times prior to sample collection. Purge water was contained in a bucket and disposed of on the FTA LTU.

One groundwater sample and one field duplicate sample were collected from MW15-8 using low-flow sampling techniques with a peristaltic pump and dedicated tubing. While sampling for volatile parameters using a peristaltic pump is not in accordance with Stantec's SOPs, a peristaltic pump was used as opposed to a bladder pump as the associated tubing did not contain PFAS. Groundwater samples were immediately transferred to laboratory supplied containers and stored in ice-chilled coolers prior to and during transportation to the laboratory.

One field blank sample was prepared by Stantec personnel by pouring laboratory provided PFAS free water over the sampling equipment into laboratory supplied bottles for laboratory analysis of PFAS for QA/QC purposes.

Samples were transported by First Air Cargo from Cambridge Bay to the Maxxam depot in Yellowknife, NT for transfer to the laboratories in Edmonton, Alberta and Mississauga, Ontario for analysis of the parameters specified in

the NWB Licence (See section 3.2.3 of this report). One laboratory prepared trip blank was shipped with the samples to the Maxxam depot for transfer to the laboratories in Edmonton, Alberta and Mississauga, Ontario for analysis of PFAS parameters for QA/QC purposes.

Stantec field personnel followed the TC February 2017 PFAS field sampling guidance to decrease the potential for cross-contamination.

Monitoring well locations were georeferenced using a hand-held GPS with a variance of accuracy of ± 5 m.

3.2.2 Soil Monitoring and Sampling

The soil monitoring portion of the Program was completed on August 12, 2018. Upon completion of the tilling / aeration of the LTU, and prior to sump de-watering, Stantec personnel divided the FTA LTU into six sections measuring approximately 52 m by 35 m. One soil sample (six soil samples total) was collected from each section from depths of approximately 0.0-0.3 m below ground surface (BGS). The soil samples were identified as FTA-S01 through FTA-S06. One field duplicate soil sample (identified as FTA-S-QC-01) was collected from FTA-S01. The soil samples were collected as discrete samples using hand tools. One half of each soil sample was immediately transferred into laboratory supplied containers and stored in ice-chilled coolers prior to and during transportation to the laboratory. The second half of each sample was transferred to a plastic bag and allowed to warm up in the running field vehicle, at an ambient temperature of approximately 21 ^{o}C, for approximately 15 minutes prior to field screening for CHV and IHV using an RKI Eagle 2™.

Samples were transported by First Air Cargo from Cambridge Bay to the Maxxam depot in Yellowknife, NT for transfer to the laboratories in Edmonton, Alberta and Mississauga, Ontario for analysis of the parameters specified in the NWB Licence (See section 3.2.3 of this report).

The soil sample locations were georeferenced using a hand-held GPS.

3.2.3 Laboratory Analytical Program

The laboratory analytical Program is summarized in Table 3-1, below.

Table 3-1 Laboratory Analytical Program

Source	Laboratory Analysis
Groundwater (Part J, Item 7 of NWB Licence)	Total suspended solids (TSS), total hardness, conductivity, ammonia nitrogen, oil and grease, calcium, sodium, chloride, total aluminum, total cadmium, total copper, total lead, total nickel, total silver, total zinc, pH, total alkalinity, nitrate-nitrite, total phenols, magnesium, potassium, sulphate, total arsenic, total cobalt, total iron, total molybdenum, total selenium, total titanium, total extractable hydrocarbons (TEH), polycyclic aromatic hydrocarbons (PAH), per- and polyfluoroalkyl substances (PFAS), and Benzene, toluene, ethylbenzene, and toluene (BTEX).
Soil[1] (Part J, Table 1 of NWB Licence)	BTEX, PHC Fractions 1 through 4 (F1-F4), and lead.
Notes: [1]The NWB licence provides a remedial guideline for polychlorinated biphenyls (PCBs) in soil; however, TC confirmed that soil sampling for PCBs was not required during the 2018 program	

3.2.4 Quality Assurance and Quality Control

The following field quality assurance and quality control (QA/QC) procedures were followed during the Program.

- Soil and groundwater sample collection and equipment decontamination were completed in general accordance with Stantec's SOPs
- Equipment was calibrated by Stantec personnel prior to fieldwork
- Groundwater samples collected for PFAS analysis were collected per the TC Per-and Polyfluoroalkyl Substances (PFAS) field sampling guidance (February 2017)
- Soil and groundwater samples were stored in ice-chilled coolers prior to and during transportation to the laboratory
- Soil and groundwater samples were delivered to the laboratory following standard chain-of-custody protocols
- Samples selected for analysis were analyzed by Maxxam, which is accredited by the Canadian Association of Laboratory Accreditation (CALA)
- One field duplicate groundwater sample and one field duplicate soil sample were collected by Stantec and analyzed by Maxxam. The analytical results were compared to those of the parent samples using the method of relative percent difference (RPD) to evaluate precision
- One trip blank and one field blank were collected by Stantec and analyzed by Maxxam

In addition to the Stantec QA/QC procedures, the laboratory analyzes and assesses method blanks, Certified Reference Materials, method spikes, and surrogate recoveries to monitor data quality. These results are presented as part of laboratory certificates of analysis.

Maxxam reviewed Stantec's sampling plan prior to field work and provided confirmation that the sampling plan satisfied the CCME requirements for field QC. A copy of Maxxam's letter is provided in **Appendix B**.

4.0 RESULTS

The site layout and monitoring well locations are shown on Figure 2, **Appendix A**. Soil sampling locations are shown on Figure 3, **Appendix A**. Water levels recorded during sump de-watering are summarized on Table 1, **Appendix C**. Groundwater monitoring results and monitoring well conditions and groundwater analytical results are summarized in Tables 2 and 3, **Appendix C**. Soil monitoring and analytical results are summarized on Tables 4 and 5, **Appendix C**. QA/QC results are summarized on Table 6, **Appendix C.** The GPS locations (UTM Easting and Northing Coordinates) of groundwater monitoring wells and soil samples are presented on Table 7**, Appendix C**. Copies of the laboratory certificates of analysis are presented in **Appendix E**, and a photographic log is presented in **Appendix E**.

4.1 REMEDIAL ACITVITIES SUPERVISION

The FTA LTU contained two sumps. One sump was located in the northwest corner of the LTU (NW sump), and one sump was located in the southeast corner of the LTU (SE sump).

Based on field measurements, Stantec estimated that the FTA-NE sump contained approximately 135 m^3 of water and the FTA-SW sump contained approximately 50 m^3 of water. Both sumps were fully de-watered onto the FTA LTU. Upon leaving the Site, Stantec personnel noted that the sumps had begun to re-charge. As the disk harrow attachment only disturbed approximately the top 0.3 m of soil, it was concluded that soil absorption was limited.

4.2 ENVIRONMENTAL MONITORING

4.2.1 Groundwater Monitoring and Sampling

Stantec monitored 11 groundwater monitoring wells associated with the FTA LTU and excavation area. During the monitoring portion of the Program, 10 of the 11 monitoring wells did not contain sufficient water to allow for field parameter measurement or sampling or were frozen and could not be monitored or sampled.

The depth to water (or ice) in the 11 monitoring wells ranged from 1.896 metres below top of casing (mBTOC) in MW15-1 to 2.483 mBTOC in MW15-4. Parameters including temperature, specific conductance, pH, oxidation reduction potential, and dissolved oxygen could only be measured in one monitoring well (MW15-8).

One groundwater sample and one field duplicate groundwater sample were collected from MW15-8 and submitted for laboratory analysis of the parameters required by the NWB Licence. The reported concentrations of dissolved BTEX, PHC Fraction F1-F2, and PAHs concentrations were below the laboratory reportable detection limits (RDLs). Groundwater analytical results indicated that the concentrations of the parameters analyzed per the NWB Licence satisfied the referenced guidelines with the exception of the parameters shown in Table 4-1 below:

Table 4-1 Summary of Parameters Exceeding Applicable Guidelines

Parameter Category	Individual Parameter	Applicable Guideline Exceeded
Total Metals	Total iron, copper, silver	CWQG The copper concentration was one order of magnitude greater than the applicable guideline. The iron and silver concentrations were within the same order of magnitude of the applicable guidelines.
Routine	Dissolved chloride	CWQG The dissolved chloride concentration was within the same order of magnitude as the applicable guideline.
PFAS	Perfluoroheptanoic Acid (PFHpA) Perfluorohexane Sulfonate (PFHxS) Perfluorohexanoic Acid (PFHxA) Perfluoro-n-Octanoic Acid (PFOA) Perfluoropentanoic Acid (PFPeA) Perfluorononanoic Acid (PFNA) (reportable detection limit)	HC drinking water screening value. The concentrations ranged from one to two orders of magnitude greater than guidelines.
PFAS	Perfluorooctane Sulfonate (PFOS)	Effluent guideline per the NWB Licence, HC drinking water screening value, and the ECC guideline. The PFOS concentration was one to two orders of magnitude greater than the applicable guidelines.

4.2.2 Soil Monitoring and Sampling

Soil samples were collected from 0.0-0.3 metres below ground surface (m BGS) within the FTA LTU and consisted of clayey gravelly sand with some silt. Field screening results for CHV and IHV were less than the detection limits of the equipment.

Six soil samples and one field duplicate soil sample were submitted for analysis of the parameters required by the NWB Licence, with the exception of PCBs. The laboratory analytical results indicated that the concentrations of the parameters analyzed satisfied the referenced guidelines.

Petroleum hydrocarbon soil concentrations were below the laboratory detection limit for the soil samples, except for PHC fraction F2 (FTA S01, S04, S05, and S06), F3 (in the 6 samples), and F4 (S01 and S03). The F2 soil concentrations ranged from approximately 2 to 9 times lower than the applicable guideline of 260 mg/kg. The F3 soil concentrations ranged from approximately 5 to 23 times lower than the applicable guideline of 1700 mg/kg. The F4 soil concentrations ranged from approximately 23 to 60 times lower than the applicable guideline of 3300 mg/kg. Detectable lead soil concentrations were measured in the six samples, ranging from 5.7 to 8.3 mg/kg. The lead soil concentrations were below the applicable guideline of 600 mg/kg.

5.0 QUALITY ASSURANCE / QUALITY CONTROL

A QA/QC Program was conducted to assess data reliability. Soil and groundwater samples were collected in general accordance with Stantec's sampling SOPs, were uniquely labelled, and control was maintained using chain-of-custody forms. Soil and groundwater samples were collected in laboratory supplied containers and preserved in ice-chilled insulated coolers.

The data quality objective (DQO) of the Program was to collect data that were reproducible, complete, and suitable for comparison with the referenced guidelines.

5.1 SAMPLE CONTAINERS

In 2016, the CCME updated the sample container requirements for soil analyzed for BTEX and PHC F1 from a 125 mL jar, to a sample collected with a hermetic sampler and field extracted in methanol. Due to transportation of dangerous goods requirements on commercial flights, methanol could not be shipped from Cambridge Bay; therefore, the samples submitted for BTEX and PHC F1 analysis were submitted in 125 mL glass jars supplied by the laboratory. While this procedure does not satisfy the CCME sampling requirements, it is consistent with the historical sampling programs; therefore, the 2018 soil analytical results for BTEX and PHC F1 were suitable for comparison to historical analytical reports and deemed suitable for the Program.

5.2 SAMPLE HOLD TIMES

Due to unexpected complications with shipping, the laboratory hold times for soil samples were exceeded for BTEX and PHC F1 analysis; therefore, the reported BTEX and PHC F1 concentrations may be biased low.

The reported concentrations were less than the RDLs. The RDLs ranged from one to three orders of magnitude less than the applicable guidelines with the exception of ethylbenzene which was the same order of magnitude (guideline: 0.082 mg/L, RDL: <0.010 mg/L). Because the reported concentrations were less than the laboratory RDLs, it is likely that the bias did not impact the findings of the Program.

5.3 TEMPERATURE

Sample temperatures were recorded upon arrival at the laboratory by measuring up to three random sample container temperatures and calculating the average result to obtain a representative temperature. The ideal temperature should be approximately 4°C. Samples that arrive at the laboratory with temperatures measured above 4°C may have reported concentrations for constituents that are biased low as a result of the elevated sample temperatures.

Although it is ideal to have sample temperatures below 4°C, Maxxam has noted the difficulty in maintaining samples below 4°C. As such, Maxxam considers a temperature range of 4°C to 10°C as acceptable. Samples submitted to the laboratory indicated temperatures that were considered acceptable.

5.4 FIELD DUPLICATES

The method of RPD is used to evaluate the sample result variability and is calculated by the following equation:

$$RPD = \left[\frac{|S1 - S2|}{S3} \right] \times 100$$

Where:
RPD = relative percent difference
S1 = original soil or groundwater sample concentration
S2 = duplicate soil or groundwater sample concentration
S3 = average concentration = (S1 + S2)/2

In the event that the analytical result for either sample is less than five times the laboratory reportable detection limit (RDL), any calculated RPD is considered not to be valid and no conclusion can be made with respect to the data reproducibility. The generally accepted industry standard for acceptable RPD's analyses is less than or equal to 60% for field duplicated soil samples and less than or equal to 40% for field duplicated groundwater samples (CCME, 2016).

FTA-S-QC-01 was a field duplicate soil sample of FTA-S01-0-0.3. The duplicate soil samples were submitted for analysis of the parameters required by the NWB licence. Where they could be calculated, the RPD's ranged from 26% (F2) to 87% (F3). The RPD's satisfied the CCME requirements with the exception of F3 and F4 which exceeded the CCME requirements. The PHC F3 and F4 concentrations in both the parent and duplicate sample were below the referenced guidelines; therefore, the elevated RFP did not impact the interpretation of the results.

GW-QC-01 was a field duplicate groundwater sample of MW15-08. The duplicated groundwater sample was submitted for analysis of the parameters required by the NWB licence. Where they could be calculated, the RPD's ranged from 0.0% (numerous parameters) to 20% (total suspended solids) and satisfied the CCME requirements.

The RPD results are summarized on Tables 3 and 5 of **Appendix B**.

5.5 TRIP BLANK

TRIP BLANK-01 was a de-ionized and PFAS-free water trip blank sample provided by Maxxam. The trip blank sample was submitted for analysis of the NWB Licence required parameters. Laboratory analytical results indicated the reported concentrations of tested parameters were less than the laboratory RDL, where applicable, with the exception of total copper which exceeded the RDL but was below the referenced guidelines. The total copper concentration detected in the trip blank was one order of magnitude lower than the CWQG. As such, the trip blank results indicate that sample shipping and storage did not influence the groundwater analytical results.

5.6 FIELD BLANK

FIELD-BLANK-01 was a de-ionized and PFAS-free water field blank. The water was provided by Maxxam and was packaged in laboratory supplied bottles in the field by Stantec using the same equipment used to collect the groundwater sample from MW15-05. The field blank sample was submitted for analysis of PFAS parameters. Laboratory analytical results indicated the reported concentrations of the tested parameters were less than the laboratory RDLs. As such, the field blank results indicate that sample handling and sampling equipment did not influence the groundwater analytical results for PFAS parameters.

5.7 LABORATORY QA/QC

In addition to the Stantec QA/QC procedures, the laboratory analyzes and assesses method blanks, Certified Reference Materials, method spikes, and surrogate recoveries to monitor data quality. These results were considered acceptable and are presented as part of laboratory certificates of analysis in **Appendix C.**

5.8 SUMMARY

In general, the data quality objective for the Program was considered to have been met; however, due to unexpected complications with shipping which resulted in the laboratory hold times for soil analysis of BTEX and PHC F1 parameters being exceeded, the reported BTEX and PHC F1 concentrations in soil may be biased low.

The reported concentrations were less than the RDLs. The RDLs ranged from one to three orders of magnitude less than the applicable guidelines with the exception of ethylbenzene which was the same order of magnitude (guideline: 0.082 mg/L, RDL: <0.010 mg/L). As the reported concentrations were less than the laboratory RDLs, the bias did not impact the findings of the program.

6.0 SUMMARY OF FINDINGS

Stantec completed the Program at the FTA LTU located at the Cambridge Bay Airport in Cambridge Bay, Victoria Island, Nunavut in August 2018. The findings of the Program are summarized below.

Remedial Activities Supervision

Aeration of the LTU was conducted between August 11 and 12, 2018 by Kitnuna. Aeration was completed using a dozer with a disk harrow attachment to till the soil. The disk harrow was dragged by the dozer across the surface of the LTU three times in a circular pattern to disturb surface soil and to encourage an increase of water absorption.

Upon completion of soil sampling, Kitnuna pumped accumulated water from the southeast and northwest LTU sumps (FTA-SE and FTA-NW) using two-inch diameter hoses spread over the soil contained within the FTA LTU. De-watering activities were conducted between August 13 and 17, 2018.

Based on field measurements, Stantec estimated that the FTA-NW sump contained approximately 135 m^3 of water and the FTA-SE sump contained approximately 50 m^3 of water. Both sumps were fully de-watered onto the FTA LTU. Upon leaving the Site, Stantec personnel observed that the sumps had begun to re-charge. As the disk harrow attachment only disturbed approximately the top 0.3 m of soil, it was concluded that water absorption in the LTU soils was limited.

Environmental Monitoring

During the monitoring portion of the Program, 10 of the 11 monitoring wells did not contain sufficient water to allow for field parameter measurement or sampling or were frozen and could not be monitored or sampled. The depth to water (or ice) in the 11 monitoring wells ranged from 1.896 mBTOC in MW15-1 to 2.483 mBTOC in MW15-4.

One groundwater sample and one field duplicate groundwater sample were collected from MW15-8 (located immediately hydraulically downgradient of the FTA excavated area) and submitted for laboratory analysis of the parameters required by the NWB Licence. The dissolved BTEX, PHC Fraction F1-F2, and PAHs concentrations were below the laboratory RDLs. Groundwater analytical results indicated that the concentrations of the parameters analyzed per the NWB Licence satisfied the referenced guidelines with the exception of the parameters listed in Table 6-1, below.

Table 6-1 Summary of Parameters Exceeding Applicable Guidelines

Parameter Category	Individual Parameter	Exceedance of Applicable Guideline
Total Metals	Total iron, copper, silver	CWQG The copper concentration was one order of magnitude greater than the applicable guideline. The iron and silver concentrations were within the same order of magnitude of the applicable guidelines.
Routine	Dissolved chloride	CWQG The dissolved chloride concentration was within the same order of magnitude as the applicable guideline.
PFAS	Perfluoroheptanoic Acid (PFHpA), Perfluorohexane Sulfonate (PFHxS), Perfluorohexanoic Acid (PFHxA), Perfluoro-n-Octanoic Acid (PFOA); Perfluoropentanoic Acid (PFPeA), Perfluorononanoic Acid (PFNA) (reportable detection limit)	HC drinking water screening value. The concentrations ranged from one to two orders of magnitude greater than guidelines.
PFAS	Perfluorooctane Sulfonate (PFOS)	Effluent guideline per the NWB Licence, HC drinking water screening value, and the ECC guideline. The PFOS concentration was one to two orders of magnitude greater than the applicable guidelines.

Upon completion of the tilling / aeration of the LTU, and prior to sump de-watering, Stantec personnel divided the FTA LTU into six sections measuring approximately 52 m by 35 m. One discrete soil sample (six soil samples total) was collected from each section from depths of approximately 0.0-0.3 m BGS. One field duplicate soil sample was collected for QA/QC purpose. The soil samples were submitted for analysis of the parameters required by the NWB Licence, with the exception of PCBs.

The soil samples consisted of clayey gravelly sand with some silt. Field screening results for CHV and IHV were less than the detection limits of the equipment. The laboratory analytical results indicated that the concentrations of the parameters analyzed satisfied the referenced guidelines.

Petroleum hydrocarbon soil concentrations were below the laboratory RDLs for the soil samples with the exception of PHC fraction F2 (FTA S01, S04, S05, and S06), F3 (in the 6 samples), and F4 (S01 and S03). The F2 soil concentrations ranged approximately from 2 to 9 times lower than the applicable guideline of 260 mg/kg. The F3 soil concentrations ranged approximately from 5 to 23 times lower than the applicable guideline of 1700 mg/kg. The F4 soil concentrations ranged approximately from 23 to 60 times lower than the applicable guideline of 3300 mg/kg. Detectable lead soil concentrations were measured in the six samples, ranging from 5.7 to 8.3 mg/kg. The lead soil concentrations were below the applicable guideline of 600 mg/kg.

Quality Assurance / Quality Control

In general, the data quality objective for the Program was considered to have been met; however, due to unexpected complications with shipping which resulted in the laboratory hold times for soil analysis of BTEX and PHC F1 parameters being exceeded, the reported BTEX and PHC F1 concentrations in soil may be biased low.

The reported concentrations were less than the RDLs. The RDLs ranged from one to three orders of magnitude less than the applicable guidelines with the exception of ethylbenzene which was the same order of magnitude (guideline: 0.082 mg/L, RDL: <0.010 mg/L). As the reported concentrations were less than the laboratory RDLs, the bias did not impact the findings of the program.

7.0 LIMITATIONS

This report documents work that was performed in accordance with generally accepted professional standards at the time and location in which the services were provided. No other representations, warranties or guarantees are made concerning the accuracy or completeness of the data or conclusions contained within this report, including no assurance that this work has uncovered all potential liabilities associated with the identified property.

This report provides an evaluation of selected environmental conditions associated with the identified portion of the property that was assessed at the time the work was conducted and is based on information obtained by and/or provided to Stantec at that time. There are no assurances regarding the accuracy and completeness of this information. All information received from the client or third parties in the preparation of this report has been assumed by Stantec to be correct. Stantec assumes no responsibility for any deficiency or inaccuracy in information received from others.

The opinions in this report can only be relied upon as they relate to the condition of the portion of the identified property that was assessed at the time the work was conducted. Activities at the property subsequent to Stantec's assessment may have significantly altered the property's condition. Stantec cannot comment on other areas of the property that were not assessed.

Conclusions made within this report consist of Stantec's professional opinion as of the time of the writing of this report and are based solely on the scope of work described in the report, the limited data available and the results of the work. They are not a certification of the property's environmental condition. This report should not be construed as legal advice.

This report has been prepared for the exclusive use of the client identified herein and any use by any third party is prohibited. Stantec assumes no responsibility for losses, damages, liabilities or claims, howsoever arising, from third party use of this report.

This report is limited by the following:

- The condition and volume of water in the groundwater monitoring wells limited the number of wells that could be sampled.
- Transportation of dangerous goods requirements for shipping methanol on commercial flights; therefore, the CCME requirement for sample preservation for volatile compounds (BTEX) could not be adhered to.
  - Soil samples for BTEX were collected in 125 mL glass jars which is consistent with historical monitoring programs.
- Increased shipping times from a remote location to the laboratory leading to the hold time for BTEX in soil samples being exceeded.

The locations of any utilities, buildings and structures, and property boundaries illustrated in or described within this report, if any, including pole lines, conduits, water mains, sewers and other surface or sub-surface utilities and structures are not guaranteed. Before starting work, the exact location of all such utilities and structures should be confirmed and Stantec assumes no liability for damage to them.

Limitations
January 2019

The conclusions are based on the site conditions encountered by Stantec at the time the work was performed at the specific testing and/or sampling locations, and conditions may vary among sampling locations. Factors such as areas of potential concern identified in previous studies, site conditions (e.g., utilities) and cost may have constrained the sampling locations used in this assessment. In addition, analysis has been carried out for only a limited number of chemical parameters, and it should not be inferred that other chemical species are not present. Due to the nature of the investigation and the limited data available, Stantec does not warrant against undiscovered environmental liabilities nor that the sampling results are indicative of the condition of the entire site. As the purpose of this report is to identify site conditions which may pose an environmental risk; the identification of non-environmental risks to structures or people on the site is beyond the scope of this assessment.

Should additional information become available which differs significantly from our understanding of conditions presented in this report, Stantec specifically disclaims any responsibility to update the conclusions in this report.

8.0 REFERENCES

Arcadis Canada Inc. January 5, 2017. Site Remedial Activities Supervision and Monitoring Program at the FTA, Cambridge Bay Airport, Victoria Island, Nunavut. File No. 12089-001.

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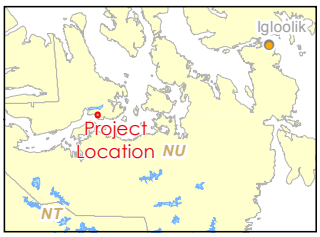
Public Services and Procurement Canada. July 12, 2018. Terms of Reference for Apron and Fire Training Area Site Remedial Activities Supervision and Environmental Monitoring Program, Cambridge Bay Airport, Victoria Island, Nunavut.

Transport Canada. 2017. Per-and Polyfluoroalkyl Substances (PFAS) Field Sampling Guidance.

APPENDIX A

Figures



Site Feature

Land Parcel

0 400 800 metres

1:30,000 (at original document size of 8.5x11)

Stantec

Project Location
Cambridge Bay
Nunavut

110220176
Prepared by MK on 2018-09-13
Quality Review by MR on 2018-11-16
Approved by TS on 2018-11-20

Project
2018 Site Remedial Activities Supervision and Environmental Monitoring Program - Cambridge Bay Airport, Fire Training Area Land Treatment Unit

Figure No.
1

Title
Site Location Plan

Notes
1. Coordinate System: NAD 1983 UTM Zone 13N
2. Base features: Geogratis, ©Department of Natural Resources Canada, All rights reserved.
3. Imagery: Microsoft Bing product screen shot(s) reprinted with permission from Microsoft Corporation.

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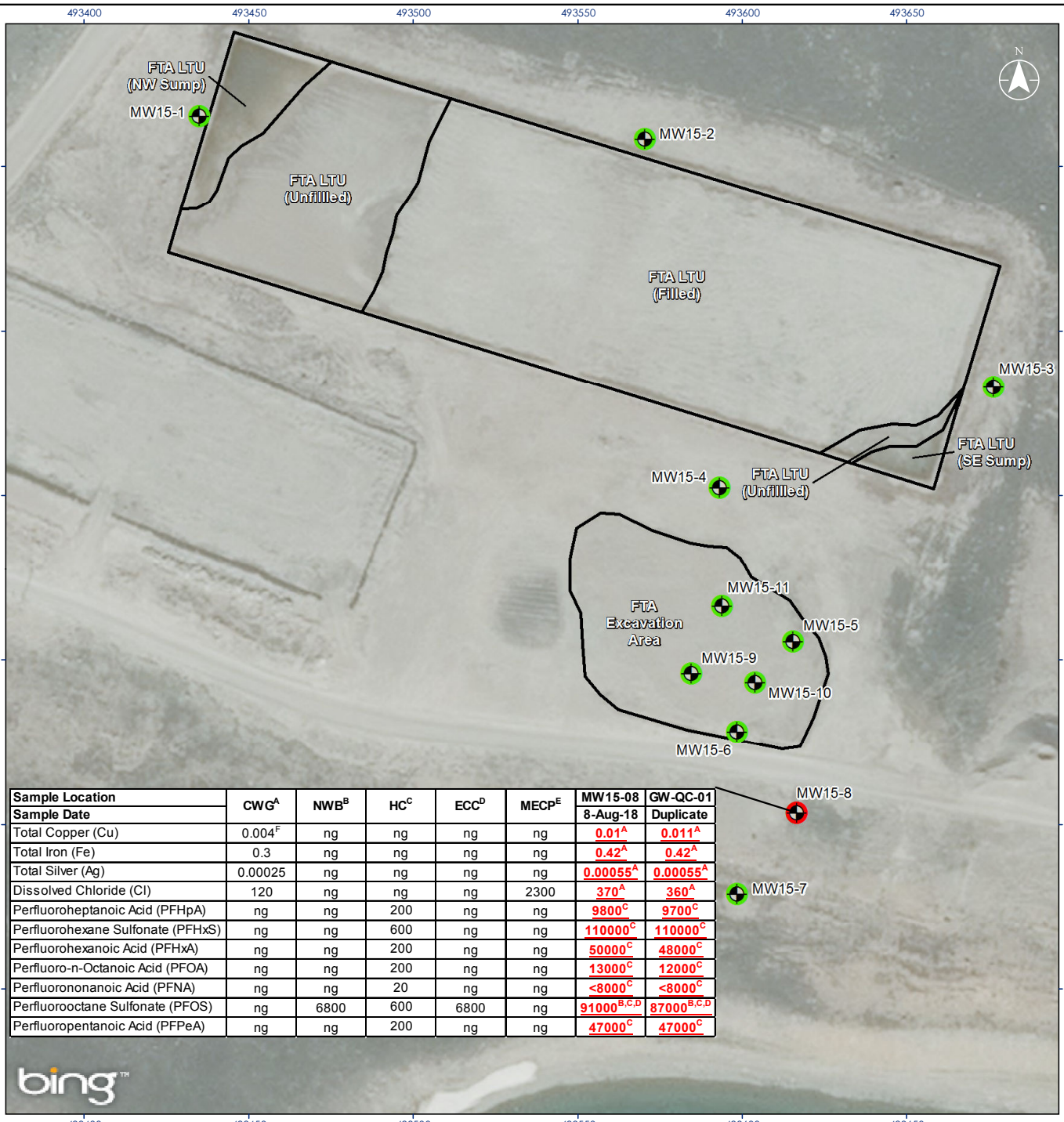
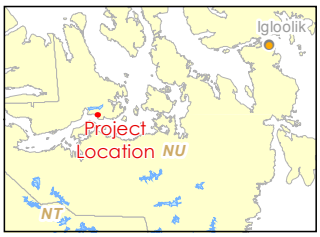


Sample Location / Sample Date	CWG[A]	NWB[B]	HC[C]	ECC[D]	MECP[E]	MW15-08 8-Aug-18	GW-QC-01 Duplicate
Total Copper (Cu)	0.004[F]	ng	ng	ng	ng	0.01[A]	0.011[A]
Total Iron (Fe)	0.3	ng	ng	ng	ng	0.42[A]	0.42[A]
Total Silver (Ag)	0.00025	ng	ng	ng	ng	0.00055[A]	0.00055[A]
Dissolved Chloride (Cl)	120	ng	ng	ng	2300	370[A]	360[A]
Perfluoroheptanoic Acid (PFHpA)	ng	ng	200	ng	ng	9800[C]	9700[C]
Perfluorohexane Sulfonate (PFHxS)	ng	ng	600	ng	ng	110000[C]	110000[C]
Perfluorohexanoic Acid (PFHxA)	ng	ng	200	ng	ng	50000[C]	48000[C]
Perfluoro-n-Octanoic Acid (PFOA)	ng	ng	200	ng	ng	13000[C]	12000[C]
Perfluorononanoic Acid (PFNA)	ng	ng	20	ng	ng	<8000[C]	<8000[C]
Perfluorooctane Sulfonate (PFOS)	ng	6800	600	6800	ng	91000[B,C,D]	87000[B,C,D]
Perfluoropentanoic Acid (PFPeA)	ng	ng	200	ng	ng	47000[C]	47000[C]



Monitoring Well Location (Others 2013 and 2015)

Groundwater Sample Below Applicable Guidelines

Groundwater Sample Above Applicable Guidelines

Approximate LTU and Excavation Location

[A] CCME. Canadian Water Quality Guidelines for the Protection of Aquatic Life, Feshwater.

[B] Nunavut Water Board. 2018. Licence No. 1-BR-FTA1828. Part E, Item 5.

[C] Health Canada. July 2018. Drinking Water Screening Values: Perfluoroalkylated Substances.

[D] Environment and Climate Change Canada. 2017. Federal Environmental Qulaity Guidelines for Perfluorooctanoic Sulfonate (PFOS).

[E] Ontario Ministry of the Environment and Climate Change (now referred to as the Ministry of Environment, Conservation, and Parks). Soil, Groundwater, and Sediment Standards for use under Part XV.1 of the Environmental Protection Act. Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Groundwater Condition.

[F] Guideline is calculated based on hardness ($CaCO_3$)

Notes

1. Coordinate System: NAD 1983 UTM Zone 13N
2. Base features: Geogratis, ©Department of Natural Resources Canada. All rights reserved.
3. Imagery: Microsoft Bing product screen shot(s) reprinted with permission from Microsoft Corporation.

0 25 50 metres

1:1,800 (at original document size of 8.5x11)

Stantec

Project Location
Cambridge Bay
Nunavut

110220176
Prepared by MK on 2018-09-13
Quality Review by DJ on 2019-01-21
Approved by LVN on 2019-01-24

Client/Project
Public Services and Procurement Canada (PSCPC)
For Transport Canada, Cambridge Bay Airport
Fire Training Area Land Treatment Unit

Figure No.
2

Title
Site Plan Showing Monitoring Well Locations and Groundwater Analytical Results

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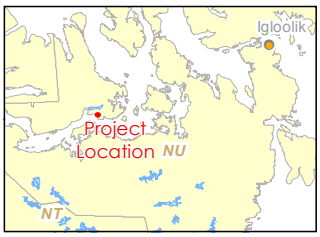

Soil Sampling Location (FTA LTU)

Soil Sample Below Applicable Guidelines

Site Feature

0 25 50 metres

1:1,500 (at original document size of 8.5x11)

Notes

1. Coordinate System: NAD 1983 UTM Zone 13N
2. Base features: Geogratis, ©Department of Natural Resources Canada. All rights reserved.
3. Imagery: Microsoft Bing product screen shot(s) reprinted with permission from Microsoft Corporation.
4. Soil Guideline Reference: Nunavut Water Board. 2018. Licence NO. 1BR-FTA-1828. Part J. Table 1 - Remediation Requirements. Industrial Land Use. Excluding the protection of potable groundwater.

Stantec

Project Location
Cambridge Bay
Nunavut

110220176
Prepared by MK on 2018-09-13
Quality Review by DJ on 2019-01-21
Approved by LVN on 2019-01-29

Client/Project
Public Services and Procurement Canada (PSCPC)
For Transport Canada, Cambridge Bay Airport
Fire Training Area Land Treatment Unit

Figure No.
3

Title
Site Plan showing Soil Sampling Locations and Soil Analytical Results

APPENDIX B

Maxxam Letter RE: QC

maxxam.ca
MAXXAM ANALYTICS
4606 Canada Way
Burnaby, BC V5G 1K5
Office 604 734 7276
Toll Free 800 665 8566
Fax 604 731 2386

Stantec
10160 112 Street
Edmonton AB T5K 2L6 CA

Attn: Lindsay van Noortwyk , Associate / Project Manager

Re: Cambridge Bay Fire Training Area Sampling Plan (as provided by Stantec)

Dear Ms van Noortwyk

As requested, Maxxam has reviewed the Cambridge Bay Fire Training Area Sampling Plan (appended). In our opinion the Plan meets the CCME requirements for field QC.

I trust this meets your needs. If anything further is required, please do not hesitate to contact me directly. bloescher@maxxam.ca 250 325-8887.

Sincerely,

Barry Loescher, PhD PChem QP
Quality Systems Specialist

Source	Location	Laboratory Analysis
Soil	6 representative soil samples and 1 field duplicate sample from the FTA LTU.	Benzene, toluene, ethylbenzene, and toluene (BTEX), PHC fractions 1 through 4 (F1-F4), and lead.
Groundwater	11 groundwater samples, 2 field duplicated samples, 1 field blank, and 1 trip blank (from MW15-1 through MW15-11)	Total suspended solids (TSS), total hardness, conductivity, ammonia nitrogen, oil and grease, calcium, sodium, chloride, total aluminum, total cadmium, total copper, total lead, total nickel, total silver, total zinc, pH, total alkalinity, nitrate-nitrite, total phenols, magnesium, potassium, sulphate, total arsenic, total cobalt, total iron, total molybdenum, total selenium, total titanium, total extractable hydrocarbons (TEH), polycyclic aromatic hydrocarbons (PAH), per- and polyfluoroalkyl substances (PFAS), and BTEX.
Sump	1 sump water sample and 1 field duplicate sample from the sump located in the northwest portion of the FTA LTU.	TSS, total hardness, conductivity, ammonia nitrogen, oil and grease, calcium, sodium, chloride, total aluminum, total cadmium, total copper, total lead, total nickel, total silver, total zinc, pH, total alkalinity, nitrate-nitrite, total phenols, magnesium, potassium, sulphate, total arsenic, total cobalt, total iron, total molybdenum, total selenium, total titanium, TEH, PAH, PFAS, BTEX
Ponded Water (Sampled same day and same way as the sump)	7 ponded water samples (3 from seepage area, 3 step outs, and 1 from area not impacted by seepage), one field blank, and one trip blank.	TSS, total hardness, conductivity, ammonia nitrogen, oil and grease, calcium, sodium, chloride, total aluminum, total cadmium, total copper, total lead, total nickel, total silver, total zinc, pH, total alkalinity, nitrate-nitrite, total phenols, magnesium, potassium, sulphate, total arsenic, total cobalt, total iron, total molybdenum, total selenium, total titanium, TEH, PAH, PFAS, BTEX
Soil	12 soil samples and 2 field duplicates and 1 equipment blank (water)	BTEX, PHC F1-F4, lead, PFAS.

APPENDIX C

Tables

2018 Site Remedial Activities Remediation and Environmental Monitoring Program
Cambridge Bay Airport, Fire Training Area Land Treatment Unit
Public Services and Procurement Canada for Transport Canada
110220176
Jan-19

Table 1 - FTA Water Level Monitoring

Sump Location	Date	Time	mBTOB	Comments
NW sump	13-Aug-18	1330	0.75	Pump Start
NW sump	13-Aug-18	1500	0.77	
NW sump	13-Aug-18	1600	0.71	
NW sump	13-Aug-18	1630	0.84	
NW sump	13-Aug-18	1645	0.86	
NW sump	13-Aug-18	1730	0.88	Pump Off
NW sump	14-Aug-18	1430	0.85	Pump On - heavy rain overnight
NW sump	14-Aug-18	1700	0.87	Pump Off
NW sump	15-Aug-18	736	0.88	Pump On
NW sump	15-Aug-18	900	0.89	Pump Off
NW sump	15-Aug-18	1000	0.9	Pump On
NW sump	15-Aug-18	1020	0.915	
NW sump	15-Aug-18	1037	0.92	
NW sump	15-Aug-18	1219	0.97	
NW sump	15-Aug-18	1300	1.02	
NW sump	15-Aug-18	1400	10.6	
NW sump	15-Aug-18	1415	1.1	
NW sump	15-Aug-18	1424	1.14	
NW sump	15-Aug-18	1436	1.2	Pump Off
SE sump	17-Aug-18	1200	1.03	Pump On
SE sump	17-Aug-18	1230	1.035	
SE sump	17-Aug-18	1241	1.04	
SE sump	17-Aug-18	1331	1.505	
SE sump	17-Aug-18	1400	1.07	
SE sump	17-Aug-18	1415	1.08	
SE sump	17-Aug-18	1445	1.09	
SE sump	17-Aug-18	1500	1.1	
SE sump	17-Aug-18	1523	1.11	
SE sump	17-Aug-18	1545	1.1135	
SE sump	17-Aug-18	1608	1.1155	
SE sump	17-Aug-18	1630	1.1175	
SE sump	17-Aug-18	1638	1.119	
SE sump	17-Aug-18	1653	1.235	
SE sump	17-Aug-18	1705	1.28	
SE sump	17-Aug-18	1711	1.335	
SE sump	17-Aug-18	1715	1,38	De-watering Complete

Notes:

mBTOB	Metres below top of berm
NW sump	Northwest sump of FTA LTU
SE sump	Southeast sump of FTA LTU

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2018 Site Remedial Activities Remediation and Environmental Monitoring Program
Cambridge Bay Airport, Fire Training Area Land Treatment Unit
Public Services and Procurement Canada for Transport Canada
110220176
Jan-19

Table 2 - 2018 Groundwater Monitoring Results

Well ID	Date	Water Level (mBTOC)	Frozen Level (mBTOC)	Depth to Bottom (mBTOC)	Stick-up Height (mAGS)	CHV (ppm)	IHV (ppm)	Sampling Date	Temperature (°C)	Specific Conductance (mS/cm)	pH	ORP (mV)	DO (mg/L)	Comments
MW15-1	8-Aug-18	1.896	-	2.062	0.85	0	0	-	-	-	-	-	-	Insufficient water to sample
MW15-2	8-Aug-18	-	1.998	-	0.97	0	0	-	-	-	-	-	-	Frozen - could not sample
MW15-3	8-Aug-18	-	2.069	-	0.96	0	0	-	-	-	-	-	-	Frozen - could not sample
MW15-4	8-Aug-18	2.483	-	2.483	0.97	0	0	-	-	-	-	-	-	Insufficient water to samples
MW15-5	8-Aug-18	-	2.187	-	1.03	0	0	-	-	-	-	-	-	Frozen - could not sample
MW15-6	8-Aug-18	-	2.372	-	1.00	0	0	-	-	-	-	-	-	Frozen - could not sample
MW15-7	8-Aug-18	-	1.843	-	0.98	0	0	-	-	-	-	-	-	Frozen - could not sample
MW15-8	8-Aug-18	1.956	-	2.506	0.96	0	0	8-Aug-18	3.8	2.582	7.3	52.9	1.25	
MW15-9	8-Aug-18	-	2.172	-	0.92	0	0	-	-	-	-	-	-	Frozen - could not sample
MW15-10	8-Aug-18	-	2.325	-	1.08	0	0	-	-	-	-	-	-	Frozen - could not sample
MW15-11	8-Aug-18	-	2.041	-	0.90	0	0	-	-	-	-	-	-	Frozen - could not sample

Notes:

CHV	Combustible headspace vapour concentrations	ORP	Oxidization/Reduction Potential
IHV	Ionizable headspace vapour concentrations	mV	millivolts
m BTOC	Metres below top of Casing	DO	Dissolved oxygen
m AGS	Meters above ground surface	mg/L	Milligrams per litre
ppm	parts per million	°C	Degrees Celcius
mS/cm	millisiemens per centimeter	-	Not monitored

Stantec

2018 Site Remedial Activities Remediation and Environmental Monitoring Program
Cambridge Bay Airport, Fire Training Area Land Treatment Unit
Public Services and Procurement Canada for Transport Canada
110220176
Jan-19

Table 3 - Nunavut Water Board Licence Requirements - Groundwater Analytical Results

Sample Location	Units	CWG[A]	NWB[B]	HC[C]	ECC[D]	MECP[E]	MW15-08	GW-QC-01	RPD (%)
Sample Date							8-Aug-18	Duplicate of MW15-08	
Sampling Company							Stantec		
Laboratory							Maxxam		
Petroleum Hydrocarbons									
Benzene	mg/L	0.37	0.37	ng	ng	0.044	<0.00040	<0.00040	nc
Toluene	mg/L	0.002	0.002	ng	ng	18	<0.00040	<0.00040	nc
Ethylbenzene	mg/L	0.090	0.090	ng	ng	2.3	<0.00040	<0.00040	nc
m & p-Xylene	mg/L	ng	ng	ng	ng	ng	<0.00080	<0.00080	nc
o-Xylene	mg/L	ng	ng	ng	ng	ng	<0.00040	<0.00040	nc
Xylenes (Total)	mg/L	ng	ng	ng	ng	4.2	<0.00089	<0.00089	nc
F1 (C6-C10) - BTEX	mg/L	ng	ng	ng	ng	0.75	<0.10	<0.10	nc
F1 (C6-C10)	mg/L	ng	ng	ng	ng	ng	<0.10	<0.10	nc
F2 (C10-C16 Hydrocarbons)	mg/L	ng	ng	ng	ng	0.15	<0.10	<0.10	nc
Polycyclic Aromatic Hydrocarbons									
Benzo[a]pyrene equivalency	mg/L	ng	ng	ng	ng	ng	<0.000010	<0.000010	nc
Acenaphthene	mg/L	0.0058	ng	ng	ng	0.6	<0.00010	<0.00010	nc
Acenaphthylene	mg/L	ng	ng	ng	ng	0.00018	<0.00010	<0.00010	nc
Acridine	mg/L	0.0044	ng	ng	ng	ng	<0.000050	<0.000050	nc
Anthracene	mg/L	0.000012	ng	ng	ng	0.0024	<0.000010	<0.000010	nc
Benzo(a)anthracene	mg/L	0.000018	ng	ng	ng	0.0047	<0.0000085	<0.0000085	nc
Benzo(b&j)fluoranthene	mg/L	ng	ng	ng	ng	0.00075	<0.0000085	<0.0000085	nc
Benzo(k)fluoranthene	mg/L	ng	ng	ng	ng	0.0004	<0.0000085	<0.0000085	nc
Benzo(g,h,i)perylene	mg/L	ng	ng	ng	ng	0.0002	<0.0000085	<0.0000085	nc
Benzo(c)phenanthrene	mg/L	ng	ng	ng	ng	ng	<0.000050	<0.000050	nc
Benzo(a)pyrene	mg/L	0.000015	ng	ng	ng	0.00081	<0.0000075	<0.0000075	nc
Benzo[e]pyrene	mg/L	ng	ng	ng	ng	ng	<0.000050	<0.000050	nc
Chrysene	mg/L	ng	ng	ng	ng	0.0001	<0.0000085	<0.0000085	nc
Dibenz(a,h)anthracene	mg/L	ng	ng	ng	ng	0.00052	<0.0000075	<0.0000075	nc
Fluoranthene	mg/L	0.00004	ng	ng	ng	0.13	<0.000010	<0.000010	nc
Fluorene	mg/L	0.003	ng	ng	ng	0.4	<0.000050	<0.000050	nc
Indeno(1,2,3-cd)pyrene	mg/L	ng	ng	ng	ng	0.0002	<0.0000085	<0.0000085	nc
1-Methylnaphthalene	mg/L	ng	ng	ng	ng	1.8	<0.00010	<0.00010	nc
2-Methylnaphthalene	mg/L	ng	ng	ng	ng	1.8	<0.00010	<0.00010	nc
Naphthalene	mg/L	0.0011	ng	ng	ng	1.4	<0.00010	<0.00010	nc
Phenanthrene	mg/L	0.0004	ng	ng	ng	0.58	<0.000050	<0.000050	nc
Perylene	mg/L	ng	ng	ng	ng	ng	<0.000050	<0.000050	nc
Pyrene	mg/L	0.000025	ng	ng	ng	0.068	<0.000020	<0.000020	nc
Quinoline	mg/L	0.0034	ng	ng	ng	ng	<0.00020	<0.00020	nc
Total Metals									
Total Aluminum (Al)	mg/L	0.10	ng	ng	ng	ng	0.01	0.011	9.5
Total Antimony (Sb)	mg/L	ng	ng	ng	ng	ng	<0.00060	<0.00060	nc
Total Arsenic (As)	mg/L	0.005	ng	ng	ng	ng	0.0012	0.0012	0.0
Total Barium (Ba)	mg/L	ng	ng	ng	ng	ng	0.036	0.036	0.0
Total Beryllium (Be)	mg/L	ng	ng	ng	ng	ng	<0.0010	<0.0010	nc
Total Boron (B)	mg/L	1.5	ng	ng	ng	ng	0.43	0.43	0.0
Total Cadmium (Cd)	mg/L	0.00009	ng	ng	ng	ng	0.000045	0.000047	4.3
Total Calcium (Ca)	mg/L	ng	ng	ng	ng	ng	190	190	0.0
Total Chromium (Cr)	mg/L	ng	ng	ng	ng	ng	<0.0010	<0.0010	nc
Total Cobalt (Co)	mg/L	ng	ng	ng	ng	ng	0.0097	0.0097	0.0
Total Copper (Cu)	mg/L	0.004[F]	ng	ng	ng	ng	**0.01[A]**	**0.011[A]**	9.5
Total Iron (Fe)	mg/L	0.3	ng	ng	ng	ng	**0.42[A]**	**0.42[A]**	0.0
Total Lead (Pb)	mg/L	0.007[F]	ng	ng	ng	ng	0.00043	0.00045	4.5
Total Lithium (Li)	mg/L	ng	ng	ng	ng	ng	0.033	0.031	6.3
Total Magnesium (Mg)	mg/L	ng	ng	ng	ng	ng	100	100	0.0
Total Manganese (Mn)	mg/L	ng	ng	ng	ng	ng	0.86	0.84	2.4
Total Molybdenum (Mo)	mg/L	0.073	ng	ng	ng	ng	0.0037	0.0037	0.0
Total Nickel (Ni)	mg/L	0.15[F]	ng	ng	ng	ng	0.03	0.03	0.0
Total Phosphorus (P)	mg/L	ng	ng	ng	ng	ng	<0.10	<0.10	nc
Total Potassium (K)	mg/L	ng	ng	ng	ng	ng	60	60	0.0
Total Selenium (Se)	mg/L	0.001	ng	ng	ng	ng	0.00029	0.00028	3.5
Total Silicon (Si)	mg/L	ng	ng	ng	ng	ng	3.3	3.3	0.0
Total Silver (Ag)	mg/L	0.00025	ng	ng	ng	ng	**0.00055[A]**	**0.00055[A]**	0.0
Total Sodium (Na)	mg/L	ng	ng	ng	ng	ng	250	260	0.0
Total Strontium (Sr)	mg/L	ng	ng	ng	ng	ng	0.34	0.34	0.0
Total Sulphur (S)	mg/L	ng	ng	ng	ng	ng	210	210	0.0
Total Thallium (Tl)	mg/L	0.0008	ng	ng	ng	ng	<0.00020	<0.00020	nc
Total Tin (Sn)	mg/L	ng	ng	ng	ng	ng	<0.0010	<0.0010	nc
Total Titanium (Ti)	mg/L	ng	ng	ng	ng	ng	0.0021	<0.0010	nc
Total Uranium (U)	mg/L	0.015	ng	ng	ng	ng	0.011	0.011	0.0
Total Vanadium (V)	mg/L	ng	ng	ng	ng	ng	<0.0010	<0.0010	nc
Total Zinc (Zn)	mg/L	0.030	5	ng	ng	ng	<0.0030	<0.0030	nc
Routine Parameters									
Routine Parameters - Calculated Parameters									
Anion Sum	meq/L	ng	ng	ng	ng	ng	33	31	nc
Cation Sum	meq/L	ng	ng	ng	ng	ng	32	31	nc
Hardness (CaCO3)	mg/L	ng	ng	ng	ng	ng	920	920	0.0
Ion Balance (% Difference)	%	ng	ng	ng	ng	ng	2	1.1	nc
Dissolved Nitrate (N)	mg/L	ng	ng	ng	ng	ng	0.1	0.11	9.5
Dissolved Nitrate (NO3)	mg/L	13	ng	ng	ng	ng	0.45	0.49	8.5
Dissolved Nitrite (NO2)	mg/L	0.06	ng	ng	ng	ng	<0.033	<0.033	nc
Calculated Total Dissolved Solids	mg/L	ng	ng	ng	ng	ng	1900	1800	5.4
Routine Parameters - Miscellaneous Inorgamics									
Conductivity	uS/cm	ng	ng	ng	ng	ng	2800	2900	3.5
pH	pH	6.5-9.0	6-9	ng	ng	ng	7.65	7.42	nc

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Table 3 - Nunavut Water Board Licence Requirements - Groundwater Analytical Results

Routine Parameters - Anions									
Alkalinity (PP as CaCO3)	mg/L	ng	ng	ng	ng	ng	<1.0	<1.0	nc
Alkalinity (Total as CaCO3)	mg/L	ng	ng	ng	ng	ng	390	390	0.0
Bicarbonate (HCO3)	mg/L	ng	ng	ng	ng	ng	480	470	2.1
Carbonate (CO3)	mg/L	ng	ng	ng	ng	ng	<1.0	<1.0	nc
Hydroxide (OH)	mg/L	ng	ng	ng	ng	ng	<1.0	<1.0	nc
Dissolved Sulphate (SO4)	mg/L	ng	ng	ng	ng	ng	700	610	13.7
Dissolved Chloride (Cl)	mg/L	120	ng	ng	ng	2300	**370[A]**	**360[A]**	2.7
Routine Parameters - Nurtirents									
Dissolved Nitrite (N)	mg/L	0.06	ng	ng	ng	ng	<0.010	<0.010	nc
Dissolved Nitrate plus Nitrite (N)	mg/L	ng	ng	ng	ng	ng	0.1	0.11	9.5
Routine Parameters - Lab Filtered Elements									
Dissolved Calcium (Ca)	mg/L	ng	ng	ng	ng	ng	190	190	0.0
Dissolved Iron (Fe)	mg/L	0.3	ng	ng	ng	ng	<0.060	<0.060	nc
Dissolved Magnesium (Mg)	mg/L	ng	ng	ng	ng	ng	110	110	0.0
Dissolved Manganese (Mn)	mg/L	ng	ng	ng	ng	ng	0.88	0.87	1.1
Dissolved Potassium (K)	mg/L	ng	ng	ng	ng	ng	66	64	3.1
Dissolved Sodium (Na)	mg/L	ng	ng	ng	ng	2300	260	260	0.0
Inorganic Parameters									
Total Suspended Solids	mg/L	ng	ng	ng	ng	ng	3.3	2.7	20.0
Additional Nutrients									
Total Ammonia (N)	mg/L	4.27[G]	ng	ng	ng	ng	0.76	0.75	1.3
Miscellaneous Organics									
Extractable (n-Hex.) Oil and grease	mg/L	ng	5	ng	ng	ng	<2.0	2	nc
Phenols	mg/L	ng	ng	ng	ng	12	0.013	0.019	nc
PFAS									
Perfluorobutane Sulfonate (PFBS)	ng/L	ng	ng	15000	ng	ng	<8000	<8000	nc
Perfluorobutanoic Acid	ng/L	ng	ng	30000	ng	ng	11000	11000	0.0
Perfluorodecane Sulfonate	ng/L	ng	ng	ng	ng	ng	<8000	<8000	nc
Perfluorodecanoic Acid (PFDA)	ng/L	ng	ng	ng	ng	ng	<8000	<8000	nc
Perfluorododecanoic Acid (PFDoA)	ng/L	ng	ng	ng	ng	ng	<8000	<8000	nc
Perfluoroheptane sulfonate	ng/L	ng	ng	ng	ng	ng	<8000	<8000	nc
Perfluoroheptanoic Acid (PFHpA)	ng/L	ng	ng	200	ng	ng	**9800[C]**	**9700[C]**	1.0
Perfluorohexane Sulfonate (PFHxS)	ng/L	ng	ng	600	ng	ng	**110000[C]**	**110000[C]**	0.0
Perfluorohexanoic Acid (PFHxA)	ng/L	ng	ng	200	ng	ng	**50000[C]**	**48000[C]**	4.0
Perfluoro-n-Octanoic Acid (PFOA)	ng/L	ng	ng	200	ng	ng	**13000[C]**	**12000[C]**	7.7
Perfluorononanoic Acid (PFNA)	ng/L	ng	ng	20	ng	ng	**<8000[C]**	**<8000[C]**	nc
Perfluorooctane Sulfonamide (PFOSA)	ng/L	ng	ng	ng	ng	ng	<8000	<8000	nc
Perfluorooctane Sulfonate (PFOS)	ng/L	ng	6800	600	6800	ng	**91000[B,C,D]**	**87000[B,C,D]**	4.4
Perfluoropentanoic Acid (PFPeA)	ng/L	ng	ng	200	ng	ng	**47000[C]**	**47000[C]**	0.0
Perfluorotetradecanoic Acid	ng/L	ng	ng	ng	ng	ng	<8000	<8000	nc
Perfluorotridecanoic Acid	ng/L	ng	ng	ng	ng	ng	<8000	<8000	nc
Perfluoroudecanoic Acid (PFUnA)	ng/L	ng	ng	ng	ng	ng	<8000	<8000	nc

Notes:

[A] CCME. Canadian Water Quality Guidelines for the Protection of Aquatic Life, Feshwater.

[B] Nunavut Water Board. 2018. Licence No. 1-BR-FTA1828. Part E, Item 5.

[C] Health Canada. July 2018. Drinking Water Screening Values: Perfluoroalkylated Substances.

[D] Environment and Climate Change Canada. 2017. Federal Environmental Qulaity Guidelines for Perfluorooctanoic Sulfonate (PFOS).

[E] Ontario Ministry of the Enviornment and Climate Change (now referred to as the Ministry of Enviornment, Conservation, and Parks). Soil, Groundwater, and Sediment Standards for use under Part XV.1 of the Environmental Protection Act. Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Groundwater Condition.

[F] Guideline is calculated based on hardness ($CaCO_3$)

[G] Guideline is based on temperature and pH. The Ammonia (NH_3) guideline was multiplied by a factor of 0.8824 to calculate the Ammonia (N) guideline.

RPD	Relative percent difference. Calculated as the difference between the concentrations divided by their average, expressed as a percent.
%	Percent
mg/L	milligrams per litre
meq/L	milliequivalents per litre
µS/cm	microsiemens per centimetre
nG/L	nanograms per litre
ng	No Applicable guideline
nc	RPD could not be calculated as one or both of the concentrations were less than five times the laboratory reportable detection limit.
0.0043	Concentration exceeds applicable guideline
34.6	RPD exceeds industry standard
<0.060	Concentration is less than laboratory reportable detection Limit
<8000	Laboratory reportable detection limit exceeds applicable guideline

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Table 4 - Soil Monitoring Results

Sample ID	Date	Depth (m BGS)	CHV (ppm)	IHV (ppm)	Texture
FTA-S01	12-Aug-18	0.0-0.3	0	0	Clayey, gravelly sand, some silt.
FTA-S02	12-Aug-18	0.0-0.3	0	0	Clayey, gravelly sand, some silt.
FTA-S03	12-Aug-18	0.0-0.3	0	0	Clayey, gravelly sand, some silt.
FTA-S04	12-Aug-18	0.0-0.3	0	0	Clayey, gravelly sand, some silt.
FTA-S05	12-Aug-18	0.0-0.3	0	0	Clayey, gravelly sand, some silt.
FTA-S06	12-Aug-18	0.0-0.3	0	0	Clayey, gravelly sand, some silt.

Notes:

CHV	Combustible headspace vapour concentrations
IHV	Ionizable headspace vapour concentrations
m BGS	Metres below ground surface
ppm	parts per million

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Table 5 - Nunavut Water Board Licence Requirements - Soil Analytical Results

Sample Location	Units	NWB[A]	FTA-S01-0-0.3	FTA-S-QC-01	RPD (%)	FTA-S02-0-0.3	FTA-S03-0-0.3	FTA-S04-0-0.3	FTA-S05-0-0.3	FTA-S06-0-0.3
Sample Date			12-Aug-18	12-Aug-18		12-Aug-18	12-Aug-18	12-Aug-18	12-Aug-18	12-Aug-18
Sample Depth (mBGS)			0.0-0.3			0.0-0.3	0.0-0.3	0.0-0.3	0.0-0.3	0.0-0.3
Sampling Company			Stantec	Duplicate of		Stantec	Stantec	Stantec	Stantec	Stantec
Laboratory			Maxxam	FTA-S01-0.0-0.3		Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Petroleum Hydrocarbons										
Benzene	mg/kg	0.03	<0.0050	<0.0050	nc	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Toluene	mg/kg	0.37	<0.020	<0.020	nc	<0.020	<0.020	<0.020	<0.020	<0.020
Ethylbenzene	mg/kg	0.082	<0.010	<0.010	nc	<0.010	<0.010	<0.010	<0.010	<0.010
m & p-Xylene	mg/kg	ng	<0.040	<0.040	nc	<0.040	<0.040	<0.040	<0.040	<0.040
o-Xylene	mg/kg	ng	<0.020	<0.020	nc	<0.020	<0.020	<0.020	<0.020	<0.020
Xylenes (Total)	mg/kg	11	<0.045	<0.045	nc	<0.045	<0.045	<0.045	<0.045	<0.045
F1 (C6-C10) - BTEX	mg/kg	320	<10	<10	nc	<10	<10	<10	<10	<10
F1 (C6-C10)	mg/kg	na	<10	<10	nc	<10	<10	<10	<10	<10
F2 (C10-C16 Hydrocarbons)	mg/kg	260	30	39	26	<10	<10	83	52	100
F3 (C16-C34 Hydrocarbons)	mg/kg	1700	150	380	**87**	83	130	64	73	350
F4 (C34-C50 Hydrocarbons)	mg/kg	3300	55	120	**74**	<50	63	<50	<50	140
Reached Baseline at C50	mg/kg	ng	Yes	Yes	nc	Yes	Yes	Yes	Yes	Yes
Metals										
Total Lead	mg/kg	600	6.4	6.8	6	8.3	8	8.4	5.7	6.4

Notes:

[A]Nunavut Water Board. 2018. Licence NO. 1BR-FTA-1828. Part J. Table 1 - Remediation Requirements. Industrial Land Use. Excluding the protection of potable groundwater.

RPD	relative percent difference calculated as the difference between the two concentrations divided by their average and expressed as a percent.
mBGS	metres below ground surface
mg/kg	milligrams per kilogram
%	percent
-	parameter not analyzed
ng	no applicable guideline / standard
nc	RPD could not be calculated as one or both of the concentrations were less than five times the laboratory reportable detection limit.
<0.0050	Concentration is less than the laboratory reportable detection limit.
390[B]	Concentrations exceed applicable standard.
71	RPD exceeds industry standard.

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Table 6 - Quality Assurance / Quality Control - Blanks

Sample Location	Units	TRIP BLANK-01	FIELD BLANK-01
Sample Date		8-Aug-18	8-Aug-18
Sampling Company		Stantec	Stantec
Laboratory		Maxxam	Maxxam
Petroleum Hydrocarbons			
Benzene	mg/L	<0.00040	-
Toluene	mg/L	<0.00040	-
Ethylbenzene	mg/L	<0.00040	-
m & p-Xylene	mg/L	<0.00080	-
o-Xylene	mg/L	<0.00040	-
Xylenes (Total)	mg/L	<0.00089	-
F1 (C6-C10) - BTEX	mg/L	<0.10	-
F1 (C6-C10)	mg/L	<0.10	-
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	-
Polycyclic Aromatic Hydrocarbons			
Benzo[a]pyrene equivalency	mg/L	<0.000010	-
Acenaphthene	mg/L	<0.00010	-
Acenaphthylene	mg/L	<0.00010	-
Acridine	mg/L	<0.000050	-
Anthracene	mg/L	<0.000010	-
Benzo(a)anthracene	mg/L	<0.0000085	-
Benzo(b&j)fluoranthene	mg/L	<0.0000085	-
Benzo(k)fluoranthene	mg/L	<0.0000085	-
Benzo(g,h,i)perylene	mg/L	<0.0000085	-
Benzo(c)phenanthrene	mg/L	<0.000050	-
Benzo(a)pyrene	mg/L	<0.0000075	-
Benzo[e]pyrene	mg/L	<0.000050	-
Chrysene	mg/L	<0.0000085	-
Dibenz(a,h)anthracene	mg/L	<0.0000075	-
Fluoranthene	mg/L	<0.000010	-
Fluorene	mg/L	<0.000050	-
Indeno(1,2,3-cd)pyrene	mg/L	<0.0000085	-
1-Methylnaphthalene	mg/L	<0.00010	-
2-Methylnaphthalene	mg/L	<0.00010	-
Naphthalene	mg/L	<0.00010	-
Phenanthrene	mg/L	<0.000050	-
Perylene	mg/L	<0.000050	-
Pyrene	mg/L	<0.000020	-
Quinoline	mg/L	<0.00020	-

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Sample Location	Units	TRIP BLANK-01	FIELD BLANK-01
Sample Date		8-Aug-18	8-Aug-18
Sampling Company		Stantec	Stantec
Laboratory		Maxxam	Maxxam
Total Metals			
Total Aluminum (Al)	mg/L	<0.0030	-
Total Antimony (Sb)	mg/L	<0.00060	-
Total Arsenic (As)	mg/L	<0.00020	-
Total Barium (Ba)	mg/L	<0.010	-
Total Beryllium (Be)	mg/L	<0.0010	-
Total Boron (B)	mg/L	<0.020	-
Total Cadmium (Cd)	mg/L	<0.000020	-
Total Calcium (Ca)	mg/L	<0.30	-
Total Chromium (Cr)	mg/L	<0.0010	-
Total Cobalt (Co)	mg/L	<0.00030	-
Total Copper (Cu)	mg/L	**0.00031**	-
Total Iron (Fe)	mg/L	<0.060	-
Total Lead (Pb)	mg/L	<0.00020	-
Total Lithium (Li)	mg/L	<0.020	-
Total Magnesium (Mg)	mg/L	<0.20	-
Total Manganese (Mn)	mg/L	<0.0040	-
Total Molybdenum (Mo)	mg/L	<0.00020	-
Total Nickel (Ni)	mg/L	<0.00050	-
Total Phosphorus (P)	mg/L	<0.10	-
Total Potassium (K)	mg/L	<0.30	-
Total Selenium (Se)	mg/L	<0.00020	-
Total Silicon (Si)	mg/L	<0.10	-
Total Silver (Ag)	mg/L	<0.00010	-
Total Sodium (Na)	mg/L	<0.50	-
Total Strontium (Sr)	mg/L	<0.020	-
Total Sulphur (S)	mg/L	<0.20	-
Total Thallium (Tl)	mg/L	<0.00020	-
Total Tin (Sn)	mg/L	<0.0010	-
Total Titanium (Ti)	mg/L	<0.0010	-
Total Uranium (U)	mg/L	<0.00010	-
Total Vanadium (V)	mg/L	<0.0010	-
Total Zinc (Zn)	mg/L	<0.0030	-
Routine Parameters			
Routine Parameters - Calculated Parameters			
Anion Sum	meq/L	0.0000	-
Cation Sum	meq/L	0.0080	-
Hardness (CaCO3)	mg/L	<0.50	-
Ion Balance (% Difference)	%	NC	-
Dissolved Nitrate (N)	mg/L	<0.020	-
Dissolved Nitrate (NO3)	mg/L	<0.089	-
Dissolved Nitrite (NO2)	mg/L	<0.033	-
Calculated Total Dissolved Solids	mg/L	<0.022	-
Routine Parameters - Miscellaneous Inorgamics			
Conductivity	uS/cm	<2.0	-
pH	pH	5.11	-

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Sample Location	Units	TRIP BLANK-01	FIELD BLANK-01
Sample Date		8-Aug-18	8-Aug-18
Sampling Company		Stantec	Stantec
Laboratory		Maxxam	Maxxam
Routine Parameters - Anions			
Alkalinity (PP as CaCO3)	mg/L	<1.0	-
Alkalinity (Total as CaCO3)	mg/L	<1.0	-
Bicarbonate (HCO3)	mg/L	<1.0	-
Carbonate (CO3)	mg/L	<1.0	-
Hydroxide (OH)	mg/L	<1.0	-
Dissolved Sulphate (SO4)	mg/L	<1.0	-
Dissolved Chloride (Cl)	mg/L	<1.0	-
Routine Parameters - Nurtirents			
Dissolved Nitrite (N)	mg/L	<0.010	-
Dissolved Nitrate plus Nitrite (N)	mg/L	<0.020	-
Routine Parameters - Lab Filtered Elements			
Dissolved Calcium (Ca)	mg/L	<0.30	-
Dissolved Iron (Fe)	mg/L	<0.060	-
Dissolved Magnesium (Mg)	mg/L	<0.20	-
Dissolved Manganese (Mn)	mg/L	<0.0040	-
Dissolved Potassium (K)	mg/L	<0.30	-
Dissolved Sodium (Na)	mg/L	<0.50	-
Inorganic Parameters			
Total Suspended Solids	mg/L	<1.0	-
Additional Nutrients			
Total Ammonia (N)	mg/L	<0.015	-
Miscellaneous Organics			
Extractable (n-Hex.) Oil and grease	mg/L	<2.0	-
Phenols	mg/L	<0.0020	-
PFAS			
Perfluorobutane Sulfonate (PFBS)	ng/L	<2.0	<2.0
Perfluorobutanoic Acid	ng/L	<2.0	<2.0
Perfluorodecane Sulfonate	ng/L	<2.0	<2.0
Perfluorodecanoic Acid (PFDA)	ng/L	<2.0	<2.0
Perfluorododecanoic Acid (PFDoA)	ng/L	<2.0	<2.0
Perfluoroheptane sulfonate	ng/L	<2.0	<2.0
Perfluoroheptanoic Acid (PFHpA)	ng/L	<2.0	<2.0
Perfluorohexane Sulfonate (PFHxS)	ng/L	<2.0	<2.0
Perfluorohexanoic Acid (PFHxA)	ng/L	<2.0	<2.0
Perfluoro-n-Octanoic Acid (PFOA)	ng/L	<2.0	<2.0
Perfluorononanoic Acid (PFNA)	ng/L	<2.0	<2.0
Perfluorooctane Sulfonamide (PFOSA)	ng/L	<4.0	<4.0
Perfluorooctane Sulfonate (PFOS)	ng/L	<2.0	<2.0
Perfluoropentanoic Acid (PFPeA)	ng/L	<2.0	<2.0
Perfluorotetradecanoic Acid	ng/L	<2.0	<2.0
Perfluorotridecanoic Acid	ng/L	<2.0	<2.0
Ferfluoroudecanoic Acid (PFUnA)	ng/L	<2.0	<2.0

Notes:

%	Percent
mg/L	iligrams per litre
meq/L	milliequivalents per litre
µS/cm	microsiemens per centimetre
nG/L	nanograms per litre
ng	No Applicable guideline
0.00031	Concentration exceeds laboratory reportable detection limit.

2018 Site Remedial Activities Remediation and Environmental Monitoring Program
Cambridge Bay Airport, Fire Training Area Land Treatment Unit
Public Services and Procurement Canada for Transport Canada
110220176
Jan-19

Table 7 - GPS Locations of Soil Samples and Monitoring Wells

Location	Description	Easting	Northing
MW15-1	Monitoring Well	493434.93	7666915.57
MW15-2	Monitoring Well	493570.31	7666908.52
MW15-3	Monitoring Well	493676.24	7666833.08
MW15-4	Monitoring Well	493593.07	7666802.53
MW15-5	Monitoring Well	493615.27	7666755.86
MW15-6	Monitoring Well	493598.21	7666728.36
MW15-7	Monitoring Well	493598.36	7666679.07
MW15-8	Monitoring Well	493616.49	7666703.67
MW15-9	Monitoring Well	493584.45	7666746.01
MW15-10	Monitoring Well	493603.70	7666743.40
MW15-11	Monitoring Well	493593.73	7666766.51
FTA-S01-0-0.3	Soil Sample	493637.03	7666826.94
FTA-S02-0-0.3	Soil Sample	493651.83	7666857.46
FTA-S03-0-0.3	Soil Sample	493589.89	7666879.25
FTA-S04-0-0.3	Soil Sample	493568.87	7666844.96
FTA-S05-0-0.3	Soil Sample	493514.64	7666860.94
FTA-S06-0-0.3	Soil Sample	493522.50	7666897.60

Notes:
Lattitude / Longitude expressed per NAD 83, Zone 13
GPS Model: garmin GPSMAP 62 So

APPENDIX D

Laboratory Certificates of Analysis

Maxxam
A Bureau Veritas Group Company

Success Through Science®

Your Project #: 110220176
Site Location: CBA FTA
Your C.O.C. #: M086440

Attention: LINDSAY VAN NOORTWYK

STANTEC CONSULTING LTD
10160-112 STREET
EDMONTON, AB
CANADA T5K 2L6

Report Date: 2018/11/06
Report #: R2646578
Version: 4 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B867218
Received: 2018/08/09, 08:30

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO3,HCO3,OH (1)	1	N/A	2018/08/13	AB SOP-00005	SM 23 2320 B m
Alkalinity @25C (pp, total), CO3,HCO3,OH (1)	1	N/A	2018/08/14	AB SOP-00005	SM 23 2320 B m
BTEX/F1 in Water by HS GC/MS/FID (1)	2	N/A	2018/08/11	AB SOP-00039	CCME CWS/EPA 8260d m
F1-BTEX (1)	2	N/A	2018/08/13	AB SOP-00039	Auto Calc
Chloride by Automated Colourimetry (1)	1	N/A	2018/08/16	AB SOP-00020	SM 22 4500-Cl-E m
Chloride by Automated Colourimetry (1)	1	N/A	2018/08/17	AB SOP-00020	SM 22 4500-Cl-E m
Conductivity @25C (1)	1	N/A	2018/08/13	AB SOP-00005	SM 23 2510 B m
Conductivity @25C (1)	1	N/A	2018/08/14	AB SOP-00005	SM 23 2510 B m
CCME Hydrocarbons in Water (F2; C10-C16) (1, 2)	2	2018/08/13	2018/08/14	AB SOP-00037 / AB SOP-00040	CCME PHC-CWS m
Hardness (1)	2	N/A	2018/08/14	AB WI-00065	Auto Calc
Elements by ICP-Dissolved-Lab Filtered (1, 3)	2	N/A	2018/08/13	AB SOP-00042	EPA 6010d R4 m
Elements by ICP - Total (1)	2	2018/08/19	2018/08/20	AB SOP-00014 / AB SOP-00042	EPA 6010d R4 m
Elements by ICPMS - Total (1)	2	2018/08/19	2018/08/20	AB SOP-00014 / AB SOP-00043	EPA 6020b R2 m
Ion Balance (1)	2	N/A	2018/08/12	AB WI-00065	Auto Calc
Sum of cations, anions (1)	2	N/A	2018/08/14	AB WI-00065	Auto Calc
Ammonia-N (Total) (1)	2	N/A	2018/08/15	AB SOP-00007	SM 23 4500 NH3 A G m
Nitrate and Nitrite (1)	2	N/A	2018/08/12	AB WI-00065	Auto Calc
Nitrate (as N) (1)	2	2018/08/11	2018/08/12	AB WI-00065	Auto Calc
NO2 - NO2 + NO3 (N) by CFA (1)	2	N/A	2018/08/12	AB SOP-00082	IM 857-871m
Oil and Grease (Gravimetric, n-Hexane) (1)	2	2018/08/23	2018/08/23	EENVSOP-00093	SM 23 5520B m
Benzo[a]pyrene Equivalency (1, 4)	2	N/A	2018/08/20	AB SOP-00003	Auto Calc
PAH in Water by GC/MS (1)	2	2018/08/15	2018/08/18	AB SOP-00037 / AB SOP-00003	EPA 3510C/8270E m
pH @25°C (1, 5)	1	N/A	2018/08/13	AB SOP-00005	SM 23 4500 H+ B m
pH @25°C (1, 5)	1	N/A	2018/08/14	AB SOP-00005	SM 23 4500 H+ B m
Phenols (4-AAP) (1)	2	N/A	2018/08/17	EENVSOP-00061	MMCW 154 1996 m
Sulphate by Automated Colourimetry (1)	1	N/A	2018/08/16	AB SOP-00018	SM 22 4500-SO4 E m
Sulphate by Automated Colourimetry (1)	1	N/A	2018/08/17	AB SOP-00018	SM 22 4500-SO4 E m

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 Project #: 110220176
Site Location: CBA FTA
Your C.O.C. #: M086440

Attention: LINDSAY VAN NOORTWYK

STANTEC CONSULTING LTD
10160-112 STREET
EDMONTON, AB
CANADA T5K 2L6

Report Date: 2018/11/06
Report #: R2646578
Version: 4 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B867218
Received: 2018/08/09, 08:30

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Total Dissolved Solids (Calculated) (1)	1	N/A	2018/08/16	AB WI-00065	Auto Calc
Total Dissolved Solids (Calculated) (1)	1	N/A	2018/08/17	AB WI-00065	Auto Calc
Total Suspended Solids (NFR) (1)	2	2018/08/13	2018/08/14	AB SOP-00061	SM 23 2540 D m

Remarks:

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

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

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

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

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 Edmonton Environmental
(2) Silica gel clean up employed.
(3) Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
(4) B[a]P TPE is calculated using 1/2 of the RDL for non detect results as per Alberta Environment instructions. This protocol may not apply in other jurisdictions.
(5) The CCME method requires pH to be analysed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the CCME holding time. Maxxam endeavours to analyze samples as soon as possible after receipt.

Your Project #: 110220176
Site Location: CBA FTA
Your C.O.C. #: M086440

Attention: LINDSAY VAN NOORTWYK

STANTEC CONSULTING LTD
10160-112 STREET
EDMONTON, AB
CANADA T5K 2L6

Report Date: 2018/11/06
Report #: R2646578
Version: 4 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B867218
Received: 2018/08/09, 08:30

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Geraldlyn Gouthro, Client Service Specialist
Email: GGouthro@maxxam.ca
Phone# (403)735-2230

==========

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 #: B867218
Report Date: 2018/11/06

STANTEC CONSULTING LTD
Client Project #: 110220176
Site Location: CBA FTA
Sampler Initials: LA

AT1 BTEX AND F1-F2 IN WATER (WATER)

Maxxam ID		UB1097		UB1102			
Sampling Date		2018/08/08 14:50		2018/08/08			
COC Number		M086440		M086440			
	UNITS	MW15-8	MU	GW-QC-01	MU	RDL	QC Batch
Ext. Pet. Hydrocarbon							
F2 (C10-C16 Hydrocarbons)	mg/L	0.10	+/- <RDL	<0.10	N/A	0.10	9099779
Volatiles							
Benzene	mg/L	<0.00040	N/A	<0.00040	N/A	0.00040	9099160
Toluene	mg/L	<0.00040	N/A	<0.00040	N/A	0.00040	9099160
Ethylbenzene	mg/L	<0.00040	N/A	<0.00040	N/A	0.00040	9099160
m & p-Xylene	mg/L	<0.00080	N/A	<0.00080	N/A	0.00080	9099160
o-Xylene	mg/L	<0.00040	N/A	<0.00040	N/A	0.00040	9099160
Xylenes (Total)	mg/L	<0.00089	N/A	<0.00089	N/A	0.00089	9098790
F1 (C6-C10) - BTEX	mg/L	<0.10	N/A	<0.10	N/A	0.10	9098790
F1 (C6-C10)	mg/L	<0.10	N/A	<0.10	N/A	0.10	9099160
Surrogate Recovery (%)							
1,4-Difluorobenzene (sur.)	%	97	N/A	99	N/A	N/A	9099160
4-Bromofluorobenzene (sur.)	%	100	N/A	100	N/A	N/A	9099160
D4-1,2-Dichloroethane (sur.)	%	90	N/A	90	N/A	N/A	9099160
O-TERPHENYL (sur.)	%	115	N/A	107	N/A	N/A	9099779

RDL = Reportable Detection Limit
MU = Measurement Uncertainty
N/A = Not Applicable

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Maxxam Job #: B867218
Report Date: 2018/11/06

STANTEC CONSULTING LTD
Client Project #: 110220176
Site Location: CBA FTA
Sampler Initials: LA

ROUTINE WATER -LAB FILTERED (WATER)

Maxxam ID		UB1097		UB1097			UB1102			
Sampling Date		2018/08/08 14:50		2018/08/08 14:50			2018/08/08			
COC Number		M086440		M086440			M086440			
	UNITS	MW15-8	MU	MW15-8 Lab-Dup	MU	QC Batch	GW-QC-01	MU	RDL	QC Batch
Calculated Parameters										
Anion Sum	meq/L	33	N/A	N/A	N/A	9098797	31	N/A	N/A	9098797
Cation Sum	meq/L	32	N/A	N/A	N/A	9098797	31	N/A	N/A	9098797
Hardness (CaCO3)	mg/L	920	N/A	N/A	N/A	9098794	920	N/A	0.50	9098794
Ion Balance (% Difference)	%	2.0	N/A	N/A	N/A	9098796	1.1	N/A	N/A	9098796
Dissolved Nitrate (N)	mg/L	0.10	N/A	N/A	N/A	9099106	0.11	N/A	0.020	9099106
Dissolved Nitrate (NO3)	mg/L	0.45	N/A	N/A	N/A	9099061	0.49	N/A	0.089	9099061
Dissolved Nitrite (NO2)	mg/L	<0.033	N/A	N/A	N/A	9099061	<0.033	N/A	0.033	9099061
Calculated Total Dissolved Solids	mg/L	1900	N/A	N/A	N/A	9098801	1800	N/A	0.022	9098801
Misc. Inorganics										
Conductivity	uS/cm	2800	+/- 250	N/A	N/A	9099658	2900	+/- 250	2.0	9101838
pH	pH	7.65	+/- 0.111	N/A	N/A	9099656	7.42	+/- 0.108	N/A	9101835
Anions										
Alkalinity (PP as CaCO3)	mg/L	<1.0	N/A	N/A	N/A	9099657	<1.0	N/A	1.0	9101837
Alkalinity (Total as CaCO3)	mg/L	390	+/- 17	N/A	N/A	9099657	390	+/- 17	1.0	9101837
Bicarbonate (HCO3)	mg/L	480	+/- 110	N/A	N/A	9099657	470	+/- 110	1.0	9101837
Carbonate (CO3)	mg/L	<1.0	N/A	N/A	N/A	9099657	<1.0	N/A	1.0	9101837
Hydroxide (OH)	mg/L	<1.0	N/A	N/A	N/A	9099657	<1.0	N/A	1.0	9101837
Dissolved Sulphate (SO4)	mg/L	700 (1)	+/- 120	N/A	N/A	9100526	610 (1)	+/- 100	5.0	9106721
Dissolved Chloride (Cl)	mg/L	370 (1)	+/- 23	N/A	N/A	9100463	360 (1)	+/- 22	5.0	9106716
Nutrients										
Dissolved Nitrite (N)	mg/L	<0.010	N/A	<0.010	N/A	9099347	<0.010	N/A	0.010	9099347
Dissolved Nitrate plus Nitrite (N)	mg/L	0.10	N/A	0.097	N/A	9099347	0.11	N/A	0.020	9099347
Lab Filtered Elements										
Dissolved Calcium (Ca)	mg/L	190	+/- 12	N/A	N/A	9100446	190	+/- 12	0.30	9100446
Dissolved Iron (Fe)	mg/L	<0.060	N/A	N/A	N/A	9100446	<0.060	N/A	0.060	9100446
Dissolved Magnesium (Mg)	mg/L	110	+/- 5.6	N/A	N/A	9100446	110	+/- 5.6	0.20	9100446
Dissolved Manganese (Mn)	mg/L	0.88	+/- 0.028	N/A	N/A	9100446	0.87	+/- 0.027	0.0040	9100446
Dissolved Potassium (K)	mg/L	66	+/- 4.0	N/A	N/A	9100446	64	+/- 3.9	0.30	9100446

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate
MU = Measurement Uncertainty
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 Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Maxxam Job #: B867218
Report Date: 2018/11/06

STANTEC CONSULTING LTD
Client Project #: 110220176
Site Location: CBA FTA
Sampler Initials: LA

ROUTINE WATER -LAB FILTERED (WATER)

Maxxam ID		UB1097		UB1097			UB1102			
Sampling Date		2018/08/08 14:50		2018/08/08 14:50			2018/08/08			
COC Number		M086440		M086440			M086440			
	UNITS	**MW15-8**	**MU**	**MW15-8 Lab-Dup**	**MU**	**QC Batch**	**GW-QC-01**	**MU**	**RDL**	**QC Batch**
Dissolved Sodium (Na)	mg/L	260	+/- 16	N/A	N/A	9100446	260	+/- 15	0.50	9100446

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

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Maxxam Job #: B867218
Report Date: 2018/11/06

STANTEC CONSULTING LTD
Client Project #: 110220176
Site Location: CBA FTA
Sampler Initials: LA

REGULATED METALS (CCME/AT1) - TOTAL

Maxxam ID		UB1097		UB1102			
Sampling Date		2018/08/08 14:50		2018/08/08			
COC Number		M086440		M086440			
	UNITS	MW15-8	MU	GW-QC-01	MU	RDL	QC Batch
Elements							
Total Aluminum (Al)	mg/L	0.010	+/- 0.0089	0.011	+/- 0.0090	0.0030	9108718
Total Antimony (Sb)	mg/L	<0.00060	N/A	<0.00060	N/A	0.00060	9108718
Total Arsenic (As)	mg/L	0.0012	+/- 0.00064	0.0012	+/- 0.00064	0.00020	9108718
Total Barium (Ba)	mg/L	0.036	+/- <RDL	0.036	+/- <RDL	0.010	9108733
Total Beryllium (Be)	mg/L	<0.0010	N/A	<0.0010	N/A	0.0010	9108718
Total Boron (B)	mg/L	0.43	+/- 0.034	0.43	+/- 0.034	0.020	9108733
Total Cadmium (Cd)	mg/L	0.000045	+/- <RDL	0.000047	+/- <RDL	0.000020	9108718
Total Calcium (Ca)	mg/L	190	+/- 19	190	+/- 19	0.30	9108733
Total Chromium (Cr)	mg/L	<0.0010	N/A	<0.0010	N/A	0.0010	9108718
Total Cobalt (Co)	mg/L	0.0097	+/- 0.0011	0.0097	+/- 0.0011	0.00030	9108718
Total Copper (Cu)	mg/L	0.010	+/- 0.0014	0.011	+/- 0.0015	0.00020	9108718
Total Iron (Fe)	mg/L	0.42	+/- <RDL	0.42	+/- <RDL	0.060	9108733
Total Lead (Pb)	mg/L	0.00043	+/- <RDL	0.00045	+/- <RDL	0.00020	9108718
Total Lithium (Li)	mg/L	0.033	+/- <RDL	0.031	+/- <RDL	0.020	9108733
Total Magnesium (Mg)	mg/L	100	+/- 8.6	100	+/- 8.5	0.20	9108733
Total Manganese (Mn)	mg/L	0.86	+/- 0.078	0.84	+/- 0.076	0.0040	9108733
Total Molybdenum (Mo)	mg/L	0.0037	+/- 0.00061	0.0037	+/- 0.00062	0.00020	9108718
Total Nickel (Ni)	mg/L	0.030	+/- 0.0036	0.030	+/- 0.0036	0.00050	9108718
Total Phosphorus (P)	mg/L	<0.10	N/A	<0.10	N/A	0.10	9108733
Total Potassium (K)	mg/L	60	+/- 6.1	60	+/- 6.1	0.30	9108733
Total Selenium (Se)	mg/L	0.00029	+/- <RDL	0.00028	+/- <RDL	0.00020	9108718
Total Silicon (Si)	mg/L	3.3	+/- 0.34	3.3	+/- 0.35	0.10	9108733
Total Silver (Ag)	mg/L	0.00055	+/- <RDL	0.00055	+/- <RDL	0.00010	9108718
Total Sodium (Na)	mg/L	250	+/- 27	260	+/- 27	0.50	9108733
Total Strontium (Sr)	mg/L	0.34	+/- 0.026	0.34	+/- 0.026	0.020	9108733
Total Sulphur (S)	mg/L	210	+/- 11	210	+/- 11	0.20	9108733
Total Thallium (Tl)	mg/L	<0.00020	N/A	<0.00020	N/A	0.00020	9108718
Total Tin (Sn)	mg/L	<0.0010	N/A	<0.0010	N/A	0.0010	9108718
Total Titanium (Ti)	mg/L	0.0021	+/- <RDL	<0.0010	N/A	0.0010	9108718
Total Uranium (U)	mg/L	0.011	+/- 0.0014	0.011	+/- 0.0014	0.00010	9108718

RDL = Reportable Detection Limit
MU = Measurement Uncertainty
N/A = Not Applicable

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Maxxam Job #: B867218
Report Date: 2018/11/06

STANTEC CONSULTING LTD
Client Project #: 110220176
Site Location: CBA FTA
Sampler Initials: LA

REGULATED METALS (CCME/AT1) - TOTAL

Maxxam ID		UB1097		UB1102			
Sampling Date		2018/08/08 14:50		2018/08/08			
COC Number		M086440		M086440			
	UNITS	**MW15-8**	**MU**	**GW-QC-01**	**MU**	**RDL**	**QC Batch**
Total Vanadium (V)	mg/L	<0.0010	N/A	<0.0010	N/A	0.0010	9108718
Total Zinc (Zn)	mg/L	<0.0030	N/A	<0.0030	N/A	0.0030	9108718

RDL = Reportable Detection Limit
MU = Measurement Uncertainty
N/A = Not Applicable

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Maxxam Job #: B867218
Report Date: 2018/11/06

STANTEC CONSULTING LTD
Client Project #: 110220176
Site Location: CBA FTA
Sampler Initials: LA

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		UB1097		UB1097		UB1102			
Sampling Date		2018/08/08 14:50		2018/08/08 14:50		2018/08/08			
COC Number		M086440		M086440		M086440			
	UNITS	**MW15-8**	**MU**	**MW15-8 Lab-Dup**	**MU**	**GW-QC-01**	**MU**	**RDL**	**QC Batch**
Misc. Inorganics									
Total Suspended Solids	mg/L	3.3	+/- <RDL	N/A	N/A	2.7	+/- <RDL	1.0	9100590
Nutrients									
Total Ammonia (N)	mg/L	0.76	+/- 0.076	0.75	+/- 0.075	0.75	+/- 0.075	0.015	9099951
Misc. Organics									
Extractable (n-Hex.) Oil and grease	mg/L	<2.0	N/A	N/A	N/A	3.0	+/- <RDL	2.0	9114731
Phenols	mg/L	0.013	+/- <RDL	N/A	N/A	0.013	+/- <RDL	0.0020	9106666

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

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Report Date: 2018/11/06

STANTEC CONSULTING LTD
Client Project #: 110220176
Site Location: CBA FTA
Sampler Initials: LA

SEMIVOLATILE ORGANICS BY GC-MS (WATER)

Maxxam ID		UB1097		UB1102			
Sampling Date		2018/08/08 14:50		2018/08/08			
COC Number		M086440		M086440			
	UNITS	MW15-8	MU	GW-QC-01	MU	RDL	QC Batch
Polycyclic Aromatics							
Benzo[a]pyrene equivalency	mg/L	<0.000010	N/A	<0.000010	N/A	0.000010	9099107
Acenaphthene	mg/L	<0.00010	N/A	<0.00010	N/A	0.00010	9102950
Acenaphthylene	mg/L	<0.00010	N/A	<0.00010	N/A	0.00010	9102950
Acridine	mg/L	<0.000050	N/A	<0.000050	N/A	0.000050	9102950
Anthracene	mg/L	<0.000010	N/A	<0.000010	N/A	0.000010	9102950
Benzo(a)anthracene	mg/L	<0.0000085	N/A	<0.0000085	N/A	0.0000085	9102950
Benzo(b&j)fluoranthene	mg/L	<0.0000085	N/A	<0.0000085	N/A	0.0000085	9102950
Benzo(k)fluoranthene	mg/L	<0.0000085	N/A	<0.0000085	N/A	0.0000085	9102950
Benzo(g,h,i)perylene	mg/L	<0.0000085	N/A	<0.0000085	N/A	0.0000085	9102950
Benzo(c)phenanthrene	mg/L	<0.000050	N/A	<0.000050	N/A	0.000050	9102950
Benzo(a)pyrene	mg/L	<0.0000075	N/A	<0.0000075	N/A	0.0000075	9102950
Benzo[e]pyrene	mg/L	<0.000050	N/A	<0.000050	N/A	0.000050	9102950
Chrysene	mg/L	<0.0000085	N/A	<0.0000085	N/A	0.0000085	9102950
Dibenz(a,h)anthracene	mg/L	<0.0000075	N/A	<0.0000075	N/A	0.0000075	9102950
Fluoranthene	mg/L	<0.000010	N/A	<0.000010	N/A	0.000010	9102950
Fluorene	mg/L	<0.000050	N/A	<0.000050	N/A	0.000050	9102950
Indeno(1,2,3-cd)pyrene	mg/L	<0.0000085	N/A	<0.0000085	N/A	0.0000085	9102950
1-Methylnaphthalene	mg/L	<0.00010	N/A	<0.00010	N/A	0.00010	9102950
2-Methylnaphthalene	mg/L	<0.00010	N/A	<0.00010	N/A	0.00010	9102950
Naphthalene	mg/L	<0.00010	N/A	<0.00010	N/A	0.00010	9102950
Phenanthrene	mg/L	<0.000050	N/A	<0.000050	N/A	0.000050	9102950
Perylene	mg/L	<0.000050	N/A	<0.000050	N/A	0.000050	9102950
Pyrene	mg/L	<0.000020	N/A	<0.000020	N/A	0.000020	9102950
Quinoline	mg/L	<0.00020	N/A	<0.00020	N/A	0.00020	9102950
Surrogate Recovery (%)							
D10-ANTHRACENE (sur.)	%	117	N/A	114	N/A	N/A	9102950
D8-ACENAPHTHYLENE (sur.)	%	80	N/A	59	N/A	N/A	9102950
D8-NAPHTHALENE (sur.)	%	38 (1)	N/A	25 (1)	N/A	N/A	9102950

RDL = Reportable Detection Limit
MU = Measurement Uncertainty
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.

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STANTEC CONSULTING LTD
Client Project #: 110220176
Site Location: CBA FTA
Sampler Initials: LA

SEMIVOLATILE ORGANICS BY GC-MS (WATER)

Maxxam ID		UB1097		UB1102			
Sampling Date		2018/08/08 14:50		2018/08/08			
COC Number		M086440		M086440			
	UNITS	MW15-8	MU	GW-QC-01	MU	RDL	QC Batch
TERPHENYL-D14 (sur.)	%	100	N/A	88	N/A	N/A	9102950

RDL = Reportable Detection Limit
MU = Measurement Uncertainty
N/A = Not Applicable

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GENERAL COMMENTS

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

Package 1	1.7°C
Package 2	3.3°C
Package 3	3.0°C

Split Report sent at client request 2018/11/06

Sample UB1097 [MW15-8] : Please see attachment for Perfluorinated Compounds (Water) results.

Sample UB1098 [SW-01] : Please see attachment for Perfluorinated Compounds (Water) results.

Sample UB1099 [NW-SUMP] : Please see attachment for Perfluorinated Compounds (Water) results.

Sample UB1100 [SW-02] : Please see attachment for Perfluorinated Compounds (Water) results.

Sample UB1101 [SUMP-QC-01] : Please see attachment for Perfluorinated Compounds (Water) results.

Sample UB1102 [GW-QC-01] : Please see attachment for Perfluorinated Compounds (Water) results.

Sample UB1103 [SW-03] : Please see attachment for Perfluorinated Compounds (Water) results.

Sample UB1104 [SW-04] : Please see attachment for Perfluorinated Compounds (Water) results.

Sample UB1105 [SW-05] : Please see attachment for Perfluorinated Compounds (Water) results.

The estimate of uncertainty has been reported as an expanded uncertainty and calculated using a coverage factor of 2, which gives a level of confidence of 95%.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
9099160	AMJ	Matrix Spike [UB1099-08]	1,4-Difluorobenzene (sur.)	2018/08/11		97	%	50 - 140
			4-Bromofluorobenzene (sur.)	2018/08/11		96	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2018/08/11		101	%	50 - 140
			Benzene	2018/08/11		105	%	50 - 140
			Toluene	2018/08/11		89	%	50 - 140
			Ethylbenzene	2018/08/11		96	%	50 - 140
			m & p-Xylene	2018/08/11		92	%	50 - 140
			o-Xylene	2018/08/11		95	%	50 - 140
			F1 (C6-C10)	2018/08/11		87	%	60 - 140
9099160	AMJ	Spiked Blank	1,4-Difluorobenzene (sur.)	2018/08/11		91	%	50 - 140
			4-Bromofluorobenzene (sur.)	2018/08/11		96	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2018/08/11		99	%	50 - 140
			Benzene	2018/08/11		97	%	60 - 130
			Toluene	2018/08/11		83	%	60 - 130
			Ethylbenzene	2018/08/11		93	%	60 - 130
			m & p-Xylene	2018/08/11		89	%	60 - 130
			o-Xylene	2018/08/11		94	%	60 - 130
			F1 (C6-C10)	2018/08/11		80	%	60 - 140
9099160	AMJ	Method Blank	1,4-Difluorobenzene (sur.)	2018/08/11		98	%	50 - 140
			4-Bromofluorobenzene (sur.)	2018/08/11		100	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2018/08/11		87	%	50 - 140
			Benzene	2018/08/11	<0.00040		mg/L	
			Toluene	2018/08/11	<0.00040		mg/L	
			Ethylbenzene	2018/08/11	<0.00040		mg/L	
			m & p-Xylene	2018/08/11	<0.00080		mg/L	
			o-Xylene	2018/08/11	<0.00040		mg/L	
			F1 (C6-C10)	2018/08/11	<0.10		mg/L	
9099160	AMJ	RPD [UB1098-08]	Benzene	2018/08/11	NC		%	30
			Toluene	2018/08/11	NC		%	30
			Ethylbenzene	2018/08/11	NC		%	30
			m & p-Xylene	2018/08/11	NC		%	30
			o-Xylene	2018/08/11	NC		%	30
			F1 (C6-C10)	2018/08/11	NC		%	30
9099347	AF6	Matrix Spike [UB1097-02]	Dissolved Nitrite (N)	2018/08/12		108	%	80 - 120
			Dissolved Nitrate plus Nitrite (N)	2018/08/12		97	%	80 - 120
9099347	AF6	Spiked Blank	Dissolved Nitrite (N)	2018/08/12		103	%	80 - 120
			Dissolved Nitrate plus Nitrite (N)	2018/08/12		94	%	80 - 120
9099347	AF6	Method Blank	Dissolved Nitrite (N)	2018/08/12	<0.010		mg/L	
			Dissolved Nitrate plus Nitrite (N)	2018/08/12	<0.020		mg/L	
9099347	AF6	RPD [UB1097-02]	Dissolved Nitrite (N)	2018/08/12	NC		%	20
			Dissolved Nitrate plus Nitrite (N)	2018/08/12	4.9		%	20
9099656	MA4	Spiked Blank	pH	2018/08/13		100	%	97 - 103
9099656	MA4	RPD	pH	2018/08/13	0.27		%	N/A
9099657	MA4	Spiked Blank	Alkalinity (Total as CaCO3)	2018/08/13		99	%	80 - 120
9099657	MA4	Method Blank	Alkalinity (PP as CaCO3)	2018/08/13	<1.0		mg/L	
			Alkalinity (Total as CaCO3)	2018/08/13	<1.0		mg/L	
			Bicarbonate (HCO3)	2018/08/13	<1.0		mg/L	
			Carbonate (CO3)	2018/08/13	<1.0		mg/L	
			Hydroxide (OH)	2018/08/13	<1.0		mg/L	
9099657	MA4	RPD	Alkalinity (PP as CaCO3)	2018/08/13	NC		%	20
			Alkalinity (Total as CaCO3)	2018/08/13	0.13		%	20
			Bicarbonate (HCO3)	2018/08/13	0.13		%	20

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Carbonate (CO3)	2018/08/13	NC		%	20
			Hydroxide (OH)	2018/08/13	NC		%	20
9099658	MA4	Spiked Blank	Conductivity	2018/08/13		100	%	90 - 110
9099658	MA4	Method Blank	Conductivity	2018/08/13	<2.0		uS/cm	
9099658	MA4	RPD	Conductivity	2018/08/13	1.4		%	10
9099779	KHO	Matrix Spike	O-TERPHENYL (sur.)	2018/08/14		105	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2018/08/14		101	%	60 - 140
9099779	KHO	Spiked Blank	O-TERPHENYL (sur.)	2018/08/14		118	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2018/08/14		116	%	60 - 140
9099779	KHO	Method Blank	O-TERPHENYL (sur.)	2018/08/14		104	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2018/08/14	<0.10		mg/L	
9099779	KHO	RPD	F2 (C10-C16 Hydrocarbons)	2018/08/14	NC		%	30
9099951	AL2	Matrix Spike [UB1097-04]	Total Ammonia (N)	2018/08/15		103	%	80 - 120
9099951	AL2	Spiked Blank	Total Ammonia (N)	2018/08/15		102	%	80 - 120
9099951	AL2	Method Blank	Total Ammonia (N)	2018/08/15	<0.015		mg/L	
9099951	AL2	RPD [UB1097-04]	Total Ammonia (N)	2018/08/15	0.69		%	20
9100446	JK9	Matrix Spike	Dissolved Calcium (Ca)	2018/08/13		93	%	80 - 120
			Dissolved Iron (Fe)	2018/08/13		97	%	80 - 120
			Dissolved Magnesium (Mg)	2018/08/13		101	%	80 - 120
			Dissolved Manganese (Mn)	2018/08/13		95	%	80 - 120
			Dissolved Potassium (K)	2018/08/13		102	%	80 - 120
			Dissolved Sodium (Na)	2018/08/13		NC	%	80 - 120
9100446	JK9	Spiked Blank	Dissolved Calcium (Ca)	2018/08/13		97	%	80 - 120
			Dissolved Iron (Fe)	2018/08/13		97	%	80 - 120
			Dissolved Magnesium (Mg)	2018/08/13		102	%	80 - 120
			Dissolved Manganese (Mn)	2018/08/13		96	%	80 - 120
			Dissolved Potassium (K)	2018/08/13		102	%	80 - 120
			Dissolved Sodium (Na)	2018/08/13		100	%	80 - 120
9100446	JK9	Method Blank	Dissolved Calcium (Ca)	2018/08/13	<0.30		mg/L	
			Dissolved Iron (Fe)	2018/08/13	<0.060		mg/L	
			Dissolved Magnesium (Mg)	2018/08/13	<0.20		mg/L	
			Dissolved Manganese (Mn)	2018/08/13	<0.0040		mg/L	
			Dissolved Potassium (K)	2018/08/13	<0.30		mg/L	
			Dissolved Sodium (Na)	2018/08/13	<0.50		mg/L	
9100446	JK9	RPD	Dissolved Iron (Fe)	2018/08/13	NC		%	20
9100463	MRD	Matrix Spike	Dissolved Chloride (Cl)	2018/08/16		109	%	80 - 120
9100463	MRD	Spiked Blank	Dissolved Chloride (Cl)	2018/08/16		106	%	80 - 120
9100463	MRD	Method Blank	Dissolved Chloride (Cl)	2018/08/16	<1.0		mg/L	
9100463	MRD	RPD	Dissolved Chloride (Cl)	2018/08/16	1.6		%	20
9100526	MRD	Matrix Spike	Dissolved Sulphate (SO4)	2018/08/16		NC	%	80 - 120
9100526	MRD	Spiked Blank	Dissolved Sulphate (SO4)	2018/08/16		102	%	80 - 120
9100526	MRD	Method Blank	Dissolved Sulphate (SO4)	2018/08/16	<1.0		mg/L	
9100526	MRD	RPD	Dissolved Sulphate (SO4)	2018/08/16	0.15		%	20
9100590	VFE	Matrix Spike	Total Suspended Solids	2018/08/14		98	%	80 - 120
9100590	VFE	Spiked Blank	Total Suspended Solids	2018/08/14		104	%	80 - 120
9100590	VFE	Method Blank	Total Suspended Solids	2018/08/14	<1.0		mg/L	
9100590	VFE	RPD	Total Suspended Solids	2018/08/14	NC		%	20
9101835	MA4	Spiked Blank	pH	2018/08/14		100	%	97 - 103
9101835	MA4	RPD [UB1099-02]	pH	2018/08/14	0.13		%	N/A
9101837	MA4	Spiked Blank	Alkalinity (Total as CaCO3)	2018/08/14		100	%	80 - 120
9101837	MA4	Method Blank	Alkalinity (PP as CaCO3)	2018/08/14	<1.0		mg/L	
			Alkalinity (Total as CaCO3)	2018/08/14	<1.0		mg/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Bicarbonate (HCO3)	2018/08/14	<1.0		mg/L	
			Carbonate (CO3)	2018/08/14	<1.0		mg/L	
			Hydroxide (OH)	2018/08/14	<1.0		mg/L	
9101837	MA4	RPD [UB1099-02]	Alkalinity (PP as CaCO3)	2018/08/14	NC		%	20
			Alkalinity (Total as CaCO3)	2018/08/14	1.1		%	20
			Bicarbonate (HCO3)	2018/08/14	1.1		%	20
			Carbonate (CO3)	2018/08/14	NC		%	20
			Hydroxide (OH)	2018/08/14	NC		%	20
9101838	MA4	Spiked Blank	Conductivity	2018/08/14		100	%	90 - 110
9101838	MA4	Method Blank	Conductivity	2018/08/14	<2.0		uS/cm	
9101838	MA4	RPD [UB1099-02]	Conductivity	2018/08/14	0		%	10
9102950	BC5	Matrix Spike	D10-ANTHRACENE (sur.)	2018/08/18		117	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2018/08/18		111	%	50 - 130
			D8-NAPHTHALENE (sur.)	2018/08/18		93	%	50 - 130
			TERPHENYL-D14 (sur.)	2018/08/18		89	%	50 - 130
			Acenaphthene	2018/08/18		100	%	50 - 130
			Acenaphthylene	2018/08/18		110	%	50 - 130
			Acridine	2018/08/18		111	%	50 - 130
			Anthracene	2018/08/18		109	%	50 - 130
			Benzo(a)anthracene	2018/08/18		104	%	50 - 130
			Benzo(b&j)fluoranthene	2018/08/18		81	%	50 - 130
			Benzo(k)fluoranthene	2018/08/18		81	%	50 - 130
			Benzo(g,h,i)perylene	2018/08/18		77	%	50 - 130
			Benzo(c)phenanthrene	2018/08/18		125	%	50 - 130
			Benzo(a)pyrene	2018/08/18		86	%	50 - 130
			Benzo[e]pyrene	2018/08/18		84	%	50 - 130
			Chrysene	2018/08/18		91	%	50 - 130
			Dibenz(a,h)anthracene	2018/08/18		84	%	50 - 130
			Fluoranthene	2018/08/18		121	%	50 - 130
			Fluorene	2018/08/18		107	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2018/08/18		83	%	50 - 130
			1-Methylnaphthalene	2018/08/18		96	%	50 - 130
			2-Methylnaphthalene	2018/08/18		95	%	50 - 130
			Naphthalene	2018/08/18		96	%	50 - 130
			Phenanthrene	2018/08/18		104	%	50 - 130
			Perylene	2018/08/18		73	%	50 - 130
			Pyrene	2018/08/18		117	%	50 - 130
			Quinoline	2018/08/18		105	%	50 - 130
9102950	BC5	Spiked Blank	D10-ANTHRACENE (sur.)	2018/08/18		110	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2018/08/18		92	%	50 - 130
			D8-NAPHTHALENE (sur.)	2018/08/18		68	%	50 - 130
			TERPHENYL-D14 (sur.)	2018/08/18		117	%	50 - 130
			Acenaphthene	2018/08/18		95	%	50 - 130
			Acenaphthylene	2018/08/18		103	%	50 - 130
			Acridine	2018/08/18		102	%	50 - 130
			Anthracene	2018/08/18		107	%	50 - 130
			Benzo(a)anthracene	2018/08/18		121	%	50 - 130
			Benzo(b&j)fluoranthene	2018/08/18		116	%	50 - 130
			Benzo(k)fluoranthene	2018/08/18		109	%	50 - 130
			Benzo(g,h,i)perylene	2018/08/18		112	%	50 - 130
			Benzo(c)phenanthrene	2018/08/18		122	%	50 - 130
			Benzo(a)pyrene	2018/08/18		118	%	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[e]pyrene	2018/08/18		120	%	50 - 130
			Chrysene	2018/08/18		113	%	50 - 130
			Dibenz(a,h)anthracene	2018/08/18		117	%	50 - 130
			Fluoranthene	2018/08/18		119	%	50 - 130
			Fluorene	2018/08/18		106	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2018/08/18		107	%	50 - 130
			1-Methylnaphthalene	2018/08/18		84	%	50 - 130
			2-Methylnaphthalene	2018/08/18		84	%	50 - 130
			Naphthalene	2018/08/18		85	%	50 - 130
			Phenanthrene	2018/08/18		103	%	50 - 130
			Perylene	2018/08/18		102	%	50 - 130
			Pyrene	2018/08/18		117	%	50 - 130
			Quinoline	2018/08/18		108	%	50 - 130
9102950	BC5	Method Blank	D10-ANTHRACENE (sur.)	2018/08/18		124	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2018/08/18		92	%	50 - 130
			D8-NAPHTHALENE (sur.)	2018/08/18		54	%	50 - 130
			TERPHENYL-D14 (sur.)	2018/08/18		131 (1)	%	50 - 130
			Acenaphthene	2018/08/18	<0.00010		mg/L	
			Acenaphthylene	2018/08/18	<0.00010		mg/L	
			Acridine	2018/08/18	<0.000050		mg/L	
			Anthracene	2018/08/18	<0.000010		mg/L	
			Benzo(a)anthracene	2018/08/18	<0.0000085		mg/L	
			Benzo(b&j)fluoranthene	2018/08/18	<0.0000085		mg/L	
			Benzo(k)fluoranthene	2018/08/18	<0.0000085		mg/L	
			Benzo(g,h,i)perylene	2018/08/18	<0.0000085		mg/L	
			Benzo(c)phenanthrene	2018/08/18	<0.000050		mg/L	
			Benzo(a)pyrene	2018/08/18	<0.0000075		mg/L	
			Benzo[e]pyrene	2018/08/18	<0.000050		mg/L	
			Chrysene	2018/08/18	<0.0000085		mg/L	
			Dibenz(a,h)anthracene	2018/08/18	<0.0000075		mg/L	
			Fluoranthene	2018/08/18	<0.000010		mg/L	
			Fluorene	2018/08/18	<0.000050		mg/L	
			Indeno(1,2,3-cd)pyrene	2018/08/18	<0.0000085		mg/L	
			1-Methylnaphthalene	2018/08/18	<0.00010		mg/L	
			2-Methylnaphthalene	2018/08/18	<0.00010		mg/L	
			Naphthalene	2018/08/18	<0.00010		mg/L	
			Phenanthrene	2018/08/18	<0.000050		mg/L	
			Perylene	2018/08/18	<0.000050		mg/L	
			Pyrene	2018/08/18	<0.000020		mg/L	
			Quinoline	2018/08/18	<0.00020		mg/L	
9102950	BC5	RPD	Acenaphthene	2018/08/19	NC		%	30
			Acenaphthylene	2018/08/19	NC		%	30
			Acridine	2018/08/19	NC		%	30
			Anthracene	2018/08/19	NC		%	30
			Benzo(a)anthracene	2018/08/19	NC		%	30
			Benzo(b&j)fluoranthene	2018/08/19	NC		%	30
			Benzo(k)fluoranthene	2018/08/19	NC		%	30
			Benzo(g,h,i)perylene	2018/08/19	NC		%	30
			Benzo(c)phenanthrene	2018/08/19	NC		%	30
			Benzo(a)pyrene	2018/08/19	NC		%	30
			Benzo[e]pyrene	2018/08/19	NC		%	30
			Chrysene	2018/08/19	NC		%	30

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STANTEC CONSULTING LTD
Client Project #: 110220176
Site Location: CBA FTA
Sampler Initials: LA

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dibenz(a,h)anthracene	2018/08/19	NC		%	30
			Fluoranthene	2018/08/19	NC		%	30
			Fluorene	2018/08/19	NC		%	30
			Indeno(1,2,3-cd)pyrene	2018/08/19	NC		%	30
			1-Methylnaphthalene	2018/08/19	NC		%	30
			2-Methylnaphthalene	2018/08/19	NC		%	30
			Naphthalene	2018/08/19	NC		%	30
			Phenanthrene	2018/08/19	NC		%	30
			Perylene	2018/08/19	NC		%	30
			Pyrene	2018/08/19	NC		%	30
			Quinoline	2018/08/19	NC		%	30
9106666	YY	Matrix Spike	Phenols	2018/08/17		109	%	80 - 120
9106666	YY	Spiked Blank	Phenols	2018/08/17		97	%	80 - 120
9106666	YY	Method Blank	Phenols	2018/08/17	<0.0020		mg/L	
9106666	YY	RPD	Phenols	2018/08/17	13		%	20
9106716	CH7	Matrix Spike	Dissolved Chloride (Cl)	2018/08/17		108	%	80 - 120
9106716	CH7	Spiked Blank	Dissolved Chloride (Cl)	2018/08/17		105	%	80 - 120
9106716	CH7	Method Blank	Dissolved Chloride (Cl)	2018/08/17	<1.0		mg/L	
9106716	CH7	RPD	Dissolved Chloride (Cl)	2018/08/17	12		%	20
9106721	CH7	Matrix Spike	Dissolved Sulphate (SO4)	2018/08/17		NC	%	80 - 120
9106721	CH7	Spiked Blank	Dissolved Sulphate (SO4)	2018/08/17		105	%	80 - 120
9106721	CH7	Method Blank	Dissolved Sulphate (SO4)	2018/08/17	<1.0		mg/L	
9106721	CH7	RPD	Dissolved Sulphate (SO4)	2018/08/17	0.040		%	20
9108718	JK9	Matrix Spike [UB1101-05]	Total Aluminum (Al)	2018/08/20		121 (1)	%	80 - 120
			Total Antimony (Sb)	2018/08/20		109	%	80 - 120
			Total Arsenic (As)	2018/08/20		103	%	80 - 120
			Total Beryllium (Be)	2018/08/20		99	%	80 - 120
			Total Cadmium (Cd)	2018/08/20		103	%	80 - 120
			Total Chromium (Cr)	2018/08/20		105	%	80 - 120
			Total Cobalt (Co)	2018/08/20		103	%	80 - 120
			Total Copper (Cu)	2018/08/20		98	%	80 - 120
			Total Lead (Pb)	2018/08/20		97	%	80 - 120
			Total Molybdenum (Mo)	2018/08/20		109	%	80 - 120
			Total Nickel (Ni)	2018/08/20		100	%	80 - 120
			Total Selenium (Se)	2018/08/20		101	%	80 - 120
			Total Silver (Ag)	2018/08/20		102	%	80 - 120
			Total Thallium (Tl)	2018/08/20		99	%	80 - 120
			Total Tin (Sn)	2018/08/20		105	%	80 - 120
			Total Titanium (Ti)	2018/08/20		108	%	80 - 120
			Total Uranium (U)	2018/08/20		100	%	80 - 120
			Total Vanadium (V)	2018/08/20		107	%	80 - 120
			Total Zinc (Zn)	2018/08/20		99	%	80 - 120
9108718	JK9	Spiked Blank	Total Aluminum (Al)	2018/08/20		106	%	80 - 120
			Total Antimony (Sb)	2018/08/20		103	%	80 - 120
			Total Arsenic (As)	2018/08/20		99	%	80 - 120
			Total Beryllium (Be)	2018/08/20		99	%	80 - 120
			Total Cadmium (Cd)	2018/08/20		100	%	80 - 120
			Total Chromium (Cr)	2018/08/20		103	%	80 - 120
			Total Cobalt (Co)	2018/08/20		104	%	80 - 120
			Total Copper (Cu)	2018/08/20		102	%	80 - 120
			Total Lead (Pb)	2018/08/20		100	%	80 - 120
			Total Molybdenum (Mo)	2018/08/20		104	%	80 - 120

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Maxxam Job #: B867218
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STANTEC CONSULTING LTD
Client Project #: 110220176
Site Location: CBA FTA
Sampler Initials: LA

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Nickel (Ni)	2018/08/20		101	%	80 - 120
			Total Selenium (Se)	2018/08/20		103	%	80 - 120
			Total Silver (Ag)	2018/08/20		102	%	80 - 120
			Total Thallium (Tl)	2018/08/20		102	%	80 - 120
			Total Tin (Sn)	2018/08/20		102	%	80 - 120
			Total Titanium (Ti)	2018/08/20		105	%	80 - 120
			Total Uranium (U)	2018/08/20		101	%	80 - 120
			Total Vanadium (V)	2018/08/20		104	%	80 - 120
			Total Zinc (Zn)	2018/08/20		100	%	80 - 120
9108718	JK9	Method Blank	Total Aluminum (Al)	2018/08/20	<0.0030		mg/L	
			Total Antimony (Sb)	2018/08/20	<0.00060		mg/L	
			Total Arsenic (As)	2018/08/20	<0.00020		mg/L	
			Total Beryllium (Be)	2018/08/20	<0.0010		mg/L	
			Total Cadmium (Cd)	2018/08/20	<0.000020		mg/L	
			Total Chromium (Cr)	2018/08/20	<0.0010		mg/L	
			Total Cobalt (Co)	2018/08/20	<0.00030		mg/L	
			Total Copper (Cu)	2018/08/20	<0.00020		mg/L	
			Total Lead (Pb)	2018/08/20	<0.00020		mg/L	
			Total Molybdenum (Mo)	2018/08/20	<0.00020		mg/L	
			Total Nickel (Ni)	2018/08/20	<0.00050		mg/L	
			Total Selenium (Se)	2018/08/20	<0.00020		mg/L	
			Total Silver (Ag)	2018/08/20	<0.00010		mg/L	
			Total Thallium (Tl)	2018/08/20	<0.00020		mg/L	
			Total Tin (Sn)	2018/08/20	<0.0010		mg/L	
			Total Titanium (Ti)	2018/08/20	<0.0010		mg/L	
			Total Uranium (U)	2018/08/20	<0.00010		mg/L	
			Total Vanadium (V)	2018/08/20	<0.0010		mg/L	
			Total Zinc (Zn)	2018/08/20	<0.0030		mg/L	
9108718	JK9	RPD [UB1103-05]	Total Aluminum (Al)	2018/08/20	15		%	20
			Total Antimony (Sb)	2018/08/20	NC		%	20
			Total Arsenic (As)	2018/08/20	7.5		%	20
			Total Beryllium (Be)	2018/08/20	NC		%	20
			Total Cadmium (Cd)	2018/08/20	3.2		%	20
			Total Chromium (Cr)	2018/08/20	6.6		%	20
			Total Cobalt (Co)	2018/08/20	8.3		%	20
			Total Copper (Cu)	2018/08/20	11		%	20
			Total Lead (Pb)	2018/08/20	2.0		%	20
			Total Molybdenum (Mo)	2018/08/20	4.5		%	20
			Total Nickel (Ni)	2018/08/20	5.2		%	20
			Total Selenium (Se)	2018/08/20	4.8		%	20
			Total Silver (Ag)	2018/08/20	NC		%	20
			Total Thallium (Tl)	2018/08/20	NC		%	20
			Total Tin (Sn)	2018/08/20	NC		%	20
			Total Titanium (Ti)	2018/08/20	NC		%	20
			Total Uranium (U)	2018/08/20	6.2		%	20
			Total Vanadium (V)	2018/08/20	9.9		%	20
			Total Zinc (Zn)	2018/08/20	9.9		%	20
9108733	BAH	Matrix Spike [UB1102-05]	Total Barium (Ba)	2018/08/20		89	%	80 - 120
			Total Boron (B)	2018/08/20		92	%	80 - 120
			Total Calcium (Ca)	2018/08/20		NC	%	80 - 120
			Total Iron (Fe)	2018/08/20		90	%	80 - 120
			Total Lithium (Li)	2018/08/20		92	%	80 - 120

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STANTEC CONSULTING LTD
Client Project #: 110220176
Site Location: CBA FTA
Sampler Initials: LA

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Magnesium (Mg)	2018/08/20		NC	%	80 - 120
			Total Manganese (Mn)	2018/08/20		89	%	80 - 120
			Total Phosphorus (P)	2018/08/20		97	%	80 - 120
			Total Potassium (K)	2018/08/20		NC	%	80 - 120
			Total Silicon (Si)	2018/08/20		94	%	80 - 120
			Total Sodium (Na)	2018/08/20		NC	%	80 - 120
			Total Strontium (Sr)	2018/08/20		87	%	80 - 120
9108733	BAH	Spiked Blank	Total Barium (Ba)	2018/08/20		93	%	80 - 120
			Total Boron (B)	2018/08/20		95	%	80 - 120
			Total Calcium (Ca)	2018/08/20		97	%	80 - 120
			Total Iron (Fe)	2018/08/20		96	%	80 - 120
			Total Lithium (Li)	2018/08/20		93	%	80 - 120
			Total Magnesium (Mg)	2018/08/20		95	%	80 - 120
			Total Manganese (Mn)	2018/08/20		96	%	80 - 120
			Total Phosphorus (P)	2018/08/20		95	%	80 - 120
			Total Potassium (K)	2018/08/20		93	%	80 - 120
			Total Silicon (Si)	2018/08/20		97	%	80 - 120
			Total Sodium (Na)	2018/08/20		94	%	80 - 120
			Total Strontium (Sr)	2018/08/20		93	%	80 - 120
9108733	BAH	Method Blank	Total Barium (Ba)	2018/08/20	<0.010		mg/L	
			Total Boron (B)	2018/08/20	<0.020		mg/L	
			Total Calcium (Ca)	2018/08/20	<0.30		mg/L	
			Total Iron (Fe)	2018/08/20	<0.060		mg/L	
			Total Lithium (Li)	2018/08/20	<0.020		mg/L	
			Total Magnesium (Mg)	2018/08/20	<0.20		mg/L	
			Total Manganese (Mn)	2018/08/20	<0.0040		mg/L	
			Total Phosphorus (P)	2018/08/20	<0.10		mg/L	
			Total Potassium (K)	2018/08/20	<0.30		mg/L	
			Total Silicon (Si)	2018/08/20	<0.10		mg/L	
			Total Sodium (Na)	2018/08/20	<0.50		mg/L	
			Total Strontium (Sr)	2018/08/20	<0.020		mg/L	
			Total Sulphur (S)	2018/08/20	<0.20		mg/L	
9108733	BAH	RPD [UB1103-05]	Total Barium (Ba)	2018/08/20	0.78		%	20
			Total Boron (B)	2018/08/20	1.2		%	20
			Total Calcium (Ca)	2018/08/20	2.6		%	20
			Total Iron (Fe)	2018/08/20	2.3		%	20
			Total Lithium (Li)	2018/08/20	NC		%	20
			Total Magnesium (Mg)	2018/08/20	2.8		%	20
			Total Manganese (Mn)	2018/08/20	2.3		%	20
			Total Phosphorus (P)	2018/08/20	NC		%	20
			Total Potassium (K)	2018/08/20	3.0		%	20
			Total Silicon (Si)	2018/08/20	2.3		%	20
			Total Sodium (Na)	2018/08/20	3.0		%	20
			Total Strontium (Sr)	2018/08/20	3.0		%	20
			Total Sulphur (S)	2018/08/20	2.5		%	20
9114731	SKH	Spiked Blank	Extractable (n-Hex.) Oil and grease	2018/08/23		101	%	70 - 130

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Client Project #: 110220176
Site Location: CBA FTA
Sampler Initials: LA

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
9114731	SKH	Method Blank	Extractable (n-Hex.) Oil and grease	2018/08/23	<2.0		mg/L	

N/A = Not Applicable

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

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

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

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

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

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

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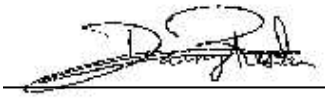
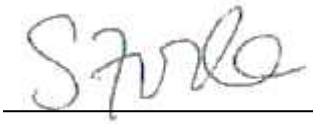
VALIDATION SIGNATURE PAGE

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

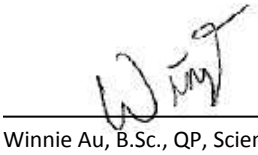


Daniel Reslan, cCT, QP, Organics Manager

Justin Geisel, B.Sc., Organics Supervisor



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



Winnie Au, B.Sc., QP, 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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ADDITIONAL COOLER TEMPERATURE RECORD

CHAIN-OF-CUSTODY RECORD

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COOLER OBSERVATIONS:

MAXXAM JOB#: B867218

Cooler	Custody Seal Present (YES / NO)	Custody Seal Intact (YES / NO)	Ice Present (YES / NO)	Cooler ID	Temp 1	Temp 2	Temp 3
1	YES ✓	YES ✓	YES ✓		6	4	4
2	YES ✓	YES ✓	YES ✓		7	3	2
3	YES ✓	YES ✓	YES ✓		4	4	5
4	YES ✓	YES ✓	YES ✓		5	4	3
5							
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[signature]	DE JI WU	2018/08/11	06:00

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ADDITIONAL COOLER TEMPERATURE RECORD

CHAIN-OF-CUSTODY RECORD

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COOLER OBSERVATIONS: All samples in good condition.

MAXXAM JOB#: Stantec Consulting Project #110220176

	CUSTODY SEAL PRESENT (YES/NO)	CUSTODY SEAL INTACT (YES/NO)	ICE PRESENT (YES/NO)	COOLER ID	TEMP 1	TEMP 2	TEMP 3
1	✓ (YES)	✓ (YES)	✓ (YES)	1	1	1	3
2	✓ (YES)	✓ (YES)	✓ (YES)	2	3	3	4
3	✓ (YES)	✓ (YES)	✓ (YES)	3	4	3	2
4							
5							
6							
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[signature] Jeffery - S	2018/08/10	08:30

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Calgary: 4000 19th St. NE, T2E 6P8. Toll Free (800) 386-7247
Edmonton: 9331-48 St. T6B 2R4. Toll Free (800) 386-7247
maxxam.ca

CHAIN OF CUSTODY RECORD

M 086440

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Invoice Information	Report Information (if differs from invoice)	Project Information	Turnaround Time (TAT) Required
Company: Stantec	Company:	Quotation #:	[X] 5 - 7 Days Regular (Most analyses)
Contact Name: Lindsay Van Noortwyk	Contact Name:	P.O. #/ AFE#: 110220176	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 10160 112 St NW Edmonton AB T5K2L6	Address:	Project #: 110220176	Rush TAT (Surcharges will be applied)
Phone: 780 232 1114	Phone:	Site Location: CBA FTA	[ ] Same Day [ ] 2 Days [ ] 1 Day [ ] 3-4 Days
Email: Lindsay.VanNoortwyk@stantec.com	Email:	Site #:	Date Required:
Copies: Ruth.Bonneville@stantec.com	Copies:	Sampled By: LA	Rush Confirmation #:

Laboratory Use Only

	YES	NO	Cooler ID	Temp
Seal Present / Seal Intact / Cooling Media				See ACTR
Seal Present / Seal Intact / Cooling Media				
Seal Present / Seal Intact / Cooling Media				

RECEIVED BY: YELLOWKNIFE Depot Reception
By: Jeffery.S
Ice-yes 2018 -08- 09
Sealed-yes 08:30
See temp Record
Temp: / /

Analysis Requested

Sample Identification	Depth (Unit)	Date Sampled (YYYY/MM/DD)	Time Sampled (HH:MM)	Matrix	# of containers	BTEX F1	VOC	BTEX F1-F2	BTEX F1-F4	Routine Water	Regulated Metals	Tot [X] Diss [ ]	Mercury	Dissolved [ ] Total	Salinity 4	Sieve (75 micron)	Texture (% Sand, Silt, Clay)	Basic Class II Landfill	TSS	Nitrogen, Ammonia	Oil & Grease (Total)	Total Phenols	PAH	PFAS (17 Parameter Low Detection limit)				HOLD - DO NOT ANALYZE
1 MW15-8		2018/08/08	1450	W	15			x		x	x								x	x	x	x	x	x				
2 ~~QA-QC-01~~ SW-01			1717		15			x		x	x								x	x	x	x	x	x				
3 NW-Sump			1630		15			x		x	x								x	x	x	x	x	x				
4 SW-02			1740		15			x		x	x								x	x	x	x	x	x				
5 Sump-QC-01			—		15			x		x	x								x	x	x	x	x	x				
6 GW-QC-01		2018/08/08	—	W	15			x		x	x								x	x	x	x	x	x				
7 SW-03		2018/08/09	745		15			x		x	x								x	x	x	x	x	x				
8 SW-04		2018/08/09	820		15			x		x	x								x	x	x	x	x	x				
9 SW-05		2018/08/09	905	W	15			x		x	x								x	x	x	x	x	x				
10																												
Please indicate Filtered, Preserved or Both (F, P, F/P)											P																	

Regulatory Criteria

- [ ] AT1
- [ ] CCME
- [ ] Drinking Water
- [ ] D50 (Drilling Waste)
- [ ] Saskatchewan
- [ ] Other:

Special Instructions

Relinquished by: (Signature/ Print)	DATE (YYYY/MM/DD)	Time (HH:MM)	Received by: (Signature/ Print)	DATE (YYYY/MM/DD)	Time (HH:MM)	Maxxam Job #
Luke Anderson	2018/08/09	09:41	DEJ WU	2018/08/11	06:00	B867218

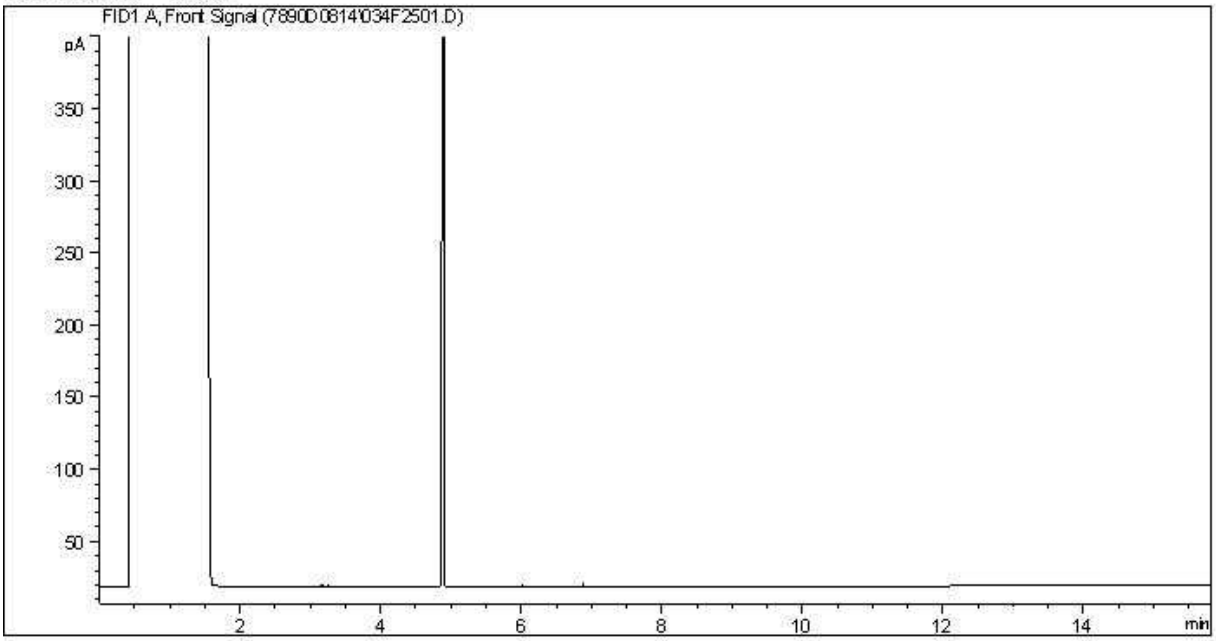
AB FCD-00331/7

Maxxam Job #: B867218
Report Date: 2018/11/06
Maxxam Sample: UB1097

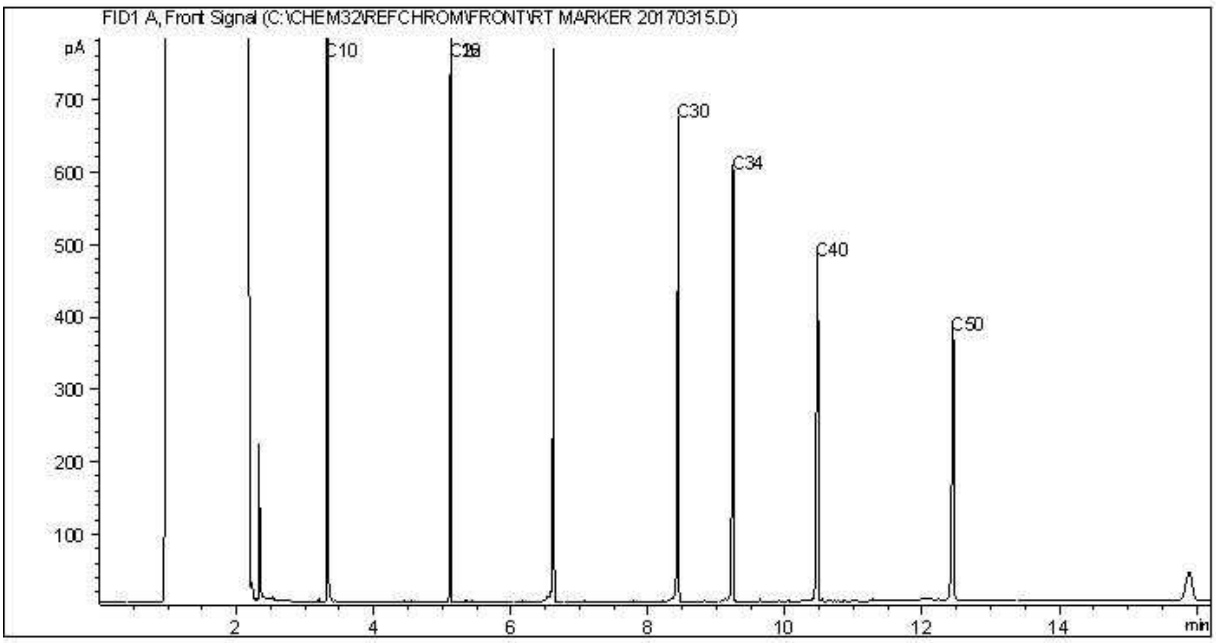
STANTEC CONSULTING LTD
Client Project #: 110220176
Site Reference: CBA FTA
Client ID: MW15-8

CCME Hydrocarbons in Water (F2; C10-C16) Chromatogram

Instrument: 7890D



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

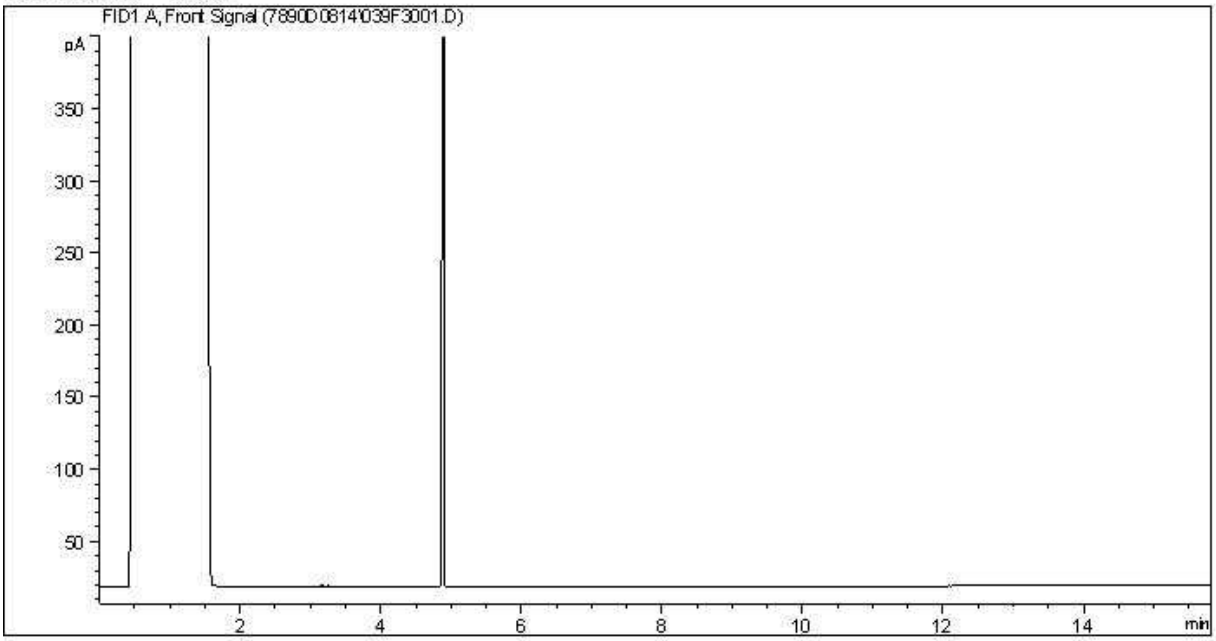
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B867218
Report Date: 2018/11/06
Maxxam Sample: UB1102

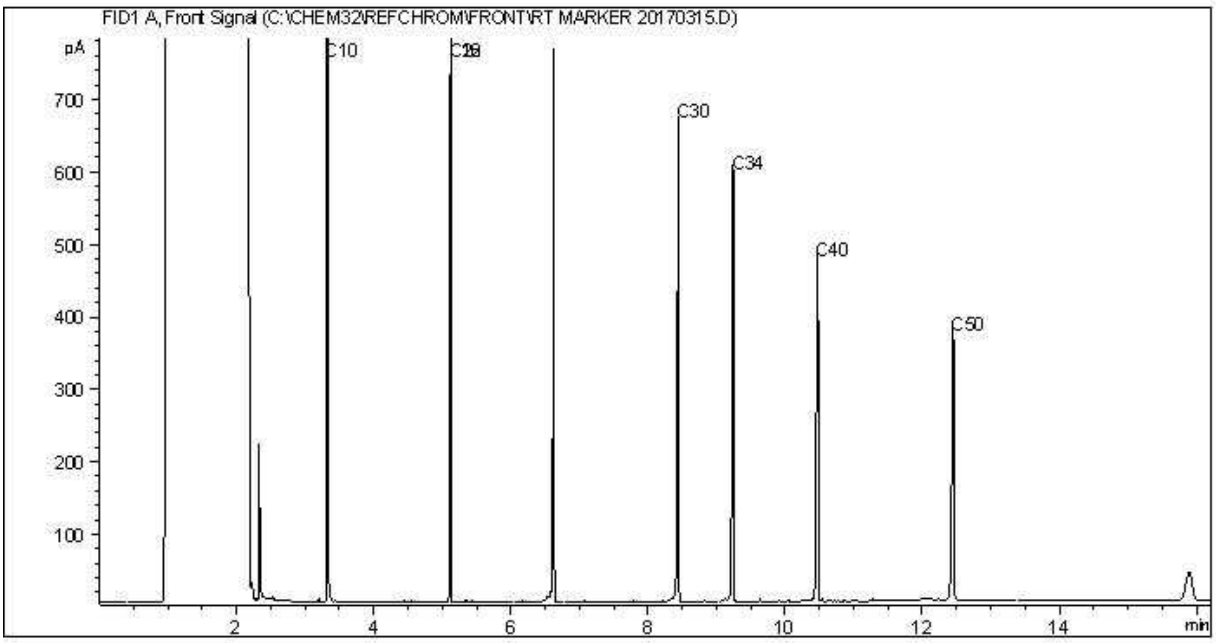
STANTEC CONSULTING LTD
Client Project #: 110220176
Site Reference: CBA FTA
Client ID: GW-QC-01

CCME Hydrocarbons in Water (F2; C10-C16) Chromatogram

Instrument: 7890D



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

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

Maxxam
A Bureau Veritas Group Company

Your Project #: 110220176
Site#: B867218
Your C.O.C. #: n/a

Attention: Stantec Reporting

Maxxam Analytics
Edmonton - Environmental
9331 48th St
Edmonton, AB
CANADA T6B 2R4

Report Date: 2018/11/21
Report #: R5493541
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B8K6840
Received: 2018/08/14, 10:29

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Low level PFOS and PFOA by SPE/LCMS (1)	2	2018/08/16	2018/08/22	CAM SOP-00894	EPA 537 m

Remarks:

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

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

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

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

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

Your Project #: 110220176
Site#: B867218
Your C.O.C. #: n/a

Attention: Stantec Reporting

Maxxam Analytics
Edmonton - Environmental
9331 48th St
Edmonton, AB
CANADA T6B 2R4

Report Date: 2018/11/21
Report #: R5493541
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B8K6840
Received: 2018/08/14, 10:29

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Augustyna Dobosz, Project Manager
Email: ADobosz@maxxam.ca
Phone# (905)817-5700 Ext:5798

==========

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 #: B8K6840
Report Date: 2018/11/21

Maxxam Analytics
Client Project #: 110220176

RESULTS OF ANALYSES OF WATER

Maxxam ID		HLU477	HLU482		
Sampling Date		2018/08/08 14:50	2018/08/08		
COC Number		n/a	n/a		
	UNITS	UB1097-MW15-8	UB1102-GW-QC-1	RDL	QC Batch
Miscellaneous Parameters					
Perfluorobutane Sulfonate (PFBS)	ng/L	<8000	<8000	8000	5683826
Perfluorobutanoic acid	ng/L	11000	11000	8000	5683826
Perfluorodecane Sulfonate	ng/L	<8000	<8000	8000	5683826
Perfluorodecanoic Acid (PFDA)	ng/L	<8000	<8000	8000	5683826
Perfluorododecanoic Acid (PFDoA)	ng/L	<8000	<8000	8000	5683826
Perfluoroheptane sulfonate	ng/L	<8000	<8000	8000	5683826
Perfluoroheptanoic Acid (PFHpA)	ng/L	9800	9700	8000	5683826
Perfluorohexane Sulfonate (PFHxS)	ng/L	110000	110000	8000	5683826
Perfluorohexanoic Acid (PFHxA)	ng/L	50000	48000	8000	5683826
Perfluoro-n-Octanoic Acid (PFOA)	ng/L	13000	12000	8000	5683826
Perfluorononanoic Acid (PFNA)	ng/L	<8000	<8000	8000	5683826
Perfluorooctane Sulfonamide (PFOSA)	ng/L	<8000	<8000	8000	5683826
Perfluorooctane Sulfonate (PFOS)	ng/L	91000	87000	8000	5683826
Perfluoropentanoic Acid (PFPeA)	ng/L	47000	47000	8000	5683826
Perfluorotetradecanoic Acid	ng/L	<8000	<8000	8000	5683826
Perfluorotridecanoic Acid	ng/L	<8000	<8000	8000	5683826
Perfluoroundecanoic Acid (PFUnA)	ng/L	<8000	<8000	8000	5683826
Surrogate Recovery (%)					
13C2-Perfluorodecanoic acid	%	81	86	N/A	5683826
13C2-Perfluorododecanoic acid	%	97	82	N/A	5683826
13C2-Perfluorohexanoic acid	%	85	82	N/A	5683826
13C2-perfluorotetradecanoic acid	%	75	50	N/A	5683826
13C2-Perfluoroundecanoic acid	%	101	97	N/A	5683826
13C4-Perfluorobutanoic acid	%	78	78	N/A	5683826
13C4-Perfluoroheptanoic acid	%	85	83	N/A	5683826
13C4-Perfluorooctanesulfonate	%	92	93	N/A	5683826
13C4-Perfluorooctanoic acid	%	85	79	N/A	5683826
13C5-Perfluorononanoic acid	%	97	89	N/A	5683826
13C5-Perfluoropentanoic acid	%	85	84	N/A	5683826
13C8-Perfluorooctane Sulfonamide	%	96	92	N/A	5683826
18O2-Perfluorohexanesulfonate	%	91	92	N/A	5683826

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
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

GENERAL COMMENTS

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

Package 1	2.0°C

Revised report (2018/11/21): The report has been split per client request

Sample HLU477 [UB1097-MW15-8] : Perfluorinated Compounds (PFCs): Due to high concentration of the target analyte, sample required high level analysis with additional serial dilutions. Detection limits were adjusted accordingly.

Sample HLU478 [UB1098-SW-01] : Perfluorinated Compounds (PFCs): Due to high concentrations of the target analytes, a reduced sample volume was extracted and analyzed. Detection limits were adjusted accordingly.

Sample HLU479 [UB1099-NW-SUMP] : Perfluorinated Compounds (PFCs): Due to high concentration of the target analyte, sample required high level analysis with additional serial dilutions. Detection limits were adjusted accordingly.

Sample HLU480 [UB1100-SW-02] : Perfluorinated Compounds (PFCs): Due to high concentrations of the target analytes, a reduced sample volume was extracted and analyzed. Detection limits were adjusted accordingly.

Sample HLU481 [UB1101-SUMP-QC-01] : Perfluorinated Compounds (PFCs): Due to high concentrations of the target analytes, a reduced sample volume was extracted and analyzed. Detection limits were adjusted accordingly.

Sample HLU482 [UB1102-GW-QC-1] : Perfluorinated Compounds (PFCs): Due to high concentration of the target analyte, sample required high level analysis with additional serial dilutions. Detection limits were adjusted accordingly.

Sample HLU483 [UB1103-SW-03] : Perfluorinated Compounds (PFCs): Due to high concentrations of the target analytes, a reduced sample volume was extracted and analyzed. Detection limits were adjusted accordingly.

Sample HLU484 [UB1104-SW-04] : Perfluorinated Compounds (PFCs): Due to high concentrations of the target analytes, a reduced sample volume was extracted and analyzed. Detection limits were adjusted accordingly.

Results relate only to the items tested.

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 #: B8K6840
Report Date: 2018/11/21

QUALITY ASSURANCE REPORT

Maxxam Analytics
Client Project #: 110220176

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5683826	13C2-Perfluorodecanoic acid	2018/08/22	79	50 - 150	94	50 - 150	80	%		
5683826	13C2-Perfluorododecanoic acid	2018/08/22	65	50 - 150	105	50 - 150	81	%		
5683826	13C2-Perfluorohexanoic acid	2018/08/22	84	50 - 150	88	50 - 150	88	%		
5683826	13C2-perfluorotetradecanoic acid	2018/08/22	35 (1)	50 - 150	122	50 - 150	90	%		
5683826	13C2-Perfluoroundecanoic acid	2018/08/22	88	50 - 150	99	50 - 150	87	%		
5683826	13C4-Perfluorobutanoic acid	2018/08/22	78	50 - 150	90	50 - 150	84	%		
5683826	13C4-Perfluoroheptanoic acid	2018/08/22	88	50 - 150	92	50 - 150	81	%		
5683826	13C4-Perfluorooctanesulfonate	2018/08/22	91	50 - 150	93	50 - 150	82	%		
5683826	13C4-Perfluorooctanoic acid	2018/08/22	87	50 - 150	96	50 - 150	78	%		
5683826	13C5-Perfluorononanoic acid	2018/08/22	84	50 - 150	99	50 - 150	73	%		
5683826	13C5-Perfluoropentanoic acid	2018/08/22	33 (1)	50 - 150	91	50 - 150	86	%		
5683826	13C8-Perfluorooctane Sulfonamide	2018/08/22	93	20 - 100	98	20 - 100	87	%		
5683826	18O2-Perfluorohexanesulfonate	2018/08/22	94	50 - 150	91	50 - 150	83	%		
5683826	Perfluorobutane Sulfonate (PFBS)	2018/08/22	81	70 - 130	130	70 - 130	<800	ng/L	0	30
5683826	Perfluorobutanoic acid	2018/08/22	102	70 - 130	114	70 - 130	<800	ng/L	1.3	30
5683826	Perfluorodecane Sulfonate	2018/08/22	107	70 - 130	109	70 - 130	<800	ng/L	NC	30
5683826	Perfluorodecanoic Acid (PFDA)	2018/08/22	116	70 - 130	98	70 - 130	<800	ng/L	NC	30
5683826	Perfluorododecanoic Acid (PFDoA)	2018/08/22	103	70 - 130	105	70 - 130	<800	ng/L	NC	30
5683826	Perfluoroheptane sulfonate	2018/08/22	106	70 - 130	108	70 - 130	<800	ng/L	NC	30
5683826	Perfluoroheptanoic Acid (PFHpA)	2018/08/22	103	70 - 130	113	70 - 130	<800	ng/L	2.9	30
5683826	Perfluorohexane Sulfonate (PFHxS)	2018/08/22	103	70 - 130	108	70 - 130	<800	ng/L	8.8	30
5683826	Perfluorohexanoic Acid (PFHxA)	2018/08/22	124	70 - 130	120	70 - 130	<800	ng/L	4.1	30
5683826	Perfluoro-n-Octanoic Acid (PFOA)	2018/08/22	119	70 - 130	124	70 - 130	<800	ng/L	NC	30
5683826	Perfluorononanoic Acid (PFNA)	2018/08/22	117	70 - 130	106	70 - 130	<800	ng/L	NC	30
5683826	Perfluorooctane Sulfonamide (PFOSA)	2018/08/22	110	70 - 130	112	70 - 130	<800	ng/L	NC	30
5683826	Perfluorooctane Sulfonate (PFOS)	2018/08/22	111	70 - 130	112	70 - 130	<800	ng/L	NC	30
5683826	Perfluoropentanoic Acid (PFPeA)	2018/08/22	105	70 - 130	113	70 - 130	<800	ng/L	2.3	30
5683826	Perfluorotetradecanoic Acid	2018/08/22	93	70 - 130	106	70 - 130	<800	ng/L	NC	30
5683826	Perfluorotridecanoic Acid	2018/08/22	159 (2)	70 - 130	101	70 - 130	<800	ng/L	NC	30

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5683826	Perfluoroundecanoic Acid (PFUnA)	2018/08/22	103	70 - 130	133 (3)	70 - 130	<800	ng/L	NC	30

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

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

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

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

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

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Extracted internal standard analyte recovery was below the defined lower control limit (LCL). Laboratory spiked water resulted in satisfactory recovery of the extracted internal standard analyte. When considered together, these QC data suggest that matrix interferences may be biasing the data low. Because quantitation is performed using isotope dilution techniques, any losses of the native compound that may occur during any of the sample preparation, extraction, cleanup or determinative steps will be mirrored by a similar loss of the labeled standard, and as such can be accounted for and corrected. Therefore, the quantification of these target compounds is not affected by the low extracted internal standard analyte recovery.

(2) Recovery of the matrix spike was above the upper control limit. Laboratory spiked water resulted in satisfactory recovery of the compound of interest. When considered together, these QC data suggest that matrix interferences may be biasing the data high. For results that were not detected (ND), this potential bias has no impact.

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

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Maxxam Job #: B8K6840
Report Date: 2018/11/21

Maxxam Analytics
Client Project #: 110220176

VALIDATION SIGNATURE PAGE

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

Colm McNamara, Senior Analyst, Liquid Chromatography

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

Your Project #: 110220176
Site Location: CBA FTA
Your C.O.C. #: M053900, M005380

Attention: LINDSAY VAN NOORTWYK

STANTEC CONSULTING LTD
10160-112 STREET
EDMONTON, AB
CANADA T5K 2L6

Report Date: 2018/11/06
Report #: R2646647
Version: 4 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B869039
Received: 2018/08/15, 08:30

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	2018/08/22	2018/08/23	AB SOP-00039	CCME CWS/EPA 8260d m
F1-BTEX (1)	7	N/A	2018/08/23	AB SOP-00039	Auto Calc
CCME Hydrocarbons (F2-F4 in soil) (1, 2)	7	2018/08/22	2018/08/24	AB SOP-00036 / AB SOP-00040	CCME PHC-CWS m
Moisture (1)	7	N/A	2018/08/23	AB SOP-00002	CCME PHC-CWS m
Lead (1)	7	2018/08/24	2018/08/24	AB SOP-00001 / AB SOP-00043	EPA 6020b R2 m

Remarks:

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

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

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

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

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

Your Project #: 110220176
Site Location: CBA FTA
Your C.O.C. #: M053900, M005380

Attention: LINDSAY VAN NOORTWYK

STANTEC CONSULTING LTD
10160-112 STREET
EDMONTON, AB
CANADA T5K 2L6

Report Date: 2018/11/06
Report #: R2646647
Version: 4 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B869039
Received: 2018/08/15, 08:30

(1) This test was performed by Maxxam Edmonton 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.
Geraldlyn Gouthro, Client Service Specialist
Email: GGouthro@maxxam.ca
Phone# (403)735-2230

==========

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 Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Maxxam Job #: B869039
Report Date: 2018/11/06

STANTEC CONSULTING LTD
Client Project #: 110220176
Site Location: CBA FTA
Sampler Initials: LA

AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		UD0760		UD0761		UD0762			
Sampling Date		2018/08/12 12:15		2018/08/12 12:25		2018/08/12 12:40			
COC Number		M053900		M053900		M053900			
	UNITS	FTA-S01-0-0.3	MU	FTA-S02-0-0.3	MU	FTA-S03-0-0.3	MU	RDL	QC Batch
Ext. Pet. Hydrocarbon									
F2 (C10-C16 Hydrocarbons)	mg/kg	30	+/- 15	39	+/- 17	<10	N/A	10	9108859
F3 (C16-C34 Hydrocarbons)	mg/kg	150	+/- 53	380	+/- 130	83	+/- <RDL	50	9108859
F4 (C34-C50 Hydrocarbons)	mg/kg	55	+/- <RDL	120	+/- <RDL	<50	N/A	50	9108859
Reached Baseline at C50	mg/kg	Yes	N/A	Yes	N/A	Yes	N/A	N/A	9108859
Physical Properties									
Moisture	%	8.6	+/- 0.63	8.8	+/- 0.65	8.8	+/- 0.65	0.30	9112497
Volatiles									
Benzene	mg/kg	<0.0050	N/A	<0.0050	N/A	<0.0050	N/A	0.0050	9106729
Toluene	mg/kg	<0.020	N/A	<0.020	N/A	<0.020	N/A	0.020	9106729
Ethylbenzene	mg/kg	<0.010	N/A	<0.010	N/A	<0.010	N/A	0.010	9106729
m & p-Xylene	mg/kg	<0.040	N/A	<0.040	N/A	<0.040	N/A	0.040	9106729
o-Xylene	mg/kg	<0.020	N/A	<0.020	N/A	<0.020	N/A	0.020	9106729
Xylenes (Total)	mg/kg	<0.045	N/A	<0.045	N/A	<0.045	N/A	0.045	9112276
F1 (C6-C10) - BTEX	mg/kg	<10	N/A	<10	N/A	<10	N/A	10	9112276
F1 (C6-C10)	mg/kg	<10	N/A	<10	N/A	<10	N/A	10	9106729
Surrogate Recovery (%)									
1,4-Difluorobenzene (sur.)	%	102	N/A	98	N/A	97	N/A	N/A	9106729
4-Bromofluorobenzene (sur.)	%	101	N/A	99	N/A	98	N/A	N/A	9106729
D10-o-Xylene (sur.)	%	116	N/A	114	N/A	116	N/A	N/A	9106729
D4-1,2-Dichloroethane (sur.)	%	113	N/A	113	N/A	114	N/A	N/A	9106729
O-TERPHENYL (sur.)	%	91	N/A	99	N/A	104	N/A	N/A	9108859

RDL = Reportable Detection Limit
MU = Measurement Uncertainty
N/A = Not Applicable

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 #: B869039
Report Date: 2018/11/06

STANTEC CONSULTING LTD
Client Project #: 110220176
Site Location: CBA FTA
Sampler Initials: LA

AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		UD0763		UD0764		UD0765			
Sampling Date		2018/08/12 12:50		2018/08/12 12:58		2018/08/12 13:05			
COC Number		M053900		M053900		M053900			
	UNITS	FTA-S04-0-0.3	MU	FTA-S05-0-0.3	MU	FTA-S06-0-0.3	MU	RDL	QC Batch
Ext. Pet. Hydrocarbon									
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	N/A	83	+/- 30	52	+/- 21	10	9108859
F3 (C16-C34 Hydrocarbons)	mg/kg	130	+/- <RDL	64	+/- <RDL	73	+/- <RDL	50	9108859
F4 (C34-C50 Hydrocarbons)	mg/kg	63	+/- <RDL	<50	N/A	<50	N/A	50	9108859
Reached Baseline at C50	mg/kg	Yes	N/A	Yes	N/A	Yes	N/A	N/A	9108859
Physical Properties									
Moisture	%	9.8	+/- 0.72	7.8	+/- 0.58	8.1	+/- 0.60	0.30	9112497
Volatiles									
Benzene	mg/kg	<0.0050	N/A	<0.0050	N/A	<0.0050	N/A	0.0050	9106729
Toluene	mg/kg	<0.020	N/A	<0.020	N/A	<0.020	N/A	0.020	9106729
Ethylbenzene	mg/kg	<0.010	N/A	<0.010	N/A	<0.010	N/A	0.010	9106729
m & p-Xylene	mg/kg	<0.040	N/A	<0.040	N/A	<0.040	N/A	0.040	9106729
o-Xylene	mg/kg	<0.020	N/A	<0.020	N/A	<0.020	N/A	0.020	9106729
Xylenes (Total)	mg/kg	<0.045	N/A	<0.045	N/A	<0.045	N/A	0.045	9112276
F1 (C6-C10) - BTEX	mg/kg	<10	N/A	<10	N/A	<10	N/A	10	9112276
F1 (C6-C10)	mg/kg	<10	N/A	<10	N/A	<10	N/A	10	9106729
Surrogate Recovery (%)									
1,4-Difluorobenzene (sur.)	%	102	N/A	99	N/A	101	N/A	N/A	9106729
4-Bromofluorobenzene (sur.)	%	98	N/A	98	N/A	96	N/A	N/A	9106729
D10-o-Xylene (sur.)	%	109	N/A	112	N/A	103	N/A	N/A	9106729
D4-1,2-Dichloroethane (sur.)	%	109	N/A	109	N/A	104	N/A	N/A	9106729
O-TERPHENYL (sur.)	%	99	N/A	106	N/A	108	N/A	N/A	9108859

RDL = Reportable Detection Limit
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N/A = Not Applicable

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STANTEC CONSULTING LTD
Client Project #: 110220176
Site Location: CBA FTA
Sampler Initials: LA

AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		UD0766			
Sampling Date		2018/08/12			
COC Number		M053900			
	UNITS	FTA-S-QC-01	MU	RDL	QC Batch
Ext. Pet. Hydrocarbon					
F2 (C10-C16 Hydrocarbons)	mg/kg	100	+/- 36	10	9108859
F3 (C16-C34 Hydrocarbons)	mg/kg	350	+/- 120	50	9108859
F4 (C34-C50 Hydrocarbons)	mg/kg	140	+/- 54	50	9108859
Reached Baseline at C50	mg/kg	Yes	N/A	N/A	9108859
Physical Properties					
Moisture	%	9.0	+/- 0.66	0.30	9112497
Volatiles					
Benzene	mg/kg	<0.0050	N/A	0.0050	9106729
Toluene	mg/kg	<0.020	N/A	0.020	9106729
Ethylbenzene	mg/kg	<0.010	N/A	0.010	9106729
m & p-Xylene	mg/kg	<0.040	N/A	0.040	9106729
o-Xylene	mg/kg	<0.020	N/A	0.020	9106729
Xylenes (Total)	mg/kg	<0.045	N/A	0.045	9112276
F1 (C6-C10) - BTEX	mg/kg	<10	N/A	10	9112276
F1 (C6-C10)	mg/kg	<10	N/A	10	9106729
Surrogate Recovery (%)					
1,4-Difluorobenzene (sur.)	%	103	N/A	N/A	9106729
4-Bromofluorobenzene (sur.)	%	99	N/A	N/A	9106729
D10-o-Xylene (sur.)	%	115	N/A	N/A	9106729
D4-1,2-Dichloroethane (sur.)	%	110	N/A	N/A	9106729
O-TERPHENYL (sur.)	%	110	N/A	N/A	9108859

RDL = Reportable Detection Limit
MU = Measurement Uncertainty
N/A = Not Applicable

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STANTEC CONSULTING LTD
Client Project #: 110220176
Site Location: CBA FTA
Sampler Initials: LA

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		UD0760		UD0760		UD0761		UD0762			
Sampling Date		2018/08/12 12:15		2018/08/12 12:15		2018/08/12 12:25		2018/08/12 12:40			
COC Number		M053900		M053900		M053900		M053900			
	UNITS	FTA-S01-0-0.3	MU	FTA-S01-0-0.3 Lab-Dup	MU	FTA-S02-0-0.3	MU	FTA-S03-0-0.3	MU	RDL	QC Batch
Elements											
Total Lead (Pb)	mg/kg	6.4	+/- 1.2	6.4	+/- 1.2	8.3	+/- 1.5	8.0	+/- 1.5	0.50	9116368

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate
MU = Measurement Uncertainty

Maxxam ID		UD0763		UD0764		UD0765		UD0766			
Sampling Date		2018/08/12 12:50		2018/08/12 12:58		2018/08/12 13:05		2018/08/12			
COC Number		M053900		M053900		M053900		M053900			
	UNITS	FTA-S04-0-0.3	MU	FTA-S05-0-0.3	MU	FTA-S06-0-0.3	MU	FTA-S-QC-01	MU	RDL	QC Batch
Elements											
Total Lead (Pb)	mg/kg	8.4	+/- 1.6	5.7	+/- 1.1	6.4	+/- 1.2	6.8	+/- 1.3	0.50	9116368

RDL = Reportable Detection Limit
MU = Measurement Uncertainty

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GENERAL COMMENTS

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

Package 1	3.0°C
Package 2	2.0°C
Package 3	2.7°C

Split Report issued at client request 2018/11/06

Sample UC0354 [FTA-S07-05-0.55] : Sample received was not in compliance with CCME sampling requirements for VOC/BTEX/F1 in soil. Please see attachment for Perfluorinated Compounds (Soil) results.

Sample UC0355 [FTA-S08-05-0.55] : Sample received was not in compliance with CCME sampling requirements for VOC/BTEX/F1 in soil. Please see attachment for Perfluorinated Compounds (Soil) results.

Sample UC0356 [FTA-S09-05-0.55] : Sample received was not in compliance with CCME sampling requirements for VOC/BTEX/F1 in soil. Please see attachment for Perfluorinated Compounds (Soil) results.

Sample UC0383 [FTA-S10-0.5-0.55] : Sample received was not in compliance with CCME sampling requirements for VOC/BTEX/F1 in soil. Please see attachment for Perfluorinated Compounds (Soil) results.

Sample UC0384 [FTA-S11-0.5-0.55] : Sample received was not in compliance with CCME sampling requirements for VOC/BTEX/F1 in soil. Please see attachment for Perfluorinated Compounds (Soil) results.

Sample UC0385 [FTA-S12-0.5-0.55] : Sample received was not in compliance with CCME sampling requirements for VOC/BTEX/F1 in soil. Please see attachment for Perfluorinated Compounds (Soil) results.

Sample UC0386 [FTA-S13-0.5-0.55] : Sample received was not in compliance with CCME sampling requirements for VOC/BTEX/F1 in soil. Please see attachment for Perfluorinated Compounds (Soil) results.

Sample UC0387 [FTA-S14-0.5-0.55] : Sample received was not in compliance with CCME sampling requirements for VOC/BTEX/F1 in soil. Please see attachment for Perfluorinated Compounds (Soil) results.

Sample UC0388 [FTA-S15-0.5-0.55] : Sample received was not in compliance with CCME sampling requirements for VOC/BTEX/F1 in soil. Please see attachment for Perfluorinated Compounds (Soil) results.

Sample UC0389 [FTA-S16-0.5-0.55] : Sample received was not in compliance with CCME sampling requirements for VOC/BTEX/F1 in soil. Please see attachment for Perfluorinated Compounds (Soil) results.

Sample UC0390 [FTA-S17-0.5-0.55] : Sample received was not in compliance with CCME sampling requirements for VOC/BTEX/F1 in soil. Please see attachment for Perfluorinated Compounds (Soil) results.

Sample UC0391 [FTA-S18-0.5-0.55] : Sample received was not in compliance with CCME sampling requirements for VOC/BTEX/F1 in soil. Please see attachment for Perfluorinated Compounds (Soil) results.

Sample UC0392 [FTA-S-QC-02] : Sample received was not in compliance with CCME sampling requirements for VOC/BTEX/F1 in soil. Please see attachment for Perfluorinated Compounds (Soil) results.

Sample UC0393 [FTA-SQC-03] : Sample received was not in compliance with CCME sampling requirements for VOC/BTEX/F1 in soil. Please see attachment for Perfluorinated Compounds (Soil) results.

Sample UC0394 [EQUIPMENT BLANK-01] : Please see attachment for Perfluorinated Compounds (Soil) results.

Sample UD0760 [FTA-S01-0-0.3] : Sample received was not in compliance with CCME sampling requirements for VOC/BTEX/F1 in soil.

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Sample UD0761 [FTA-S02-0-0.3] : Sample received was not in compliance with CCME sampling requirements for VOC/BTEX/F1 in soil.

Sample UD0762 [FTA-S03-0-0.3] : Sample received was not in compliance with CCME sampling requirements for VOC/BTEX/F1 in soil.

Sample UD0763 [FTA-S04-0-0.3] : Sample received was not in compliance with CCME sampling requirements for VOC/BTEX/F1 in soil.

Sample UD0764 [FTA-S05-0-0.3] : Sample received was not in compliance with CCME sampling requirements for VOC/BTEX/F1 in soil.

Sample UD0765 [FTA-S06-0-0.3] : Sample received was not in compliance with CCME sampling requirements for VOC/BTEX/F1 in soil.

Sample UD0766 [FTA-S-QC-01] : Sample received was not in compliance with CCME sampling requirements for VOC/BTEX/F1 in soil.

The estimate of uncertainty has been reported as an expanded uncertainty and calculated using a coverage factor of 2, which gives a level of confidence of 95%.

Results relate only to the items tested.

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Maxxam Job #: B869039
Report Date: 2018/11/06

STANTEC CONSULTING LTD
Client Project #: 110220176
Site Location: CBA FTA
Sampler Initials: LA

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
9106729	DUO	Matrix Spike	1,4-Difluorobenzene (sur.)	2018/08/21		95	%	50 - 140
			4-Bromofluorobenzene (sur.)	2018/08/21		101	%	50 - 140
			D10-o-Xylene (sur.)	2018/08/21		119	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2018/08/21		116	%	50 - 140
			Benzene	2018/08/21		118	%	50 - 140
			Toluene	2018/08/21		108	%	50 - 140
			Ethylbenzene	2018/08/21		109	%	50 - 140
			m & p-Xylene	2018/08/21		114	%	50 - 140
			o-Xylene	2018/08/21		112	%	50 - 140
			F1 (C6-C10)	2018/08/21		118	%	60 - 140
9106729	DUO	Spiked Blank	1,4-Difluorobenzene (sur.)	2018/08/21		101	%	50 - 140
			4-Bromofluorobenzene (sur.)	2018/08/21		98	%	50 - 140
			D10-o-Xylene (sur.)	2018/08/21		104	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2018/08/21		104	%	50 - 140
			Benzene	2018/08/21		102	%	60 - 130
			Toluene	2018/08/21		94	%	60 - 130
			Ethylbenzene	2018/08/21		94	%	60 - 130
			m & p-Xylene	2018/08/21		100	%	60 - 130
			o-Xylene	2018/08/21		96	%	60 - 130
			F1 (C6-C10)	2018/08/21		103	%	60 - 140
9106729	DUO	Method Blank	1,4-Difluorobenzene (sur.)	2018/08/21		101	%	50 - 140
			4-Bromofluorobenzene (sur.)	2018/08/21		99	%	50 - 140
			D10-o-Xylene (sur.)	2018/08/21		103	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2018/08/21		107	%	50 - 140
			Benzene	2018/08/21	<0.0050		mg/kg	
			Toluene	2018/08/21	<0.020		mg/kg	
			Ethylbenzene	2018/08/21	<0.010		mg/kg	
			m & p-Xylene	2018/08/21	<0.040		mg/kg	
			o-Xylene	2018/08/21	<0.020		mg/kg	
			F1 (C6-C10)	2018/08/21	<10		mg/kg	
9106729	DUO	RPD	Benzene	2018/08/21	NC		%	50
			Toluene	2018/08/21	NC		%	50
			Ethylbenzene	2018/08/21	NC		%	50
			m & p-Xylene	2018/08/21	NC		%	50
			o-Xylene	2018/08/21	NC		%	50
			F1 (C6-C10)	2018/08/21	NC		%	40
9108859	GG3	Matrix Spike	O-TERPHENYL (sur.)	2018/08/20		120	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2018/08/20		125	%	60 - 130
			F3 (C16-C34 Hydrocarbons)	2018/08/20		123	%	60 - 130
			F4 (C34-C50 Hydrocarbons)	2018/08/20		116	%	60 - 130
9108859	GG3	Spiked Blank	O-TERPHENYL (sur.)	2018/08/20		110	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2018/08/20		112	%	70 - 130
			F3 (C16-C34 Hydrocarbons)	2018/08/20		111	%	70 - 130
			F4 (C34-C50 Hydrocarbons)	2018/08/20		106	%	70 - 130
9108859	GG3	Method Blank	O-TERPHENYL (sur.)	2018/08/20		116	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2018/08/20	<10		mg/kg	
			F3 (C16-C34 Hydrocarbons)	2018/08/20	<50		mg/kg	
			F4 (C34-C50 Hydrocarbons)	2018/08/20	<50		mg/kg	
9108859	GG3	RPD	F2 (C10-C16 Hydrocarbons)	2018/08/20	NC		%	40
			F3 (C16-C34 Hydrocarbons)	2018/08/20	0.34		%	40
			F4 (C34-C50 Hydrocarbons)	2018/08/20	NC		%	40
9112497	LJA	Method Blank	Moisture	2018/08/23	<0.30		%	

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Site Location: CBA FTA
Sampler Initials: LA

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
9112497	LJA	RPD	Moisture	2018/08/23	3.2		%	20
9116368	JHS	Matrix Spike [UD0760-01]	Total Lead (Pb)	2018/08/24		101	%	75 - 125
9116368	JHS	QC Standard	Total Lead (Pb)	2018/08/24		119	%	79 - 121
9116368	JHS	Spiked Blank	Total Lead (Pb)	2018/08/24		98	%	80 - 120
9116368	JHS	Method Blank	Total Lead (Pb)	2018/08/24	<0.50		mg/kg	
9116368	JHS	RPD [UD0760-01]	Total Lead (Pb)	2018/08/24	0.15		%	35

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

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

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 (absolute difference <= 2x RDL).

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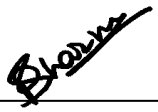
STANTEC CONSULTING LTD
Client Project #: 110220176
Site Location: CBA FTA
Sampler Initials: LA

VALIDATION SIGNATURE PAGE

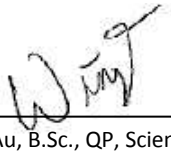
The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Justin Geisel, B.Sc., Organics Supervisor



Poonam Sharma, cCT, Organics Supervisor

Roland Menard, Analyst II



Winnie Au, B.Sc., QP, 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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ADDITIONAL COOLER TEMPERATURE RECORD

CHAIN-OF-CUSTODY RECORD

CHAIN OF CUSTODY #	
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COOLER OBSERVATIONS:

MAXXAM JOB#: B869039

CUSTODY SEAL PRESENT (YES/NO)	CUSTODY SEAL INTACT (YES/NO)	ICE PRESENT (YES/NO)	COOLER ID	TEMP 1	TEMP 2	TEMP 3
YES ✓	YES ✓	YES ✓		2	2	4
YES ✓	YES ✓	YES ✓		5	3	2
YES ✓	YES ✓	YES ✓		7	3	3
YES ✓	YES ✓	YES ✓		2	2	2

RECEIVED BY (SIGN & PRINT)		DATE (YYYY/MM/DD)	TIME (HH:MM)
Gina Antonucci (signature)	Gina Antonucci	20180816	1028

Maxxam
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Calgary: 4000 19th St. NE, T2E 6P8. Toll Free (800) 386-7247
Edmonton: 9331-48 St. T6B 2R4. Toll Free (800) 386-7247
maxxam.ca

CHAIN OF CUSTODY RECORD

M 053900

Invoice Information	Report Information (if differs from invoice)	Project Information	Turnaround Time (TAT) Required
Company: Stantec	Company:	Quotation #:	[X] 5 - 7 Days Regular (Most analyses)
Contact Name: Lindsay Van Noortwyk	Contact Name:	P.O. #/ AFE#: 110220176	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 10160 112 St NW Edmonton AB T5K 2L6	Address:	Project #: 110220176	Rush TAT (Surcharges will be applied)
Phone: 780 [redacted] 232 1114	Phone:	Site Location: CBA FTA	[ ] Same Day [ ] 2 Days [ ] 1 Day [ ] 3-4 Days
Email: Lindsay.VanNoortwyk@stantec.com	Email:	Site #:	Date Required:
Copies:	Copies:	Sampled By: LA	Rush Confirmation #:

Laboratory Use Only

	YES	NO	Cooler ID	Temp		
Seal Present						
Seal Intact						
Cooling Media						
	YES	NO	Cooler ID			
Seal Present						
Seal Intact						
Cooling Media						
	YES	NO	Cooler ID			
Seal Present						
Seal Intact						
Cooling Media						

Temp: see ACTR

RECEIVED IN YELLOWKNIFE
Depot Reception
By: Jeffery.S
Ice-yes 2018 -08- 15
Sealed-yes 0830
Temp: 2 / 3 / 1 — 2 3 4

Analysis Requested

Sample Identification	Depth (Unit) (m)	Date Sampled (YYYY/MM/DD)	Time Sampled (HH:MM)	Matrix	# of containers	BTEX F1 ☐ VOC	BTEX F1-F2	BTEX F1-F4	Routine Water	Regulated Metals ☐ Tot ☐ Diss	Mercury ☐ Total ☐ Dissolved	Salinity 4	Sieve (75 micron)	Texture (% Sand, Silt, Clay)	Basic Class II Landfill	Lead	PFAS (17 Parameter Low DL)	HOLD - DO NOT ANALYZE
1 FTA-S01-0-0.3	0-0.3	2018/08/12	1215	S	3			X								X		
2 FTA-S02-0-0.3			1225					X								X		
3 FTA-S03-0-0.3			1240					X								X		
4 FTA-S04-0-0.3			1250					X								X		
5 FTA-S05-0-0.3			1258					X								X		
6 FTA-S06-0-0.3	0-0.3		1305					X								X		
7 FTA-S-QC-01	—		—		3			X								X		
8 FTA-S07-0.5-0.55	0.5-0.55		1450		4			X								X	X	
9 FTA-S08-0.5-0.55	"		1520		4			X								X	X	
10 FTA-S09-0.5-0.55	0.5-0.55	2018/08/12	1545	S	4			X								X	X	

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

Regulatory Criteria

- [ ] AT1
- [ ] CCME
- [ ] Drinking Water
- [ ] D50 (Drilling Waste)
- [ ] Saskatchewan
- [ ] Other:

Special Instructions

Relinquished by: (Signature/ Print)	DATE (YYYY/MM/DD)	Time (HH:MM)	Received by: (Signature/ Print)	DATE (YYYY/MM/DD)	Time (HH:MM)	Maxxam Job #
Luke Andersen	2018/08/14	0845 LA	Gina Antonucci	20180816	1028	B869039

Unless otherwise agreed to in writing, work submitted on this Chain of Custody is subject to Maxxam's standard Terms and Conditions. Signing of this Chain of Custody document is acknowledgment and acceptance of our terms which are available for viewing at www.maxxam.ca/terms

AB FCD-00331/7

Maxxam
A Bureau Veritas Group Company

Calgary: 4000 19th St. NE, T2E 6P8. Toll Free (800) 386-7247
Edmonton: 9331-48 St. T6B 2R4. Toll Free (800) 386-7247
maxxam.ca

CHAIN OF CUSTODY RECORD

M 005380

Report Information	Comments	Same as CoC
Company: Stantec Contact: Lindsay van Noortwyk Phone: 780 232 1114 Email: Lindsay.vanNoortwyk@stantec.com Sampled by:		M053900 Project/LSD: 110220176 Special Instructions

	Sample Identification	Depth (mm)	Date Sampled (YYYY/MM/DD)	Time Sampled (HH:MM)	Matrix	# of containers	BTEX F1 ☐ VOC ☐	BTEX F1-F2	BTEX F1-F4	Routine Water	Regulated Metals Tot ☐ Diss ☐	Mercury Total ☐ Dissolved ☐	Salinity 4	Sieve (75 micron)	Texture (% Sand, Silt, Clay)	Basic Class II Landfill	Lead	PFAS (17 parameter Low QL)	HOLD - DO NOT ANALYZE
11	FTA-S10-0.5-0.55	0.5-0.55	2018/08/12	1605	S	4			x								x	x	
12	FTA-S11-0.5-0.55			1635					x								x	x	
13	FTA-S12-0.5-0.55			1650					x								x	x	
14	FTA-S13-0.5-0.55			1700					x								x	x	
15	FTA-S14-0.5-0.55			1716					x								x	x	
16	FTA-S15-0.5-0.55			1728					x								x	x	
17	FTA-S16-0.5-0.55			1746					x								x	x	
18	FTA-S17-0.5-0.55		2018/08/12	1810					x								x	x	
19	FTA-S18-0.5-0.55	0.5-0.55	2018/08/13	740					x								x	x	
20	FTA-S-QC-02	—	2018/08/12	—					x								x	x	
21	FTA-S-QC-03	—	2018/08/12	—	S	4			x								x	x	
22	Equipment Blank-01		2018/08/12	1815	W	2												x	
23																			
24																			
25																			
26																			
27																			
28																			
29																			
30																			

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

RECEIVED IN YELLOWKNIFE
By: Jeffery.S
Ice-yes 2018-08-15 0830
Sealed-yes
Temp: 2 3 4
2 3 1

Relinquished by: (Signature/ Print)	DATE (YYYY/MM/DD)	Time (HH:MM)	Received by: (Signature/ Print)	DATE (YYYY/MM/DD)	Time (HH:MM)	Maxxam Job #
Luke Anderson	2018/08/14	0745	Gina Antonucci	20180816	1028	B869039

AB FCD-00331/6

Maxxam
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maxxam.ca

1014

CHAIN OF CUSTODY RECORD

M 053901

Page 1 of 2

Invoice Information	Report Information (if differs from invoice)	Project Information	Turnaround Time (TAT) Required
Company: Stantec	Company:	Quotation #:	[X] 5 - 7 Days Regular (Most analyses)
Contact Name: Lindsay Van Noortwyk	Contact Name:	P.O. #/ AFE#: 110220176	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 10160 112 St NW Edmonton AB T5K 2L6	Address:	Project #: 110220176	Rush TAT (Surcharges will be applied)
Phone: 780 232 1114	Phone:	Site Location: CBA FTA	[ ] Same Day [ ] 2 Days [ ] 1 Day [ ] 3-4 Days
Email: Lindsay.VanNoortwyk@stantec.com	Email:	Site #:	Date Required:
Copies:	Copies:	Sampled By: LA	Rush Confirmation #:

Laboratory Use Only

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

Depot Reception?
RECEIVED IN YELLOWKNIFE
By: Jeffery S
Sealed-Yes 2018 -08- ~~16~~ 14
Ice-yes 13:53
Temp: 2, 2, 4

Analysis Requested

	Sample Identification	Depth (Unit)	Date Sampled (YYYY/MM/DD)	Time Sampled (HH:MM)	Matrix	# of containers	BTEX F1 ☐ VOC	BTEX F1-F2	BTEX F1-F4	Routine Water	Regulated Metals ☐ Tot ☐ Diss	Mercury Total ☐ Dissolved	Salinity 4	Sieve (75 micron)	Texture (% Sand, Silt, Clay)	Basic Class II Landfill	Lead	PFAS (17 Parameter Low DL)	HOLD - DO NOT ANALYZE
1	FTA-S01-0-0.3	0-0.3	2018/08/12	1215	S	3			X								X		
2	FTA-S02-0-0.3			1225					X								X		
3	FTA-S03-0-0.3			1240					X								X		
4	FTA-S04-0-0.3			1250					X								X		
5	FTA-S05-0-0.3			1258					X								X		
6	FTA-S06-0-0.3	0-0.3		1305					X								X		
7	FTA-S-QC-01	—		—		3			X								X		
8	FTA-S07-0.5-0.55	0.5-0.55		1450		4			X								X	X	
9	FTA-S08-0.5-0.55			1520		4			X								X	X	
10	FTA-S09-0.5-0.55	0.5-0.55	2018/08/12	1545	S	4			X								X	X	

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

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

Special Instructions

Relinquished by: (Signature/ Print)	DATE (YYYY/MM/DD)	Time (HH:MM)	Received by: (Signature/ Print)	DATE (YYYY/MM/DD)	Time (HH:MM)	Maxxam Job #
Luke Andersen	2018/08/14	0745 LA	David Tidmen	20180820	1025	~~B870716~~ D-T 20180822 B869039

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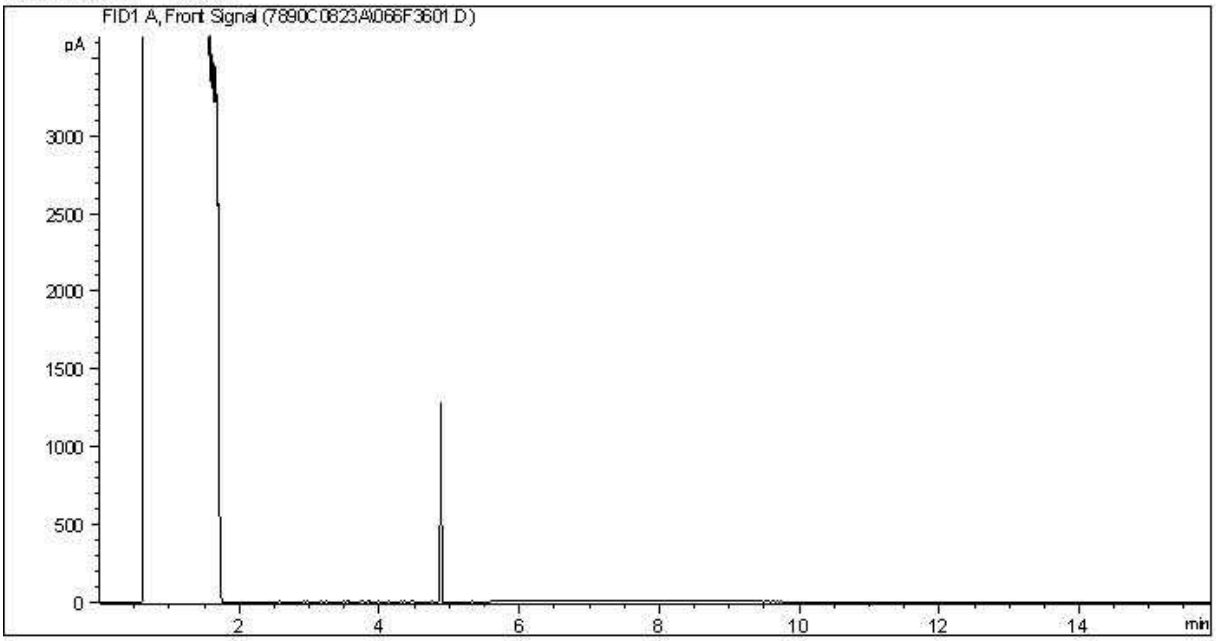
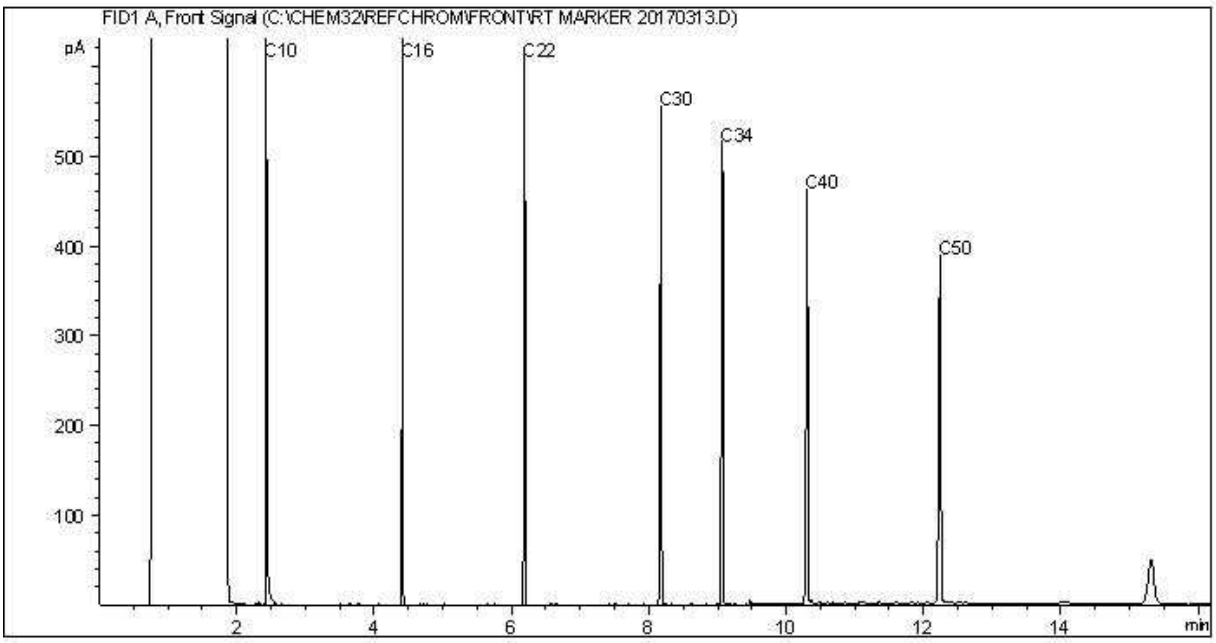
AB FCD-00331/7

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890C



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

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

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

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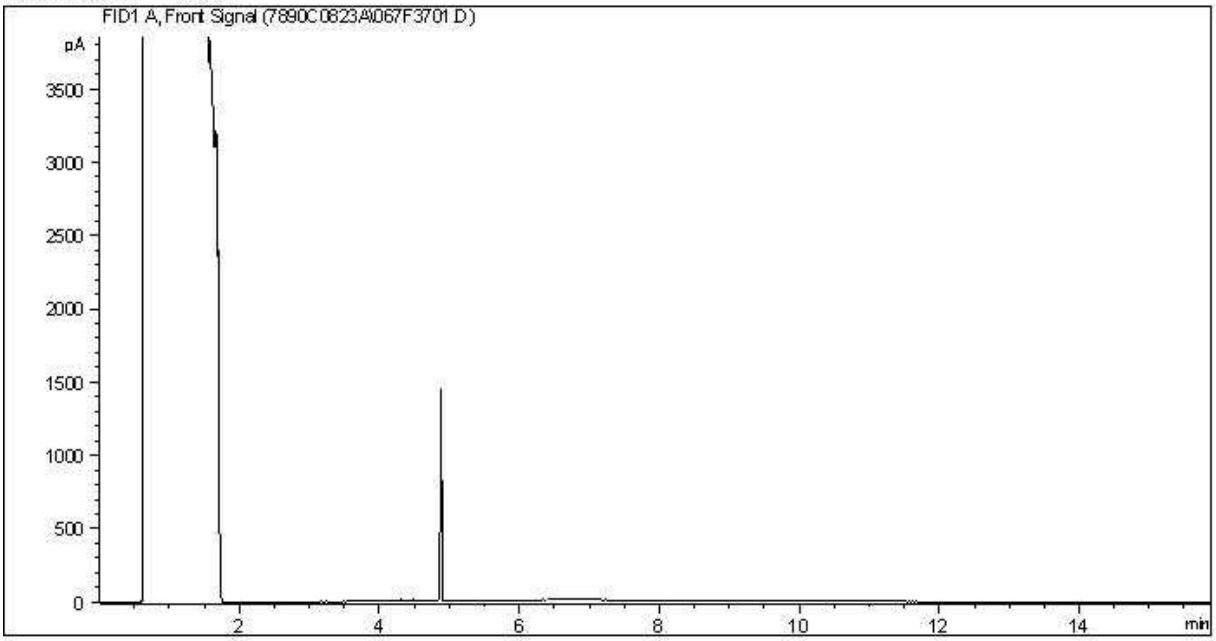
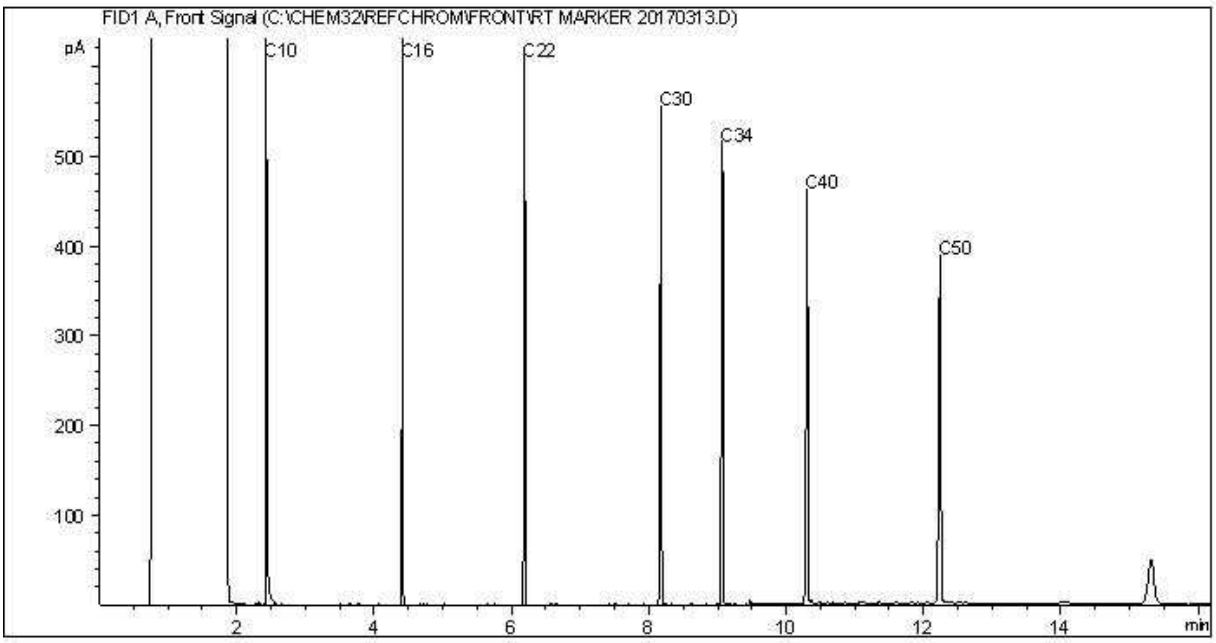


Carbon Range Distribution - Reference Chromatogram



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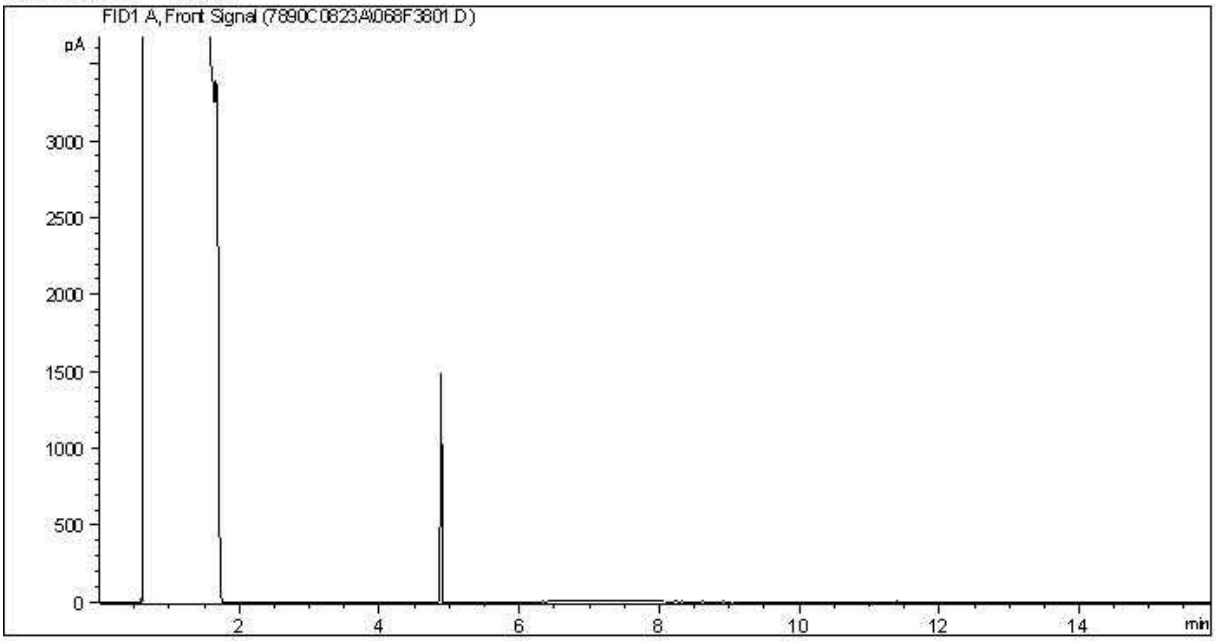
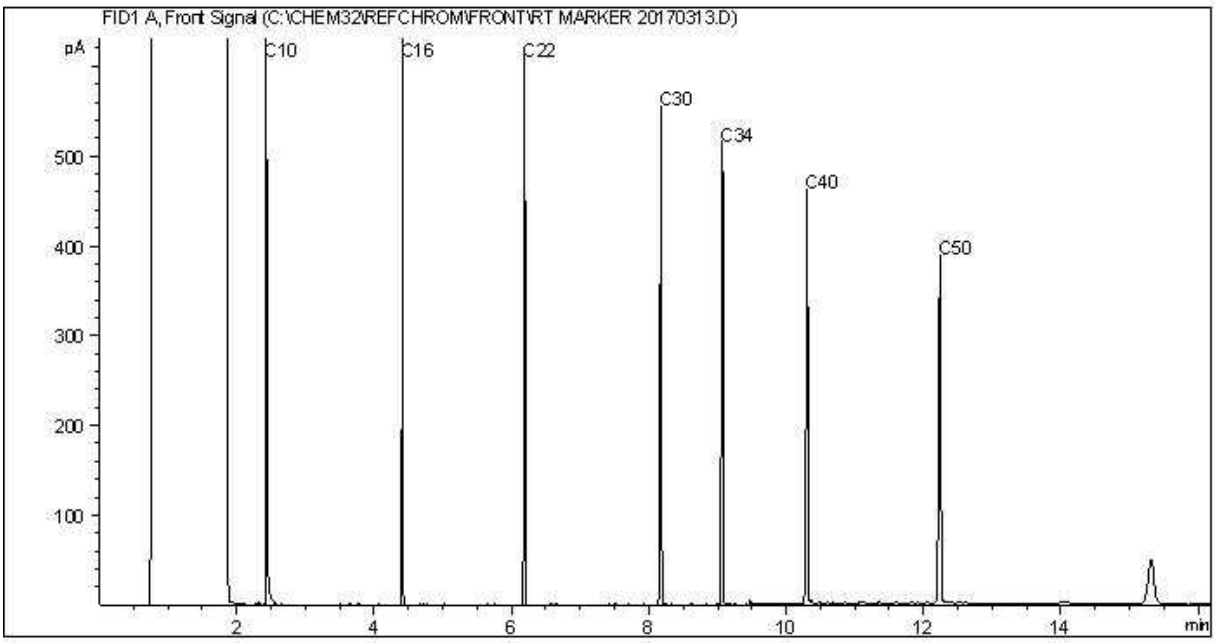


Carbon Range Distribution - Reference Chromatogram



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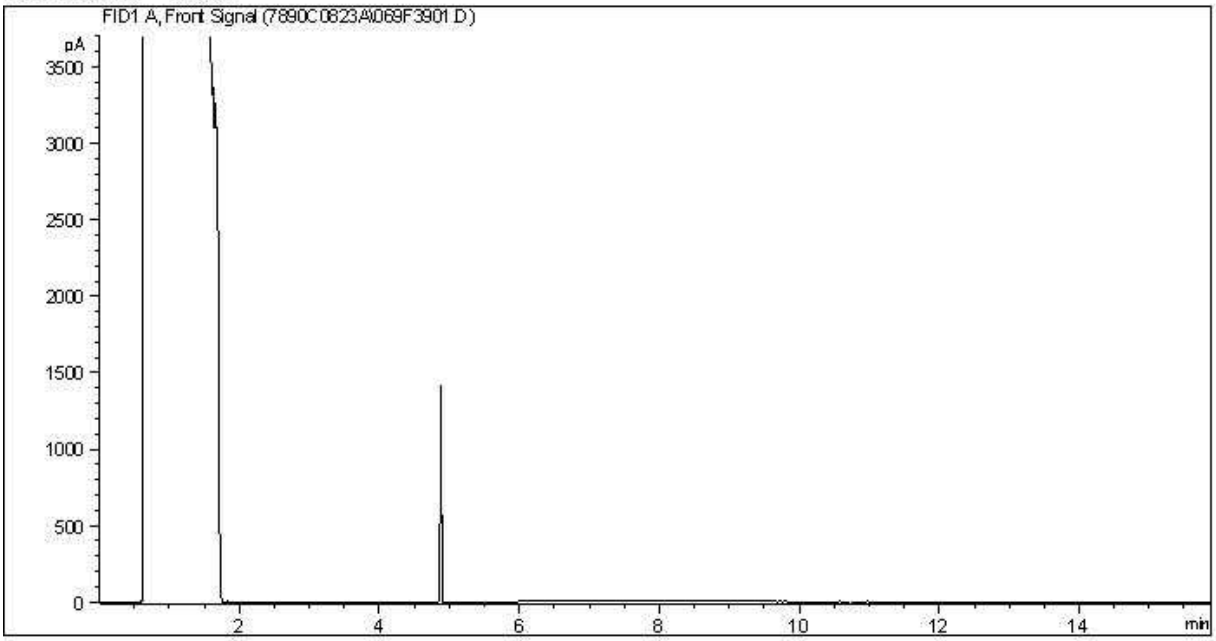
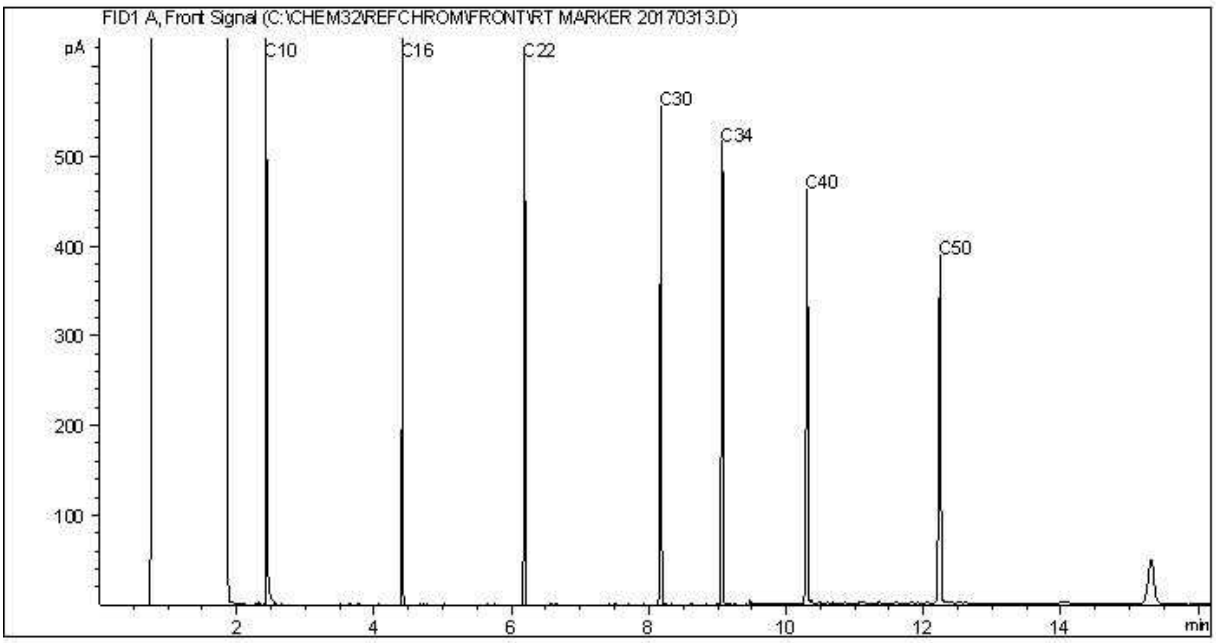


Carbon Range Distribution - Reference Chromatogram



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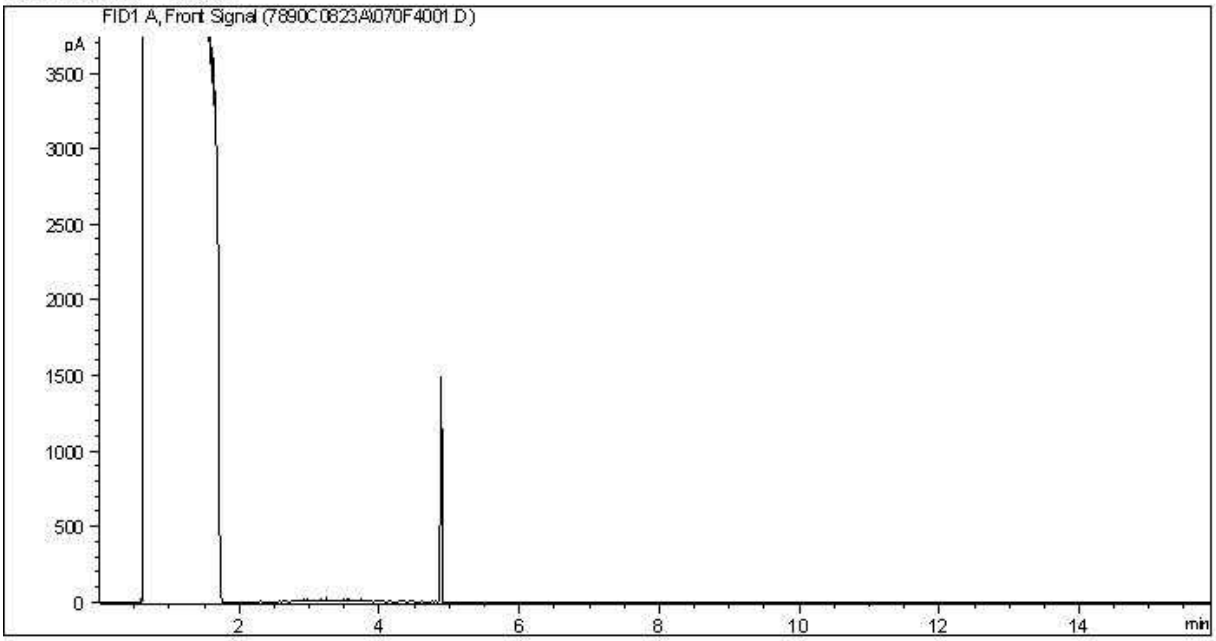

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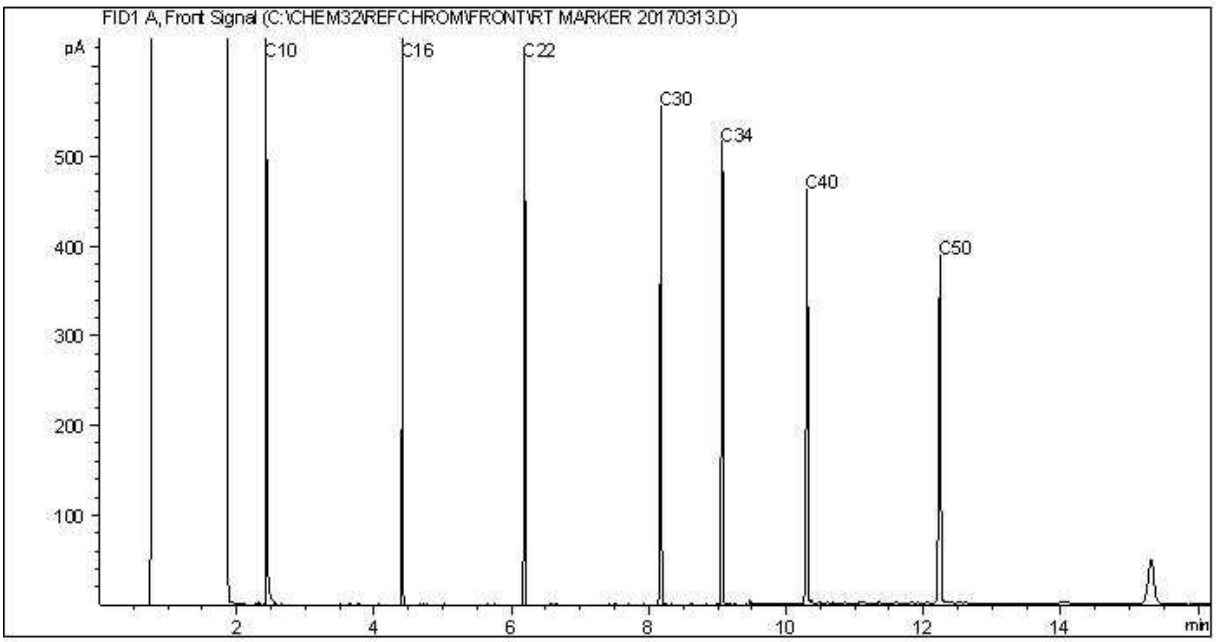

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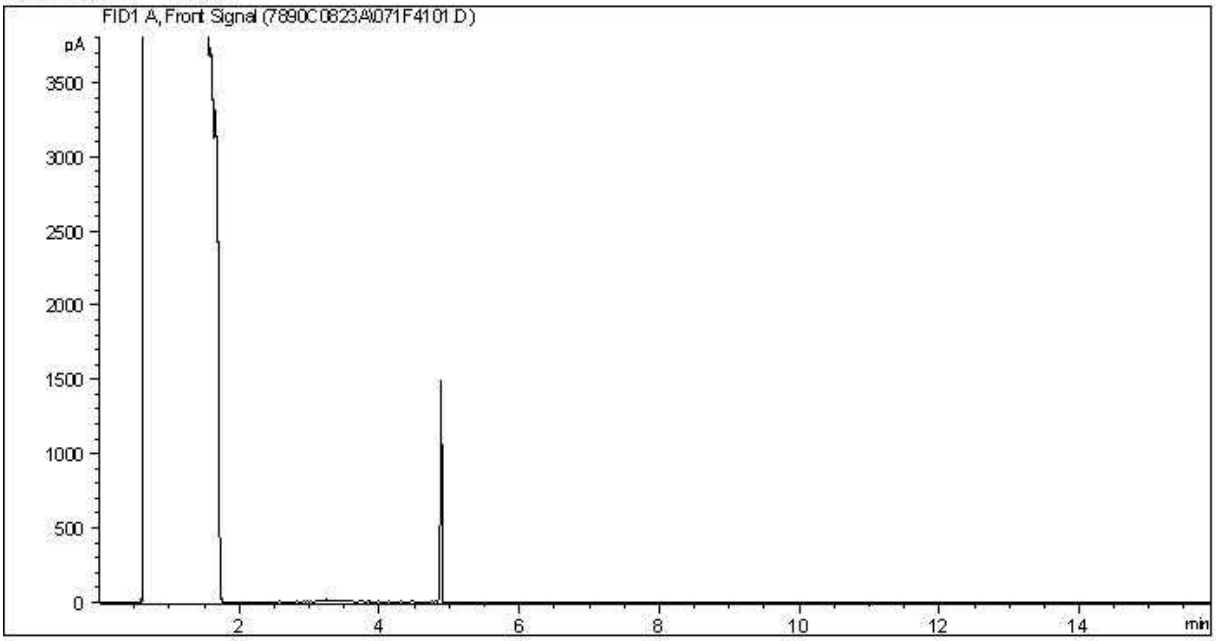

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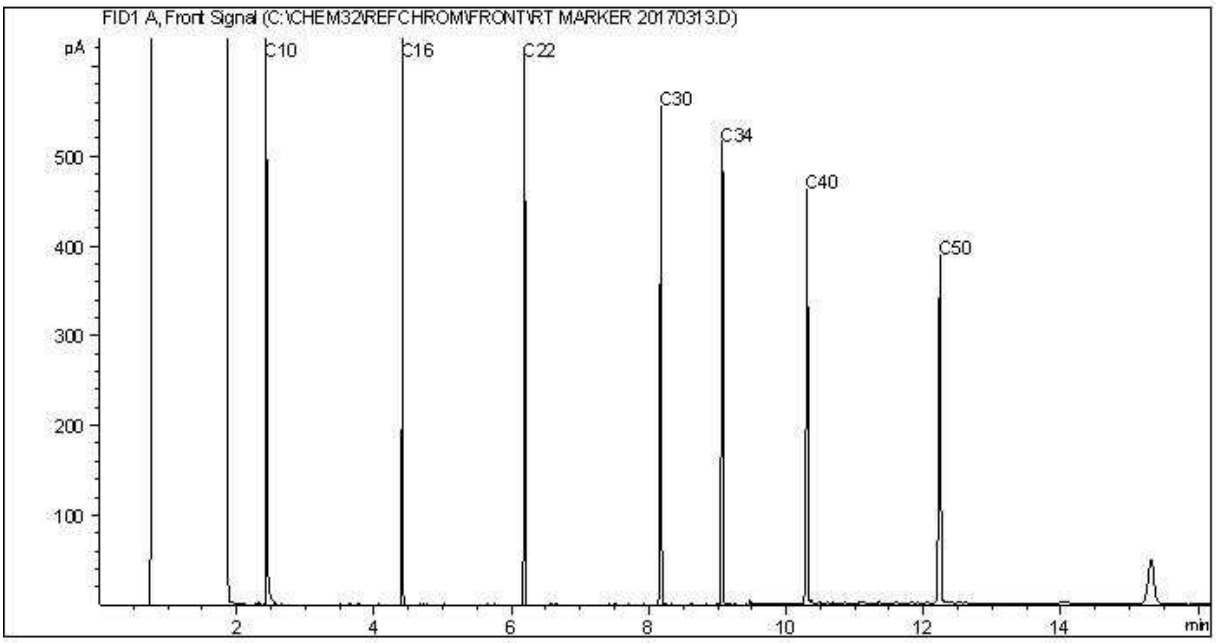

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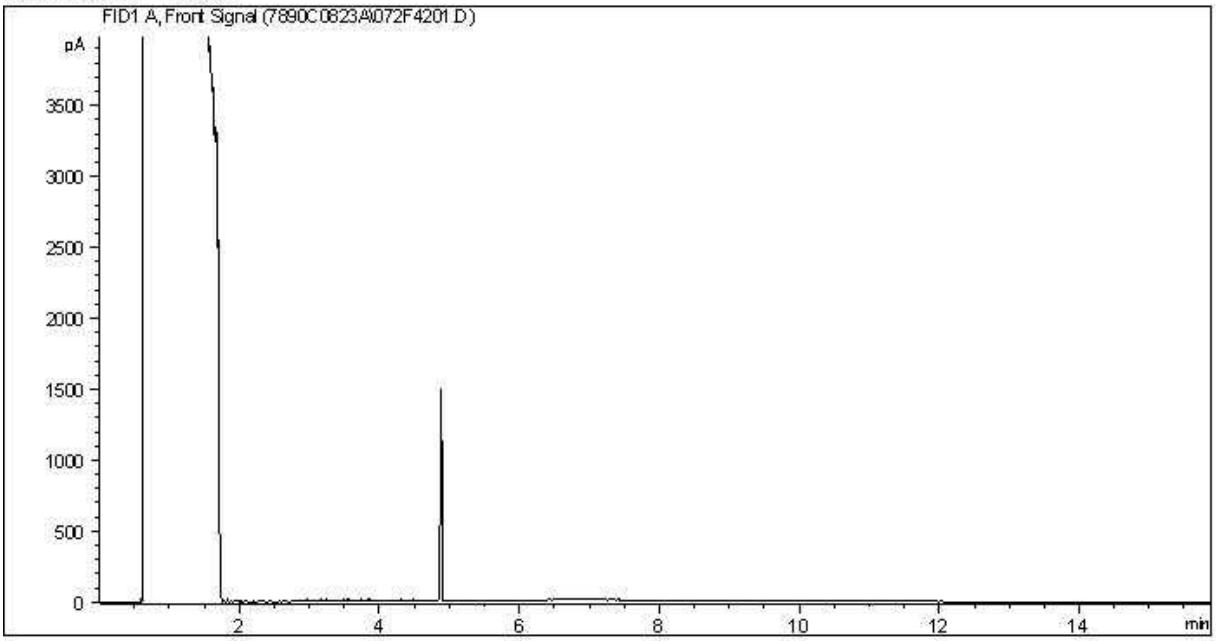

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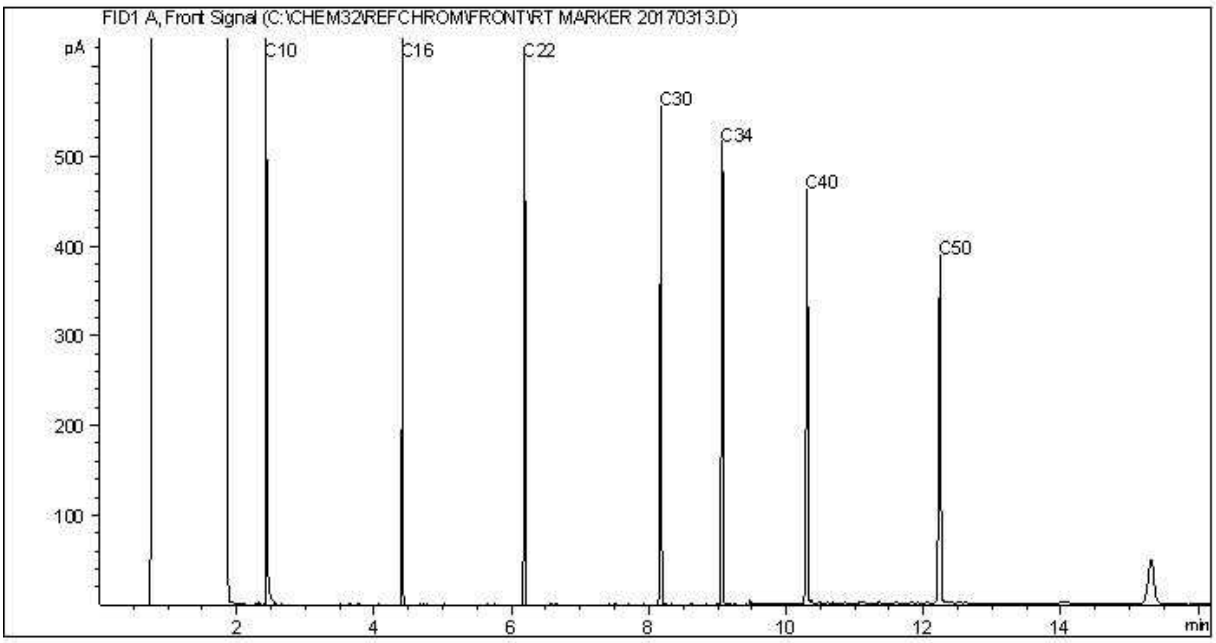

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Maxxam
A Bureau Veritas Group Company

Success Through Science®

Your P.O. #: 110220176
Your Project #: 110220176
Site Location: CBA FTA
Your C.O.C. #: M086439

Attention: LINDSAY VAN NOORTWYK

STANTEC CONSULTING LTD
10160-112 STREET
EDMONTON, AB
CANADA T5K 2L6

Report Date: 2018/08/31
Report #: R2612308
Version: 3 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B867222
Received: 2018/08/09, 08:30

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO3,HCO3,OH	1	N/A	2018/08/13	AB SOP-00005	SM 23 2320 B m
BTEX/F1 in Water by HS GC/MS/FID	1	N/A	2018/08/12	AB SOP-00039	CCME CWS/EPA 8260d m
F1-BTEX	1	N/A	2018/08/13	AB SOP-00039	Auto Calc
Chloride by Automated Colourimetry	1	N/A	2018/08/14	AB SOP-00020	SM 22 4500-Cl-E m
Conductivity @25C	1	N/A	2018/08/13	AB SOP-00005	SM 23 2510 B m
Perfluorinated Compounds (Water) (1)	1	N/A	2018/08/31		
CCME Hydrocarbons in Water (F2; C10-C16) (2)	1	2018/08/13	2018/08/13	AB SOP-00037 / AB SOP-00040	CCME PHC-CWS m
Hardness	1	N/A	2018/08/14	AB WI-00065	Auto Calc
Elements by ICP-Dissolved-Lab Filtered (3)	1	N/A	2018/08/13	AB SOP-00042	EPA 6010d R4 m
Elements by ICP - Total	1	2018/08/15	2018/08/15	AB SOP-00014 / AB SOP-00042	EPA 6010d R4 m
Elements by ICPMS - Total	1	2018/08/15	2018/08/15	AB SOP-00014 / AB SOP-00043	EPA 6020b R2 m
Ion Balance	1	N/A	2018/08/12	AB WI-00065	Auto Calc
Sum of cations, anions	1	N/A	2018/08/14	AB WI-00065	Auto Calc
Ammonia-N (Total)	1	N/A	2018/08/14	AB SOP-00007	SM 23 4500 NH3 A G m
Nitrate and Nitrite	1	N/A	2018/08/12	AB WI-00065	Auto Calc
Nitrate (as N)	1	2018/08/11	2018/08/12	AB WI-00065	Auto Calc
NO2 - NO2 + NO3 (N) by CFA	1	N/A	2018/08/12	AB SOP-00082	IM 857-871m
Oil and Grease (Gravimetric, n-Hexane)	1	2018/08/23	2018/08/23	EENVSOP-00093	SM 23 5520B m
Benzo[a]pyrene Equivalency (4)	1	N/A	2018/08/18	AB SOP-00003	Auto Calc
PAH in Water by GC/MS	1	2018/08/15	2018/08/17	AB SOP-00037 / AB SOP-00003	EPA 3510C/8270E m
pH @25°C (5)	1	N/A	2018/08/13	AB SOP-00005	SM 23 4500 H+ B m
Phenols (4-AAP)	1	N/A	2018/08/17	EENVSOP-00061	MMCW 154 1996 m
Sulphate by Automated Colourimetry	1	N/A	2018/08/14	AB SOP-00018	SM 22 4500-SO4 E m
Total Dissolved Solids (Calculated)	1	N/A	2018/08/14	AB WI-00065	Auto Calc
Total Suspended Solids (NFR)	1	2018/08/13	2018/08/14	AB SOP-00061	SM 23 2540 D m

Remarks:

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. #: 110220176
Your Project #: 110220176
Site Location: CBA FTA
Your C.O.C. #: M086439

Attention: LINDSAY VAN NOORTWYK

STANTEC CONSULTING LTD
10160-112 STREET
EDMONTON, AB
CANADA T5K 2L6

Report Date: 2018/08/31
Report #: R2612308
Version: 3 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B867222
Received: 2018/08/09, 08:30

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

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

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

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

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 Edmonton)
(2) Silica gel clean up employed.
(3) Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
(4) B[a]P TPE is calculated using 1/2 of the RDL for non detect results as per Alberta Environment instructions. This protocol may not apply in other jurisdictions.
(5) The CCME method requires pH to be analysed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the CCME holding time. Maxxam endeavours to analyze samples as soon as possible after receipt.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Geraldlyn Gouthro, Client Service Specialist
Email: GGouthro@maxxam.ca
Phone# (403)735-2230

==========

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 #: B867222
Report Date: 2018/08/31

STANTEC CONSULTING LTD
Client Project #: 110220176
Site Location: CBA FTA
Your P.O. #: 110220176
Sampler Initials: LA

AT1 BTEX AND F1-F2 IN WATER (WATER)

Maxxam ID		UB1118			
Sampling Date		2018/08/08 16:10			
COC Number		M086439			
	UNITS	TRIP BLANK -01	MU	RDL	QC Batch
Ext. Pet. Hydrocarbon					
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	N/A	0.10	9099681
Volatiles					
Benzene	mg/L	<0.00040	N/A	0.00040	9099160
Toluene	mg/L	<0.00040	N/A	0.00040	9099160
Ethylbenzene	mg/L	<0.00040	N/A	0.00040	9099160
m & p-Xylene	mg/L	<0.00080	N/A	0.00080	9099160
o-Xylene	mg/L	<0.00040	N/A	0.00040	9099160
Xylenes (Total)	mg/L	<0.00089	N/A	0.00089	9098790
F1 (C6-C10) - BTEX	mg/L	<0.10	N/A	0.10	9098790
F1 (C6-C10)	mg/L	<0.10	N/A	0.10	9099160
Surrogate Recovery (%)					
1,4-Difluorobenzene (sur.)	%	98	N/A	N/A	9099160
4-Bromofluorobenzene (sur.)	%	99	N/A	N/A	9099160
D4-1,2-Dichloroethane (sur.)	%	89	N/A	N/A	9099160
O-TERPHENYL (sur.)	%	119	N/A	N/A	9099681

RDL = Reportable Detection Limit
MU = Measurement Uncertainty
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Maxxam Job #: B867222
Report Date: 2018/08/31

STANTEC CONSULTING LTD
Client Project #: 110220176
Site Location: CBA FTA
Your P.O. #: 110220176
Sampler Initials: LA

ROUTINE WATER -LAB FILTERED (WATER)

Maxxam ID		UB1118		UB1118			
Sampling Date		2018/08/08 16:10		2018/08/08 16:10			
COC Number		M086439		M086439			
	UNITS	TRIP BLANK -01	MU	TRIP BLANK -01 Lab-Dup	MU	RDL	QC Batch
Calculated Parameters							
Anion Sum	meq/L	0.0000	N/A	N/A	N/A	N/A	9098797
Cation Sum	meq/L	0.0080	N/A	N/A	N/A	N/A	9098797
Hardness (CaCO3)	mg/L	<0.50	N/A	N/A	N/A	0.50	9098794
Ion Balance (% Difference)	%	NC	N/A	N/A	N/A	N/A	9098796
Dissolved Nitrate (N)	mg/L	<0.020	N/A	N/A	N/A	0.020	9099106
Dissolved Nitrate (NO3)	mg/L	<0.089	N/A	N/A	N/A	0.089	9099061
Dissolved Nitrite (NO2)	mg/L	<0.033	N/A	N/A	N/A	0.033	9099061
Calculated Total Dissolved Solids	mg/L	<0.022	N/A	N/A	N/A	0.022	9098801
Misc. Inorganics							
Conductivity	uS/cm	<2.0	N/A	<2.0	N/A	2.0	9099663
pH	pH	5.11	+/- 0.0740	5.08	+/- 0.0736	N/A	9099660
Anions							
Alkalinity (PP as CaCO3)	mg/L	<1.0	N/A	<1.0	N/A	1.0	9099661
Alkalinity (Total as CaCO3)	mg/L	<1.0	N/A	<1.0	N/A	1.0	9099661
Bicarbonate (HCO3)	mg/L	<1.0	N/A	<1.0	N/A	1.0	9099661
Carbonate (CO3)	mg/L	<1.0	N/A	<1.0	N/A	1.0	9099661
Hydroxide (OH)	mg/L	<1.0	N/A	<1.0	N/A	1.0	9099661
Dissolved Sulphate (SO4)	mg/L	<1.0	N/A	<1.0	N/A	1.0	9099553
Dissolved Chloride (Cl)	mg/L	<1.0	N/A	<1.0	N/A	1.0	9099547
Nutrients							
Dissolved Nitrite (N)	mg/L	<0.010	N/A	N/A	N/A	0.010	9099347
Dissolved Nitrate plus Nitrite (N)	mg/L	<0.020	N/A	N/A	N/A	0.020	9099347
Lab Filtered Elements							
Dissolved Calcium (Ca)	mg/L	<0.30	N/A	N/A	N/A	0.30	9100446
Dissolved Iron (Fe)	mg/L	<0.060	N/A	N/A	N/A	0.060	9100446
Dissolved Magnesium (Mg)	mg/L	<0.20	N/A	N/A	N/A	0.20	9100446
Dissolved Manganese (Mn)	mg/L	<0.0040	N/A	N/A	N/A	0.0040	9100446

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

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ROUTINE WATER -LAB FILTERED (WATER)

Maxxam ID		UB1118		UB1118			
Sampling Date		2018/08/08 16:10		2018/08/08 16:10			
COC Number		M086439		M086439			
	UNITS	**TRIP BLANK -01**	**MU**	**TRIP BLANK -01 Lab-Dup**	**MU**	**RDL**	**QC Batch**
Dissolved Potassium (K)	mg/L	<0.30	N/A	N/A	N/A	0.30	9100446
Dissolved Sodium (Na)	mg/L	<0.50	N/A	N/A	N/A	0.50	9100446

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

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Sampler Initials: LA

REGULATED METALS (CCME/AT1) - TOTAL

Maxxam ID		UB1118			
Sampling Date		2018/08/08 16:10			
COC Number		M086439			
	UNITS	**TRIP BLANK -01**	**MU**	**RDL**	**QC Batch**
Elements					
Total Aluminum (Al)	mg/L	<0.0030	N/A	0.0030	9102986
Total Antimony (Sb)	mg/L	<0.00060	N/A	0.00060	9102986
Total Arsenic (As)	mg/L	<0.00020	N/A	0.00020	9102986
Total Barium (Ba)	mg/L	<0.010	N/A	0.010	9102991
Total Beryllium (Be)	mg/L	<0.0010	N/A	0.0010	9102986
Total Boron (B)	mg/L	<0.020	N/A	0.020	9102991
Total Cadmium (Cd)	mg/L	<0.000020	N/A	0.000020	9102986
Total Calcium (Ca)	mg/L	<0.30	N/A	0.30	9102991
Total Chromium (Cr)	mg/L	<0.0010	N/A	0.0010	9102986
Total Cobalt (Co)	mg/L	<0.00030	N/A	0.00030	9102986
Total Copper (Cu)	mg/L	0.00031	+/- 0.00040	0.00020	9102986
Total Iron (Fe)	mg/L	<0.060	N/A	0.060	9102991
Total Lead (Pb)	mg/L	<0.00020	N/A	0.00020	9102986
Total Lithium (Li)	mg/L	<0.020	N/A	0.020	9102991
Total Magnesium (Mg)	mg/L	<0.20	N/A	0.20	9102991
Total Manganese (Mn)	mg/L	<0.0040	N/A	0.0040	9102991
Total Molybdenum (Mo)	mg/L	<0.00020	N/A	0.00020	9102986
Total Nickel (Ni)	mg/L	<0.00050	N/A	0.00050	9102986
Total Phosphorus (P)	mg/L	<0.10	N/A	0.10	9102991
Total Potassium (K)	mg/L	<0.30	N/A	0.30	9102991
Total Selenium (Se)	mg/L	<0.00020	N/A	0.00020	9102986
Total Silicon (Si)	mg/L	<0.10	N/A	0.10	9102991
Total Silver (Ag)	mg/L	<0.00010	N/A	0.00010	9102986
Total Sodium (Na)	mg/L	<0.50	N/A	0.50	9102991
Total Strontium (Sr)	mg/L	<0.020	N/A	0.020	9102991
Total Sulphur (S)	mg/L	<0.20	N/A	0.20	9102991
Total Thallium (Tl)	mg/L	<0.00020	N/A	0.00020	9102986
Total Tin (Sn)	mg/L	<0.0010	N/A	0.0010	9102986

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REGULATED METALS (CCME/AT1) - TOTAL

Maxxam ID		UB1118			
Sampling Date		2018/08/08 16:10			
COC Number		M086439			
	UNITS	**TRIP BLANK -01**	**MU**	**RDL**	**QC Batch**
Total Titanium (Ti)	mg/L	<0.0010	N/A	0.0010	9102986
Total Uranium (U)	mg/L	<0.00010	N/A	0.00010	9102986
Total Vanadium (V)	mg/L	<0.0010	N/A	0.0010	9102986
Total Zinc (Zn)	mg/L	<0.0030	N/A	0.0030	9102986

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RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		UB1118		UB1118			UB1119		
Sampling Date		2018/08/08 16:10		2018/08/08 16:10			2018/08/08 16:15		
COC Number		M086439		M086439			M086439		
	UNITS	TRIP BLANK -01	MU	TRIP BLANK -01 Lab-Dup	MU	RDL	FIELD BLANK -01	MU	QC Batch
Parameter									
Subcontract Parameter	ug/L	N/A	N/A	N/A	N/A	N/A	ATTACHED	N/A	9125829
Misc. Inorganics									
Total Suspended Solids	mg/L	<1.0	N/A	N/A	N/A	1.0	N/A	N/A	9100590
Nutrients									
Total Ammonia (N)	mg/L	<0.015	N/A	N/A	N/A	0.015	N/A	N/A	9099830
Misc. Organics									
Extractable (n-Hex.) Oil and grease	mg/L	<2.0	N/A	N/A	N/A	2.0	N/A	N/A	9114731
Phenols	mg/L	<0.0020	N/A	<0.0020	N/A	0.0020	N/A	N/A	9106764

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N/A = Not Applicable

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SEMIVOLATILE ORGANICS BY GC-MS (WATER)

Maxxam ID		UB1118			
Sampling Date		2018/08/08 16:10			
COC Number		M086439			
	UNITS	**TRIP BLANK -01**	**MU**	**RDL**	**QC Batch**
Polycyclic Aromatics					
Benzo[a]pyrene equivalency	mg/L	<0.000010	N/A	0.000010	9099107
Acenaphthene	mg/L	<0.00010	N/A	0.00010	9103739
Acenaphthylene	mg/L	<0.00010	N/A	0.00010	9103739
Acridine	mg/L	<0.000050	N/A	0.000050	9103739
Anthracene	mg/L	<0.000010	N/A	0.000010	9103739
Benzo(a)anthracene	mg/L	<0.0000085	N/A	0.0000085	9103739
Benzo(b&j)fluoranthene	mg/L	<0.0000085	N/A	0.0000085	9103739
Benzo(k)fluoranthene	mg/L	<0.0000085	N/A	0.0000085	9103739
Benzo(g,h,i)perylene	mg/L	<0.0000085	N/A	0.0000085	9103739
Benzo(c)phenanthrene	mg/L	<0.000050	N/A	0.000050	9103739
Benzo(a)pyrene	mg/L	<0.0000075	N/A	0.0000075	9103739
Benzo[e]pyrene	mg/L	<0.000050	N/A	0.000050	9103739
Chrysene	mg/L	<0.0000085	N/A	0.0000085	9103739
Dibenz(a,h)anthracene	mg/L	<0.0000075	N/A	0.0000075	9103739
Fluoranthene	mg/L	<0.000010	N/A	0.000010	9103739
Fluorene	mg/L	<0.000050	N/A	0.000050	9103739
Indeno(1,2,3-cd)pyrene	mg/L	<0.0000085	N/A	0.0000085	9103739
1-Methylnaphthalene	mg/L	<0.00010	N/A	0.00010	9103739
2-Methylnaphthalene	mg/L	<0.00010	N/A	0.00010	9103739
Naphthalene	mg/L	<0.00010	N/A	0.00010	9103739
Phenanthrene	mg/L	<0.000050	N/A	0.000050	9103739
Perylene	mg/L	<0.000050	N/A	0.000050	9103739
Pyrene	mg/L	<0.000020	N/A	0.000020	9103739
Quinoline	mg/L	<0.00020	N/A	0.00020	9103739
Surrogate Recovery (%)					
D10-ANTHRACENE (sur.)	%	229 (1)	N/A	N/A	9103739

RDL = Reportable Detection Limit
MU = Measurement Uncertainty
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.

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SEMIVOLATILE ORGANICS BY GC-MS (WATER)

Maxxam ID		UB1118			
Sampling Date		2018/08/08 16:10			
COC Number		M086439			
	UNITS	**TRIP BLANK -01**	**MU**	**RDL**	**QC Batch**
D8-ACENAPHTHYLENE (sur.)	%	210 (1)	N/A	N/A	9103739
D8-NAPHTHALENE (sur.)	%	151 (1)	N/A	N/A	9103739
TERPHENYL-D14 (sur.)	%	202 (1)	N/A	N/A	9103739

RDL = Reportable Detection Limit
MU = Measurement Uncertainty
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.

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GENERAL COMMENTS

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

Package 1	1.7°C
Package 2	3.3°C
Package 3	3.0°C

Sample UB1118 [TRIP BLANK -01] : PAH: Surrogate recovery exceeds acceptance criteria (high recovery). As results are non-detect, there is no impact on data quality. Please see attachment for Perfluorinated Compounds (Water) results.

Sample UB1119 [FIELD BLANK -01] : Please see attachment for Perfluorinated Compounds (Water) results.

The estimate of uncertainty has been reported as an expanded uncertainty and calculated using a coverage factor of 2, which gives a level of confidence of 95%.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
9099160	AMJ	Matrix Spike	1,4-Difluorobenzene (sur.)	2018/08/11		97	%	50 - 140
			4-Bromofluorobenzene (sur.)	2018/08/11		96	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2018/08/11		101	%	50 - 140
			Benzene	2018/08/11		105	%	50 - 140
			Toluene	2018/08/11		89	%	50 - 140
			Ethylbenzene	2018/08/11		96	%	50 - 140
			m & p-Xylene	2018/08/11		92	%	50 - 140
			o-Xylene	2018/08/11		95	%	50 - 140
			F1 (C6-C10)	2018/08/11		87	%	60 - 140
9099160	AMJ	Spiked Blank	1,4-Difluorobenzene (sur.)	2018/08/11		91	%	50 - 140
			4-Bromofluorobenzene (sur.)	2018/08/11		96	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2018/08/11		99	%	50 - 140
			Benzene	2018/08/11		97	%	60 - 130
			Toluene	2018/08/11		83	%	60 - 130
			Ethylbenzene	2018/08/11		93	%	60 - 130
			m & p-Xylene	2018/08/11		89	%	60 - 130
			o-Xylene	2018/08/11		94	%	60 - 130
			F1 (C6-C10)	2018/08/11		80	%	60 - 140
9099160	AMJ	Method Blank	1,4-Difluorobenzene (sur.)	2018/08/11		98	%	50 - 140
			4-Bromofluorobenzene (sur.)	2018/08/11		100	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2018/08/11		87	%	50 - 140
			Benzene	2018/08/11	<0.00040		mg/L	
			Toluene	2018/08/11	<0.00040		mg/L	
			Ethylbenzene	2018/08/11	<0.00040		mg/L	
			m & p-Xylene	2018/08/11	<0.00080		mg/L	
			o-Xylene	2018/08/11	<0.00040		mg/L	
			F1 (C6-C10)	2018/08/11	<0.10		mg/L	
9099160	AMJ	RPD	Benzene	2018/08/11	NC		%	30
			Toluene	2018/08/11	NC		%	30
			Ethylbenzene	2018/08/11	NC		%	30
			m & p-Xylene	2018/08/11	NC		%	30
			o-Xylene	2018/08/11	NC		%	30
			F1 (C6-C10)	2018/08/11	NC		%	30
9099347	AF6	Matrix Spike	Dissolved Nitrite (N)	2018/08/12		108	%	80 - 120
			Dissolved Nitrate plus Nitrite (N)	2018/08/12		97	%	80 - 120
9099347	AF6	Spiked Blank	Dissolved Nitrite (N)	2018/08/12		103	%	80 - 120
			Dissolved Nitrate plus Nitrite (N)	2018/08/12		94	%	80 - 120
9099347	AF6	Method Blank	Dissolved Nitrite (N)	2018/08/12	<0.010		mg/L	
			Dissolved Nitrate plus Nitrite (N)	2018/08/12	<0.020		mg/L	
9099347	AF6	RPD	Dissolved Nitrite (N)	2018/08/12	NC		%	20
			Dissolved Nitrate plus Nitrite (N)	2018/08/12	4.9		%	20
9099547	MRD	Matrix Spike [UB1118-02]	Dissolved Chloride (Cl)	2018/08/14		110	%	80 - 120
9099547	MRD	Spiked Blank	Dissolved Chloride (Cl)	2018/08/14		107	%	80 - 120
9099547	MRD	Method Blank	Dissolved Chloride (Cl)	2018/08/14	<1.0		mg/L	
9099547	MRD	RPD [UB1118-02]	Dissolved Chloride (Cl)	2018/08/14	NC		%	20
9099553	MRD	Matrix Spike [UB1118-02]	Dissolved Sulphate (SO4)	2018/08/14		109	%	80 - 120
9099553	MRD	Spiked Blank	Dissolved Sulphate (SO4)	2018/08/14		105	%	80 - 120
9099553	MRD	Method Blank	Dissolved Sulphate (SO4)	2018/08/14	<1.0		mg/L	
9099553	MRD	RPD [UB1118-02]	Dissolved Sulphate (SO4)	2018/08/14	NC		%	20
9099660	MA4	Spiked Blank	pH	2018/08/13		100	%	97 - 103
9099660	MA4	RPD [UB1118-02]	pH	2018/08/13	0.58		%	N/A

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
9099661	MA4	Spiked Blank	Alkalinity (Total as CaCO3)	2018/08/13		99	%	80 - 120
9099661	MA4	Method Blank	Alkalinity (PP as CaCO3)	2018/08/13	<1.0		mg/L	
			Alkalinity (Total as CaCO3)	2018/08/13	<1.0		mg/L	
			Bicarbonate (HCO3)	2018/08/13	<1.0		mg/L	
			Carbonate (CO3)	2018/08/13	<1.0		mg/L	
			Hydroxide (OH)	2018/08/13	<1.0		mg/L	
9099661	MA4	RPD [UB1118-02]	Alkalinity (PP as CaCO3)	2018/08/13	NC		%	20
			Alkalinity (Total as CaCO3)	2018/08/13	NC		%	20
			Bicarbonate (HCO3)	2018/08/13	NC		%	20
			Carbonate (CO3)	2018/08/13	NC		%	20
			Hydroxide (OH)	2018/08/13	NC		%	20
9099663	MA4	Spiked Blank	Conductivity	2018/08/13		102	%	90 - 110
9099663	MA4	Method Blank	Conductivity	2018/08/13	<2.0		uS/cm	
9099663	MA4	RPD [UB1118-02]	Conductivity	2018/08/13	NC		%	10
9099681	JR1	Matrix Spike	O-TERPHENYL (sur.)	2018/08/13		105	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2018/08/13		103	%	60 - 140
9099681	JR1	Spiked Blank	O-TERPHENYL (sur.)	2018/08/13		116	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2018/08/13		139	%	60 - 140
9099681	JR1	Method Blank	O-TERPHENYL (sur.)	2018/08/13		120	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2018/08/13	<0.10		mg/L	
9099681	JR1	RPD	F2 (C10-C16 Hydrocarbons)	2018/08/13	NC		%	30
9099830	AL2	Matrix Spike	Total Ammonia (N)	2018/08/14		102	%	80 - 120
9099830	AL2	Spiked Blank	Total Ammonia (N)	2018/08/14		102	%	80 - 120
9099830	AL2	Method Blank	Total Ammonia (N)	2018/08/14	<0.015		mg/L	
9099830	AL2	RPD	Total Ammonia (N)	2018/08/14	NC		%	20
9100446	JK9	Matrix Spike	Dissolved Calcium (Ca)	2018/08/13		93	%	80 - 120
			Dissolved Iron (Fe)	2018/08/13		97	%	80 - 120
			Dissolved Magnesium (Mg)	2018/08/13		101	%	80 - 120
			Dissolved Manganese (Mn)	2018/08/13		95	%	80 - 120
			Dissolved Potassium (K)	2018/08/13		102	%	80 - 120
			Dissolved Sodium (Na)	2018/08/13		NC	%	80 - 120
9100446	JK9	Spiked Blank	Dissolved Calcium (Ca)	2018/08/13		97	%	80 - 120
			Dissolved Iron (Fe)	2018/08/13		97	%	80 - 120
			Dissolved Magnesium (Mg)	2018/08/13		102	%	80 - 120
			Dissolved Manganese (Mn)	2018/08/13		96	%	80 - 120
			Dissolved Potassium (K)	2018/08/13		102	%	80 - 120
			Dissolved Sodium (Na)	2018/08/13		100	%	80 - 120
9100446	JK9	Method Blank	Dissolved Calcium (Ca)	2018/08/13	<0.30		mg/L	
			Dissolved Iron (Fe)	2018/08/13	<0.060		mg/L	
			Dissolved Magnesium (Mg)	2018/08/13	<0.20		mg/L	
			Dissolved Manganese (Mn)	2018/08/13	<0.0040		mg/L	
			Dissolved Potassium (K)	2018/08/13	<0.30		mg/L	
			Dissolved Sodium (Na)	2018/08/13	<0.50		mg/L	
9100446	JK9	RPD	Dissolved Iron (Fe)	2018/08/13	NC		%	20
9100590	VFE	Matrix Spike	Total Suspended Solids	2018/08/14		98	%	80 - 120
9100590	VFE	Spiked Blank	Total Suspended Solids	2018/08/14		104	%	80 - 120
9100590	VFE	Method Blank	Total Suspended Solids	2018/08/14	<1.0		mg/L	
9100590	VFE	RPD	Total Suspended Solids	2018/08/14	NC		%	20
9102986	JHS	Matrix Spike	Total Aluminum (Al)	2018/08/15		101	%	80 - 120
			Total Antimony (Sb)	2018/08/15		119	%	80 - 120
			Total Arsenic (As)	2018/08/15		100	%	80 - 120

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QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Beryllium (Be)	2018/08/15		100	%	80 - 120
			Total Cadmium (Cd)	2018/08/15		101	%	80 - 120
			Total Chromium (Cr)	2018/08/15		102	%	80 - 120
			Total Cobalt (Co)	2018/08/15		101	%	80 - 120
			Total Copper (Cu)	2018/08/15		98	%	80 - 120
			Total Lead (Pb)	2018/08/15		105	%	80 - 120
			Total Molybdenum (Mo)	2018/08/15		106	%	80 - 120
			Total Nickel (Ni)	2018/08/15		100	%	80 - 120
			Total Selenium (Se)	2018/08/15		110	%	80 - 120
			Total Silver (Ag)	2018/08/15		102	%	80 - 120
			Total Thallium (Tl)	2018/08/15		110	%	80 - 120
			Total Tin (Sn)	2018/08/15		101	%	80 - 120
			Total Titanium (Ti)	2018/08/15		103	%	80 - 120
			Total Uranium (U)	2018/08/15		109	%	80 - 120
			Total Vanadium (V)	2018/08/15		102	%	80 - 120
			Total Zinc (Zn)	2018/08/15		100	%	80 - 120
9102986	JHS	Spiked Blank	Total Aluminum (Al)	2018/08/15		100	%	80 - 120
			Total Antimony (Sb)	2018/08/15		118	%	80 - 120
			Total Arsenic (As)	2018/08/15		104	%	80 - 120
			Total Beryllium (Be)	2018/08/15		100	%	80 - 120
			Total Cadmium (Cd)	2018/08/15		101	%	80 - 120
			Total Chromium (Cr)	2018/08/15		106	%	80 - 120
			Total Cobalt (Co)	2018/08/15		106	%	80 - 120
			Total Copper (Cu)	2018/08/15		105	%	80 - 120
			Total Lead (Pb)	2018/08/15		107	%	80 - 120
			Total Molybdenum (Mo)	2018/08/15		105	%	80 - 120
			Total Nickel (Ni)	2018/08/15		103	%	80 - 120
			Total Selenium (Se)	2018/08/15		110	%	80 - 120
			Total Silver (Ag)	2018/08/15		103	%	80 - 120
			Total Thallium (Tl)	2018/08/15		110	%	80 - 120
			Total Tin (Sn)	2018/08/15		101	%	80 - 120
			Total Titanium (Ti)	2018/08/15		117	%	80 - 120
			Total Uranium (U)	2018/08/15		108	%	80 - 120
			Total Vanadium (V)	2018/08/15		106	%	80 - 120
			Total Zinc (Zn)	2018/08/15		106	%	80 - 120
9102986	JHS	Method Blank	Total Aluminum (Al)	2018/08/15	<0.0030		mg/L	
			Total Antimony (Sb)	2018/08/15	<0.00060		mg/L	
			Total Arsenic (As)	2018/08/15	<0.00020		mg/L	
			Total Beryllium (Be)	2018/08/15	<0.0010		mg/L	
			Total Cadmium (Cd)	2018/08/15	<0.000020		mg/L	
			Total Chromium (Cr)	2018/08/15	<0.0010		mg/L	
			Total Cobalt (Co)	2018/08/15	<0.00030		mg/L	
			Total Copper (Cu)	2018/08/15	<0.00020		mg/L	
			Total Lead (Pb)	2018/08/15	<0.00020		mg/L	
			Total Molybdenum (Mo)	2018/08/15	<0.00020		mg/L	
			Total Nickel (Ni)	2018/08/15	<0.00050		mg/L	
			Total Selenium (Se)	2018/08/15	<0.00020		mg/L	
			Total Silver (Ag)	2018/08/15	<0.00010		mg/L	
			Total Thallium (Tl)	2018/08/15	<0.00020		mg/L	
			Total Tin (Sn)	2018/08/15	<0.0010		mg/L	
			Total Titanium (Ti)	2018/08/15	<0.0010		mg/L	

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QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Uranium (U)	2018/08/15	<0.00010		mg/L	
			Total Vanadium (V)	2018/08/15	<0.0010		mg/L	
			Total Zinc (Zn)	2018/08/15	<0.0030		mg/L	
9102986	JHS	RPD	Total Aluminum (Al)	2018/08/15	18		%	20
			Total Antimony (Sb)	2018/08/15	NC		%	20
			Total Arsenic (As)	2018/08/15	6.3		%	20
			Total Beryllium (Be)	2018/08/15	NC		%	20
			Total Chromium (Cr)	2018/08/15	NC		%	20
			Total Cobalt (Co)	2018/08/15	6.5		%	20
			Total Copper (Cu)	2018/08/15	2.7		%	20
			Total Lead (Pb)	2018/08/15	0.31		%	20
			Total Molybdenum (Mo)	2018/08/15	1.9		%	20
			Total Nickel (Ni)	2018/08/15	5.0		%	20
			Total Selenium (Se)	2018/08/15	7.1		%	20
			Total Silver (Ag)	2018/08/15	NC		%	20
			Total Thallium (Tl)	2018/08/15	NC		%	20
			Total Tin (Sn)	2018/08/15	NC		%	20
			Total Titanium (Ti)	2018/08/15	2.0		%	20
			Total Uranium (U)	2018/08/15	2.4		%	20
			Total Vanadium (V)	2018/08/15	3.8		%	20
			Total Zinc (Zn)	2018/08/15	15		%	20
9102991	ACY	Matrix Spike	Total Barium (Ba)	2018/08/15		102	%	80 - 120
			Total Boron (B)	2018/08/15		105	%	80 - 120
			Total Calcium (Ca)	2018/08/15		NC	%	80 - 120
			Total Iron (Fe)	2018/08/15		102	%	80 - 120
			Total Lithium (Li)	2018/08/15		101	%	80 - 120
			Total Magnesium (Mg)	2018/08/15		98	%	80 - 120
			Total Manganese (Mn)	2018/08/15		101	%	80 - 120
			Total Phosphorus (P)	2018/08/15		97	%	80 - 120
			Total Potassium (K)	2018/08/15		104	%	80 - 120
			Total Silicon (Si)	2018/08/15		97	%	80 - 120
			Total Sodium (Na)	2018/08/15		NC	%	80 - 120
			Total Strontium (Sr)	2018/08/15		93	%	80 - 120
9102991	ACY	Spiked Blank	Total Barium (Ba)	2018/08/15		100	%	80 - 120
			Total Boron (B)	2018/08/15		102	%	80 - 120
			Total Calcium (Ca)	2018/08/15		98	%	80 - 120
			Total Iron (Fe)	2018/08/15		100	%	80 - 120
			Total Lithium (Li)	2018/08/15		98	%	80 - 120
			Total Magnesium (Mg)	2018/08/15		98	%	80 - 120
			Total Manganese (Mn)	2018/08/15		100	%	80 - 120
			Total Phosphorus (P)	2018/08/15		96	%	80 - 120
			Total Potassium (K)	2018/08/15		101	%	80 - 120
			Total Silicon (Si)	2018/08/15		95	%	80 - 120
			Total Sodium (Na)	2018/08/15		96	%	80 - 120
			Total Strontium (Sr)	2018/08/15		93	%	80 - 120
9102991	ACY	Method Blank	Total Barium (Ba)	2018/08/15	<0.010		mg/L	
			Total Boron (B)	2018/08/15	<0.020		mg/L	
			Total Calcium (Ca)	2018/08/15	<0.30		mg/L	
			Total Iron (Fe)	2018/08/15	<0.060		mg/L	
			Total Lithium (Li)	2018/08/15	<0.020		mg/L	
			Total Magnesium (Mg)	2018/08/15	<0.20		mg/L	

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			Total Manganese (Mn)	2018/08/15	<0.0040		mg/L	
			Total Phosphorus (P)	2018/08/15	<0.10		mg/L	
			Total Potassium (K)	2018/08/15	<0.30		mg/L	
			Total Silicon (Si)	2018/08/15	<0.10		mg/L	
			Total Sodium (Na)	2018/08/15	<0.50		mg/L	
			Total Strontium (Sr)	2018/08/15	<0.020		mg/L	
			Total Sulphur (S)	2018/08/15	<0.20		mg/L	
9102991	ACY	RPD	Total Barium (Ba)	2018/08/15	0.87		%	20
			Total Boron (B)	2018/08/15	2.2		%	20
			Total Calcium (Ca)	2018/08/15	1.2		%	20
			Total Iron (Fe)	2018/08/15	0.10		%	20
			Total Lithium (Li)	2018/08/15	NC		%	20
			Total Magnesium (Mg)	2018/08/15	0.36		%	20
			Total Manganese (Mn)	2018/08/15	0.84		%	20
			Total Phosphorus (P)	2018/08/15	0.65		%	20
			Total Potassium (K)	2018/08/15	0.78		%	20
			Total Silicon (Si)	2018/08/15	0.74		%	20
			Total Sodium (Na)	2018/08/15	1.0		%	20
			Total Strontium (Sr)	2018/08/15	0.30		%	20
			Total Sulphur (S)	2018/08/15	0.062		%	20
9103739	BC5	Matrix Spike	D10-ANTHRACENE (sur.)	2018/08/18		109	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2018/08/18		91	%	50 - 130
			D8-NAPHTHALENE (sur.)	2018/08/18		53	%	50 - 130
			TERPHENYL-D14 (sur.)	2018/08/18		88	%	50 - 130
			Acenaphthene	2018/08/18		100	%	50 - 130
			Acenaphthylene	2018/08/18		108	%	50 - 130
			Acridine	2018/08/18		98	%	50 - 130
			Anthracene	2018/08/18		110	%	50 - 130
			Benzo(a)anthracene	2018/08/18		99	%	50 - 130
			Benzo(b&j)fluoranthene	2018/08/18		85	%	50 - 130
			Benzo(k)fluoranthene	2018/08/18		79	%	50 - 130
			Benzo(g,h,i)perylene	2018/08/18		80	%	50 - 130
			Benzo(c)phenanthrene	2018/08/18		111	%	50 - 130
			Benzo(a)pyrene	2018/08/18		87	%	50 - 130
			Benzo[e]pyrene	2018/08/18		88	%	50 - 130
			Chrysene	2018/08/18		86	%	50 - 130
			Dibenz(a,h)anthracene	2018/08/18		82	%	50 - 130
			Fluoranthene	2018/08/18		114	%	50 - 130
			Fluorene	2018/08/18		109	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2018/08/18		85	%	50 - 130
			1-Methylnaphthalene	2018/08/18		NC	%	50 - 130
			2-Methylnaphthalene	2018/08/18		NC	%	50 - 130
			Naphthalene	2018/08/18		NC	%	50 - 130
			Phenanthrene	2018/08/18		106	%	50 - 130
			Perylene	2018/08/18		76	%	50 - 130
			Pyrene	2018/08/18		111	%	50 - 130
			Quinoline	2018/08/18		106	%	50 - 130
9103739	BC5	Spiked Blank	D10-ANTHRACENE (sur.)	2018/08/17		112	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2018/08/17		92	%	50 - 130
			D8-NAPHTHALENE (sur.)	2018/08/17		61	%	50 - 130
			TERPHENYL-D14 (sur.)	2018/08/17		115	%	50 - 130

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QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Acenaphthene	2018/08/17		102	%	50 - 130
			Acenaphthylene	2018/08/17		110	%	50 - 130
			Acridine	2018/08/17		115	%	50 - 130
			Anthracene	2018/08/17		110	%	50 - 130
			Benzo(a)anthracene	2018/08/17		125	%	50 - 130
			Benzo(b&j)fluoranthene	2018/08/17		119	%	50 - 130
			Benzo(k)fluoranthene	2018/08/17		109	%	50 - 130
			Benzo(g,h,i)perylene	2018/08/17		105	%	50 - 130
			Benzo(c)phenanthrene	2018/08/17		127	%	50 - 130
			Benzo(a)pyrene	2018/08/17		117	%	50 - 130
			Benzo[e]pyrene	2018/08/17		123	%	50 - 130
			Chrysene	2018/08/17		113	%	50 - 130
			Dibenz(a,h)anthracene	2018/08/17		117	%	50 - 130
			Fluoranthene	2018/08/17		121	%	50 - 130
			Fluorene	2018/08/17		110	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2018/08/17		115	%	50 - 130
			1-Methylnaphthalene	2018/08/17		91	%	50 - 130
			2-Methylnaphthalene	2018/08/17		91	%	50 - 130
			Naphthalene	2018/08/17		90	%	50 - 130
			Phenanthrene	2018/08/17		106	%	50 - 130
			Perylene	2018/08/17		104	%	50 - 130
			Pyrene	2018/08/17		114	%	50 - 130
			Quinoline	2018/08/17		116	%	50 - 130
9103739	BC5	Method Blank	D10-ANTHRACENE (sur.)	2018/08/17		124	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2018/08/17		107	%	50 - 130
			D8-NAPHTHALENE (sur.)	2018/08/17		68	%	50 - 130
			TERPHENYL-D14 (sur.)	2018/08/17		129	%	50 - 130
			Acenaphthene	2018/08/17	<0.00010		mg/L	
			Acenaphthylene	2018/08/17	<0.00010		mg/L	
			Acridine	2018/08/17	<0.000050		mg/L	
			Anthracene	2018/08/17	<0.000010		mg/L	
			Benzo(a)anthracene	2018/08/17	<0.0000085		mg/L	
			Benzo(b&j)fluoranthene	2018/08/17	<0.0000085		mg/L	
			Benzo(k)fluoranthene	2018/08/17	<0.0000085		mg/L	
			Benzo(g,h,i)perylene	2018/08/17	<0.0000085		mg/L	
			Benzo(c)phenanthrene	2018/08/17	<0.000050		mg/L	
			Benzo(a)pyrene	2018/08/17	<0.0000075		mg/L	
			Benzo[e]pyrene	2018/08/17	<0.000050		mg/L	
			Chrysene	2018/08/17	<0.0000085		mg/L	
			Dibenz(a,h)anthracene	2018/08/17	<0.0000075		mg/L	
			Fluoranthene	2018/08/17	<0.000010		mg/L	
			Fluorene	2018/08/17	<0.000050		mg/L	
			Indeno(1,2,3-cd)pyrene	2018/08/17	<0.0000085		mg/L	
			1-Methylnaphthalene	2018/08/17	<0.00010		mg/L	
			2-Methylnaphthalene	2018/08/17	<0.00010		mg/L	
			Naphthalene	2018/08/17	<0.00010		mg/L	
			Phenanthrene	2018/08/17	<0.000050		mg/L	
			Perylene	2018/08/17	<0.000050		mg/L	
			Pyrene	2018/08/17	<0.000020		mg/L	
			Quinoline	2018/08/17	<0.00020		mg/L	
9103739	BC5	RPD	Acenaphthene	2018/08/18	NC		%	30

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			Acenaphthylene	2018/08/18	NC		%	30
			Acridine	2018/08/18	NC		%	30
			Anthracene	2018/08/18	NC		%	30
			Benzo(a)anthracene	2018/08/18	NC		%	30
			Benzo(b&j)fluoranthene	2018/08/18	NC		%	30
			Benzo(k)fluoranthene	2018/08/18	NC		%	30
			Benzo(g,h,i)perylene	2018/08/18	NC		%	30
			Benzo(c)phenanthrene	2018/08/18	NC		%	30
			Benzo(a)pyrene	2018/08/18	NC		%	30
			Benzo[e]pyrene	2018/08/18	NC		%	30
			Chrysene	2018/08/18	NC		%	30
			Dibenz(a,h)anthracene	2018/08/18	NC		%	30
			Fluoranthene	2018/08/18	NC		%	30
			Fluorene	2018/08/18	NC		%	30
			Indeno(1,2,3-cd)pyrene	2018/08/18	NC		%	30
			1-Methylnaphthalene	2018/08/18	NC		%	30
			2-Methylnaphthalene	2018/08/18	NC		%	30
			Naphthalene	2018/08/18	NC		%	30
			Phenanthrene	2018/08/18	NC		%	30
			Perylene	2018/08/18	NC		%	30
			Pyrene	2018/08/18	NC		%	30
			Quinoline	2018/08/18	NC		%	30
9106764	YY	Matrix Spike [UB1118-09]	Phenols	2018/08/17		98	%	80 - 120
9106764	YY	Spiked Blank	Phenols	2018/08/17		91	%	80 - 120
9106764	YY	Method Blank	Phenols	2018/08/17	<0.0020		mg/L	
9106764	YY	RPD [UB1118-09]	Phenols	2018/08/17	NC		%	20
9114731	SKH	Spiked Blank	Extractable (n-Hex.) Oil and grease	2018/08/23		101	%	70 - 130
9114731	SKH	Method Blank	Extractable (n-Hex.) Oil and grease	2018/08/23	<2.0		mg/L	

N/A = Not Applicable

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

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

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

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

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

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

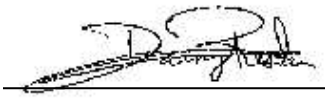
Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B867222
Report Date: 2018/08/31

STANTEC CONSULTING LTD
Client Project #: 110220176
Site Location: CBA FTA
Your P.O. #: 110220176
Sampler Initials: LA

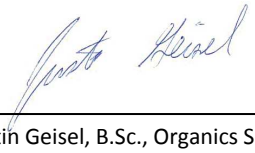
VALIDATION SIGNATURE PAGE

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

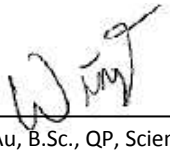


Daniel Reslan, cCT, QP, Organics Manager

Geraldlyn Gouthro, Client Service Specialist



Justin Geisel, B.Sc., Organics Supervisor



Winnie Au, B.Sc., QP, Scientific Specialist

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ADDITIONAL COOLER TEMPERATURE RECORD

CHAIN-OF-CUSTODY RECORD

Page	CHAIN OF CUSTODY #
Page 1 of 1	M086439
Page ___ of ___	
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COOLER OBSERVATIONS:

MAXXAM JOB#: B867222

Cooler	CUSTODY SEAL PRESENT (YES / NO)	CUSTODY SEAL INTACT (YES / NO)	ICE PRESENT (YES / NO)	COOLER ID	TEMP 1	TEMP 2	TEMP 3
1	✓ (YES)	✓ (YES)	✓ (YES)		6	4	4
2	✓ (YES)	✓ (YES)	✓ (YES)		7	3	2
3	✓ (YES)	✓ (YES)	✓ (YES)		4	4	5
4	✓ (YES)	✓ (YES)	✓ (YES)		5	4	3
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							

RECEIVED BY (SIGN & PRINT)		DATE (YYYY/MM/DD)	TIME (HH:MM)
[signature]	DE JI WU	2018/08/11	06:00

Maxxam
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ADDITIONAL COOLER TEMPERATURE RECORD

CHAIN-OF-CUSTODY RECORD

Page	CHAIN OF CUSTODY #
Page 1 of 1	M086439
Page 1 of 1	M086440
Page ___ of ___	
Page ___ of ___	
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COOLER OBSERVATIONS: All samples in good condition.

MAXXAM JOB#: Stantec Consulting Project #110220176

COOLER ID	CUSTODY SEAL PRESENT (YES / NO)	CUSTODY SEAL INTACT (YES / NO)	ICE PRESENT (YES / NO)	TEMP 1	TEMP 2	TEMP 3
1	✓ YES	✓ YES	✓ YES	1	1	3
2	✓ YES	✓ YES	✓ YES	3	3	4
3	✓ YES	✓ YES	✓ YES	4	3	2

RECEIVED BY (SIGN & PRINT)	DATE (YYYY/MM/DD)	TIME (HH:MM)
[signature] Jeffery - S	2018/08/10	08:30

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Calgary: 4000 19th St. NE, T2E 6P8. Toll Free (800) 386-7247
Edmonton: 9331-48 St. T6B 2R4. Toll Free (800) 386-7247
maxxam.ca

549 (4)

CHAIN OF CUSTODY RECORD

M 086439

Page 1 of 1

Invoice Information	Report Information (if differs from invoice)	Project Information	Turnaround Time (TAT) Required
Company: Stantec	Company:	Quotation #:	[X] 5 - 7 Days Regular (Most analyses)
Contact Name: Lindsay Van Noortwyk	Contact Name:	P.O. #/ AFE#: 110220176	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 10160 112 St NW Edmonton AB T5K 2L6	Address:	Project #: 110220176	Rush TAT (Surcharges will be applied)
Phone: 780 232 1114	Phone:	Site Location: CBA FTA	[ ] Same Day [ ] 2 Days [ ] 1 Day [ ] 3-4 Days
Email: Lindsay.VanNoortwyk@stantec.com	Email:	Site #:	Date Required:
Copies: Ruth.Bonneville@stantec.com	Copies:	Sampled By: LA	Rush Confirmation #:

Laboratory Use Only

	YES	NO	Cooler ID			
Seal Present						
Seal Intact			Temp			
Cooling Media						
	YES	NO	Cooler ID			
Seal Present						
Seal Intact			Temp	ACTR		
Cooling Media						
	YES	NO	Cooler ID			
Seal Present						
Seal Intact			Temp			
Cooling Media						

RECEIVED IN YELLOWKNIFE
Depot Reception
By: Jeffery. S
Ice-yes 2018 -08- 09
Sealed-yes 08:30
Temp: See temp Record

Analysis Requested

	Sample Identification	Depth (Unit)	Date Sampled (YYYY/MM/DD)	Time Sampled (HH:MM)	Matrix	# of containers	BTEX F1 ☐ VOC	BTEX F1-F2	BTEX F1-F4	Routine Water	Regulated Metals Tot ☒ Diss ☐	Mercury Total ☐ Dissolved ☐	Salinity 4	Sieve (75 micron)	Texture (% Sand, Silt, Clay)	Basic Class II Landfill	PFAS (17 parameter list)	TSS	Nitrogen, Ammonia	Oil+Grease (Total)	Total Phenols	PAH				HOLD - DO NOT ANALYZE
1	Trip Blank-01		2018/08/08	1610	W	14		x		X	x							x	x	x	x	x				
2	Field Blank-01		2018/08/08	1615	W	2											x									
3																										
4																										
5																										
6																										
7																										
8																										
9																										
10																										

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

Regulatory Criteria

- [ ] AT1
- [ ] CCME
- [ ] Drinking Water
- [ ] D50 (Drilling Waste)
- [ ] Saskatchewan
- [ ] Other:

Special Instructions

"Trip Blank-01" relabelled in pencil above Pre-printed label on PFAS bottles

Relinquished by: (Signature/ Print)	DATE (YYYY/MM/DD)	Time (HH:MM)	Received by: (Signature/ Print)	DATE (YYYY/MM/DD)	Time (HH:MM)	Maxxam Job #
Luke Anderson	2018/08/09	09:41	DEJI WU	2018/08/11	06:00	B867222

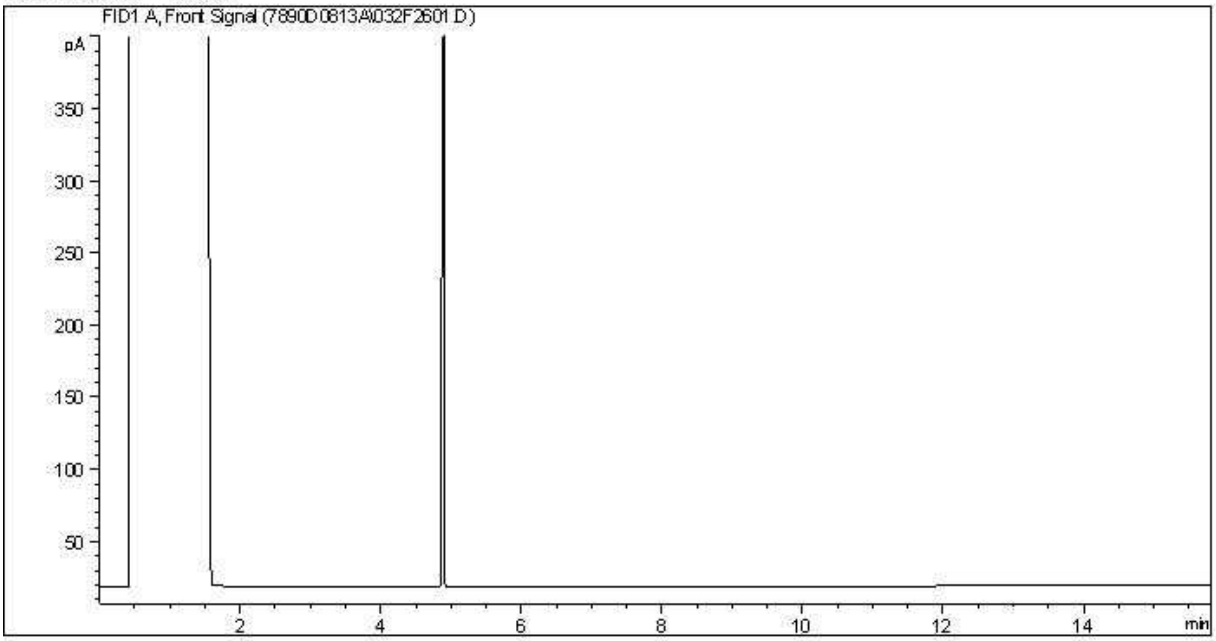
AB FCD-00331/7

Maxxam Job #: B867222
Report Date: 2018/08/31
Maxxam Sample: UB1118

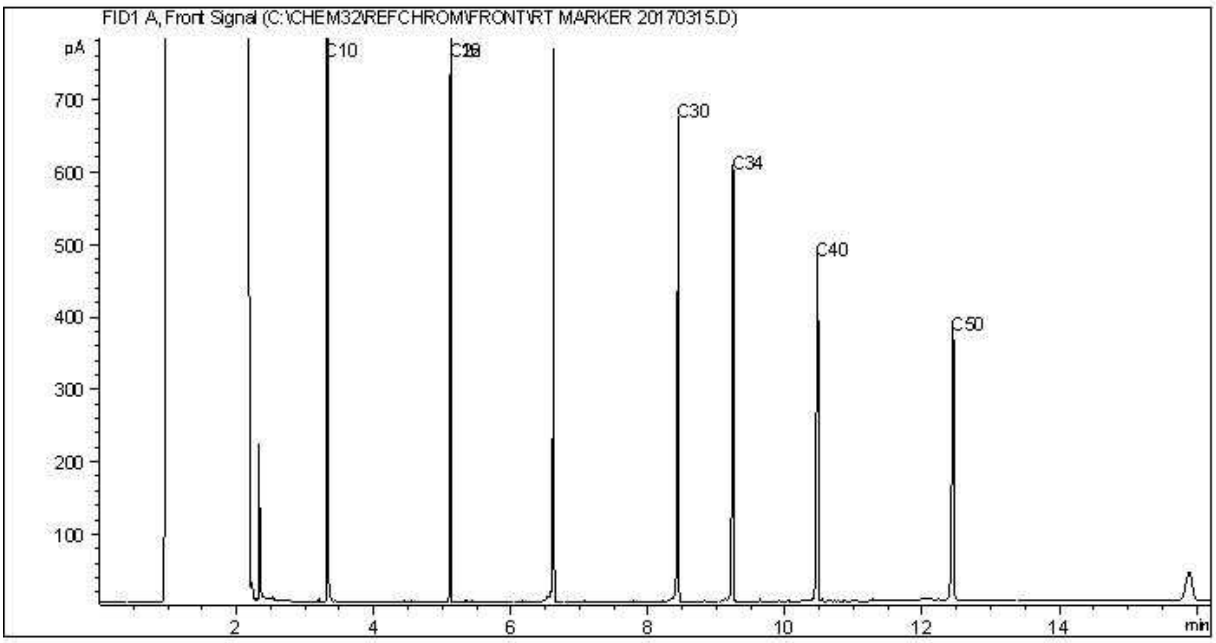
STANTEC CONSULTING LTD
Client Project #: 110220176
Site Reference: CBA FTA
Client ID: TRIP BLANK -01

CCME Hydrocarbons in Water (F2; C10-C16) Chromatogram

Instrument: 7890D



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

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

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Your Project #: 110220176
Site#: B867222
Your C.O.C. #: n/a

Attention: Geraldlyn Gouthro

Maxxam Analytics
Edmonton - Environmental
9331 48th St
Edmonton, AB
CANADA T6B 2R4

Report Date: 2018/08/29
Report #: R5378938
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8K6854
Received: 2018/08/14, 10:29

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Low level PFOS and PFOA by SPE/LCMS (1)	2	2018/08/22	2018/08/24	CAM SOP-00894	EPA 537 m

Remarks:

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

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

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

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

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

Your Project #: 110220176
Site#: B867222
Your C.O.C. #: n/a

Attention: Geraldlyn Gouthro

Maxxam Analytics
Edmonton - Environmental
9331 48th St
Edmonton, AB
CANADA T6B 2R4

Report Date: 2018/08/29
Report #: R5378938
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8K6854
Received: 2018/08/14, 10:29

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Augustyna Dobosz, Project Manager
Email: ADobosz@maxxam.ca
Phone# (905)817-5700 Ext:5798

==========

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Maxxam Job #: B8K6854
Report Date: 2018/08/29

Maxxam Analytics
Client Project #: 110220176

RESULTS OF ANALYSES OF WATER

Maxxam ID		HLU559	HLU560		
Sampling Date		2018/08/08 16:10	2018/08/08 16:15		
COC Number		n/a	n/a		
	UNITS	UB1118-TRIP BLANK-01	UB1119-FIELD BLANK-01	RDL	QC Batch
Miscellaneous Parameters					
Perfluorobutane Sulfonate (PFBS)	ng/L	<2.0	<2.0	2.0	5692616
Perfluorobutanoic acid	ng/L	<2.0	<2.0	2.0	5692616
Perfluorodecane Sulfonate	ng/L	<2.0	<2.0	2.0	5692616
Perfluorodecanoic Acid (PFDA)	ng/L	<2.0	<2.0	2.0	5692616
Perfluorododecanoic Acid (PFDoA)	ng/L	<2.0	<2.0	2.0	5692616
Perfluoroheptane sulfonate	ng/L	<2.0	<2.0	2.0	5692616
Perfluoroheptanoic Acid (PFHpA)	ng/L	<2.0	<2.0	2.0	5692616
Perfluorohexane Sulfonate (PFHxS)	ng/L	<2.0	<2.0	2.0	5692616
Perfluorohexanoic Acid (PFHxA)	ng/L	<2.0	<2.0	2.0	5692616
Perfluoro-n-Octanoic Acid (PFOA)	ng/L	<2.0	<2.0	2.0	5692616
Perfluorononanoic Acid (PFNA)	ng/L	<2.0	<2.0	2.0	5692616
Perfluorooctane Sulfonamide (PFOSA)	ng/L	<4.0 (1)	<4.0 (1)	4.0	5702169
Perfluorooctane Sulfonate (PFOS)	ng/L	<2.0	<2.0	2.0	5692616
Perfluoropentanoic Acid (PFPeA)	ng/L	<2.0	<2.0	2.0	5692616
Perfluorotetradecanoic Acid	ng/L	<2.0	<2.0	2.0	5692616
Perfluorotridecanoic Acid	ng/L	<2.0	<2.0	2.0	5692616
Perfluoroundecanoic Acid (PFUnA)	ng/L	<2.0	<2.0	2.0	5692616
Surrogate Recovery (%)					
13C2-Perfluorodecanoic acid	%	91	83	N/A	5692616
13C2-Perfluorododecanoic acid	%	81	80	N/A	5692616
13C2-Perfluorohexanoic acid	%	98	92	N/A	5692616
13C2-perfluorotetradecanoic acid	%	78	69	N/A	5692616
13C2-Perfluoroundecanoic acid	%	88	80	N/A	5692616
13C4-Perfluorobutanoic acid	%	99	89	N/A	5692616
13C4-Perfluoroheptanoic acid	%	103	94	N/A	5692616
13C4-Perfluorooctanesulfonate	%	101	104	N/A	5692616
13C4-Perfluorooctanoic acid	%	101	102	N/A	5692616
13C5-Perfluorononanoic acid	%	101	100	N/A	5692616
13C5-Perfluoropentanoic acid	%	100	94	N/A	5692616
13C8-Perfluorooctane Sulfonamide	%	31	19 (2)	N/A	5702169

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

N/A = Not Applicable

(1) Analysis was performed past the method defined holding time. Because of their chemical structure, PFCs are chemically and biologically stable in the environment and resist typical environmental degradation processes. This would suggest a hold time exceedance would not have a significant impact on the data.

(2) Extracted internal standard analyte recovery was below the defined lower control limit (LCL). Because quantitation is performed using isotope dilution techniques, any losses of the native compound that may occur during any of the sample preparation, extraction, cleanup or determinative steps will be mirrored by a similar loss of the labeled standard, and as such can be accounted for and corrected. Therefore, the quantification of these target compounds is not affected by the low extracted internal standard analyte recovery.

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 #: B8K6854
Report Date: 2018/08/29

Maxxam Analytics
Client Project #: 110220176

RESULTS OF ANALYSES OF WATER

Maxxam ID		HLU559	HLU560		
Sampling Date		2018/08/08 16:10	2018/08/08 16:15		
COC Number		n/a	n/a		
	UNITS	**UB1118-TRIP BLANK-01**	**UB1119-FIELD BLANK-01**	**RDL**	**QC Batch**
18O2-Perfluorohexanesulfonate	%	99	97	N/A	5692616

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

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GENERAL COMMENTS

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

Package 1	2.0°C

Sample HLU559, Low level PFOS and PFOA by SPE/LCMS: Test repeated.
Sample HLU560, Low level PFOS and PFOA by SPE/LCMS: Test repeated.

Results relate only to the items tested.

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
A Bureau Veritas Group Company

Maxxam Job #: B8K6854
Report Date: 2018/08/29

QUALITY ASSURANCE REPORT

Maxxam Analytics
Client Project #: 110220176

			SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5692616	13C2-Perfluorodecanoic acid	2018/08/23	91	50 - 150	91	%		
5692616	13C2-Perfluorododecanoic acid	2018/08/23	82	50 - 150	80	%		
5692616	13C2-Perfluorohexanoic acid	2018/08/23	86	50 - 150	90	%		
5692616	13C2-perfluorotetradecanoic acid	2018/08/23	75	50 - 150	74	%		
5692616	13C2-Perfluoroundecanoic acid	2018/08/23	85	50 - 150	81	%		
5692616	13C4-Perfluorobutanoic acid	2018/08/23	87	50 - 150	88	%		
5692616	13C4-Perfluoroheptanoic acid	2018/08/23	86	50 - 150	91	%		
5692616	13C4-Perfluorooctanesulfonate	2018/08/23	93	50 - 150	83	%		
5692616	13C4-Perfluorooctanoic acid	2018/08/23	91	50 - 150	89	%		
5692616	13C5-Perfluorononanoic acid	2018/08/23	88	50 - 150	94	%		
5692616	13C5-Perfluoropentanoic acid	2018/08/23	86	50 - 150	92	%		
5692616	18O2-Perfluorohexanesulfonate	2018/08/23	87	50 - 150	84	%		
5702169	13C8-Perfluorooctane Sulfonamide	2018/08/29	21	20 - 100	19 (1)			
5692616	Perfluorobutane Sulfonate (PFBS)	2018/08/23	110	70 - 130	<2.0	ng/L	0.93	30
5692616	Perfluorobutanoic acid	2018/08/23	98	70 - 130	<2.0	ng/L	1.3	30
5692616	Perfluorodecane Sulfonate	2018/08/23	94	70 - 130	<2.0	ng/L	0.75	30
5692616	Perfluorodecanoic Acid (PFDA)	2018/08/23	94	70 - 130	<2.0	ng/L	2.5	30
5692616	Perfluorododecanoic Acid (PFDoA)	2018/08/23	98	70 - 130	<2.0	ng/L	1.6	30
5692616	Perfluoroheptane sulfonate	2018/08/23	99	70 - 130	<2.0	ng/L	1.1	30
5692616	Perfluoroheptanoic Acid (PFHpA)	2018/08/23	99	70 - 130	<2.0	ng/L	3.0	30
5692616	Perfluorohexane Sulfonate (PFHxS)	2018/08/23	100	70 - 130	<2.0	ng/L	2.2	30
5692616	Perfluorohexanoic Acid (PFHxA)	2018/08/23	104	70 - 130	<2.0	ng/L	0.86	30
5692616	Perfluoro-n-Octanoic Acid (PFOA)	2018/08/23	100	70 - 130	<2.0	ng/L	5.3	30
5692616	Perfluorononanoic Acid (PFNA)	2018/08/23	99	70 - 130	<2.0	ng/L	7.1	30
5692616	Perfluorooctane Sulfonate (PFOS)	2018/08/23	98	70 - 130	<2.0	ng/L	5.2	30
5692616	Perfluoropentanoic Acid (PFPeA)	2018/08/23	100	70 - 130	<2.0	ng/L	1.3	30
5692616	Perfluorotetradecanoic Acid	2018/08/23	102	70 - 130	<2.0	ng/L	1.3	30
5692616	Perfluorotridecanoic Acid	2018/08/23	109	70 - 130	<2.0	ng/L	0.74	30
5692616	Perfluoroundecanoic Acid (PFUnA)	2018/08/23	110	70 - 130	<2.0	ng/L	2.2	30

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QUALITY ASSURANCE REPORT(CONT'D)

			SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5702169	Perfluorooctane Sulfonamide (PFOSA)	2018/08/29	104	70 - 130	<4.0	ng/L	7.0	30

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

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

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

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

(1) Extracted internal standard analyte recovery was below the defined lower control limit (LCL). Because quantitation is performed using isotope dilution techniques, any losses of the native compound that may occur during any of the sample preparation, extraction, cleanup or determinative steps will be mirrored by a similar loss of the labeled standard, and as such can be accounted for and corrected. Therefore, the quantification of these target compounds is not affected by the low extracted internal standard analyte recovery.

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Maxxam Job #: B8K6854
Report Date: 2018/08/29

Maxxam Analytics
Client Project #: 110220176

VALIDATION SIGNATURE PAGE

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

Sin Chii Chia, 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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APPENDIX E

Photographic Log

Photograph 1: Monitoring Well MW15-8, August 8, 2018

Photograph 2: Northwest view of FTA LTU during tilling, August 11, 2018

Photograph 3: Northeast view of FTA LTU during tilling, August 11, 2018

Photograph 4: West view of FTA LTU after tilling, August 12, 2018

Photograph 5: West view of FTA northwest sump during dewatering, August 14, 2018.

Photograph 6: East view of FTA southeast sump prior to dewatering, August 18, 2018.

Photograph 7: Northwest view of FTA northwest sump after dewatering, August 16, 2018.

Photograph 8: Southeast view of FTA southeast sump after dewatering, August 18, 2018.