2019 Site Remedial Activities Supervision and Environmental Monitoring Program – Cambridge Bay Airport, Apron Land Treatment Unit and Excavation Area

Final Report

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Prepared for:

Public Services and Procurement Canada for Transport Canada

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2019 SITE REMEDIAL ACTIVITIES SUPERVISION AND ENVIRONMENTAL MONITORING PROGRAM – CAMBRIDGE BAY AIRPORT, APRON LAND TREATMENT UNIT AND EXCAVATION AREA

This document entitled 2019 Site Remedial Activities Supervision and Environmental Monitoring Program – Cambridge Bay Airport, Apron Land Treatment Unit and Excavation Area **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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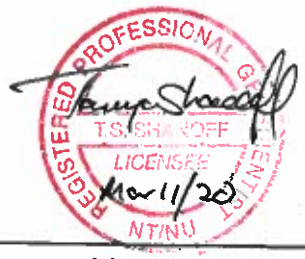

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Executive Summary

Stantec Consulting Ltd. (Stantec) completed the 2019 Site Remedial Activities Supervision and Environmental Monitoring Program (the Program) at the Apron Land Treatment Unit (LTU) and Excavation Area located in the western and eastern portions of the Cambridge Bay Airport in Cambridge Bay, Victoria Island, Nunavut, respectively. The LTU is approximately 55 metres (m) x 148 m in dimension and contains approximately 3,500 cubic metres (m^3) of impacted soil. 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 Apron LTU to increase water absorption and conducting de-watering 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 currently occurring at the LTU. The work was completed between August 9 and 16, 2019.

Remedial Activities Supervision

Aeration of the Apron LTU was conducted on August 9, 2019 by Qillaq Innovations of Cambridge Bay, NU (Qillaq). Aeration was completed using a dozer with a ripper attachment that disturbed the soil to a depth of approximately 0.55 metres below ground surface (m BGS) and to encourage an increase of water absorption.

Approximately 82 m^3 of water was de-watered from the Apron sump and spread on the Apron LTU on August 10 and 17, 2019.

Environmental Monitoring

Groundwater monitoring and sampling was conducted on August 10, 15, and 16, 2019. Stantec attempted to monitor nine groundwater monitoring wells associated with the Apron LTU and the Apron Excavation Area. Two of the four groundwater monitoring wells (MW13-6 and MW13-8), associated with the Apron Excavation Area, could not be located. Two of the five groundwater monitoring wells associated with the Apron LTU (MW13-2 and MW13-4) were dry and could not be sampled.

Five groundwater samples and one corresponding blind field duplicate groundwater sample were submitted for analysis the parameters listed in Part J, Item 7 of the NWB Licence.

Groundwater analytical results indicated that the concentrations of the parameters analyzed satisfied the Ontario Ministry of the Environment, Conservation, and Parks (MECP) 2011 Table 3 Site Condition Standards (Table 3 SCS) with the exception of dissolved chloride and dissolved sodium in MW13-9 which were the same orders of magnitude as the standards. The parameter concentrations exceeding the guidelines referenced for information purposes are indicated in Table A, below:

Table A Parameters Exceeding Applicable Standards and/or Guidelines Referenced for Information Purposes – Groundwater

Monitoring Well	Parameter Category	Individual Parameter
MW13-1 (West of Apron LTU)	General Chemistry, Dissolved Ions, Total Metals	Nitrate, Nitrate (as N), Chloride, Iron
MW13-3 (East of Apron LTU)	Dissolved Ions, Total Metals, PFAS	Chloride, Aluminum, Iron, PFHpA, PHFxA, PFOA, PFNA (RDL only), PFPeA
MW13-5 (South of Apron LTU, South of Access Road)	Dissolved Ions, Total Metals, PFAS	Chloride, Iron, PFPeA
MW13-7 (East of Apron Excavation)	Dissolved Ions, Total Metals, PFAS	Chloride, Aluminum, Iron, PFHxA, PFPeA
MW13-9 (South of Apron Excavation)	General Chemistry, Dissolved Ions, Total Metals, PFAS	Nitrite (RDL Only), Nitrite (as N) (RDL Only) Chloride*, Sodium*, Iron, PFPeA
*Indicates parameter concentration that exceeds applicable standard. The CWQG, Health Canada, and ECCC Guidelines and Screening Values were provided for information purposes.		

A total of six soil samples were collected from a depth of approximately 0.5 m below ground surface (BGS) for analysis of the parameters required by the NWB Licence. One field duplicate soil sample (identified as QC-APR-01) was also collected.

The laboratory analytical results indicated that the concentrations of the parameters analyzed satisfied the applicable guidelines with the exception of the parameters shown in Table B, below.

Table B Parameters Exceeding Applicable Guidelines - Soil

Location	Parameter Category	Individual Parameter
APR-S03 (North central portion of LTU)	Petroleum Hydrocarbons	PHC F1/F2
APR-S05 (West portion of LTU)	BTEX	Toluene
APR-S06 (West portion of LTU)	Petroleum Hydrocarbons	PHC F2

Quality Assurance / Quality Control (QA/QC)

In general, based on the results of the QA/QC program presented above, the DQO for the Program was considered to have been met; however, the reported concentrations for nitrogen parameters in groundwater (Nitrate, Nitrate [as N], Nitrite, Nitrite [as N], and Ammonia [as N]) may be biased low in the groundwater samples, as the sample hold time was exceeded, and as such the results should be viewed with caution.

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 2019 Site Remedial Activities Supervision and Environmental Monitoring Program (the Program) at the Apron Land Treatment Unit (LTU) and Excavation Area 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 Apron LTU to increase water absorption.
- Conduct de-watering activities.

1.2 BACKGROUND

Stantec reviewed the Arcadis Canada Inc. (Arcadis) Draft 2018 Environmental Monitoring Program at Cambridge Bay Airport LTU report (December 1, 2018) prior to the Program. The Arcadis report indicated that a fuel transfer building was demolished and associated contaminated soil was excavated from the Apron of the Cambridge Bay Airport (Apron Excavation Area) in 2013.

The Apron LTU was constructed in 2013 and covers an area of approximately 55 m x 148 m in the western portion of the airport property. The LTU consists of a 0.5 m high berm and a high-density polyethylene liner. The Apron Excavation Area is located within the operating area of the airport southeast of the airport terminal building (in the eastern portion of the airport property).

In 2013, approximately 3,500 cubic metres (m^3) of petroleum hydrocarbon (PHC) and metals impacted soil was excavated from the Apron Excavation Area and transferred to the Apron LTU for treatment.

During the construction of the adjacent fire training area (FTA) LTU in 2014, a drum cache was discovered within the FTA LTU footprint. Approximately 560 m^3 of impacted soil originating from the drum cache was stored in the Apron LTU. The material from the drum cache was suspected to contain poly- and perfluoroalkyl substances (PFAS).

In 2015, nutrients were added to the soil in the Apron LTU to facilitate remediation, and in 2017, approximately 290 m^3 of impacted material was transferred from the Apron LTU to the FTA LTU.

In 2016, sump water in the Apron LTU contained PFAS and PHC compounds that exceeded effluent discharge guidelines; therefore, sump water in the Apron LTU has not discharged to the environment. Sump water has been recirculated over the LTU as a standard practice since 2016.

Ongoing monitoring of the soil and water associated with the Apron LTU and the water associated with the Apron Excavation Area has been required per the Nunavut Water Board (NBW) Licence No. 1BR-FTA1828 since 2014.

The Site layout and monitoring well locations are shown on Figures 2 and 3, **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 Apron LTU, to dewater the sumps, and to discharge the sump water onto the Apron 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, using hand tools, six soil samples and one field duplicate sample from 0.5 metres below the surface of the LTU.
- Georeference sample locations with easting and northing UTM coordinates based on NAD 83 system.
- Monitor the existing groundwater monitoring wells (MW13-1 through MW13-9) for depth to liquid petroleum hydrocarbons (if present) and depth to water.
- Purge the existing monitoring wells and collect nine groundwater samples and one field duplicate sample.

- Submit the samples to Bureau Veritas Canada (2019) Inc. (Bureau Veritas) of Yellowknife, NT (formerly Maxxam Analytics) for analysis of the parameters specified in the NWB Licence (and Section 3.2.3 of this report).
- Provide a letter from Bureau Veritas confirming review of quality control sampling plan (**Appendix B**).

1.3.4 Deviations from Scope of Work

- Two of the existing groundwater monitoring wells (MW13-6 and MW13-8), located respectively on the north and west side of the Apron Excavation Area, could not be found and were not monitored or sampled.
- Two of the existing groundwater monitoring wells (MW13-2 and MW13-4), located respectively on the north and south sides of the Apron LTU, were dry and could not be sampled.
- The laboratory prepared soil trip blank did not contain the appropriate containers for laboratory analysis of BTEX and PHC F1.
  - The soil trip blank was analyzed for PHC F2-F4, total lead, and total PCBs.
  - An equipment rinsate blank prepared by Stantec personnel was submitted with the soil samples for analysis of BTEX and PHF F1-F4 instead.

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 (CWS) and the Government of Nunavut 2009 Environmental Guideline for Site Remediation (EGSR). 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.

The Licence states that effluent cannot be discharged to federal land unless it meets the CCME Canadian Water Quality Guidelines (CWQG) and the Environment and Climate Change Canada (ECCC) May 2018 Federal Environmental Quality Guidelines for Perfluorooctanoic Sulfonate (PFOS) (ECCC Guidelines). The CWQG and the ECCC Guidelines are not applicable to groundwater, and effluent was not discharged at the Site in 2019; therefore, the CWQG and ECCC Guidelines are referenced in this report for information purposes only.

In 2018, the NWB directed TC to use the Ontario Ministry of the Environment, Conservation and Parks (MECP) 2011 Site Condition Standards (Under Ontario Regulation 153/04) for evaluation of parameter concentrations in groundwater. A copy of the e-mail communication from the NWB is provided in **Appendix C**. Per Ontario Regulation 153/04 (Section 35(3)), properties are considered non-potable when the property, and all other properties located in whole, or in part, within 250 m of the boundaries of the properties are supplied by a municipal drinking water system and have no wells installed. As there are no potable water wells within 250 m of the site boundary, the site is considered non-potable. As such, the Table 3 Full Depth Generic Site Condition Standards in a Non-Potable Groundwater Condition (Table 3 SCS) were considered applicable to the Site. The Table 3 SCS are not dependent on land use.

In addition to the ECCC Guidelines, the following federal guidelines are also applicable to PFAS:

- Health Canada April 2019 Drinking Water Screening Values: Perfluoroalkylated Substances (HC DWSV).
- Health Canada April 2019 Guidelines for Canadian Drinking Water Quality for PFOS and perfluorooctanoic acid (PFOA) (HC Guidelines).

Because the Site is considered non-potable (MECP, 2011), the Health HC DWSV and HC Guidelines are not applicable to the groundwater samples collected at the Site. In the absence of applicable PFAS guidelines / standards, the HC DWSV and HC Guidelines have been referenced in this report for information purposes only.

The guidelines and standards considered applicable to the Site are summarized in Table 2-1 and excerpts of these guidelines and standards are provided in **Appendix D**.

Table 2-1 Summary of Applicable Guidelines and Standards

Source	Guidelines / Standards
Soil	NWB Requirements
Groundwater	MECP Table 3 SCS (coarse-textured soil) CCME CWQG (provided for information purposes only) ECCC Guidelines (provided for information purposes only) HC Guidelines (provided for information purposes only) HC DWSV (provided for information purposes only)

3.0 METHODOLOGY

3.1 REMEDIAL ACTIVITIES SUPERVISION

Aeration of the LTU was conducted on August 9, 2019 by Qillaq Innovations of Cambridge Bay, NU (Qillaq). Aeration was completed using a dozer with a ripper attachment. The ripper attachment was pulled by the dozer across the surface of the LTU three times in a circular pattern to a depth of approximately 0.55 metres below ground surface (m BGS) to disturb surface soil and to encourage an increase of water absorption.

Upon completion of soil sampling (as summarized in Section 3.2.2), Qillaq pumped accumulated water from the Apron LTU sump and, using two-inch diameter hoses, spread the water over the soil contained within the Apron LTU. Stantec monitored the depth of water in the sump during the de-watering process using an interface probe to monitor de-watering progress and water absorption. De-watering activities were completed on August 12, 2019 and again, prior to leaving the Site, on August 17, 2019.

During the 2016 - 2018 Environmental Monitoring Programs, the Apron LTU was aerated using a disc harrow. Using the disc harrow, the aeration depth was limited to approximately 0.3 m BGS. The aeration depth during the 2019 Program was approximately 0.55 m BGS using the ripper attachment.

3.2 ENVIRONMENTAL MONITORING

3.2.1 Groundwater Monitoring and Sampling

The groundwater monitoring and sampling portion of the Program was completed on August 10, 15, and 16, 2019. Two groundwater monitoring wells in the Apron Excavation Area (MW13-6 and MW13-7) could not be located. Seven (7) existing groundwater monitoring wells in the vicinity of the Apron LTU and Apron Excavation Area were observed to be in good condition and were monitored for depth to liquid petroleum hydrocarbons (if present) and depth to water using an interface probe, combustible headspace vapour concentrations (CHV) and ionizable headspace vapour concentrations (IHV) using an RKI Eagle 2™, and, where groundwater was present, for field temperature, pH, redox potential, electrical conductivity (EC), and dissolved oxygen (DO) using a YSI Multi Parameter Water Quality Metre.

Five groundwater monitoring wells (MW13-1, MW13-3, MW13-5, MW13-7, and MW13-9) contained sufficient groundwater to allow for sample collection and were purged in general accordance with Stantec's groundwater monitoring and sampling SOPs which are consistent with the CCME Guidance Manual (Volume 1) (CCME, 2016). Purge water was contained in a bucket and disposed of on the Apron LTU after sampling was complete.

Five groundwater samples and one field duplicate samples were collected from MW13-1, MW13-3, MW13-5, MW13-7, and MW13-9 using low-flow sampling techniques with a peristaltic pump and

dedicated tubing to fill the laboratory-supplied bottles for non-volatile parameters. Groundwater was collected from the monitoring wells using dedicated bailers to fill the laboratory-supplied bottles for volatile parameters. Groundwater samples were immediately transferred to laboratory-supplied bottles using the procedures described above and were stored in ice-chilled coolers prior to and during transportation to the laboratory.

Two equipment rinsate blank (equipment blank) samples (EB-06 and EB-07) were prepared by Stantec personnel by pouring PFAS free water over the sampling equipment into laboratory-supplied bottles for laboratory analysis of PFAS for quality assurance / quality control (QA/QC) purposes.

Samples were transported by First Air Cargo from Cambridge Bay, NU to the Bureau Veritas depot in Yellowknife, Northwest Territories (NT) for transfer to the laboratories in Calgary, 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 (TB-05) was shipped with the samples to the Bureau Veritas depot for transfer to the laboratories in Calgary, Alberta and Mississauga, Ontario for analysis of PFAS 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 10, 2019. Upon completion of the aeration of the Apron LTU, and prior to sump de-watering, Stantec personnel divided the Apron LTU into six sections consisting of approximately 1,250 square metres (m^2) per section. Due to the irregular shape of the Apron LTU, it could not be divided into six equally shaped sections. One soil sample (six samples total) was collected from each section from a depth of approximately 0.5 m BGS. The soil samples were identified as APR-S01 through APR-S06. One field duplicate soil sample (identified as QC-APR-01) was collected from APR-S03. The soil samples were collected as discrete soil samples using hand tools.

Following visual examination, each soil sample was split into three portions. The first portion was placed into a re-sealable laboratory-supplied plastic sample bag for measurement of CHV and VHV concentrations. The second portion was placed into laboratory supplied 120-milliliter (mL) glass containers filled to reduce headspace and sealed with Teflon™-lined lids for possible laboratory analysis. The third portion was collected using a laboratory supplied Terra Core™ sampler and placed into two laboratory-supplied 40-ml glass vials containing methanol preservative. The first portion of each sample was 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™.

One equipment blank (EB-05) was prepared by Stantec personnel by pouring PFAS free water over the soil sampling equipment into laboratory supplied bottles for QA/QC purposes. EB-05 was submitted for analysis of BTEX, PHC F1-F4, and lead.

Samples were transported by First Air Cargo from Cambridge Bay, NU to the Bureau Veritas depot in Yellowknife, NT for transfer to the laboratories in Calgary, 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 (TB-04) was shipped with the samples for QA/QC purposes. TB-04 was a laboratory-prepared soil blank and was analyzed for petroleum hydrocarbons PHC F2-F4, Total Lead, and PCBs. The laboratory prepared soil blank did not contain the appropriate containers for laboratory analysis of BTEX or PHC F1. In the absence of sufficient media for BTEX and PHC F1 analyses, the equipment rinsate blank (EB-05) was shipped with the soil samples and was analyzed for BTEX and PHC F1.

The soil sample locations were georeferenced using a hand-held GPS with a variance of accuracy of ± 5 m.

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), PFAS, and BTEX.
Soil (Part J, Table 1 of NWB Licence)	BTEX, PHC Fractions 1 through 4 (F1-F4), lead, and polychlorinated biphenyls (PCBs).

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 Bureau Veritas, 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 Bureau Veritas. The analytical results were compared to those of the parent samples using the method of relative percent difference (RPD) to evaluate precision.
- Trip blanks and equipment blanks were collected by Stantec and analyzed by Bureau Veritas.
- The laboratory reviewed Stantec's sampling plan and indicated that it meets CCME requirements (**Appendix B**).

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.

4.0 RESULTS

The 2019 field program was conducted between August 9 and 17, 2019.

The results of the Program are presented in the following figures, tables, and appendices of the report, and are presented in detail in subsections presented in Table 4-1, below:

Table 4-1 Figures or Tables and Associated Appendices

Description	Figures or Tables and Associated Appendix
Site Location	Figure 1, **Appendix A**
Site Features	Figures 2, 3, and 4, **Appendix A**
Groundwater Monitoring Results	Table 1, **Appendix E**
Groundwater Analytical Results	Figures 2 and 3, **Appendix A** and Table 2, **Appendix E**
Soil Monitoring Results	Table 3, **Appendix E**
Soil Analytical Results	Figure 4, **Appendix A** and Table 4, **Appendix E**
QA/QC Analytical Results	Tables 5 and 6, **Appendix E**
GPS Coordinates of Monitoring and Sampling Locations	Table 7, **Appendix E**
Photographic Log	**Appendix F**
Copies of the Laboratory Certificates of Analysis	**Appendix G**

4.1 REMEDIAL ACITVITIES SUPERVISION

The Apron LTU contained one sump located in the southwest corner (Apron Sump). Based on field measurements, Stantec estimated that the Apron Sump contained approximately 74 cubic metres (m^3) of water. The Apron sump was fully de-watered onto the Apron LTU on August 10, 2019. After de-watering, Stantec personnel noted that the sump had begun to recharge; however, the re-charge rate was not measured. The recharge may have been a result of rain which occurred throughout the field program. As such, the recharged water was removed from the sump again on August 17, 2019, prior to Stantec leaving the Site. An additional 8 m^3 of water were removed from the Apron Sump and deposited onto the Apron LTU on August 17, 2019.

Sump dewatering volumes to date (2014 to 2019) are summarized in Table 4-2 below:

Table 4-2 Summary of Sump de-watering volumes to date (2016-2019)

Year	Sump Volume De-Watered (m^3)
2019	82
2018	70
2017	46
2016	110
2015	86
2014	30

4.2 ENVIRONMENTAL MONITORING

4.2.1 Groundwater Monitoring and Sampling

Stantec monitored five groundwater monitoring wells associated with the Apron LTU and two groundwater monitoring wells associated with the Apron Excavation Area. Two of the four groundwater monitoring wells (MW13-6 and MW13-8), associated with the Apron Excavation Area, could not be located. Two of the five groundwater monitoring wells associated with the Apron LTU (MW13-2 and MW13-4) were dry and could not be sampled. Frozen wells were not encountered during the program.

The depth to water in the wells that could be located and where groundwater was encountered, ranged from 0.34 m BGS in MW13-7 (Apron Excavation Area) to 1.47 m BGS in MW13-1 (Apron LTU). Parameters including temperature, specific conductance, pH, oxidation reduction potential, and dissolved oxygen could only be measured in five monitoring wells (MW13-1, MW13-3, MW13-5, MW13-7, and MW13-9).

Five groundwater samples (MW13-1, MW13-3, MW13-5, MW13-7, and MW13-9) and one field duplicate groundwater sample (GW-QC-02) were collected and submitted for laboratory analysis of the parameters required by the NWB Licence.

The reported concentrations of dissolved BTEX, PHC F1-F2, PAH, and total phenols were below the laboratory reportable detection limits (RDLs) with the exception of total phenols and benzene in the groundwater sample from MW13-7, which were reported at concentrations above the laboratory RDL but were one to six orders of magnitude less than the CWQG and MECP Table 3 SCS.

Groundwater analytical results indicated that the concentrations of the parameters analyzed satisfied the applicable standards and/or the guidelines provided for information purposes with the exception of the parameters indicated in Table 4-3 below:

Table 4-3 Parameters Exceeding Applicable Standards and/or Guidelines Referenced for Information Purposes – Groundwater

Monitoring Well	Parameter Category	Individual Parameter	Guideline Exceeded
MW13-1 (West of Apron LTU)	General Chemistry Dissolved Ions Total Metals	Nitrate, Nitrate (as N) Chloride Iron	**CWQG** The nitrate (35 mg/L), nitrate as N (7.9 mg/L), chloride (240 mg/L), and iron (1.8 mg/L) concentrations exceeded the CWQG (nitrate – 13 mg/L, nitrate as N – 3.0 mg/L, chloride – 120 mg/L, and iron – 0.3 mg/L).
MW13-3 (East of Apron LTU)	Dissolved Ions Total Metals PFAS	Chloride Aluminum, Iron PFHpA, PHFxA, PFOA, PFNA (RDL only), PFPeA	**CWQG** The chloride (730 mg/L), aluminum (0.16 mg/L), and iron (1.4 mg/L) concentrations exceeded the CWQG (chloride – 120 mg/L, aluminum – 0.1 mg/L, and iron – 0.3 mg/L). **Health Canada** The PFHpA (0.67 µg/L), PHFxA (2.9 µg/L), PFOA (0.26 µg/L), PFNA (RDL only – no detectable concentration), and PFPeA (5.1 µg/L) ranged from within the same order of magnitude to one order of magnitude greater than the HC DWSVs and/or the HC Guidelines.
MW13-5 (South of Apron LTU, South of Access Road)	Dissolved Ions Total Metals PFAS	Chloride Iron PFPeA	**CWQG** The chloride (180 mg/L) and iron (0.32 mg/L) concentrations exceeded the CWQG (chloride -120 mg/L, iron - 0.3 mg/L). **Health Canada** The PFPeA concentration (0.30 µg/L) exceeded the HC DWSV (0.2 µg/L).
MW13-7 (East of Apron Excavation)	Dissolved Ions Total Metals PFAS	Chloride Aluminum, Iron PFHxA, PFPeA	**CWQG** The chloride (570 mg/L), aluminum (0.13 mg/L, and iron (0.92 mg/L) concentrations exceeded the CWQG (chloride - 120 mg/L, aluminum - 0.1 mg/L, and iron - 0.3 mg/L). **Health Canada** The PFHxA (0.32 µg/L) and the PFPeA (0.68 µg/L) exceeded the HC DWSVs (0.2 µg/L).
MW13-9 (South of Apron Excavation)	General Chemistry Dissolved Ions Total Metals PFAS	Nitrite (RDL Only), Nitrite (as N) (RDL Only) Chloride, Sodium Iron PFPeA	**CWQG** The nitrite and nitrite as N (RDL Only – no detectable concentrations) exceeded the CWQG. The chloride (7,800 mg/L) and iron (8.0 mg/L) concentrations exceeded the CWQG (chloride – 120 mg/L and iron – 0.3 mg/L). **Health Canada** The PFPeA concentration (0.68 µg/L) exceeded the HC DWSV (0.2 µg/L). **MECP*** The chloride (7,800 mg/L) and sodium (5,800 mg/L) exceeded the MECP Table 3 SCS (chloride – 2,300 mg/L and sodium – 2,300 mg/L).

*MECP are applicable standards. The CWQG, Health Canada Guidelines and Screening Values were provided for information purposes.

4.2.2 Soil Monitoring and Sampling

Soil samples were collected from approximately 0.5 m BGS within the Apron LTU. Field screening results for CHV and IHV ranged from 1 ppm (IHV) in APR-S01 and APR-S05 to 120 ppm (CHV) in APR-S03.

Six soil samples (APR-S01 to APR-S06) and one field duplicate soil sample (QC-APR-01) were submitted for analysis of the parameters required by the NWB Licence. The laboratory analytical results indicated that the concentrations of the parameters analyzed satisfied the applicable guidelines with the exception of the parameters indicated in Table 4-4, below.

Table 4-4 Summary of Soil Parameters Exceeding Applicable Guidelines

Location	Parameter Category	Individual Parameter	Applicable Guideline Exceeded
APR-S03 (North central portion of LTU)	Petroleum Hydrocarbons	PHC F1/F2	**NWB** The PHC F1 concentration (580 mg/Kg) and the PHC F2 concentration (1500 mg/Kg) exceeded the NWB Requirements (PHC F1 - 320 mg/kg, PHC F2 - 260 mg/kg).
APR-S05 (West portion of LTU)	BTEX	Toluene	**NWB** The toluene concentration (7.2 mg/kg) exceeded the NWB Requirement (0.37 mg/kg).
APR-S06 (West portion of LTU)	Petroleum Hydrocarbons	PHC F2	**NWB** The PHC F2 concentration (2,300 mg/kg) exceeded the NWB Requirement (260 mg/kg).

In the soil samples that did not contain BTEX and PHC concentrations exceeding the NWB requirements, the concentrations were less than the laboratory RDLs or ranged from the same order of magnitude to one order of magnitude less than the NWB Requirements.

The lead concentrations ranged from one to two orders of magnitude less than the NWB Requirement. The total PCB concentrations were less than the laboratory RDLs which were two to three orders of magnitude less than NWB requirement.

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 HOLD TIMES

Soil and Groundwater samples were analyzed by the laboratory within the recommended hold times with the exception of the following:

- Nitrogen (Nitrite-Nitrate) in the groundwater samples.
  - The laboratory certificate of analysis states that exceedances of hold time increase the uncertainty of test results but does not necessary imply that results are compromised.
  - These results may be biased low due to the hold time exceedances.

5.2 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, Bureau Veritas has noted the difficulty in maintaining samples below 4°C. As such, Bureau Veritas considers a temperature range of 4°C to 10°C as acceptable. Samples submitted to the laboratory indicated temperatures that were considered acceptable.

5.3 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).

GW-QC-02 was a field duplicate groundwater sample of MW13-3. 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% (numerous parameters) to 35% (Iron) and satisfied the CCME requirements.

QC-APR-01 was a blind field duplicate sample of APR-S05. The duplicate soil sample was submitted for analysis of the parameters required by the NWB Licence. Where they could be calculated, the RPD's ranged from 5% (lead) to 75% (PHC F3). The calculated RPD for PHC F3 exceeded the CCME requirements which may have been a result of the heterogeneity of the soil in the sample. Because both concentrations were below the NWB Requirement, the elevated RPD for PHC F3 did not impact the interpretation of the results.

The RPD results are summarized on Tables 2 and 4 of **Appendix E**.

5.4 TRIP BLANK

One trip blank sample (TB-05) consisted of sample bottles pre-filled with de-ionized and PFAS free water provided by Bureau Veritas. One trip blank sample (TB-04) consisted of sample jars pre-filled with Ottawa sand provided by Bureau Veritas. The trip blank samples were submitted for analysis of the following:

- TB-04 – PHC F2-F4, total lead, total PCBs (submitted with soil samples collected from Apron LTU)
- TB-05 – PFAS (submitted with groundwater samples).

Laboratory analytical results indicated the reported concentrations of tested parameters were less than the laboratory RDL. As such, the trip blanks results indicate that the sample shipping and storage did not influence the soil or groundwater analytical results with respect to PFAS and PHC F2-F4.

The laboratory analytical results for the trip blanks are summarized in Tables 5 and 6, **Appendix E**.

5.5 EQUPIMENT BLANK

Three equipment blanks (EB-05, EB-06, and EB-07) consisted of de-ionized and PFAS-free water provided by the laboratory. The water was poured over the field sampling equipment directly into laboratory supplied bottles in the field. The equipment blank samples were submitted for analysis of the following:

- EB-05 – NWB Licence parameters for soil (collected from soil sampling equipment).
- EB-06 – PFAS (collected from groundwater sampling equipment)
- EB-07 - PFAS (collected from groundwater sampling equipment).

Laboratory analytical results indicated the reported concentrations of the tested parameters were less than the laboratory RDLs. As such, the equipment blank results indicate that cross-contamination did not influence groundwater analytical results for the parameters analyzed.

EB-05 was shipped with the soil samples. The reported concentrations of BTEX and PHC F1 were below the laboratory RDLs. As such, the results indicate that the sample shipping and storage did not influence the soil analytical results with respect for BTEX and PHC F1.

The laboratory analytical results for the equipment blanks are summarized in Table 5, **Appendix E**.

5.6 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.

In the copy of the groundwater laboratory certificate of analysis (**Appendix G**), the laboratory reported that detection limits for the following groundwater parameters were raised due to dilution to bring the analyte within the calibrated range or due to matrix interference:

- The RDL for PFNA in MW13-3 was raised to above the HC DWSVs.
  - Because there are other PFAS exceeding the HC DWSVs and/or the HC Guidelines in MW13-13, it is possible that this parameter may also exceed these guidelines. However, this does not impact the overall findings that there are concentrations of PFAS over the applicable guidelines.
- The RDLs for Nitrite and Nitrite (as N) in MW13-9 were raised above the CWQG.
  - Because there are other inorganic parameters exceeding the CWQG (chloride, sodium, and iron) in MW13-3, it is possible that Nitrite and Nitrite (as N) may also exceed the guidelines. However,

this does not impact the overall findings that there are concentrations of inorganic parameters over the applicable guidelines.

An extracted internal standard analyte recovery was below the defined lower control limit for some PFAS surrogates in MW13-9. Laboratory spiked water resulted in satisfactory recovery of the extracted internal standard analyte. When considered together, the quality control data suggest that matrix interferences may be increasing the variability of the associated native analyte result (Perfluoropentanoic Acid [PFPeA] and PFBA). The PFBA concentration in MW13-9 was two orders of magnitude less than the HC DWSV. The PFPeA concentration in MW13-9 exceeded the HC DWSV but was within the same order of magnitude and was within the same order of magnitude as the PFPeA concentrations reported in MW13-5 and MW13-7. As such, the increased variability is not expected to affect the findings of the Program.

In the copy of the soil laboratory certificate of analysis (**Appendix G**), the detection limits for PCBs in APR-S01, APR-S02, APR-S03, and APR-S06 were raised due to matrix interference. The laboratory RDLs were two to three orders of magnitude less than the CWQG. As such, the raised RDLs did not influence data interpretation of the data.

5.7 SUMMARY

In general, based on the results of the QA/QC program presented above, the DQO for the Program was considered to have been met; however, the reported concentrations for nitrogen parameters in groundwater (Nitrate, Nitrate [as N], Nitrite, Nitrite [as N], and Ammonia [as N]) may be biased low in the groundwater samples as the sample hold time was exceeded, and as such the results should be viewed with caution.

6.0 SUMMARY OF FINDINGS

Stantec completed the Program at the Apron LTU and Apron Excavation Area located at the Cambridge Bay Airport in Cambridge Bay, Victoria Island, Nunavut in August 2019. The findings of the Program are summarized below.

Remedial Activities Supervision

Aeration of the Apron LTU was conducted on August 9, 2019 by Qillaq to encourage an increase of water absorption. Aeration was completed using a dozer with a ripper attachment that disturbed the soil to a depth of approximately 0.55 m BGS.

Upon completion of aeration and soil sampling, Qillaq pumped the accumulated water from the Apron Sump over the soil contained within the Apron LTU. Dewatering occurred on August 10 and again on 17, 2019 to mitigate recharged water, prior to Stantec leaving the Site. An estimated total of 82 m3 of water was removed from the sump.

Environmental Monitoring

In the vicinity of the Apron LTU, two of the five monitoring wells (MW13-2 and MW13-4) were dry and could not be sampled. In the vicinity of the Apron Excavation Area, two of the four monitoring wells (MW13-6 and MW13-8) could not be located. Frozen wells were not encountered during the Program. Five monitoring wells (MW13-1, MW13-3, MW13-5, MW13-7, and MW13-9) were located and contained sufficient groundwater to allow for sample collection. The depth to water in the five wells ranged from 0.3335 m BGS in MW13-7 (Apron excavation area) to 1.474 m BGS in MW13-1 (Apron LTU).

Groundwater analytical results indicated that the concentrations of the parameters analyzed per the NWB Licence satisfied the applicable guidelines with the exception of the parameters shown in Table 6-1 below.

Table 6-1 Parameters Exceeding Applicable Standards and/or Guidelines Referenced for Information Purposes – Groundwater

Monitoring Well	Parameter Category	Individual Parameter
MW13-1 (West of Apron LTU)	General Chemistry, Dissolved Ions, Total Metals	Nitrate, Nitrate (as N), Chloride, Iron
MW13-3 (East of Apron LTU)	Dissolved Ions, Total Metals, PFAS	Chloride, Aluminum, Iron, PFHpA, PHFxA, PFOA, PFNA (RDL only), PFPeA
MW13-5 (South of Apron LTU, South of Access Road)	Dissolved Ions, Total Metals, PFAS	Chloride, Iron, PFPeA
MW13-7 (East of Apron Excavation)	Dissolved Ions, Total Metals, PFAS	Chloride, Aluminum, Iron, PFHxA, PFPeA
MW13-9 (South of Apron Excavation)	General Chemistry, Dissolved Ions, Total Metals, PFAS	Nitrite (RDL Only), Nitrite (as N) (RDL Only) Chloride*, Sodium*, Iron, PFPeA
*Indicates parameter concentration that exceeds applicable standard. The CWQG, Health Canada, and ECCC Guidelines and Screening Values were provided for information purposes.		

Upon completion of the aeration of the Apron LTU, and prior to sump de-watering, Stantec personnel collected six soil samples from an approximate depth of 0.5 BGS within the Apron LTU for analysis of the parameters required by the NWB Licence. The soil samples were identified as APR-S01 through APR-S06. One field duplicate soil sample (identified as QC-APR-01) was collected from APR-S03.

The laboratory analytical results indicated that the concentrations of the parameters analyzed satisfied the applicable NWB requirements with the exception of the parameters shown in Table 6-2, below.

Table 6-2 Summary of Soil Parameters Exceeding Applicable Guidelines

Location	Parameter Category	Individual Parameter	Applicable Guideline Exceeded
APR-S03 (North central portion of LTU)	PHC	PHC F1/F2	The PHC F1 concentration was within the same order of magnitude and the PHC F2 concentration was one order of magnitude higher than the NWB Requirements.
APR-S05 (West portion of LTU)	BTEX	Toluene	The toluene concentration was one order of magnitude higher than the NWB Requirement.
APR-S06 (West portion of LTU)	PHCs	PHC F2	The PHC F2 concentration was one order of magnitude higher than the NWB Requirement.

Quality Assurance / Quality Control

In general, based on the results of the QA/QC program presented above, the DQO for the Program was considered to have been met; however, the reported concentrations for nitrogen parameters in groundwater (Nitrate, Nitrate [as N], Nitrite, Nitrite [as N], and Ammonia [as N]) may be biased low in the groundwater samples as the sample hold time was exceeded, and as such the results should be viewed with caution.

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.

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.

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

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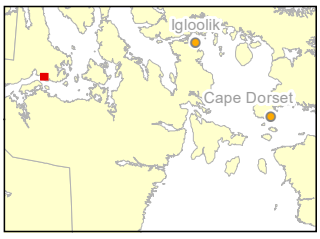
APPENDIX A

Figures



Land Parcel

Site Feature

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Notes

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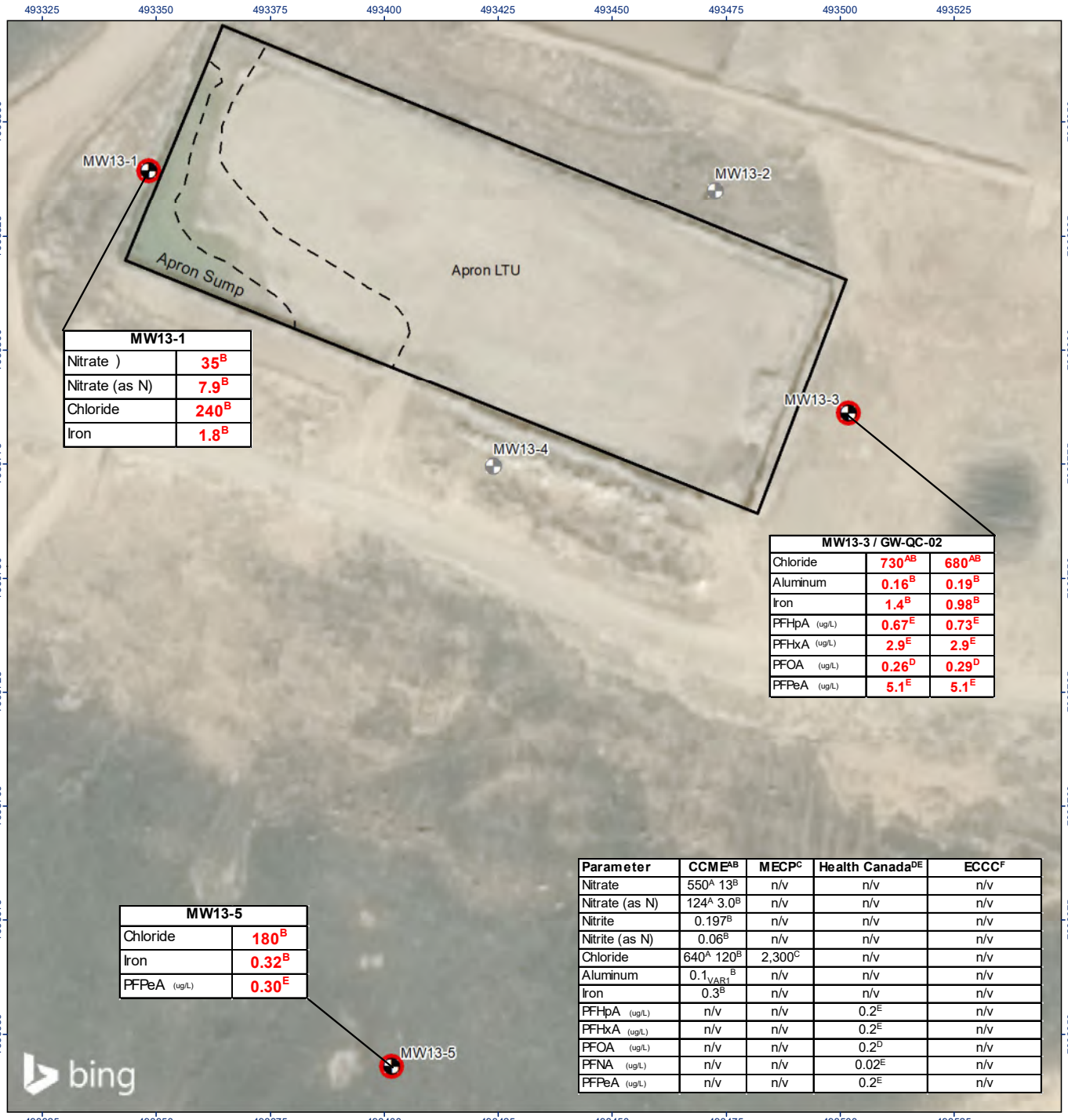
Project Location
Cambridge Bay
Nunavut

Prepared by DJ on 2019-11-18
TR by LVN on 2019-11-18
IR Review by TS on 2019-11-18

Client/Project 110220369
Public Services and Procurement Canada (PSPC) for Transport Canada, Cambridge Bay Airport Apron Land Treatment Unit and Excavation Area

Figure No.
1

Title
Site Location Plan

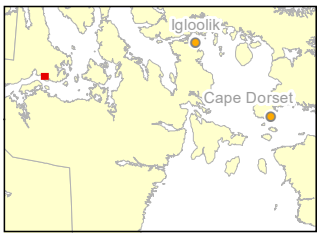


MW13-1	
Nitrate)	35[B]
Nitrate (as N)	7.9[B]
Chloride	240[B]
Iron	1.8[B]

MW13-3 / GW-QC-02		
Chloride	730[AB]	680[AB]
Aluminum	0.16[B]	0.19[B]
Iron	1.4[B]	0.98[B]
PFHpA (ug/L)	0.67[E]	0.73[E]
PFHxA (ug/L)	2.9[E]	2.9[E]
PFOA (ug/L)	0.26[D]	0.29[D]
PFPeA (ug/L)	5.1[E]	5.1[E]

MW13-5	
Chloride	180[B]
Iron	0.32[B]
PFPeA (ug/L)	0.30[E]

Parameter	CCME[AB]	MECP[C]	Health Canada[DE]	ECCC[F]
Nitrate	550[A] 13[B]	n/v	n/v	n/v
Nitrate (as N)	124[A] 3.0[B]	n/v	n/v	n/v
Nitrite	0.197[B]	n/v	n/v	n/v
Nitrite (as N)	0.06[B]	n/v	n/v	n/v
Chloride	640[A] 120[B]	2,300[C]	n/v	n/v
Aluminum	0.1_{VAR1}[B]	n/v	n/v	n/v
Iron	0.3[B]	n/v	n/v	n/v
PFHpA (ug/L)	n/v	n/v	0.2[E]	n/v
PFHxA (ug/L)	n/v	n/v	0.2[E]	n/v
PFOA (ug/L)	n/v	n/v	0.2[D]	n/v
PFNA (ug/L)	n/v	n/v	0.02[E]	n/v
PFPeA (ug/L)	n/v	n/v	0.2[E]	n/v



Site Feature
Monitoring Well Location (Others 2013)
Well not sampled due to insufficient water
Approximate LTU Limits
Exceeds Applicable Guidelines / Standards

* Concentrations expressed as mg/L unless otherwise indicated.
mg/L - milligrams per litre, ug/L - micrograms per litre

CCME Canadian Council of Ministers of the Environment
[A] Canadian Environmental Quality Guidelines, Canadian Water Quality Guidelines for the Protection of Aquatic Life - Freshwater Aquatic Short Term
[B] Canadian Environmental Quality Guidelines, Canadian Water Quality Guidelines for the Protection of Aquatic Life - Freshwater Aquatic Long Term
MECP Ontario Ministry of the Environment, Conservation and Parks, Formerly Ontario Ministry of the Environment (MOE), Ontario Ministry of the Environment, Conservation and Parks, Formerly Ontario Ministry of the Environment (MOE)
[C] Table 3 - All Types of Property Use - Coarse Textured Soils
Health Canada Health Canada Screening Values / Guidelines
D Guidelines for Canadian Drinking Water Quality for PFOS and PFOA (April 2019)
[E] Drinking Water Screening Values for other PFAS (April 2019)
ECCC Environment and Climate Change Canada (February 2017)
[F] Federal Environmental Quality Guidelines for Perfluorooctane Sulfonate (PFOS) for surface water, dated February 2017 (Table 1, Water)

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Project Location
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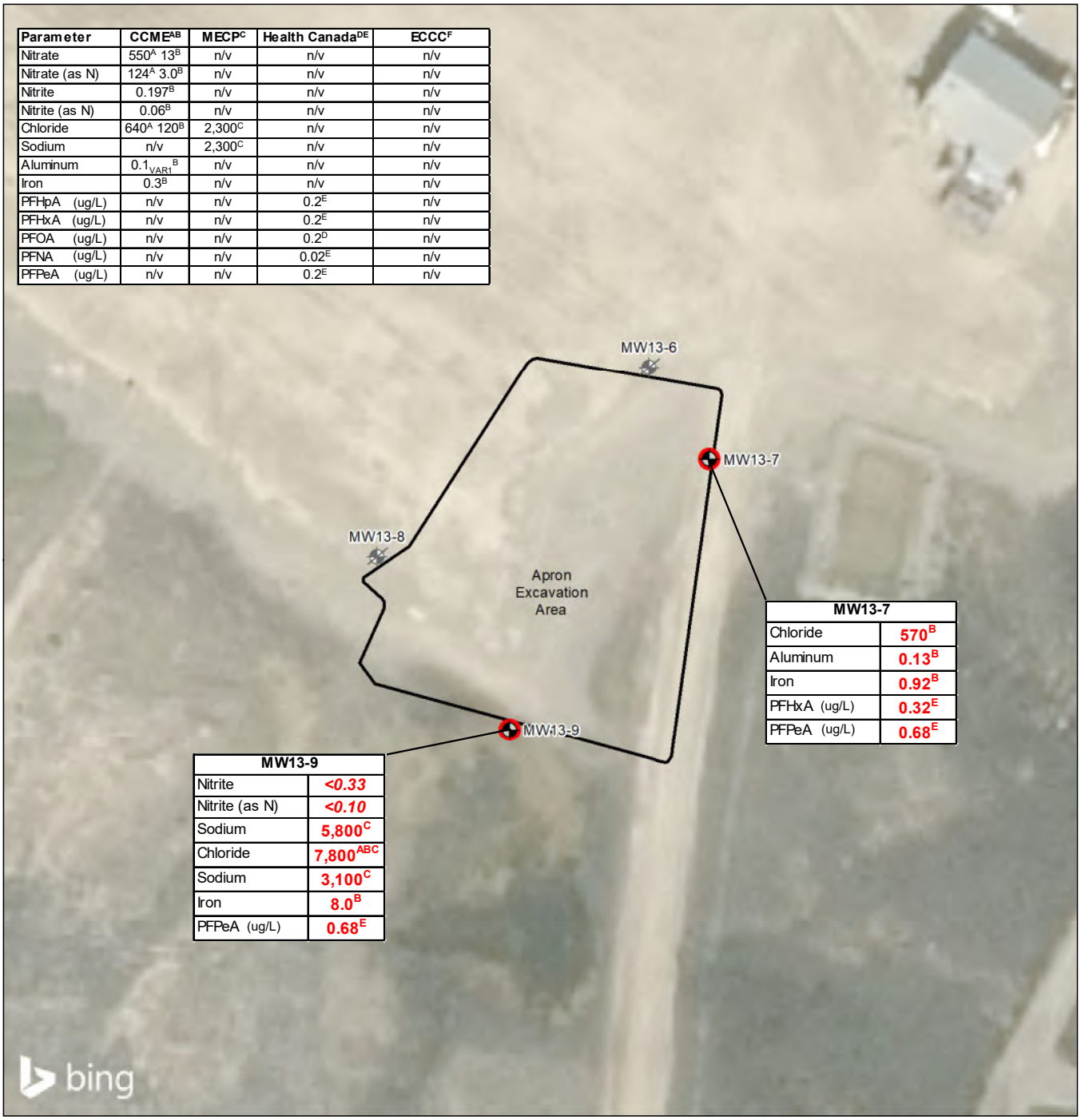
Prepared by DJ on 2019-11-18
TR by LVN on 2019-11-18
IR Review by TS on 2019-11-18

Client/Project 110220369
Public Services and Procurement Canada (PSPC) for Transport Canada, Cambridge Bay Airport Apron Land Treatment Unit and Excavation Area

Figure No.
2

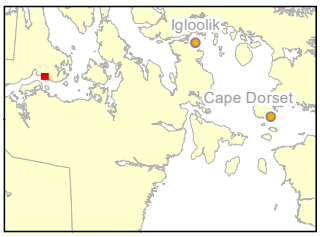
Title
Site Plan Showing LTU Monitoring Wells and Groundwater Analytical

Parameter	CCME[AB]	MECP[C]	Health Canada[DE]	ECCC[F]
Nitrate	550[A] 13[B]	n/v	n/v	n/v
Nitrate (as N)	124[A] 3.0[B]	n/v	n/v	n/v
Nitrite	0.197[B]	n/v	n/v	n/v
Nitrite (as N)	0.06[B]	n/v	n/v	n/v
Chloride	640[A] 120[B]	2,300[C]	n/v	n/v
Sodium	n/v	2,300[C]	n/v	n/v
Aluminum	0.1_{VAR1}[B]	n/v	n/v	n/v
Iron	0.3[B]	n/v	n/v	n/v
PFHpA (ug/L)	n/v	n/v	0.2[E]	n/v
PFHxA (ug/L)	n/v	n/v	0.2[E]	n/v
PFOA (ug/L)	n/v	n/v	0.2[D]	n/v
PFNA (ug/L)	n/v	n/v	0.02[E]	n/v
PFPeA (ug/L)	n/v	n/v	0.2[E]	n/v



MW13-7	
Chloride	570[B]
Aluminum	0.13[B]
Iron	0.92[B]
PFHxA (ug/L)	0.32[E]
PFPeA (ug/L)	0.68[E]

MW13-9	
Nitrite	<0.33
Nitrite (as N)	<0.10
Sodium	5,800[C]
Chloride	7,800[ABC]
Sodium	3,100[C]
Iron	8.0[B]
PFPeA (ug/L)	0.68[E]



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Monitoring Well Location (Others 2013)

Monitoring Well Could Not Be Located (Approximate Location)

Exceeds Applicable Guidelines / Standards

Site Feature

* Concentrations expressed as mg/L unless otherwise indicated.
mg/L - milligrams per litre, ug/L - micrograms per litre

CCME Canadian Council of Ministers of the Environment
[A] Canadian Environmental Quality Guidelines, Canadian Water Quality Guidelines for the Protection of Aquatic Life - Freshwater Aquatic Short Term
[B] Canadian Environmental Quality Guidelines, Canadian Water Quality Guidelines for the Protection of Aquatic Life - Freshwater Aquatic Long Term
MECP Ontario Ministry of the Environment, Conservation and Parks, Formerly Ontario Ministry of the Environment (MOE), Ontario Ministry of the Environment, Conservation and Parks, Formerly Ontario Ministry of the Environment (MOE)
[C] Table 3 - All Types of Property Use - Coarse Textured Soils
Health Canada Health Canada Screening Values / Guidelines
[D] Guidelines for Canadian Drinking Water Quality for PFOS and PFOA (April 2019)
[E] Drinking Water Screening Values for other PFAS (April 2019)
ECCC - Environment and Climate Change Canada (February 2017)
[F] Federal Environmental Quality Guidelines for Perfluorooctane Sulfonate (PFOS) for surface water, dated February 2017 (Table 1, Water)

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Cambridge Bay
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TR by LVN on 2019-11-18
IR Review by TS on 2019-11-18

Client/Project 110220369
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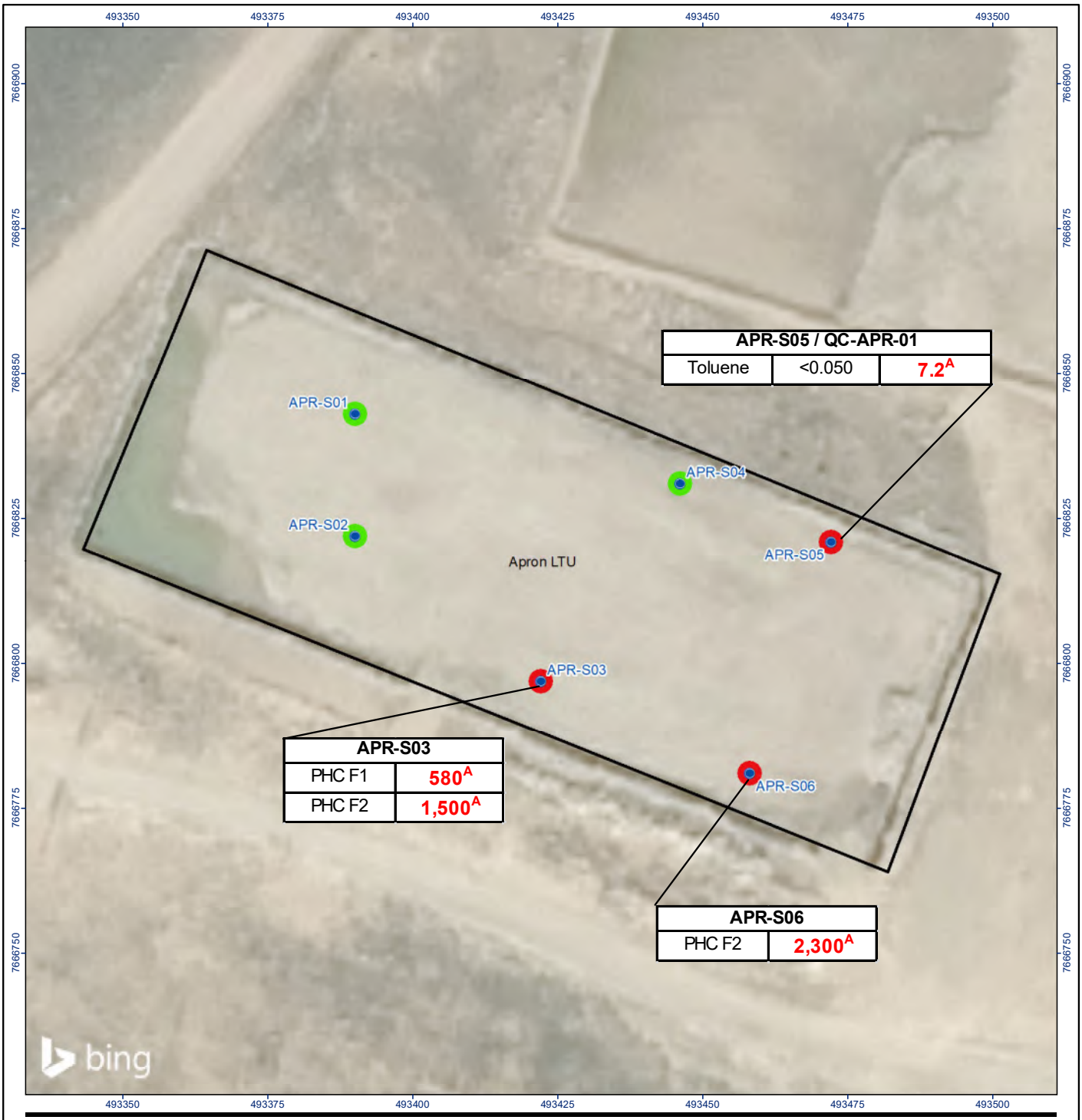
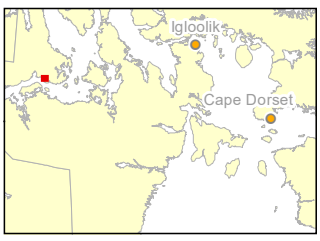
Figure No.
3

Title
Site Plan Showing Excavation Monitoring Wells and Groundwater Analytical Results





Site Feature

Soil Sampling Location (0.5 m BGS) -2019

Below Applicable Guidelines / Standards

Exceeds Applicable Guidelines / Standards

Parameter	NWB[A]
Toluene	0.37[A]
PHC F1	320[A]
PHC F2	260[A]

* Concentrations expressed as milligrams per kilogram (mg/kg)

NWB A Nunavut Water Board. 2018. NWB Licence No. 1BR-FTA-1828□ Table 1 Remediation Requirements - Industrial Coarse Land Use, excluding the protection of potable groundwater□

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

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Notes

1. Coordinate System: NAD 1983 UTM Zone 13N
2. Data Sources: Geogratis, ©Department of Natural Resources Canada, All rights reserved.
3. Background: © 2019 Microsoft Corporation © 2019 DigitalGlobe ©CNES (2019) Distribution Airbus DS

Stantec

Project Location
Cambridge Bay
Nunavut

Prepared by DJ on 2019-11-18
TR by LVN on 2019-11-18
IR Review by TS on 2019-11-18

Client/Project 110220369
Public Services and Procurement Canada (PSPC) for Transport Canada, Cambridge Bay Airport Apron Land Treatment Unit and Excavation Area

Figure No.
4

Title
Site Plan Showing Soil Sampling Locations and Soil Analytical Results

APPENDIX B

Laboratory Review of QA/QC Plan

2019/10/22

Stantec
10160 112 Street
Edmonton AB T5K 2L6 CA

Attn: Lindsay van Noortwyk , Associate / Project Manager

Re: Cambridge Bay Apron LTU and Excavation Area – 2019 Environmental Monitoring Program (as provided by Stantec)

Dear Ms van Noortwyk

As requested, Bureau Veritas Laboratories has reviewed the Cambridge Bay Apron LTU and Excavation Area Sampling Plan (appended). In our opinion the Plan meets or exceeds 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 at barry.loescher@BVlabs.com, 250 325-8887.

Sincerely,

Barry Loescher, PhD PChem QP
Quality Systems Specialist
Bureau Veritas Laboratories

Source	Location	Laboratory Analysis	Rationale
Soil	6 representative soil samples and 1 field duplicate sample from the FTA LTU collected at depth, 1 equipment rinsate blank, and 1 trip blank.	Benzene, toluene, ethylbenzene, and toluene (BTEX), PHC fractions 1 through 4 (F1-F4), lead, and polychlorinated biphenyls (PCBs).	NWB Licence Requirement
Groundwater	11 groundwater samples, 2 field duplicated samples, 1 equipment rinsate 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.	NWB Licence Requirement
*PFAS include the following 17 parameters: Perfluorobutane Sulfonate (PFBS), Perfluorobutanoic acid (PFBA), Perfluorodecane Sulfonate, Perfluorodecanoic Acid (PFDA), Perfluorododecanoic Acid (PFDoA), Perfluoroheptane sulfonate, Perfluoroheptanoic Acid (PFHpA), Perfluorohexane Sulfonate (PFHxS), Perfluorohexanoic Acid (PFHxA), Perfluoro-n-Octanoic Acid (PFOA), Perfluorononanoic Acid (PFNA), Perfluorooctane Sulfonamide (PFOSA), Perfluorooctane Sulfonate (PFOS), Perfluoropentanoic Acid (PFPeA), Perfluorotetradecanoic Acid, Perfluorotridecanoic Acid, Perfluoroundecanoic Acid (PFUnA).			

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APPENDIX C

NWB Communication RE: Applicable Standards

From: Karén Kharatyan
To: Barker, Jackie; Assol Kubeisinova
Cc: Licensing Department
Subject: Re: Clarifications requested regarding NWB Licence No. 1BR-FTA1828 - Transport Canada Cambridge Bay Land Treatment Units
Date: October 16, 2018 5:05:44 PM

Hi Jackie,

Thank you for pointing this out. The table included is from the Nunavut Guideline for Contaminated Sites Remediation that provides the requirements for soil remediation. However, I noticed that there are a few oversights of numbers within the table. The NWB will issue an errata letter some time in the next week.

Regarding the question related to groundwater monitoring results: as Nunavut does not have any guidelines the respective Ontario Soil, Groundwater and Sediment standards could be used for comparison and interpretation.

Regards,

On Tue, Oct 16, 2018 at 2:12 PM Barker, Jackie <Jackie.Barker@tc.gc.ca> wrote:

Good Afternoon,

While reviewing NWB Licence No. 1BR-FTA1828, Transport Canada's consultant noted that they require some clarification from NWB as follows and attached.

++

With respect to the Cambridge Bay Fire Training Area and Apron LTU's we are requesting clarification from the Board for the following:

1. While in the process of interpreting results, we noticed that the Remediation Requirements (Table 1 of the licence) do not match the Canada Wide Standards for Petroleum Hydrocarbons in Soil, The Canadian Soil Quality Guidelines, or the Nunavut Guideline for the Management of Contaminated Sites. Please see the attached file. Can you please provide clarification, or a revised table, as to which soil guidelines should be used in our annual report for Petroleum Hydrocarbons in Soil.

2. While in the process of interpreting results, we noticed that the licence does not specify the use of groundwater guidelines when interpreting the results from the groundwater monitoring wells. Please clarify which guidelines are appropriate for use for the groundwater monitoring wells.

Sincerely,

Jackie Barker

Environmental Officer, Prairie and Northern Region

Transport Canada / Government of Canada

jackie.barker@tc.gc.ca / Tel : 204-979-1739 / TTY : 1-888-675-6863

Agent en environnement, Région des Prairies et du Nord

Transports Canada / Gouvernement du Canada
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APPENDIX D

Applicable Standards and Guidelines

TABLES

Table 1 Remediation Requirements

	Soil Texture	Agricultural Land Use	Residential/Parkland Land Use	Commercial Land Use	Industrial Land Use
Fraction 1	Fine	210 (170[a])	210 (170[a])	320 (170[a])	320 (170[a])
	Coarse	30[b]	30[b]	320 (240[a])	320 (240[a])
Fraction 2	Fine	150	150	260 (230[a])	260 (230[a])
	Coarse	150	150	260	260
Fraction 3	Fine	1300	1300	2500	2500
	Coarse	300	300	1700	1700
Fraction 4	Fine	5600	5600	6600	6600
	Coarse	2800	2800	3300	3300
Benzene	Fine	0.0068	0.0068	0.0068	0.0068
	Coarse	0.03	0.03	0.03	0.03
Toluene	Fine	0.08	0.08	0.08	0.08
	Coarse	0.37	0.37	0.37	0.37
Ethylbenzene	Fine	0.018	0.018	0.018	0.018
	Coarse	0.082	0.082	0.082	0.082
Xylene	Fine	2.4	2.4	2.4	2.4
	Coarse	11	11	11	11
Lead	Fine	70	140	260	600
	Coarse				
Polychlorinated biphenyls	Fine	0.5	1.3	33	33
	Coarse				

Notes: All values are in parts per million (ppm).
a = Where applicable, for protection of potable groundwater.
b = Assumes contamination near residence

Data from CCME *Canada-Wide Standards for Petroleum Hydrocarbons (PHC) in Soil,* (2001) Revised January 2008 and the Government of Nunavut *Environmental Guideline for Site remediation* (2009).

Ontario Ministry of the Environment (Now the Ontario Ministry of the Environment, Conservation and Parks) Soil, Groundwater and Sediment Standards for Use under Part XV.1 of the Environmental Protection Act. 2011. Table 3 Site Condition Standards. Accessed from [https://www.ontario.ca/page/soil-ground-water-and-sediment-standards-use-under-part-xv1-environmental-protection-act] on October 22, 2019.

Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition

Contaminant	Soil Standards (other than sediment) µg/g Residential/Parkland/ Institutional Property Use	Soil Standards (other than sediment) µg/g Industrial/Commercial/ Community Property Use	Non-potable ground water µg/L All Types of Property Use
Acenaphthene	(58) 7.9	96	(1700) 600
Acenaphthylene	(0.17) 0.15	(0.17) 0.15	1.8
Acetone	(28) 16	(28) 16	130000
Aldrin	0.05	(0.11) 0.088	8.5
Anthracene	(0.74) 0.67	(0.74) 0.67	2.4
Antimony	7.5	(50) 40	20000
Arsenic	18	18	1900
Barium	390	670	29000
Benzene	(0.17) 0.21	(0.4) 0.32	(430) 44
Benz[a]anthracene	(0.63) 0.5	0.96	4.7
Benzo[a]pyrene	0.3	0.3	0.81
Benzo[b]fluoranthene	0.78	0.96	0.75
Benzo[ghi]perylene	(7.8) 6.6	9.6	0.2
Benzo[k]fluoranthene	0.78	0.96	0.4
Beryllium	(5) 4	(10) 8	67
Biphenyl 1,1'-	(1.1) 0.31	(210) 52	(2200) 1000
Bis(2-chloroethyl)ether	0.5	0.5	300000
Bis(2-chloroisopropyl)ether	(1.8) 0.67	(14) 11	20000
Bis(2-ethylhexyl)phthalate	5	(35) 28	140
Boron (Hot Water Soluble) *	1.5	2	NA
Boron (total)	120	120	45000
Bromodichloromethane	13	18	85000
Bromoform	(0.26) 0.27	(1.7) 0.61	(770) 380
Bromomethane	0.05	0.05	(56) 5.6
Cadmium	1.2	1.9	2.7
Carbon Tetrachloride	(0.12) 0.05	(1.5) 0.21	(8.4) 0.79
Chlordane	0.05	0.05	28
Chloroaniline p-	(0.53) 0.5	(0.53) 0.5	400
Chlorobenzene	(2.7) 2.4	(2.7) 2.4	630
Chloroform	(0.18) 0.05	(0.18) 0.47	(22) 2.4
Chlorophenol, 2-	(2) 1.6	(3.9) 3.1	3300
Chromium Total	160	160	810
Chromium VI	(10) 8	(10) 8	140
Chrysene	(7.8) 7	9.6	1
Cobalt	22	(100) 80	66
Copper	(180) 140	(300) 230	87
Cyanide (CN-)	0.051	0.051	66
Dibenz[a h]anthracene	0.1	0.1	0.52
Dibromochloromethane	9.4	13	82000

Ontario Ministry of the Environment (Now the Ontario Ministry of the Environment, Conservation and Parks) Soil, Groundwater and Sediment Standards for Use under Part XV.1 of the Environmental Protection Act. 2011. Table 3 Site Condition Standards. Accessed from [https://www.ontario.ca/page/soil-ground-water-and-sediment-standards-use-under-part-xv1-environmental-protection-act] on October 22, 2019.

Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition

Contaminant	Soil Standards (other than sediment) µg/g Residential/Parkland/ Institutional Property Use	Soil Standards (other than sediment) µg/g Industrial/Commercial/ Community Property Use	Non-potable ground water µg/L All Types of Property Use
Dichlorobenzene, 1,2-	(4.3) 3.4	(8.5) 6.8	(9600) 4600
Dichlorobenzene, 1,3-	(6) 4.8	(12) 9.6	9600
Dichlorobenzene, 1,4-	(0.097) 0.083	(0.84) 0.2	(67) 8
Dichlorobenzidine, 3,3'-	1	1	640
Dichlorodifluoromethane	(25) 16	(25) 16	4400
DDD	3.3	4.6	45
DDE	(0.33) 0.26	(0.65) 0.52	20
DDT	1.4	1.4	2.8
Dichloroethane, 1,1-	(11) 3.5	(21) 17	(3100) 320
Dichloroethane, 1,2-	0.05	0.05	(12) 1.6
Dichloroethylene, 1,1-	0.05	(0.48) 0.064	(17) 1.6
Dichloroethylene, 1,2-cis-	(30) 3.4	(37) 55	(17) 1.6
Dichloroethylene, 1,2-trans-	(0.75) 0.084	(9.3) 1.3	(17) 1.6
Dichlorophenol, 2,4-	(2.1) 1.7	(4.2) 3.4	4600
Dichloropropane, 1,2-	(0.085) 0.05	(0.68) 0.16	(140) 16
Dichloropropene,1,3-	(0.083) 0.05	(0.21) 0.18	(45) 5.2
Dieldrin	0.05	(0.11) 0.088	0.75
Diethyl Phthalate	0.5	0.5	38
Dimethylphthalate	0.5	0.5	38
Dimethylphenol, 2,4-	(420) 390	(440) 390	39000
Dinitrophenol, 2,4-	38	(66) 59	11000
Dinitrotoluene, 2,4 & 2,6-	0.92	1.2	2900
Dioxane, 1,4	1.8	1.8	(7300000)1900000
Dioxin/Furan (TEQ)	0.000013	0.000099	(0.023) 0.014
Endosulfan	0.04	(0.38) 0.3	1.5
Endrin	0.04	0.04	0.48
Ethylbenzene	(15) 2	(19) 9.5	2300
Ethylene dibromide	0.05	0.05	(0.83) 0.25
Fluoranthene	0.69	9.6	130
Fluorene	(69) 62	(69) 62	400
Heptachlor	0.15	0.19	2.5
Heptachlor Epoxide	0.05	0.05	0.048
Hexachlorobenzene	0.52	0.66	3.1
Hexachlorobutadiene	(0.014) 0.012	(0.095) 0.031	(4.5) 0.44
Hexachlorocyclohexane Gamma-	(0.063) 0.056	(0.063) 0.056	1.2
Hexachloroethane	(0.071) 0.089	(0.43) 0.21	(200) 94
Hexane (n)	(34) 2.8	(88) 46	(520) 51
Indeno[1 2 3-cd]pyrene	(0.48) 0.38	(0.95) 0.76	0.2
Lead	120	120	25

Ontario Ministry of the Environment (Now the Ontario Ministry of the Environment, Conservation and Parks) Soil, Groundwater and Sediment Standards for Use under Part XV.1 of the Environmental Protection Act. 2011. Table 3 Site Condition Standards. Accessed from [https://www.ontario.ca/page/soil-ground-water-and-sediment-standards-use-under-part-xv1-environmental-protection-act] on October 22, 2019.

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Contaminant	Soil Standards (other than sediment) µg/g Residential/Parkland/ Institutional Property Use	Soil Standards (other than sediment) µg/g Industrial/Commercial/ Community Property Use	Non-potable ground water µg/L All Types of Property Use
Mercury	(1.8) 0.27	(20) 3.9	(2.8) 0.29
Methoxychlor	0.13	1.6	6.5
Methyl Ethyl Ketone	(44) 16	(88) 70	(1500000) 470000
Methyl Isobutyl Ketone	(4.3) 1.7	(210) 31	(580000) 140000
Methyl Mercury **	(0.0094) 0.0084	(0.0094) 0.0084	0.15
Methyl tert-Butyl Ether (MTBE)	(1.4) 0.75	(3.2) 11	(1400) 190
Methylene Chloride	(0.96) 0.1	(2) 1.6	(5500) 610
Methlynaphthalene, 2-(1-) ***	(3.4) 0.99	(85) 76	1800
Molybdenum	6.9	40	9200
Naphthalene	(0.75) 0.6	(28) 9.6	(6400) 1400
Nickel	(130) 100	(340) 270	490
Pentachlorophenol	0.1	(3.3) 2.9	62
Petroleum Hydrocarbons F1 ****	(65) 55	(65) 55	750
Petroleum Hydrocarbons F2	(150) 98	(250) 230	150
Petroleum Hydrocarbons F3	(1300) 300	(2500) 1700	500
Petroleum Hydrocarbons F4	(5600) 2800	(6600) 3300	500
Phenanthrene	(7.8) 6.2	(16) 12	580
Phenol	9.4	9.4	12000
Polychlorinated Biphenyls	0.35	1.1	(15) 7.8
Pyrene	78	96	68
Selenium	2.4	5.5	63
Silver	(25) 20	(50) 40	1.5
Styrene	(2.2) 0.7	(43) 34	(9100) 1300
Tetrachloroethane, 1,1,1,2-	(0.05) 0.058	(0.11) 0.087	(28) 3.3
Tetrachloroethane, 1,1,2,2-	0.05	(0.094) 0.05	(15) 3.2
Tetrachloroethylene	(2.3) 0.28	(21) 4.5	(17) 1.6
Thallium	1	3.3	510
Toluene	(6) 2.3	(78) 68	18000
Trichlorobenzene, 1,2,4-	(1.4) 0.36	(16) 3.2	(850) 180
Trichloroethane, 1,1,1-	(3.4) 0.38	(12) 6.1	(6700) 640
Trichloroethane, 1,1,2-	0.05	(0.11) 0.05	(30) 4.7
Trichloroethylene	(0.52) 0.061	(0.61) 0.91	(17) 1.6
Trichlorofluoromethane	(5.8) 4	(5.8) 4	2500
Trichlorophenol, 2,4,5-	(5.5) 4.4	10	1600
Trichlorophenol, 2,4,6-	(4.2) 3.8	(4.2) 3.8	230
Uranium	23	33	420
Vanadium	86	86	250
Vinyl Chloride	(0.022) 0.02	(0.25) 0.032	(1.7) 0.5

Ontario Ministry of the Environment (Now the Ontario Ministry of the Environment, Conservation and Parks) Soil, Groundwater and Sediment Standards for Use under Part XV.1 of the Environmental Protection Act. 2011. Table 3 Site Condition Standards. Accessed from [https://www.ontario.ca/page/soil-ground-water-and-sediment-standards-use-under-part-xv1-environmental-protection-act] on October 22, 2019.

Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition

Contaminant	Soil Standards (other than sediment) µg/g Residential/Parkland/ Institutional Property Use	Soil Standards (other than sediment) µg/g Industrial/Commercial/ Community Property Use	Non-potable ground water µg/L All Types of Property Use
Xylene Mixture	(25) 3.1	(30) 26	4200
Zinc	340	340	1100
Electrical Conductivity (mS/cm)	0.7	1.4	#N/A
Chloride	NA	NA	2300000
Sodium Adsorption Ratio	5	12	NA
Sodium	NA	NA	2300000

Canadian Environmental Quality GuidelinesSummary Table		Water Quality Guidelinesfor the Protection of Aquatic Life					
		Freshwater			Marine		
		Concentration (ug/L)	Concentration (ug/L)	Date	Concentration (ug/L)	Concentration (ug/L)	Date
Chemical Name	Chemical Groups	Short Term	Long Term		Short Term	Long Term	
Acenaphthene\n\n	*Organic Polyaromatic compounds Polycyclic aromatic hydrocarbons*	*No data*	*5.8*	*1999*	*No data*	*Insufficient data*	*1999*
Acenaphthylene\n\n	*Organic Polyaromatic compounds Polycyclic aromatic hydrocarbons*	*No data*	*No data*	*1999*	*No data*	*No data*	*1999*
Acridine\n\n	*Organic Polyaromatic compounds Polycyclic aromatic hydrocarbons*	*No data*	*4.4*	*1999*	*No data*	*Insufficient data*	*1999*
Aluminium\n\n	*Inorganic Metals*	*No data*	*Variable*	*1987*	*No data*	*No data*	*No data*
Ammonia (total)\n\n	*Inorganic Inorganic nitrogen compounds*	*No data*	*Table*	*2001*	*No data*	*No data*	*No data*

Canadian Environmental Quality GuidelinesSummary Table		Water Quality Guidelinesfor the Protection of Aquatic Life					
		Freshwater			Marine		
		Concentration (ug/L)	Concentration (ug/L)	Date	Concentration (ug/L)	Concentration (ug/L)	Date
Chemical Name	Chemical Groups	Short Term	Long Term		Short Term	Long Term	
Anthracene\n\n	*Organic Polyaromatic compounds Polycyclic aromatic hydrocarbons*	*No data*	*0.012*	*1999*	*No data*	*Insufficient data*	*1999*
Arsenic\n\nCASRN none	*Inorganic Metals*	*No data*	*5*	*1997*	*No data*	*12.5*	*1997*
Benz(a)anthracene\n\n	*Organic Polyaromatic compounds Polycyclic aromatic hydrocarbons*	*No data*	*0.018*	*1999*	*No data*	*Insufficient data*	*1999*
Benzene\n\nCASRN 71432	*Organic Monocyclic aromatic compounds*	*No data*	*370*	*1999*	*No data*	*110*	*1999*
Benzo(a)pyrene\n\n	*Organic Polyaromatic compounds Polycyclic aromatic hydrocarbons*	*No data*	*0.015*	*1999*	*No data*	*Insufficient data*	*1999*

Canadian Environmental Quality GuidelinesSummary Table		Water Quality Guidelinesfor the Protection of Aquatic Life					
		Freshwater			Marine		
		Concentration (ug/L)	Concentration (ug/L)	Date	Concentration (ug/L)	Concentration (ug/L)	Date
Chemical Name	Chemical Groups	Short Term	Long Term		Short Term	Long Term	
Cadmium\n\nCASRN 7440439	*Inorganic Metals*	*1*	*0.09*	*2014*	*NRG*	*0.12*	*2014*
Chloride\n\n	*Inorganic*	*640,000 µg/L or 640 mg/L*	*120,000 µg/L or 120 mg/L*	*2011*	*NRG*	*NRG*	*2011*
Chrysene\n\n	*Organic Polyaromatic compounds Polycyclic aromatic hydrocarbons*	*No data*	*Insufficient data*	*1999*	*No data*	*Insufficient data*	*1999*
Copper\n\n	*Inorganic Metals*	*No data*	*Equation*	*1987*	*No data*	*No data*	*No data*
Ethylbenzene\n\nCASRN 100414	*Organic Monocyclic aromatic compounds*	*No data*	*90*	*1996*	*No data*	*25*	*1996*

Canadian Environmental Quality GuidelinesSummary Table		Water Quality Guidelinesfor the Protection of Aquatic Life					
		Freshwater			Marine		
		Concentration (ug/L)	Concentration (ug/L)	Date	Concentration (ug/L)	Concentration (ug/L)	Date
Chemical Name	Chemical Groups	Short Term	Long Term		Short Term	Long Term	
Fluoranthene\n\n	*Organic Polyaromatic compounds Polycyclic aromatic hydrocarbons*	*No data*	*0.04*	*1999*	*No data*	*Insufficient data*	*1999*
Fluorene\n\n	*Organic Polyaromatic compounds Polycyclic aromatic hydrocarbons*	*No data*	*3*	*1999*	*No data*	*Insufficient data*	*1999*
Iron\n\n	*Inorganic Metals*	*No data*	*300*	*1987*	*No data*	*No data*	*No data*
Lead\n\n	*Inorganic Metals*	*No data*	*Equation*	*1987*	*No data*	*No data*	*No data*
Molybdenum\n\n	*Inorganic Metals*	*No data*	*73*	*1999*	*No data*	*No data*	*No data*

Canadian Environmental Quality GuidelinesSummary Table		Water Quality Guidelinesfor the Protection of Aquatic Life					
		Freshwater			Marine		
		Concentration (ug/L)	Concentration (ug/L)	Date	Concentration (ug/L)	Concentration (ug/L)	Date
Chemical Name	Chemical Groups	Short Term	Long Term		Short Term	Long Term	
Naphthalene\n\n	*Organic Polyaromatic compounds Polycyclic aromatic hydrocarbons*	*No data*	*1.1*	*1999*	*No data*	*1.4*	*1999*
Nickel\n\n	*Inorganic Metals*	*No data*	*Equation*	*1987*	*No data*	*No data*	*No data*
Nitrate\n\nCASRN 14797-55-8	*Inorganic Inorganic nitrogen compounds*	*550,000 µg/L or 550 mg/L*	*13,000 µg/L or 13 mg/L*	*2012*	*1,500,000 µg/L or 1500 mg/L*	*200,000 µg/L or 200 mg/L*	*2012*
Nitrite\n\n	*Inorganic Inorganic nitrogen compounds*	*No data*	*60 NO_2-N*	*1987*	*No data*	*No data*	*No data*
Phenanthrene\n\n	*Organic Polyaromatic compounds Polycyclic aromatic hydrocarbons*	*No data*	*0.4*	*1999*	*No data*	*Insufficient data*	*1999*

Canadian Environmental Quality GuidelinesSummary Table		Water Quality Guidelinesfor the Protection of Aquatic Life					
		Freshwater			Marine		
		Concentration (ug/L)	Concentration (ug/L)	Date	Concentration (ug/L)	Concentration (ug/L)	Date
Chemical Name	Chemical Groups	Short Term	Long Term		Short Term	Long Term	
Phenols (mono-& dihydric)\n\nCASRN 108952	*Organic Aromatic hydroxy compounds*	*No data*	*4*	*1999*	*No data*	*No data*	*No data*
Pyrene\n\n	*Organic Polyaromatic compounds Polycyclic aromatic hydrocarbons*	*No data*	*0.025*	*1999*	*No data*	*Insufficient data*	*1999*
pH\n\n	*Inorganic Acidity, alkalinity and pH*	*No data*	*6.5 to 9.0*	*1987*	*No data*	*7.0 to 8.7 & Narrative*	*1996*
Quinoline\n\n	*Organic Polyaromatic compounds Polycyclic aromatic hydrocarbons*	*No data*	*3.4*	*1999*	*No data*	*Insufficient data*	*1999*
Selenium\n\n	*Inorganic Metals*	*No data*	*1*	*1987*	*No data*	*No data*	*No data*

Canadian Environmental Quality GuidelinesSummary Table		Water Quality Guidelinesfor the Protection of Aquatic Life					
		Freshwater			Marine		
		Concentration (ug/L)	Concentration (ug/L)	Date	Concentration (ug/L)	Concentration (ug/L)	Date
Chemical Name	Chemical Groups	Short Term	Long Term		Short Term	Long Term	
Silver\n\n	*Inorganic Metals*	*NRG*	*0.25*	*2015*	*7.5*	*NRG*	*2015*
Toluene\n\nCASRN 108883	*Organic Monocyclic aromatic compounds*	*No data*	*2*	*1996*	*No data*	*215*	*1996*
Zinc\n\n	*Inorganic Metals*	*37*	*7*	*2018*	*Not assessed*	*Not assessed*	*2018*

Water Talk - Perfluoroalkylated substances in drinking water

April 2019

Perfluoroalkylated substances (PFAS)

Perfluoroalkylated substances (PFAS) are synthetic chemicals, the most common being perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA). PFAS are used in a wide variety of industrial and consumer products such as adhesives, cosmetics, cleaning products, and in specialized chemical applications, such as fire-fighting foams. PFAS are also used in water-, stain-, and oil-repellent coatings for fabrics and paper. Environmental concentrations of PFAS may be higher in areas near facilities that use large amounts of these chemicals, and near locations where fire-fighting foams containing PFAS were used to put out a fire.

Short-term exposure to PFAS in drinking water at levels slightly higher than the maximum acceptable concentrations (MAC) or screening values, below, is not expected to result in health effects as these values are based on a lifetime of exposure to the substance. Potential health risks from exposure significantly above these values depend on how much PFAS a person was exposed to, and for how long he/she was exposed. High levels of PFAS have been linked with

negative health effects in animal studies, including liver damage and impacts on neurological development. However, there is little information available on human health risks associated with PFAS.

Activities like bathing, showering, washing dishes, brushing teeth and doing laundry do not pose a health concern. PFAS stay in the water, so you can't breathe them in and they won't be absorbed through the skin.

Ingesting water, such as through drinking, using it in food preparation and in infant formula, does not pose a health risk so long as the levels of PFAS in drinking water do not exceed the MACs or screening values over an extended period of time.

Guidelines for Canadian Drinking Water Quality for PFOS and PFOA

Health Canada's drinking water guideline values apply to water intended for human consumption. Only PFOS and PFOA have been studied sufficiently to develop Guideline Technical Documents under the Guidelines for Canadian Drinking Water Quality.

When guideline values are developed, Health Canada includes a margin of safety (or 'buffer zone'). As such, guideline values such as maximum acceptable concentrations (MACs) are established at a level designed to protect the health of Canadians, including children, based on a lifetime's exposure to the substance.

Table 1 - Guidelines for Canadian drinking water quality - MACs for PFOS and PFOA

PFAS Name	Acronym	Maximum acceptable concentration (MAC) (milligrams/litre) (mg/L)	Maximum acceptable concentration(MAC) (micrograms/litre)

			(µg/L)
perfluorooctanoic acid	PFOA	0.0002	0.2
perfluorooctane sulfonate	PFOS	0.0006	0.6

Water quality Testing Results for PFOS and PFOA

The health effects of PFOS and PFOA are similar and well documented. Based on recent science (2018), we know that PFOS and PFOA affect the same organ in similar ways. Thus, when PFOS and PFOA are found together in drinking water, the best approach to protect human health is to consider both chemicals together when comparing test results to the maximum acceptbale concentrations (MAC).

This is done by adding the ratio of the monitoring result for PFOS to its MAC with the ratio of the monitoring result for PFOA to its MAC; if the result is below or equal to one, then the water is considered safe for drinking. Science currently does not justify the use of this approach for other PFAS.

If water test results show concentrations of PFOS or PFOA above their respective MACs noted in Table 1, or if the sum of the ratios is greater than one as described above, there are treatment systems available that can remove PFAS from drinking water.

Health Canada's Drinking Water Screening Values for Other PFAS

Health Canada's drinking water screening values (DWSV) are provided as guidance, and apply to water intended for human consumption. They are developed at the request of a federal department or a province or territory when

there is a need for a quick response, and there are no existing formal guidelines. Because of the need for a quick response, screening values are a rapid assessment to help an organization identify a level at which no health effects are expected. They are based on a limited review of existing science and don't undergo peer review or public consultation as would formal guidelines. However, they are still based on similar risk assessment approaches as formal guidelines. Screening values are based on available scientific studies, as well as assessments conducted by other jurisdictions.

Health Canada has developed screening values for a number of other PFAS at the request of several jurisdictions. As with formal guidelines, when screening values are developed, Health Canada includes a margin of safety (or 'buffer zone'). As such, screening values are also established at a level designed to protect the health of Canadians, including children, based on a lifetime's exposure to the substance.

Scientific information is limited on the majority of PFAS. The drinking water screening values for most other PFAS were developed using PFOS and PFOA as surrogates, whereas they are expected to be less toxic because of their chemical structure.

Table 2 - Health Canada drinking water screening values - other PFAS

Pfas name	Acronym	Drinking water screening value (milligrams/litre) (mg/L)	Drinking water screening value (micrograms/litre) (µg/L)
perfluorobutanoate	PFBA	0.03	30
perfluorobutane sulfonate	PFBS	0.015	15

perfluorohexanesulfonate	PFHxS	0.0006	0.6
perfluoropentanoate	PFPeA	0.0002	0.2
perfluorohexanoate	PFHxA	0.0002	0.2
perfluoroheptanoate	PFHpA	0.0002	0.2
perfluorononanoate	PFNA	0.00002	0.02
6:2 fluorotelomer sulfonate	6:2 FTS	0.0002	0.2
8:2 fluorotelomer sulfonate	8:2 FTS	0.0002	0.2

Water quality testing results and the screening values for other pfas

Exposure to PFAS in drinking water is not considered to pose a risk to Canadians if levels fall below the Health Canada screening values outlined above.

If your drinking water testing results for other PFAS are above the screening values noted in Table 2, there are treatment systems available that can remove PFAS from drinking water.

Treatment options for PFAS

PFAS can be removed by treating well water: using either an activated carbon filter installed at the tap or where the water enters the house; or using a reverse osmosis system installed at the drinking water tap. Reverse osmosis systems should only be installed at the tap, as the treated water may cause corrosion to the plumbing and cause other contaminants, like heavy metals, to leach into the water.

Before you install a treatment system, your water should be tested for the presence and concentration of PFAS. Once the system is in place, you should have both the water entering the system and the treated water tested periodically to ensure the system is, and continues to be effective.

For more information:

Guidelines for Canadian Drinking Water Quality for PFOS and PFOA:

- For any questions on drinking water quality, visit Health Canada's drinking water quality web site or contact us at:
  - 1-833-223-1014 (toll free)
  - hc.water-eau.sc@canada.ca

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Exert from: Environment and Climate Change Canada. Federal Environmental Quality Guidelines for Perfluorooctane Sulfonate (PFOS) dated May 2018, accessed November 5, 2019 from [https://www.canada.ca/content/dam/eccc/documents/pdf/pded/feqg-pfos/20180620-PFOS-EN.pdf]

Table 1. Federal Environmental Quality Guidelines for Perfluorooctane Sulfonate (PFOS) for Surface Water, Fish Tissue, Wildlife Diet, and Bird Egg.

Water (µg/L)	**Fish Tissue (mg/kg ww)***	**Wildlife Diet (µg/kg ww food)****		**Bird Egg (µg/g ww)**
		Mammalian	Avian	
6.8	9.4	4.6	8.2	1.9

*ww = wet weight

**The wildlife diet guidelines are intended to protect either mammalian or avian species that consume aquatic biota. It is the concentration of PFOS in the aquatic biota food item, expressed on whole body, wet weight basis that could be eaten by terrestrial or semi-aquatic mammalian or avian wildlife.

APPENDIX E

Tables

Table 1
Summary of Groundwater Monitoring Results
2019 Site Remedial Activities and Environmental Monitoring Program
Cambridge Bay Airport, Apron Land Treatment Unit and Excavation Area

Monitoring Well ID	Date Monitored	Well Condition	CHV (ppm)	Top of Casing (m AGS)	Water Level (m BGS)	Total Depth (m BTOC)	Date Sampled	Temperature (°C)	Conductivity (mS/cm)	pH	ORP (mV)	DO (mg/L)
MW13-1	7-Aug-19	Good (No repair required)	0	1.16	1.474	2.29	15-Aug-19	5.52	3.085	7.12	-30.2	0.41
MW13-2	7-Aug-19	Good (No repair required)	0	1.17	Dry	1.976	NA	Dry				
MW13-3	7-Aug-19	Good (No repair required)	0	0.72	1.196	2.18	15-Aug-19	3.93	5.597	6.95	115.5	1.11
MW13-4	7-Aug-19	Good (No repair required)	0	1.08	Dry	2.251	NA	Dry				
MW13-5	7-Aug-19	Good (No repair required)	0	1.104	1.140	2.231	15-Aug-19	5.16	1.964	7.15	-45.4	1.08
MW13-6	7-Aug-19	Could not Locate										
MW13-7	7-Aug-19	Good (No repair required)	0	-0.09	0.335	1.461	16-Aug-19	5.19	4.494	7.67	-49.9	6.34
MW13-8	7-Aug-19	Could not Locate										
MW13-9	7-Aug-19	Good (No repair required)	0	0.59	0.370	1.217	16-Aug-19	3.59	32.082	6.85	28.5	0.53

Notes:

CHV	Combustible headspace vapour concentrations
m AGS	Metres above ground surface
m BGS	Metres below ground surface
m BTOC	Metres below top of casing
ppm	parts per million
0C	Degrees Celsius
mS/cm	milliSiemens per centimetre
ORP	Oxidation Reduction Potential
mV	milliVolts
DO	Dissolved Oxygen
mg/L	milligrams per litre

Parameters including Temperature, Conductivity, pH, ORP, and DO were measured at the time of sample collection.

Table 2
Summary of Groundwater Analytical Results
2019 Site Remedial Activities and Environmental Monitoring Program
Cambridge Bay Airport, Apron Land Treatment Unit and Excavation Area

Sample Location		MECP	CCME	Health Canada	ECCC	MW13-1	MW13-3			MW13-5	MW13-7	MW13-9
Sample Date		Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Groundwater Condition. Coarse-Textured Soils	Canadian Water Quality Guidelines for Protection of Aquatic Life (for information purposes)	Guidelines, Screening Values and TRVs for PFAS (for information purposes)	Federal Environmental Quality Guidelines for PFOS for surface water (for information purposes)	15-Aug-19	15-Aug-19	15-Aug-19		15-Aug-19	16-Aug-19	16-Aug-19
Sample ID						MW13-1	MW13-3	GW-QC-02		MW13-5	MW13-7	MW13-9
Sample Depth												
Sampling Company						STANTEC	STANTEC	STANTEC		STANTEC	STANTEC	STANTEC
Laboratory						BV	BV	BV		BV	BV	BV
Laboratory Work Order						B969005	B969005	B969005		B969005	B969005	B969005
Laboratory Sample ID						WI1959	WI1958	WI1960	RPD	WI1957	WI1961	WI1962
Sample Type	Units							Field Duplicate	(%)			
General Chemistry												
Total Suspended Solids	mg/L	n/v	n/v	n/v	n/v	5.3	17	15	13%	4.0	7.3	35
pH, lab	S.U.	n/v	$6.5\text{-}9.0^{B}$	n/v	n/v	7.59	7.53	7.55	nc	7.60	7.24	7.23
Hardness (as CaCO3)	mg/L	n/v	n/v	n/v	n/v	1,100	1,400	1,400	0%	670	1,900	6,700
Alkalinity, Total (as CaCO3)	mg/L	n/v	n/v	n/v	n/v	430	400	410	2%	260	480	560
Electrical Conductivity, Lab	µS/cm	n/v	n/v	n/v	n/v	2,900	5,500	5,500	0%	1,900	4,400	35,000
Nitrate + Nitrite (as N)	mg/L	n/v	n/v	n/v	n/v	7.9	2.5	2.6	4%	<0.014	0.048	<0.14
Nitrate	mg/L	n/v	550^{A} 13^{B}	n/v	n/v	**35^{B}**	11	11	0%	<0.044	0.21	<0.44
Nitrate (as N)	mg/L	n/v	124^{A} 3.0^{B}	n/v	n/v	**7.9^{B}**	2.5	2.6	4%	<0.010	0.048	<0.10
Nitrite	mg/L	n/v	0.197^{B}	n/v	n/v	<0.033	<0.033	<0.033	nc	<0.033	<0.033	***<0.33***
Nitrite (as N)	mg/L	n/v	0.06^{B}	n/v	n/v	<0.010	<0.010	<0.010	nc	<0.010	<0.010	***<0.10***
Ammonia (as N)	mg/L	n/v	3.98_{TBC}^{B}	n/v	n/v	0.58	0.28	0.23	20%	0.20	2.5	2.4
Oil and Grease, Total	mg/L	n/v	n/v	n/v	n/v	3.0	2.0	2.0	nc	<2.0	<2.0	<2.0
Phenols												
Phenol	mg/L	12^{C}	0.004^{B}	n/v	n/v	<0.00010	<0.00010	<0.00010	nc	<0.00010	<0.00010	0.0001
Dissolved Ions												
Calcium	mg/L	n/v	n/v	n/v	n/v	200	240	240	0%	120	340	520
Magnesium	mg/L	n/v	n/v	n/v	n/v	160	200	200	0%	89	250	1,300
Sodium	mg/L	$2{,}300^{C}$	n/v	n/v	n/v	210	720	720	0%	160	320	**5.800^{C}**
Potassium	mg/L	n/v	n/v	n/v	n/v	36	70	70	0%	10	21	190
Chloride	mg/L	$2{,}300^{C}$	640^{A} 120^{B}	n/v	n/v	**240^{B}**	**730^{AB}**	**680^{AB}**	7%	**180^{B}**	**570^{B}**	**$7{,}800^{ABC}$**
Sulfate	mg/L	n/v	n/v	n/v	n/v	810	1,500	1,500	0%	490	1,300	3,100
Metals, Total												
Aluminum	mg/L	n/v	0.1_{VAR1}^{B}	n/v	n/v	0.05	**0.16^{B}**	**0.19^{B}**	17%	0.078	**0.13^{B}**	0.098
Arsenic	mg/L	n/v	0.005^{B}	n/v	n/v	0.0015	0.00039	0.00039	nc	0.0011	0.00097	0.0031
Cadmium	mg/L	n/v	7.7_{STB}^{A} 0.37_{LTG}^{B}	n/v	n/v	<0.000020	0.000031	0.000027	nc	<0.000020	0.000081	0.000073
Cobalt	mg/L	n/v	n/v	n/v	n/v	0.003	0.0092	0.0090	2%	0.0048	0.0085	0.065
Copper	mg/L	n/v	0.004^{B}	n/v	n/v	0.0032	0.0029	0.0029	0%	0.0018	0.0061	0.003
Iron	mg/L	n/v	0.3^{B}	n/v	n/v	**1.8^{B}**	**1.4^{B}**	**0.98^{B}**	35%	**0.32^{B}**	**0.92^{B}**	**8.0^{B}**
Lead	mg/L	n/v	0.007^{B}	n/v	n/v	<0.00020	0.00021	<0.00020	nc	<0.00020	<0.00020	0.0011
Molybdenum	mg/L	n/v	0.073^{B}	n/v	n/v	0.0046	0.0052	0.0050	4%	0.0020	0.0056	0.0046
Nickel	mg/L	n/v	0.150^{B}	n/v	n/v	0.047	0.10	0.10	0%	0.024	0.014	0.1
Selenium	mg/L	n/v	0.001^{B}	n/v	n/v	0.00025	0.00033	0.00029	nc	<0.00020	0.00047	0.00076
Silver	mg/L	n/v	0.00025^{B}	n/v	n/v	<0.00010	<0.00010	<0.00010	nc	<0.00010	<0.00010	<0.00010
Titanium	mg/L	n/v	n/v	n/v	n/v	0.0023	0.011	0.012	9%	0.0035	0.0082	0.0064
Zinc	mg/L	n/v	n/v	n/v	n/v	<0.0030	<0.0030	<0.0030	nc	<0.0030	0.023	0.0042
BTEX and Petroleum Hydrocarbons												
Benzene	mg/L	0.044^{C}	0.37^{B}	n/v	n/v	<0.00040	<0.00040	<0.00040	nc	<0.00040	0.0055	<0.00040
Toluene	mg/L	18^{C}	0.002^{B}	n/v	n/v	<0.00040	<0.00040	<0.00040	nc	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	2.3^{C}	0.09^{B}	n/v	n/v	<0.00040	<0.00040	<0.00040	nc	<0.00040	<0.00040	<0.00040
Xylenes, Total	mg/L	4.2_{s1}^{C}	n/v	n/v	n/v	<0.00089	<0.00089	<0.00089	nc	<0.00089	<0.00089	<0.00089
PHC F1 (C6-C10 range)	mg/L	0.75_{s7}^{C}	n/v	n/v	n/v	<0.10	<0.10	<0.10	nc	<0.10	<0.10	<0.10
PHC F2 (>C10-C16 range)	mg/L	0.15_{s15}^{C}	n/v	n/v	n/v	<0.10	<0.10	<0.10	nc	<0.10	<0.10	<0.10
Polycyclic Aromatic Hydrocarbons												
Acenaphthene	mg/L	0.6^{C}	0.0058^{B}	n/v	n/v	<0.00010	<0.00010	<0.00010	nc	<0.00010	<0.00010	<0.00010
Acenaphthylene	mg/L	0.0018^{C}	n/v	n/v	n/v	<0.00010	<0.00010	<0.00010	nc	<0.00010	<0.00010	<0.00010
Acridine	mg/L	n/v	0.0044^{B}	n/v	n/v	<0.000040	<0.000040	<0.000040	nc	<0.000040	<0.000040	<0.000040
Anthracene	mg/L	0.0024^{C}	$1.2E\text{-}5^{A}$ $1.2E\text{-}5^{B}$	n/v	n/v	<0.000010	<0.000010	<0.000010	nc	<0.000010	<0.000010	<0.000010
Benzo(a)anthracene	mg/L	0.0047^{C}	$1.8E\text{-}5^{B}$	n/v	n/v	<0.0000085	<0.0000085	<0.0000085	nc	<0.0000085	<0.0000085	<0.0000085
Benzo(a)pyrene	mg/L	0.00081^{C}	$1.5E\text{-}5^{B}$	n/v	n/v	<0.0000075	<0.0000075	<0.0000075	nc	<0.0000075	<0.0000075	<0.0000075
Benzo(a)pyrene Total Potency Equivalents	mg/L	n/v	n/v	n/v	n/v	<0.000010	<0.000010	<0.000010	nc	<0.000010	<0.000010	<0.000010
Benzo(b)pyridine (Quinoline)	mg/L	n/v	0.0034^{B}	n/v	n/v	<0.00020	<0.00020	<0.00020	nc	<0.00020	<0.00020	<0.00020
Benzo(b/j)fluoranthene	mg/L	0.00075_{s2}^{C}	n/v	n/v	n/v	<0.0000085	<0.0000085	<0.0000085	nc	<0.0000085	<0.0000085	<0.0000085
Benzo(c)phenanthrene	mg/L	n/v	n/v	n/v	n/v	<0.000050	<0.000050	<0.000050	nc	<0.000050	<0.000050	<0.000050
Benzo(e)pyrene	mg/L	n/v	n/v	n/v	n/v	<0.000050	<0.000050	<0.000050	nc	<0.000050	<0.000050	<0.000050
Benzo(g,h,i)perylene	mg/L	0.0002^{C}	n/v	n/v	n/v	<0.0000085	<0.0000085	<0.0000085	nc	<0.0000085	<0.0000085	<0.0000085
Benzo(k)fluoranthene	mg/L	0.0004^{C}	n/v	n/v	n/v	<0.0000085	<0.0000085	<0.0000085	nc	<0.0000085	<0.0000085	<0.0000085
Chrysene	mg/L	0.001^{C}	n/v	n/v	n/v	<0.0000085	<0.0000085	<0.0000085	nc	<0.0000085	<0.0000085	<0.0000085
Dibenzo(a,h)anthracene	mg/L	0.00052^{C}	n/v	n/v	n/v	<0.0000075	<0.0000075	<0.0000075	nc	<0.0000075	<0.0000075	<0.0000075
Fluoranthene	mg/L	0.13^{C}	$4E\text{-}5^{B}$	n/v	n/v	<0.000010	<0.000010	<0.000010	nc	<0.000010	<0.000010	<0.000010
Fluorene	mg/L	0.4^{C}	0.003^{B}	n/v	n/v	<0.000050	<0.000050	<0.000050	nc	<0.000050	<0.000050	<0.000050
Indeno(1,2,3-cd)pyrene	mg/L	0.0002^{C}	n/v	n/v	n/v	<0.0000085	<0.0000085	<0.0000085	nc	<0.0000085	<0.0000085	<0.0000085
Methylnaphthalene, 1-	mg/L	1.8_{s3}^{C}	n/v	n/v	n/v	<0.00010	<0.00010	<0.00010	nc	<0.00010	<0.00010	<0.00010
Methylnaphthalene, 2-	mg/L	1.8_{s3}^{C}	n/v	n/v	n/v	<0.00010	<0.00010	<0.00010	nc	<0.00010	<0.00010	<0.00010
Naphthalene	mg/L	1.4^{C}	0.0011^{B}	n/v	n/v	<0.00010	<0.00010	<0.00010	nc	<0.00010	<0.00010	<0.00010
Perylene	mg/L	n/v	n/v	n/v	n/v	<0.000050	<0.000050	<0.000050	nc	<0.000050	<0.000050	<0.000050
Phenanthrene	mg/L	0.58^{C}	0.0004^{B}	n/v	n/v	<0.000050	<0.000050	<0.000050	nc	<0.000050	<0.000050	<0.000050
Pyrene	mg/L	0.068^{C}	$2.5E\text{-}5^{B}$	n/v	n/v	<0.000020	<0.000020	<0.000020	nc	<0.000020	<0.000020	<0.000020
PFAS												
Perfluorobutane Sulfonate (PFBS)	µg/L	n/v	n/v	15^{E}	n/v	<0.020	0.075	0.075	nc	<0.020	<0.020	<0.020
Perfluorobutanoic Acid (PFBA)	µg/L	n/v	n/v	30^{E}	n/v	0.033	1.3	1.4	7%	0.052	0.081	0.18
Perfluorodecane Sulfonic Acid (PFDS)	µg/L	n/v	n/v	n/v	n/v	<0.020	<0.040	<0.040	nc	<0.020	<0.020	<0.020
Perfluorodecanoic Acid (PFDA)	µg/L	n/v	n/v	n/v	n/v	<0.020	<0.040	<0.040	nc	<0.020	<0.020	<0.020
Perfluorododecanoic Acid (PFDoA)	µg/L	n/v	n/v	n/v	n/v	<0.020	<0.040	<0.040	nc	<0.020	<0.020	<0.020
Perfluoroheptane Sulfonate (PFHpS)	µg/L	n/v	n/v	n/v	n/v	<0.020	<0.040	<0.040	nc	<0.020	<0.020	<0.020
Perfluoroheptanoic Acid (PFHpA)	µg/L	n/v	n/v	0.2^{E}	n/v	0.050	**0.67^{E}**	**0.73^{E}**	9%	0.022	0.028	0.035
Perfluorohexanesulfonic acid (PFHxS)	µg/L	n/v	n/v	0.6^{E}	n/v	0.058	0.40	0.45	12%	0.027	0.029	<0.020
Perfluorohexanoic Acid (PFHxA)	µg/L	n/v	n/v	0.2^{E}	n/v	0.10	**2.9^{E}**	**2.9^{E}**	0%	0.15	**0.32^{E}**	0.2
Perfluorooctanic Acid (PFOA)	µg/L	n/v	n/v	0.2^{D}	n/v	<0.020	**0.26^{D}**	**0.29^{D}**	11%	<0.020	<0.020	<0.020
Perfluorononanesulfonic Acid (PFNS)	µg/L	n/v	n/v	n/v	n/v	<0.020	<0.040	<0.040	nc	<0.020	<0.020	<0.020
Perfluorononanoic Acid (PFNA)	µg/L	n/v	n/v	0.02^{E}	n/v	<0.020	***<0.040*** ^{E}	***<0.040*** ^{E}	nc	<0.020	<0.020	<0.020
Perfluorooctane Sulfonate (PFOS)	µg/L	n/v	n/v	0.6^{D}	6.8^{F}	<0.020	0.24	0.26	8%	<0.020	0.087	<0.020
Perfluorooctanesulfonamide (PFOSA)	µg/L	n/v	n/v	n/v	n/v	<0.020	<0.040	<0.040	nc	<0.020	<0.020	<0.020
Perfluoropentanesulfonic Acid (PFPeS)	µg/L	n/v	n/v	n/v	n/v	<0.020	0.056	0.074	nc	<0.020	<0.020	<0.020
Perfluoropentanoic Acid (PFPeA)	µg/L	n/v	n/v	0.2^{E}	n/v	0.15	**5.1^{E}**	**5.1^{E}**	0%	**0.30^{E}**	**0.68^{E}**	**0.68^{E}**
Perfluorotetradecanoic Acid (PFTeA)	µg/L	n/v	n/v	n/v	n/v	<0.020	<0.040	<0.040	nc	<0.020	<0.020	<0.020
Perfluorotridecanoic Acid (PFTriA)	µg/L	n/v	n/v	n/v	n/v	<0.020	<0.040	<0.040	nc	<0.020	<0.020	<0.020
Perfluoroundecanoic Acid (PFUnA)	µg/L	n/v	n/v	n/v	n/v	<0.020	<0.040	<0.040	nc	<0.020	<0.020	<0.020

Notes:

CCME	Canadian Council of Ministers of the Environment
A	Canadian Environmental Quality Guidelines, Canadian Water Quality Guidelines for the Protection of Aquatic Life - Freshwater Aquatics Short Term
B	Canadian Environmental Quality Guidelines, Canadian Water Quality Guidelines for the Protection of Aquatic Life - Freshwater Aquatics Long Term
MECP	Ontario Ministry of the Environment, Conservation and Parks, Formerly Ontario Ministry of the Environment (MOE) Soil, Ground Water and Sediment Standards for Use under Part XV.I of the Environmental Protection Act (MOE, 2011) Site Condition Standards (SCS)
C	Drinking Water Screening Values for Other PFAS, dated April 2019
Health Canada	Health Canada Screening Values/Guidelines
D	Guidelines for Canadian Drinking Water Quality for PFOS and PFOA, dated April 2019
E	Drinking Water Screening Values for Other PFAS, dated April 2019
ECCC	Environment and Climate Change Canada (February 2017)
F	Federal Environmental Quality Guidelines for Perfluorooctane Sulfonate (PFOS) for surface water, dated February 2017 (Table 1, Water)
6.5^{A}	Concentration exceeds the indicated standard.
98^{B}	Concentratation exceeded referenced guideline provided for information purposes only.
15.2	Measured concentration did not exceed the indicated standard.
<0.50	Laboratory reporting limit was greater than the applicable standard.
<0.03	Analyte was not detected at a concentration greater than the laboratory reporting limit.
n/v	No standard/guideline value.
-	Parameter not analyzed / not available.
LTG	Long-term benchmark for cadmium calculated using average total hardness of >280 mg/L.
n/a	Not applicable.
$_{s1}^{C}$	Standard is applicable to total xylenes.
$_{s2}^{C}$	Standard is for benzo(b)fluoranthene; however, the analytical laboratory can not distinguish between benzo(b)fluoranthene and benzo(j)fluoranthene, and therefore, the result is a combination of the two isomers, against which the standard has been compared.
$_{s3}^{C}$	Standard is applicable to both 1-methylnaphthalene and 2-methylnaphthalene, with the provision that if both are detected the sum of the two must not exceed the standard.
$_{s7}^{C}$	Standard is applicable to PHC in the F1 range minus BTEX.
$_{s15}^{C}$	Standard is applicable to PHC in the F2 range minus naphthalene. If naphthalene was not analyzed, the standard is applied to F2.
STB	Short-term benchmark for cadmium calculated using average total hardness of >360 mg/L.
VAR1	Variable, 5 µg/L if pH < 6.5 and 100 µg/L if pH > 6.5
RPD	Relative Percent Difference.
61%	RPD exceeds data quality objective of 50%.
nc	RPD is not calculated if one or more values is non detect or if one or more values is less than five times the reportable

Table 3
Summary of Soil Monitoring Results
2019 Site Remedial Activities and Environmental Monitoring Program
Cambridge Bay Airport, Fire Training Area Land Treatment Unit

Sample ID	Date	Depth (m BGS)	CHV (ppm)	IHV (ppm)	Texture
APR-S01	10-Aug-19	0.5	10	1	Clayey, gravelly sand, some silt
APR-S02	10-Aug-19	0.5	25	8	Clayey, gravelly sand, some silt
APR-S03	10-Aug-19	0.5	120	45	Clayey, gravelly sand, some silt
APR-S04	10-Aug-19	0.5	15	3	Clayey, gravelly sand, some silt
APR-S05	10-Aug-19	0.5	5	1	Clayey, gravelly sand, some silt
APR-S06	10-Aug-19	0.5	10	3	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

Table 4
Summary of Soil Analytical Results
2019 Site Remedial Activities and Environmental Monitoring Program
Cambridge Bay Airport, Apron Land Treatment Unit and Excavation Area

Sample Location			APR-S01	APR-S02	APR-S03	APR-S04	APR-S05			APR-S06
Sample Date			10-Aug-19	10-Aug-19	10-Aug-19	10-Aug-19	10-Aug-19	10-Aug-19		10-Aug-19
Sample ID			APR-SO1	APR-SO2	APR-SO3	APR-SO4	APR-SO5	QC-APR-01		APR-SO6
Sample Depth										
Sampling Company			STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC		STANTEC
Laboratory			BV	BV	BV	BV	BV	BV		BV
Laboratory Work Order			B967692	B967692	B967692	B967692	B967692	B967692		B967692
Laboratory Sample ID			WH5578	WH5579	WH5580	WH5581	WH5582	WH5584	RPD	WH5583
Sample Type	Units	NWB						Field Duplicate	(%)	
BTEX and Petroleum Hydrocarbons										
Benzene	mg/kg	0.03[A]	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	nc	<0.0050
Toluene	mg/kg	0.37[A]	<0.050	<0.050	<0.050	<0.050	<0.050	**7.2[A]**	nc	<0.050
Ethylbenzene	mg/kg	0.082[A]	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	nc	<0.010
Xylenes, Total	mg/kg	11[A]	<0.045	<0.045	0.36	<0.045	<0.045	<0.045	nc	<0.045
PHC F1 (C6-C10 range) minus BTEX	mg/kg	320[A]	16	<10	**580[A]**	<10	<10	<10	nc	<10
PHC F2 (>C10-C16 range)	mg/kg	260[A]	50	29	**1,500[A]**	32	<10	<10	nc	**2,300[A]**
PHC F3 (>C16-C34 range)	mg/kg	1,700[A]	170	180	290	1,000	300	660	**75%**	660
PHC F4 (>C34-C50 range)	mg/kg	3,300[A]	<50	<50	<50	700	220	530	nc	110
Metals										
Lead	mg/kg	600[A]	7.7	6.0	13	5.3	5.4	5.7	5%	9.1
Polychlorinated Biphenyls										
Polychlorinated Biphenyls (PCBs)	mg/kg	33[A]	<0.050	<0.050	<0.10	<0.010	<0.010	<0.010	nc	<0.10

Notes:

NWB	Nunavut Water Board. 2018. NWB Licence No. 1BR-FTA-1828
A	Table 1 Remediation Requirements - Industrial Coarse Land Use, excluding the protection of potable groundwater
6.5[A]	Concentration exceeds the indicated standard.
15.2	Measured concentration did not exceed the indicated standard.
<0.50	Laboratory reporting limit was greater than the applicable standard.
<0.03	Analyte was not detected at a concentration greater than the laboratory reporting limit.
n/v	No standard/guideline value.
-	Parameter not analyzed / not available.
mg/kg	milligrams per kilogram
75%	RPD exceeds data quality objective of 60%.

Table 5
Summary of QA/QC Analytical Results (Water)
2019 Site Remedial Activities and Environmental Monitoring Program
Cambridge Bay Airport, Apron Land Treatment Unit and Excavation Area

Sample Location		Trip Blank	Equipment Blank		
Sample Date		16-Aug-19	10-Aug-19	15-Aug-19	16-Aug-19
Sample ID		TB-05	EB-05	EB-06	EB-07
Sampling Company		STANTEC	STANTEC	STANTEC	STANTEC
Laboratory		BV	BV	BV	BV
Laboratory Work Order		B968954	B967665	B968954	B968954
Laboratory Sample ID		WI1645	WH5507	WI1643	WI1644
Sample Type	Units	Trip Blank	Equipment Blank	Equipment Blank	Equipment Blank
Metals, Total					
Lead	mg/L	-	<0.00020	-	-
BTEX and Petroleum Hydrocarbons					
Benzene	mg/L	-	<0.00040	-	-
Toluene	mg/L	-	<0.00040	-	-
Ethylbenzene	mg/L	-	<0.00040	-	-
Xylenes, Total	mg/L	-	<0.00089	-	-
PHC F1 (C6-C10 range) minus BTEX	mg/L	-	<0.10	-	-
PHC F2 (>C10-C16 range)	mg/L	-	<0.10	-	-
PHC F3 (C16-C34 range)	mg/L	-	<0.10	-	-
PHC F4 (C34-C50 range)	mg/L	-	<0.20	-	-
PFAS					
Perfluorobutane Sulfonate (PFBS)	µg/L	<0.020	-	<0.020	<0.020
Perfluorobutanoic Acid (PFBA)	µg/L	<0.020	-	<0.020	<0.020
Perfluorodecane Sulfonic Acid (PFDS)	µg/L	<0.020	-	<0.020	<0.020
Perfluorodecanoic Acid (PFDA)	µg/L	<0.020	-	<0.020	<0.020
Perfluorododecanoic Acid (PFDoA)	µg/L	<0.020	-	<0.020	<0.020
Perfluoroheptane Sulfonate (PFHpS)	µg/L	<0.020	-	<0.020	<0.020
Perfluoroheptanoic Acid (PFHpA)	µg/L	<0.020	-	<0.020	<0.020
Perfluorohexanesulfonic acid (PFHxS)	µg/L	<0.020	-	<0.020	<0.020
Perfluorohexanoic Acid (PFHxA)	µg/L	<0.020	-	<0.020	<0.020
Perfluoro-n-Octanoic Acid (PFOA)	µg/L	<0.020	-	<0.020	<0.020
Perfluorononanesulfonic Acid (PFNS)	µg/L	<0.020	-	<0.020	<0.020
Perfluorononanoic Acid (PFNA)	µg/L	<0.020	-	<0.020	<0.020
Perfluorooctane Sulfonate (PFOS)	µg/L	<0.020	-	<0.020	<0.020
Perfluorooctanesulfonamide (PFOSA)	µg/L	<0.020	-	<0.020	<0.020
Perfluoropentanesulfonic Acid (PFPeS)	µg/L	<0.020	-	<0.020	<0.020
Perfluoropentanoic Acid (PFPeA)	µg/L	<0.020	-	<0.020	<0.020
Perfluorotetradecanoic Acid (PFTeA)	µg/L	<0.020	-	<0.020	<0.020
Perfluorotridecanoic Acid (PFTriA)	µg/L	<0.020	-	<0.020	<0.020
Perfluoroundecanoic Acid (PFUnA)	µg/L	<0.020	-	<0.020	<0.020

Notes:

mg/L	milligrams per litre
S.U.	standard units
uS/cm	microSiemens per centimetre
mg/L	milligrams per litre
ug/L	micrograms per litre

Table 6
Summary of QA/QC Analytical Results (Soil)
2019 Site Remedial Activities and Environmental Monitoring Program
Cambridge Bay Airport, Apron Land Treatment Unit and Excavation Area

Sample Location		**Trip Blank**
Sample Date		**10-Aug-19**
Sample ID		**TB-04**
Sampling Company		**STANTEC**
Laboratory		**BV**
Laboratory Work Order		**B967665**
Laboratory Sample ID		**WH5508**
Sample Type	**Units**	**Trip Blank**
Petroleum Hydrocarbons		
PHC F2 (>C10-C16 range)	mg/kg	<10
PHC F3 (C16-C34 range)	mg/kg	<50
PHC F4 (C34-C50 range)	mg/kg	<50
Lead		
Total Lead	mg/kg	<0.50
PCBs		
Total PCB	mg/kg	<0.010

Notes:

mg/kg	milligrams per kilogram
<	concentration is less than laboratory reportable detection limit

Table 7
GPS of Sampling Locations and Site Features
2019 Site Remedial Activities and Environmental Monitoring Program
Cambridge Bay Airport, Apron Land Treatment Unit and Excavation Area

Location	Description	Easting	Northing
MW13-1	Monitoring Well	493350	7667540
MW13-2	Monitoring Well	493473	7666835
MW13-3	Monitoring Well	493502	7666786
MW13-4	Monitoring Well	493424	7666775
MW13-5	Monitoring Well	493402	7666643
MW13-6	Monitoring Well	Could Not Locate	
MW13-7	Monitoring Well	495243	7666197
MW13-8	Monitoring Well	Could Not Locate	
MW13-9	Monitoring Well	493584	7666746
APR-S01	Soil Sample	493390	7666843
APR-S02	Soil Sample	493390	7666822
APR-S03	Soil Sample	493422	7666797
APR-S04	Soil Sample	493446	7666831
APR-S05	Soil Sample	493472	7666821
APR-S06	Soil Sample	493458	7666781

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

APPENDIX F

Photographic Log

2019 Site Remedial Activities and Environmental Monitoring Program
Cambridge Bay Airport Apron Land Treatment Unit and Excavation Area
Appendix F - Photographic Log

Photo 1. West View of Apron LTU During Tilling

Photo 2. East view of Apron LTU During Tilling

Photo 3. North View of Apron Sump Prior to Dewatering

Photo 4. West View of Apron Sump Prior to Dewatering

Photo 5. North View of Apron LTU During Sump Dewatering

Photo 6. East View of Apron LTU During Sump Dewatering

2019 Site Remedial Activities and Environmental Monitoring Program
Cambridge Bay Airport Apron Land Treatment Unit and Excavation Area
Appendix F - Photographic Log

Photo 7. West View of Apron Sump Recharge (August 13, 2019)

Photo 8. West View of Apron Sump Recharge (August 17, 2019)

Photo 9. North View of Apron Sump After Second De-Watering (August 17, 2019)

Photo 10. West View of MW13-1 (Apron LTU Area)

Photo 11. South View of MW13-7 (Apron Excavation Area)

Photo 12. North View of MW13-9 (Apron Excavation Area)

APPENDIX G

Copies of Laboratory Certificates of Analysis

Your Project #: 110220369
Site Location: CBA APRON
Your C.O.C. #: M085562

Attention: LINDSAY VAN NOORTWYK

STANTEC CONSULTING LTD
#400, 10220 - 103 Avenue NW
EDMONTON, AB
CANADA T5J 0K4

Report Date: 2019/09/05
Report #: R2776573
Version: 2 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B969005
Received: 2019/08/19, 11:32

Sample Matrix: Water
Samples Received: 6

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO3,HCO3,OH	1	N/A	2019/08/21	AB SOP-00005	SM 23 2320 B m
Alkalinity @25C (pp, total), CO3,HCO3,OH	5	N/A	2019/08/22	AB SOP-00005	SM 23 2320 B m
BTEX/F1 in Water by HS GC/MS/FID	6	N/A	2019/08/21	AB SOP-00039	CCME CWS/EPA 8260d m
F1-BTEX	6	N/A	2019/08/22		Auto Calc
Chloride/Sulphate by Auto Colourimetry	6	N/A	2019/08/22	AB SOP-00020 / AB SOP-00018	SM23-4500-Cl/SO4-E m
Total Cresols Calculation (1)	6	N/A	2019/08/22	BBY WI-00033	Auto Calc
Conductivity @25C	1	N/A	2019/08/21	AB SOP-00005	SM 23 2510 B m
Conductivity @25C	5	N/A	2019/08/22	AB SOP-00005	SM 23 2510 B m
CCME Hydrocarbons in Water (F2; C10-C16) (3)	6	2019/08/21	2019/08/21	AB SOP-00037 / AB SOP-00040	CCME PHC-CWS m
Hardness	6	N/A	2019/08/23		Auto Calc
Elements by ICP-Dissolved-Lab Filtered (4)	5	N/A	2019/08/22	AB SOP-00042	EPA 6010d R5 m
Elements by ICP-Dissolved-Lab Filtered (4)	1	N/A	2019/08/23	AB SOP-00042	EPA 6010d R5 m
Elements by ICP - Total	5	2019/08/21	2019/08/22	AB SOP-00014 / AB SOP-00042	EPA 6010d R4 m
Elements by ICP - Total	1	2019/08/21	2019/08/23	AB SOP-00014 / AB SOP-00042	EPA 6010d R4 m
Elements by ICPMS - Total	5	2019/08/21	2019/08/21	AB SOP-00014 / AB SOP-00043	EPA 6020b R2 m
Elements by ICPMS - Total	1	2019/08/21	2019/08/22	AB SOP-00014 / AB SOP-00043	EPA 6020b R2 m
Ion Balance	6	N/A	2019/08/21		Auto Calc
Sum of cations, anions	6	N/A	2019/08/23		Auto Calc
Ammonia-N (Total)	6	N/A	2019/08/21	AB SOP-00007	SM 23 4500 NH3 A G m
Nitrate and Nitrite	6	N/A	2019/08/22		Auto Calc
Nitrate + Nitrite-N (calculated)	6	N/A	2019/08/22		Auto Calc
Nitrogen (Nitrite - Nitrate) by IC	5	N/A	2019/08/21	AB SOP-00023	SM 23 4110 B m
Nitrogen (Nitrite - Nitrate) by IC	1	N/A	2019/08/22	AB SOP-00023	SM 23 4110 B m
Oil and Grease (Gravimetric, n-Hexane)	6	2019/08/21	2019/08/21	EENVSOP-00093	SM 23 5520B m
Benzo[a]pyrene Equivalency (5)	6	N/A	2019/08/22		Auto Calc
PAH in Water by GC/MS	6	2019/08/21	2019/08/22	AB SOP-00037 / AB SOP-00003	EPA 3510C/8270E m

Your Project #: 110220369
Site Location: CBA APRON
Your C.O.C. #: M085562

Attention: LINDSAY VAN NOORTWYK

STANTEC CONSULTING LTD
#400, 10220 - 103 Avenue NW
EDMONTON, AB
CANADA T5J 0K4

Report Date: 2019/09/05
Report #: R2776573
Version: 2 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B969005
Received: 2019/08/19, 11:32

Sample Matrix: Water
Samples Received: 6

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
pH @25°C (6)	1	N/A	2019/08/21	AB SOP-00005	SM 23 4500 H+ B m
pH @25°C (6)	5	N/A	2019/08/22	AB SOP-00005	SM 23 4500 H+ B m
Phenols (semivolatile) (1)	6	2019/08/21	2019/08/22	CAL SOP-00164	EPA 8270e m
Total Dissolved Solids (Calculated)	6	N/A	2019/08/23		Auto Calc
Total Suspended Solids (NFR)	6	2019/08/21	2019/08/21	AB SOP-00061	SM 23 2540 D m
PFOS and PFOA in water by SPE/LCMS (2, 7)	6	2019/08/28	2019/08/31	CAM SOP-00894	EPA 537 m

Remarks:

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

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

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

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

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by BV Labs Calgary Environmental
(2) This test was performed by BV Labs Ontario (From Edmonton)
(3) Silica gel clean up employed.
(4) Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
(5) 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.
(6) The CCME method requires pH to be analysed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the CCME holding time. Bureau Veritas Laboratories endeavours to analyze samples as soon as possible after receipt.
(7) Per- and polyfluoroalkyl substances (PFAS) identified as surrogates on the certificate of analysis represent the extracted internal standard.

Your Project #: 110220369
Site Location: CBA APRON
Your C.O.C. #: M085562

Attention: LINDSAY VAN NOORTWYK

STANTEC CONSULTING LTD
#400, 10220 - 103 Avenue NW
EDMONTON, AB
CANADA T5J 0K4

Report Date: 2019/09/05
Report #: R2776573
Version: 2 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B969005
Received: 2019/08/19, 11:32

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Geraldlyn Gouthro, Key Account Specialist
Email: geraldlyn.gouthro@bvlabs.com
Phone# (403)735-2230

==========

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

BV Labs Job #: B969005
Report Date: 2019/09/05

STANTEC CONSULTING LTD
Client Project #: 110220369
Site Location: CBA APRON

AT1 BTEX AND F1-F2 IN WATER (WATER)

BV Labs ID		WI1957		WI1957		WI1958		WI1959			
Sampling Date		2019/08/15 12:45		2019/08/15 12:45		2019/08/15 14:25		2019/08/15 16:25			
COC Number		M085562		M085562		M085562		M085562			
	UNITS	MW13-5	MU	MW13-5 Lab-Dup	MU	MW13-3	MU	MW13-1	MU	RDL	QC Batch
Ext. Pet. Hydrocarbon											
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	N/A	N/A	N/A	<0.10	N/A	<0.10	N/A	0.10	9556395
Volatiles											
Benzene	mg/L	<0.00040	N/A	<0.00040	N/A	<0.00040	N/A	<0.00040	N/A	0.00040	9556599
Toluene	mg/L	<0.00040	N/A	<0.00040	N/A	<0.00040	N/A	<0.00040	N/A	0.00040	9556599
Ethylbenzene	mg/L	<0.00040	N/A	<0.00040	N/A	<0.00040	N/A	<0.00040	N/A	0.00040	9556599
m & p-Xylene	mg/L	<0.00080	N/A	<0.00080	N/A	<0.00080	N/A	<0.00080	N/A	0.00080	9556599
o-Xylene	mg/L	<0.00040	N/A	<0.00040	N/A	<0.00040	N/A	<0.00040	N/A	0.00040	9556599
Xylenes (Total)	mg/L	<0.00089	N/A	N/A	N/A	<0.00089	N/A	<0.00089	N/A	0.00089	9555906
F1 (C6-C10) - BTEX	mg/L	<0.10	N/A	N/A	N/A	<0.10	N/A	<0.10	N/A	0.10	9555906
F1 (C6-C10)	mg/L	<0.10	N/A	<0.10	N/A	<0.10	N/A	<0.10	N/A	0.10	9556599
Surrogate Recovery (%)											
1,4-Difluorobenzene (sur.)	%	101	N/A	100	N/A	101	N/A	101	N/A	N/A	9556599
4-Bromofluorobenzene (sur.)	%	97	N/A	96	N/A	97	N/A	96	N/A	N/A	9556599
D4-1,2-Dichloroethane (sur.)	%	99	N/A	100	N/A	99	N/A	98	N/A	N/A	9556599
O-TERPHENYL (sur.)	%	94	N/A	N/A	N/A	93	N/A	95	N/A	N/A	9556395

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

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AT1 BTEX AND F1-F2 IN WATER (WATER)

BV Labs ID		WI1960		WI1961		WI1962			
Sampling Date		2019/08/15 14:27		2019/08/16 09:10		2019/08/16 10:45			
COC Number		M085562		M085562		M085562			
	UNITS	GW-QC-02	MU	MW13-7	MU	MW13-9	MU	RDL	QC Batch
Ext. Pet. Hydrocarbon									
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	N/A	<0.10	N/A	<0.10	N/A	0.10	9556395
Volatiles									
Benzene	mg/L	<0.00040	N/A	0.0055	+/- 0.00083	<0.00040	N/A	0.00040	9556599
Toluene	mg/L	<0.00040	N/A	<0.00040	N/A	<0.00040	N/A	0.00040	9556599
Ethylbenzene	mg/L	<0.00040	N/A	<0.00040	N/A	<0.00040	N/A	0.00040	9556599
m & p-Xylene	mg/L	<0.00080	N/A	<0.00080	N/A	<0.00080	N/A	0.00080	9556599
o-Xylene	mg/L	<0.00040	N/A	<0.00040	N/A	<0.00040	N/A	0.00040	9556599
Xylenes (Total)	mg/L	<0.00089	N/A	<0.00089	N/A	<0.00089	N/A	0.00089	9555906
F1 (C6-C10) - BTEX	mg/L	<0.10	N/A	<0.10	N/A	<0.10	N/A	0.10	9555906
F1 (C6-C10)	mg/L	<0.10	N/A	<0.10	N/A	<0.10	N/A	0.10	9556599
Surrogate Recovery (%)									
1,4-Difluorobenzene (sur.)	%	102	N/A	101	N/A	100	N/A	N/A	9556599
4-Bromofluorobenzene (sur.)	%	97	N/A	95	N/A	97	N/A	N/A	9556599
D4-1,2-Dichloroethane (sur.)	%	99	N/A	98	N/A	101	N/A	N/A	9556599
O-TERPHENYL (sur.)	%	108	N/A	104	N/A	94	N/A	N/A	9556395

RDL = Reportable Detection Limit
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N/A = Not Applicable

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BV Labs Job #: B969005
Report Date: 2019/09/05

STANTEC CONSULTING LTD
Client Project #: 110220369
Site Location: CBA APRON

ROUTINE WATER -LAB FILTERED (WATER)

BV Labs ID		WI1957			WI1958			WI1959			
Sampling Date		2019/08/15 12:45			2019/08/15 14:25			2019/08/15 16:25			
COC Number		M085562			M085562			M085562			
	UNITS	MW13-5	MU	RDL	MW13-3	MU	RDL	MW13-1	MU	RDL	QC Batch
Calculated Parameters											
Anion Sum	meq/L	21	N/A	N/A	60	N/A	N/A	33	N/A	N/A	9554795
Cation Sum	meq/L	20	N/A	N/A	62	N/A	N/A	33	N/A	N/A	9554795
Hardness (CaCO3)	mg/L	670	N/A	0.50	1400	N/A	0.50	1100	N/A	0.50	9555938
Ion Balance (% Difference)	%	0.37	N/A	N/A	1.2	N/A	N/A	0.56	N/A	N/A	9555911
Dissolved Nitrate (NO3)	mg/L	<0.044	N/A	0.044	11	N/A	0.044	35	N/A	0.044	9555916
Nitrate plus Nitrite (N)	mg/L	<0.014	N/A	0.014	2.5	N/A	0.014	7.9	N/A	0.014	9555917
Dissolved Nitrite (NO2)	mg/L	<0.033	N/A	0.033	<0.033	N/A	0.033	<0.033	N/A	0.033	9555916
Calculated Total Dissolved Solids	mg/L	1200	N/A	10	3700	N/A	21	1900	N/A	10	9554799
Misc. Inorganics											
Conductivity	uS/cm	1900	+/- 170	2.0	5500	+/- 490	2.0	2900	+/- 250	2.0	9558719
pH	pH	7.60	+/- 0.110	N/A	7.53	+/- 0.109	N/A	7.59	+/- 0.110	N/A	9558715
Anions											
Alkalinity (PP as CaCO3)	mg/L	<1.0	N/A	1.0	<1.0	N/A	1.0	<1.0	N/A	1.0	9558717
Alkalinity (Total as CaCO3)	mg/L	260	+/- 12	1.0	400	+/- 17	1.0	430	+/- 19	1.0	9558717
Bicarbonate (HCO3)	mg/L	320	+/- 79	1.0	490	+/- 120	1.0	530	+/- 130	1.0	9558717
Carbonate (CO3)	mg/L	<1.0	N/A	1.0	<1.0	N/A	1.0	<1.0	N/A	1.0	9558717
Hydroxide (OH)	mg/L	<1.0	N/A	1.0	<1.0	N/A	1.0	<1.0	N/A	1.0	9558717
Dissolved Chloride (Cl)	mg/L	180	+/- 11	1.0	730 (1)	+/- 45	5.0	240 (1)	+/- 15	5.0	9558774
Dissolved Sulphate (SO4)	mg/L	490 (1)	N/A	5.0	1500 (1)	N/A	20	810 (1)	N/A	5.0	9558774
Nutrients											
Dissolved Nitrite (N)	mg/L	<0.010	N/A	0.010	<0.010	N/A	0.010	<0.010	N/A	0.010	9557061
Dissolved Nitrate (N)	mg/L	<0.010	N/A	0.010	2.5	+/- 0.29	0.010	7.9	+/- 0.89	0.010	9557061
Lab Filtered Elements											
Dissolved Calcium (Ca)	mg/L	120	+/- 7.9	0.30	240	+/- 16	0.30	200	+/- 13	0.30	9558290
Dissolved Iron (Fe)	mg/L	0.12	+/- <RDL	0.060	<0.060	N/A	0.060	<0.060	N/A	0.060	9558290
Dissolved Magnesium (Mg)	mg/L	89	+/- 4.6	0.20	200	+/- 10	0.20	160	+/- 8.1	0.20	9558290
Dissolved Manganese (Mn)	mg/L	0.44	+/- 0.014	0.0040	0.26	+/- 0.0083	0.0040	0.17	+/- 0.0057	0.0040	9558290
Dissolved Potassium (K)	mg/L	10	+/- 0.67	0.30	70	+/- 4.3	0.30	36	+/- 2.2	0.30	9558290
Dissolved Sodium (Na)	mg/L	160	+/- 9.3	0.50	720 (1)	+/- 43	5.0	210	+/- 13	0.50	9558290

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

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ROUTINE WATER -LAB FILTERED (WATER)

BV Labs ID		WI1959				WI1960			
Sampling Date		2019/08/15 16:25				2019/08/15 14:27			
COC Number		M085562				M085562			
	UNITS	MW13-1 Lab-Dup	MU	RDL	QC Batch	GW-QC-02	MU	RDL	QC Batch
Calculated Parameters									
Anion Sum	meq/L	N/A	N/A	N/A	9554795	58	N/A	N/A	9554795
Cation Sum	meq/L	N/A	N/A	N/A	9554795	62	N/A	N/A	9554795
Hardness (CaCO3)	mg/L	N/A	N/A	0.50	9555938	1400	N/A	0.50	9555938
Ion Balance (% Difference)	%	N/A	N/A	N/A	9555911	3.6	N/A	N/A	9555911
Dissolved Nitrate (NO3)	mg/L	N/A	N/A	0.044	9555916	11	N/A	0.044	9555916
Nitrate plus Nitrite (N)	mg/L	N/A	N/A	0.014	9555917	2.6	N/A	0.014	9555917
Dissolved Nitrite (NO2)	mg/L	N/A	N/A	0.033	9555916	<0.033	N/A	0.033	9555916
Calculated Total Dissolved Solids	mg/L	N/A	N/A	10	9554799	3600	N/A	21	9554799
Misc. Inorganics									
Conductivity	uS/cm	2900	+/- 250	2.0	9558719	5500	+/- 490	2.0	9557154
pH	pH	7.61	+/- 0.110	N/A	9558715	7.55	+/- 0.110	N/A	9557150
Anions									
Alkalinity (PP as CaCO3)	mg/L	<1.0	N/A	1.0	9558717	<1.0	N/A	1.0	9557152
Alkalinity (Total as CaCO3)	mg/L	420	+/- 18	1.0	9558717	410	+/- 18	1.0	9557152
Bicarbonate (HCO3)	mg/L	510	+/- 120	1.0	9558717	490	+/- 120	1.0	9557152
Carbonate (CO3)	mg/L	<1.0	N/A	1.0	9558717	<1.0	N/A	1.0	9557152
Hydroxide (OH)	mg/L	<1.0	N/A	1.0	9558717	<1.0	N/A	1.0	9557152
Dissolved Chloride (Cl)	mg/L	250	+/- 15	5.0	9558774	680 (1)	+/- 41	5.0	9558774
Dissolved Sulphate (SO4)	mg/L	800	N/A	5.0	9558774	1500 (1)	N/A	20	9558774
Nutrients									
Dissolved Nitrite (N)	mg/L	N/A	N/A	0.010	9557061	<0.010	N/A	0.010	9557061
Dissolved Nitrate (N)	mg/L	N/A	N/A	0.010	9557061	2.6	+/- 0.29	0.010	9557061
Lab Filtered Elements									
Dissolved Calcium (Ca)	mg/L	N/A	N/A	0.30	9558290	240	+/- 16	0.30	9558290
Dissolved Iron (Fe)	mg/L	N/A	N/A	0.060	9558290	<0.060	N/A	0.060	9558290
Dissolved Magnesium (Mg)	mg/L	N/A	N/A	0.20	9558290	200	+/- 10	0.20	9558290
Dissolved Manganese (Mn)	mg/L	N/A	N/A	0.0040	9558290	0.26	+/- 0.0083	0.0040	9558290
Dissolved Potassium (K)	mg/L	N/A	N/A	0.30	9558290	70	+/- 4.3	0.30	9558290
Dissolved Sodium (Na)	mg/L	N/A	N/A	0.50	9558290	720 (1)	+/- 43	5.0	9558290

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.

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ROUTINE WATER -LAB FILTERED (WATER)

BV Labs ID		WI1961			WI1962			
Sampling Date		2019/08/16 09:10			2019/08/16 10:45			
COC Number		M085562			M085562			
	UNITS	MW13-7	MU	RDL	MW13-9	MU	RDL	QC Batch
Calculated Parameters								
Anion Sum	meq/L	53	N/A	N/A	300	N/A	N/A	9554795
Cation Sum	meq/L	52	N/A	N/A	390	N/A	N/A	9554795
Hardness (CaCO3)	mg/L	1900	N/A	0.50	6700	N/A	0.50	9555938
Ion Balance (% Difference)	%	0.18	N/A	N/A	14	N/A	N/A	9555911
Dissolved Nitrate (NO3)	mg/L	0.21	N/A	0.044	<0.44	N/A	0.44	9555916
Nitrate plus Nitrite (N)	mg/L	0.048	N/A	0.014	<0.14	N/A	0.14	9555917
Dissolved Nitrite (NO2)	mg/L	<0.033	N/A	0.033	<0.33	N/A	0.33	9555916
Calculated Total Dissolved Solids	mg/L	3100	N/A	11	19000	N/A	110	9554799
Misc. Inorganics								
Conductivity	uS/cm	4400	+/- 390	2.0	35000	+/- 3000	2.0	9558293
pH	pH	7.24	+/- 0.105	N/A	7.23	+/- 0.105	N/A	9558287
Anions								
Alkalinity (PP as CaCO3)	mg/L	<1.0	N/A	1.0	<1.0	N/A	1.0	9558292
Alkalinity (Total as CaCO3)	mg/L	480	+/- 21	1.0	560	+/- 24	1.0	9558292
Bicarbonate (HCO3)	mg/L	580	+/- 140	1.0	680	+/- 160	1.0	9558292
Carbonate (CO3)	mg/L	<1.0	N/A	1.0	<1.0	N/A	1.0	9558292
Hydroxide (OH)	mg/L	<1.0	N/A	1.0	<1.0	N/A	1.0	9558292
Dissolved Chloride (Cl)	mg/L	570 (1)	+/- 34	5.0	7800 (1)	+/- 480	100	9558774
Dissolved Sulphate (SO4)	mg/L	1300 (1)	N/A	10	3100 (1)	N/A	20	9558774
Nutrients								
Dissolved Nitrite (N)	mg/L	<0.010	N/A	0.010	<0.10 (2)	N/A	0.10	9557061
Dissolved Nitrate (N)	mg/L	0.048	+/- 0.014	0.010	<0.10 (2)	N/A	0.10	9557061
Lab Filtered Elements								
Dissolved Calcium (Ca)	mg/L	340	+/- 22	0.30	520	+/- 33	3.0	9558290
Dissolved Iron (Fe)	mg/L	0.48	+/- 0.061	0.060	<0.60	N/A	0.60	9558290
Dissolved Magnesium (Mg)	mg/L	250	+/- 13	0.20	1300	+/- 69	2.0	9558290
Dissolved Manganese (Mn)	mg/L	2.9	+/- 0.092	0.0040	1.2	+/- <RDL	0.040	9558290
Dissolved Potassium (K)	mg/L	21	+/- 1.3	0.30	190	+/- 11	3.0	9558290
Dissolved Sodium (Na)	mg/L	320	+/- 19	0.50	5800 (1)	+/- 350	50	9558290

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

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REGULATED METALS (CCME/AT1) - TOTAL

BV Labs ID		WI1957			WI1958			
Sampling Date		2019/08/15 12:45			2019/08/15 14:25			
COC Number		M085562			M085562			
	UNITS	MW13-5	MU	RDL	MW13-3	MU	RDL	QC Batch
Elements								
Total Aluminum (Al)	mg/L	0.078	+/- 0.018	0.0030	0.16	+/- 0.032	0.0030	9556679
Total Antimony (Sb)	mg/L	<0.00060	N/A	0.00060	<0.00060	N/A	0.00060	9556679
Total Arsenic (As)	mg/L	0.0011	+/- 0.00063	0.00020	0.00039	+/- 0.00060	0.00020	9556679
Total Barium (Ba)	mg/L	0.025	+/- <RDL	0.010	0.018	+/- <RDL	0.010	9556687
Total Beryllium (Be)	mg/L	<0.0010	N/A	0.0010	<0.0010	N/A	0.0010	9556679
Total Boron (B)	mg/L	0.19	+/- <RDL	0.020	2.4	+/- 0.17	0.020	9556687
Total Cadmium (Cd)	mg/L	<0.000020	N/A	0.000020	0.000031	+/- <RDL	0.000020	9556679
Total Calcium (Ca)	mg/L	110	+/- 12	0.30	240	+/- 24	0.30	9556687
Total Chromium (Cr)	mg/L	<0.0010	N/A	0.0010	0.0022	+/- <RDL	0.0010	9556679
Total Cobalt (Co)	mg/L	0.0048	+/- 0.00054	0.00030	0.0092	+/- 0.0010	0.00030	9556679
Total Copper (Cu)	mg/L	0.0018	+/- 0.00046	0.00020	0.0029	+/- 0.00055	0.00020	9556679
Total Iron (Fe)	mg/L	0.32	+/- <RDL	0.060	1.4	+/- 0.17	0.060	9556687
Total Lead (Pb)	mg/L	<0.00020	N/A	0.00020	0.00021	+/- <RDL	0.00020	9556679
Total Lithium (Li)	mg/L	<0.020	N/A	0.020	0.077	+/- <RDL	0.020	9556687
Total Magnesium (Mg)	mg/L	85	+/- 7.0	0.20	200	+/- 17	0.20	9556687
Total Manganese (Mn)	mg/L	0.46	+/- 0.042	0.0040	0.25	+/- 0.023	0.0040	9556687
Total Molybdenum (Mo)	mg/L	0.0020	+/- 0.00047	0.00020	0.0052	+/- 0.00077	0.00020	9556679
Total Nickel (Ni)	mg/L	0.024	+/- 0.0029	0.00050	0.10	+/- 0.012	0.00050	9556679
Total Phosphorus (P)	mg/L	<0.10	N/A	0.10	<0.10	N/A	0.10	9556687
Total Potassium (K)	mg/L	9.9	+/- 1.0	0.30	72	+/- 7.3	0.30	9556687
Total Selenium (Se)	mg/L	<0.00020	N/A	0.00020	0.00033	+/- <RDL	0.00020	9556679
Total Silicon (Si)	mg/L	5.3	+/- 0.55	0.10	3.8	+/- 0.40	0.10	9556687
Total Silver (Ag)	mg/L	<0.00010	N/A	0.00010	<0.00010	N/A	0.00010	9556679
Total Sodium (Na)	mg/L	150	+/- 16	0.50	790 (1)	+/- 85	5.0	9556687
Total Strontium (Sr)	mg/L	0.13	+/- <RDL	0.020	0.89	+/- 0.067	0.020	9556687
Total Sulphur (S)	mg/L	160	+/- 8.8	0.20	600 (1)	+/- 33	2.0	9556687
Total Thallium (Tl)	mg/L	<0.00020	N/A	0.00020	<0.00020	N/A	0.00020	9556679
Total Tin (Sn)	mg/L	<0.0010	N/A	0.0010	<0.0010	N/A	0.0010	9556679
Total Titanium (Ti)	mg/L	0.0035	+/- <RDL	0.0010	0.011	+/- 0.0024	0.0010	9556679
Total Uranium (U)	mg/L	0.0041	+/- 0.00052	0.00010	0.023	+/- 0.0029	0.00010	9556679

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

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REGULATED METALS (CCME/AT1) - TOTAL

BV Labs ID		WI1957			WI1958			
Sampling Date		2019/08/15 12:45			2019/08/15 14:25			
COC Number		M085562			M085562			
	UNITS	MW13-5	MU	RDL	MW13-3	MU	RDL	QC Batch
Total Vanadium (V)	mg/L	0.0017	+/- 0.0017	0.0010	0.0018	+/- 0.0017	0.0010	9556679
Total Zinc (Zn)	mg/L	<0.0030	N/A	0.0030	<0.0030	N/A	0.0030	9556679

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

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REGULATED METALS (CCME/AT1) - TOTAL

BV Labs ID		WI1959			WI1960			
Sampling Date		2019/08/15 16:25			2019/08/15 14:27			
COC Number		M085562			M085562			
	UNITS	MW13-1	MU	RDL	GW-QC-02	MU	RDL	QC Batch
Elements								
Total Aluminum (Al)	mg/L	0.050	+/- 0.013	0.0030	0.19	+/- 0.038	0.0030	9556679
Total Antimony (Sb)	mg/L	<0.00060	N/A	0.00060	<0.00060	N/A	0.00060	9556679
Total Arsenic (As)	mg/L	0.0015	+/- 0.00066	0.00020	0.00039	+/- 0.00060	0.00020	9556679
Total Barium (Ba)	mg/L	0.031	+/- <RDL	0.010	0.017	+/- <RDL	0.010	9556687
Total Beryllium (Be)	mg/L	<0.0010	N/A	0.0010	<0.0010	N/A	0.0010	9556679
Total Boron (B)	mg/L	0.61	+/- 0.047	0.020	2.3	+/- 0.17	0.020	9556687
Total Cadmium (Cd)	mg/L	<0.000020	N/A	0.000020	0.000027	+/- <RDL	0.000020	9556679
Total Calcium (Ca)	mg/L	190	+/- 19	0.30	230	+/- 24	0.30	9556687
Total Chromium (Cr)	mg/L	<0.0010	N/A	0.0010	0.0024	+/- <RDL	0.0010	9556679
Total Cobalt (Co)	mg/L	0.0030	+/- 0.00033	0.00030	0.0090	+/- 0.0010	0.00030	9556679
Total Copper (Cu)	mg/L	0.0032	+/- 0.00058	0.00020	0.0029	+/- 0.00055	0.00020	9556679
Total Iron (Fe)	mg/L	1.8	+/- 0.21	0.060	0.98	+/- 0.12	0.060	9556687
Total Lead (Pb)	mg/L	<0.00020	N/A	0.00020	<0.00020	N/A	0.00020	9556679
Total Lithium (Li)	mg/L	0.040	+/- <RDL	0.020	0.075	+/- <RDL	0.020	9556687
Total Magnesium (Mg)	mg/L	140	+/- 12	0.20	200	+/- 16	0.20	9556687
Total Manganese (Mn)	mg/L	0.17	+/- 0.015	0.0040	0.25	+/- 0.022	0.0040	9556687
Total Molybdenum (Mo)	mg/L	0.0046	+/- 0.00070	0.00020	0.0050	+/- 0.00075	0.00020	9556679
Total Nickel (Ni)	mg/L	0.047	+/- 0.0057	0.00050	0.10	+/- 0.012	0.00050	9556679
Total Phosphorus (P)	mg/L	<0.10	N/A	0.10	<0.10	N/A	0.10	9556687
Total Potassium (K)	mg/L	34	+/- 3.5	0.30	71	+/- 7.2	0.30	9556687
Total Selenium (Se)	mg/L	0.00025	+/- <RDL	0.00020	0.00029	+/- <RDL	0.00020	9556679
Total Silicon (Si)	mg/L	4.7	+/- 0.49	0.10	3.8	+/- 0.40	0.10	9556687
Total Silver (Ag)	mg/L	<0.00010	N/A	0.00010	<0.00010	N/A	0.00010	9556679
Total Sodium (Na)	mg/L	210	+/- 22	0.50	770 (1)	+/- 82	5.0	9556687
Total Strontium (Sr)	mg/L	0.39	+/- 0.029	0.020	0.89	+/- 0.067	0.020	9556687
Total Sulphur (S)	mg/L	270	+/- 14	0.20	590 (1)	+/- 32	2.0	9556687
Total Thallium (Tl)	mg/L	<0.00020	N/A	0.00020	<0.00020	N/A	0.00020	9556679
Total Tin (Sn)	mg/L	<0.0010	N/A	0.0010	<0.0010	N/A	0.0010	9556679
Total Titanium (Ti)	mg/L	0.0023	+/- <RDL	0.0010	0.012	+/- 0.0025	0.0010	9556679
Total Uranium (U)	mg/L	0.014	+/- 0.0017	0.00010	0.023	+/- 0.0029	0.00010	9556679

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

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

REGULATED METALS (CCME/AT1) - TOTAL

BV Labs ID		WI1959			WI1960			
Sampling Date		2019/08/15 16:25			2019/08/15 14:27			
COC Number		M085562			M085562			
	UNITS	MW13-1	MU	RDL	GW-QC-02	MU	RDL	QC Batch
Total Vanadium (V)	mg/L	0.0019	+/- 0.0017	0.0010	0.0015	+/- 0.0017	0.0010	9556679
Total Zinc (Zn)	mg/L	<0.0030	N/A	0.0030	<0.0030	N/A	0.0030	9556679

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

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

REGULATED METALS (CCME/AT1) - TOTAL

BV Labs ID		WI1961			WI1962			
Sampling Date		2019/08/16 09:10			2019/08/16 10:45			
COC Number		M085562			M085562			
	UNITS	MW13-7	MU	RDL	MW13-9	MU	RDL	QC Batch
Elements								
Total Aluminum (Al)	mg/L	0.13	+/- 0.027	0.0030	0.098	+/- 0.021	0.0030	9556679
Total Antimony (Sb)	mg/L	<0.00060	N/A	0.00060	<0.00060	N/A	0.00060	9556679
Total Arsenic (As)	mg/L	0.00097	+/- 0.00063	0.00020	0.0031	+/- 0.00083	0.00020	9556679
Total Barium (Ba)	mg/L	0.035	+/- <RDL	0.010	<0.10	N/A	0.10	9556687
Total Beryllium (Be)	mg/L	<0.0010	N/A	0.0010	<0.0010	N/A	0.0010	9556679
Total Boron (B)	mg/L	0.24	+/- 0.021	0.020	1.9	+/- <RDL	0.20	9556687
Total Cadmium (Cd)	mg/L	0.000081	+/- <RDL	0.000020	0.000073	+/- <RDL	0.000020	9556679
Total Calcium (Ca)	mg/L	320	+/- 32	0.30	550	+/- 56	3.0	9556687
Total Chromium (Cr)	mg/L	<0.0010	N/A	0.0010	<0.0010	N/A	0.0010	9556679
Total Cobalt (Co)	mg/L	0.0085	+/- 0.00095	0.00030	0.065	+/- 0.0073	0.00030	9556679
Total Copper (Cu)	mg/L	0.0061	+/- 0.00089	0.00020	0.0030	+/- 0.00056	0.00020	9556679
Total Iron (Fe)	mg/L	0.92	+/- 0.11	0.060	8.0	+/- 0.92	0.60	9556687
Total Lead (Pb)	mg/L	<0.00020	N/A	0.00020	0.0011	+/- <RDL	0.00020	9556679
Total Lithium (Li)	mg/L	0.040	+/- <RDL	0.020	<0.20	N/A	0.20	9556687
Total Magnesium (Mg)	mg/L	240	+/- 20	0.20	1400	+/- 120	2.0	9556687
Total Manganese (Mn)	mg/L	2.7	+/- 0.24	0.0040	1.2	+/- 0.10	0.040	9556687
Total Molybdenum (Mo)	mg/L	0.0056	+/- 0.00081	0.00020	0.0046	+/- 0.00070	0.00020	9556679
Total Nickel (Ni)	mg/L	0.014	+/- 0.0018	0.00050	0.10	+/- 0.012	0.00050	9556679
Total Phosphorus (P)	mg/L	<0.10	N/A	0.10	<1.0	N/A	1.0	9556687
Total Potassium (K)	mg/L	21	+/- 2.1	0.30	190	+/- 19	3.0	9556687
Total Selenium (Se)	mg/L	0.00047	+/- <RDL	0.00020	0.00076 (1)	+/- <RDL	0.00020	9556679
Total Silicon (Si)	mg/L	8.3	+/- 0.86	0.10	4.8	+/- <RDL	1.0	9556687
Total Silver (Ag)	mg/L	<0.00010	N/A	0.00010	<0.00010	N/A	0.00010	9556679
Total Sodium (Na)	mg/L	310	+/- 33	0.50	5700 (2)	+/- 610	50	9556687
Total Strontium (Sr)	mg/L	0.52	+/- 0.040	0.020	3.0	+/- 0.23	0.20	9556687
Total Sulphur (S)	mg/L	440	+/- 24	0.20	1200	+/- 63	2.0	9556687
Total Thallium (Tl)	mg/L	<0.00020	N/A	0.00020	<0.00020	N/A	0.00020	9556679
Total Tin (Sn)	mg/L	<0.0010	N/A	0.0010	<0.0010	N/A	0.0010	9556679
Total Titanium (Ti)	mg/L	0.0082	+/- 0.0017	0.0010	0.0064	+/- 0.0014	0.0010	9556679

RDL = Reportable Detection Limit
MU = Measurement Uncertainty
N/A = Not Applicable
(1) Duplicate exceeds acceptance criteria due to sample non homogeneity. Reanalysis yields similar results.
(2) Detection limits raised due to dilution to bring analyte within the calibrated range.

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

REGULATED METALS (CCME/AT1) - TOTAL

BV Labs ID		WI1961			WI1962			
Sampling Date		2019/08/16 09:10			2019/08/16 10:45			
COC Number		M085562			M085562			
	UNITS	MW13-7	MU	RDL	MW13-9	MU	RDL	QC Batch
Total Uranium (U)	mg/L	0.019	+/- 0.0024	0.00010	0.062	+/- 0.0079	0.00010	9556679
Total Vanadium (V)	mg/L	0.0023	+/- 0.0017	0.0010	0.0025	+/- 0.0017	0.0010	9556679
Total Zinc (Zn)	mg/L	0.023	+/- 0.0047	0.0030	0.0042	+/- <RDL	0.0030	9556679

RDL = Reportable Detection Limit
MU = Measurement Uncertainty

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REGULATED METALS (CCME/AT1) - TOTAL

BV Labs ID		WI1962			
Sampling Date		2019/08/16 10:45			
COC Number		M085562			
	UNITS	MW13-9 Lab-Dup	MU	RDL	QC Batch
Elements					
Total Aluminum (Al)	mg/L	0.10	+/- 0.022	0.0030	9556679
Total Antimony (Sb)	mg/L	<0.00060	N/A	0.00060	9556679
Total Arsenic (As)	mg/L	0.0028	+/- 0.00079	0.00020	9556679
Total Barium (Ba)	mg/L	<0.10	N/A	0.10	9556687
Total Beryllium (Be)	mg/L	<0.0010	N/A	0.0010	9556679
Total Boron (B)	mg/L	2.0	+/- <RDL	0.20	9556687
Total Cadmium (Cd)	mg/L	0.000052	+/- <RDL	0.000020	9556679
Total Calcium (Ca)	mg/L	570	+/- 58	3.0	9556687
Total Chromium (Cr)	mg/L	<0.0010	N/A	0.0010	9556679
Total Cobalt (Co)	mg/L	0.064	+/- 0.0073	0.00030	9556679
Total Copper (Cu)	mg/L	0.0029	+/- 0.00055	0.00020	9556679
Total Iron (Fe)	mg/L	8.2	+/- 0.94	0.60	9556687
Total Lead (Pb)	mg/L	0.0011	+/- <RDL	0.00020	9556679
Total Lithium (Li)	mg/L	0.22	+/- <RDL	0.20	9556687
Total Magnesium (Mg)	mg/L	1500	+/- 120	2.0	9556687
Total Manganese (Mn)	mg/L	1.2	+/- 0.11	0.040	9556687
Total Molybdenum (Mo)	mg/L	0.0047	+/- 0.00072	0.00020	9556679
Total Nickel (Ni)	mg/L	0.10	+/- 0.012	0.00050	9556679
Total Phosphorus (P)	mg/L	<1.0	N/A	1.0	9556687
Total Potassium (K)	mg/L	200	+/- 20	3.0	9556687
Total Selenium (Se)	mg/L	0.0020 (1)	N/A	0.00020	9556679
Total Silicon (Si)	mg/L	5.0	+/- <RDL	1.0	9556687
Total Silver (Ag)	mg/L	<0.00010	N/A	0.00010	9556679
Total Sodium (Na)	mg/L	5600 (2)	+/- 600	50	9556687
Total Strontium (Sr)	mg/L	3.1	+/- 0.24	0.20	9556687
Total Sulphur (S)	mg/L	1200	+/- 65	2.0	9556687

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate
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.
(2) Detection limits raised due to dilution to bring analyte within the calibrated range.

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REGULATED METALS (CCME/AT1) - TOTAL

BV Labs ID		WI1962			
Sampling Date		2019/08/16 10:45			
COC Number		M085562			
	UNITS	MW13-9 Lab-Dup	MU	RDL	QC Batch
Total Thallium (Tl)	mg/L	<0.00020	N/A	0.00020	9556679
Total Tin (Sn)	mg/L	<0.0010	N/A	0.0010	9556679
Total Titanium (Ti)	mg/L	0.0077	+/- 0.0016	0.0010	9556679
Total Uranium (U)	mg/L	0.063	+/- 0.0080	0.00010	9556679
Total Vanadium (V)	mg/L	0.0025	+/- 0.0017	0.0010	9556679
Total Zinc (Zn)	mg/L	0.0041	+/- <RDL	0.0030	9556679

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

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

BV Labs Job #: B969005
Report Date: 2019/09/05

STANTEC CONSULTING LTD
Client Project #: 110220369
Site Location: CBA APRON

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		WI1957		WI1958		WI1959			
Sampling Date		2019/08/15 12:45		2019/08/15 14:25		2019/08/15 16:25			
COC Number		M085562		M085562		M085562			
	UNITS	MW13-5	MU	MW13-3	MU	MW13-1	MU	RDL	QC Batch
Misc. Inorganics									
Total Suspended Solids	mg/L	4.0	+/- <RDL	17	+/- 1.5	5.3	+/- <RDL	1.0	9556451
Nutrients									
Total Ammonia (N)	mg/L	0.20	+/- 0.024	0.28	+/- 0.031	0.58	+/- 0.063	0.015	9557413
Misc. Organics									
Extractable (n-Hex.) Oil and grease	mg/L	<2.0	N/A	2.0	+/- <RDL	3.0	+/- <RDL	2.0	9556746

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

BV Labs ID		WI1960				WI1961			
Sampling Date		2019/08/15 14:27				2019/08/16 09:10			
COC Number		M085562				M085562			
	UNITS	GW-QC-02	MU	RDL	QC Batch	MW13-7	MU	RDL	QC Batch
Misc. Inorganics									
Total Suspended Solids	mg/L	15	+/- 1.3	1.0	9556451	7.3	+/- <RDL	1.0	9556449
Nutrients									
Total Ammonia (N)	mg/L	0.23	+/- 0.027	0.015	9557413	2.5 (1)	+/- 0.26	0.075	9557413
Misc. Organics									
Extractable (n-Hex.) Oil and grease	mg/L	2.0	+/- <RDL	2.0	9556746	<2.0	N/A	2.0	9556746

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

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

BV Labs Job #: B969005
Report Date: 2019/09/05

STANTEC CONSULTING LTD
Client Project #: 110220369
Site Location: CBA APRON

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		WI1962			
Sampling Date		2019/08/16 10:45			
COC Number		M085562			
	UNITS	MW13-9	MU	RDL	QC Batch
Misc. Inorganics					
Total Suspended Solids	mg/L	35	+/- 3.1	1.0	9556451
Nutrients					
Total Ammonia (N)	mg/L	2.4 (1)	+/- 0.25	0.075	9557413
Misc. Organics					
Extractable (n-Hex.) Oil and grease	mg/L	<2.0	N/A	2.0	9556746

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

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

SEMIVOLATILE ORGANICS BY GC-MS (WATER)

BV Labs ID		WI1957		WI1958		WI1959			
Sampling Date		2019/08/15 12:45		2019/08/15 14:25		2019/08/15 16:25			
COC Number		M085562		M085562		M085562			
	UNITS	MW13-5	MU	MW13-3	MU	MW13-1	MU	RDL	QC Batch
Polycyclic Aromatics									
B[a]P TPE Total Potency Equivalents	mg/L	<0.000010	N/A	<0.000010	N/A	<0.000010	N/A	0.000010	9554798
Acenaphthene	mg/L	<0.00010	N/A	<0.00010	N/A	<0.00010	N/A	0.00010	9556380
Acenaphthylene	mg/L	<0.00010	N/A	<0.00010	N/A	<0.00010	N/A	0.00010	9556380
Acridine	mg/L	<0.000040	N/A	<0.000040	N/A	<0.000040	N/A	0.000040	9556380
Anthracene	mg/L	<0.000010	N/A	<0.000010	N/A	<0.000010	N/A	0.000010	9556380
Benzo(a)anthracene	mg/L	<0.0000085	N/A	<0.0000085	N/A	<0.0000085	N/A	0.0000085	9556380
Benzo(b&j)fluoranthene	mg/L	<0.0000085	N/A	<0.0000085	N/A	<0.0000085	N/A	0.0000085	9556380
Benzo(k)fluoranthene	mg/L	<0.0000085	N/A	<0.0000085	N/A	<0.0000085	N/A	0.0000085	9556380
Benzo(g,h,i)perylene	mg/L	<0.0000085	N/A	<0.0000085	N/A	<0.0000085	N/A	0.0000085	9556380
Benzo(c)phenanthrene	mg/L	<0.000050	N/A	<0.000050	N/A	<0.000050	N/A	0.000050	9556380
Benzo(a)pyrene	mg/L	<0.0000075	N/A	<0.0000075	N/A	<0.0000075	N/A	0.0000075	9556380
Benzo(e)pyrene	mg/L	<0.000050	N/A	<0.000050	N/A	<0.000050	N/A	0.000050	9556380
Chrysene	mg/L	<0.0000085	N/A	<0.0000085	N/A	<0.0000085	N/A	0.0000085	9556380
Dibenz(a,h)anthracene	mg/L	<0.0000075	N/A	<0.0000075	N/A	<0.0000075	N/A	0.0000075	9556380
Fluoranthene	mg/L	<0.000010	N/A	<0.000010	N/A	<0.000010	N/A	0.000010	9556380
Fluorene	mg/L	<0.000050	N/A	<0.000050	N/A	<0.000050	N/A	0.000050	9556380
Indeno(1,2,3-cd)pyrene	mg/L	<0.0000085	N/A	<0.0000085	N/A	<0.0000085	N/A	0.0000085	9556380
1-Methylnaphthalene	mg/L	<0.00010	N/A	<0.00010	N/A	<0.00010	N/A	0.00010	9556380
2-Methylnaphthalene	mg/L	<0.00010	N/A	<0.00010	N/A	<0.00010	N/A	0.00010	9556380
Naphthalene	mg/L	<0.00010	N/A	<0.00010	N/A	<0.00010	N/A	0.00010	9556380
Phenanthrene	mg/L	<0.000050	N/A	<0.000050	N/A	<0.000050	N/A	0.000050	9556380
Perylene	mg/L	<0.000050	N/A	<0.000050	N/A	<0.000050	N/A	0.000050	9556380
Pyrene	mg/L	<0.000020	N/A	<0.000020	N/A	<0.000020	N/A	0.000020	9556380
Quinoline	mg/L	<0.00020	N/A	<0.00020	N/A	<0.00020	N/A	0.00020	9556380
Phenols									
2,3,4-trichlorophenol	mg/L	<0.00010	N/A	<0.00010	N/A	<0.00010	N/A	0.00010	9556829
Cresols	mg/L	<0.00014	N/A	<0.00014	N/A	<0.00014	N/A	0.00014	9555422
Phenol	mg/L	<0.00010	N/A	<0.00010	N/A	<0.00010	N/A	0.00010	9556829
3 & 4-chlorophenol	mg/L	<0.00010	N/A	<0.00010	N/A	<0.00010	N/A	0.00010	9556829
2,3,5,6-tetrachlorophenol	mg/L	<0.00010	N/A	<0.00010	N/A	<0.00010	N/A	0.00010	9556829

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

SEMIVOLATILE ORGANICS BY GC-MS (WATER)

BV Labs ID		WI1957		WI1958		WI1959			
Sampling Date		2019/08/15 12:45		2019/08/15 14:25		2019/08/15 16:25			
COC Number		M085562		M085562		M085562			
	UNITS	MW13-5	MU	MW13-3	MU	MW13-1	MU	RDL	QC Batch
2,3,4,6-tetrachlorophenol	mg/L	<0.00010	N/A	<0.00010	N/A	<0.00010	N/A	0.00010	9556829
2,4,5-trichlorophenol	mg/L	<0.00010	N/A	<0.00010	N/A	<0.00010	N/A	0.00010	9556829
2,4,6-trichlorophenol	mg/L	<0.00010	N/A	<0.00010	N/A	<0.00010	N/A	0.00010	9556829
2,3,5-trichlorophenol	mg/L	<0.00010	N/A	<0.00010	N/A	<0.00010	N/A	0.00010	9556829
2,4-dichlorophenol	mg/L	<0.00010	N/A	<0.00010	N/A	<0.00010	N/A	0.00010	9556829
2,4-dimethylphenol	mg/L	<0.00010	N/A	<0.00010	N/A	<0.00010	N/A	0.00010	9556829
2,4-dinitrophenol	mg/L	<0.0010	N/A	<0.0010	N/A	<0.0010	N/A	0.0010	9556829
2,6-dichlorophenol	mg/L	<0.00010	N/A	<0.00010	N/A	<0.00010	N/A	0.00010	9556829
2-chlorophenol	mg/L	<0.00010	N/A	<0.00010	N/A	<0.00010	N/A	0.00010	9556829
2-methylphenol	mg/L	<0.00010	N/A	<0.00010	N/A	<0.00010	N/A	0.00010	9556829
2-nitrophenol	mg/L	<0.0010	N/A	<0.0010	N/A	<0.0010	N/A	0.0010	9556829
3 & 4-methylphenol	mg/L	<0.00010	N/A	<0.00010	N/A	<0.00010	N/A	0.00010	9556829
4,6-dinitro-2-methylphenol	mg/L	<0.0010	N/A	<0.0010	N/A	<0.0010	N/A	0.0010	9556829
4-chloro-3-methylphenol	mg/L	<0.00010	N/A	<0.00010	N/A	<0.00010	N/A	0.00010	9556829
4-nitrophenol	mg/L	<0.0010	N/A	<0.0010	N/A	<0.0010	N/A	0.0010	9556829
Pentachlorophenol	mg/L	<0.00010	N/A	<0.00010	N/A	<0.00010	N/A	0.00010	9556829
Surrogate Recovery (%)									
D10-ANTHRACENE (sur.)	%	101	N/A	104	N/A	103	N/A	N/A	9556380
D8-ACENAPHTHYLENE (sur.)	%	105	N/A	103	N/A	105	N/A	N/A	9556380
D8-NAPHTHALENE (sur.)	%	102	N/A	99	N/A	101	N/A	N/A	9556380
TERPHENYL-D14 (sur.)	%	121	N/A	113	N/A	126	N/A	N/A	9556380
2,4,6-TRIBROMOPHENOL (sur.)	%	127	N/A	133	N/A	130	N/A	N/A	9556829
2,4-DIBROMOPHENOL (sur.)	%	108	N/A	114	N/A	110	N/A	N/A	9556829

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

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SEMIVOLATILE ORGANICS BY GC-MS (WATER)

BV Labs ID		WI1960		WI1961		WI1962			
Sampling Date		2019/08/15 14:27		2019/08/16 09:10		2019/08/16 10:45			
COC Number		M085562		M085562		M085562			
	UNITS	GW-QC-02	MU	MW13-7	MU	MW13-9	MU	RDL	QC Batch
Polycyclic Aromatics									
B[a]P TPE Total Potency Equivalents	mg/L	<0.000010	N/A	<0.000010	N/A	<0.000010	N/A	0.000010	9554798
Acenaphthene	mg/L	<0.00010	N/A	<0.00010	N/A	<0.00010	N/A	0.00010	9556380
Acenaphthylene	mg/L	<0.00010	N/A	<0.00010	N/A	<0.00010	N/A	0.00010	9556380
Acridine	mg/L	<0.000040	N/A	<0.000040	N/A	<0.000040	N/A	0.000040	9556380
Anthracene	mg/L	<0.000010	N/A	<0.000010	N/A	<0.000010	N/A	0.000010	9556380
Benzo(a)anthracene	mg/L	<0.0000085	N/A	<0.0000085	N/A	<0.0000085	N/A	0.0000085	9556380
Benzo(b&j)fluoranthene	mg/L	<0.0000085	N/A	<0.0000085	N/A	<0.0000085	N/A	0.0000085	9556380
Benzo(k)fluoranthene	mg/L	<0.0000085	N/A	<0.0000085	N/A	<0.0000085	N/A	0.0000085	9556380
Benzo(g,h,i)perylene	mg/L	<0.0000085	N/A	<0.0000085	N/A	<0.0000085	N/A	0.0000085	9556380
Benzo(c)phenanthrene	mg/L	<0.000050	N/A	<0.000050	N/A	<0.000050	N/A	0.000050	9556380
Benzo(a)pyrene	mg/L	<0.0000075	N/A	<0.0000075	N/A	<0.0000075	N/A	0.0000075	9556380
Benzo(e)pyrene	mg/L	<0.000050	N/A	<0.000050	N/A	<0.000050	N/A	0.000050	9556380
Chrysene	mg/L	<0.0000085	N/A	<0.0000085	N/A	<0.0000085	N/A	0.0000085	9556380
Dibenz(a,h)anthracene	mg/L	<0.0000075	N/A	<0.0000075	N/A	<0.0000075	N/A	0.0000075	9556380
Fluoranthene	mg/L	<0.000010	N/A	<0.000010	N/A	<0.000010	N/A	0.000010	9556380
Fluorene	mg/L	<0.000050	N/A	<0.000050	N/A	<0.000050	N/A	0.000050	9556380
Indeno(1,2,3-cd)pyrene	mg/L	<0.0000085	N/A	<0.0000085	N/A	<0.0000085	N/A	0.0000085	9556380
1-Methylnaphthalene	mg/L	<0.00010	N/A	<0.00010	N/A	<0.00010	N/A	0.00010	9556380
2-Methylnaphthalene	mg/L	<0.00010	N/A	<0.00010	N/A	<0.00010	N/A	0.00010	9556380
Naphthalene	mg/L	<0.00010	N/A	<0.00010	N/A	<0.00010	N/A	0.00010	9556380
Phenanthrene	mg/L	<0.000050	N/A	<0.000050	N/A	<0.000050	N/A	0.000050	9556380
Perylene	mg/L	<0.000050	N/A	<0.000050	N/A	<0.000050	N/A	0.000050	9556380
Pyrene	mg/L	<0.000020	N/A	<0.000020	N/A	<0.000020	N/A	0.000020	9556380
Quinoline	mg/L	<0.00020	N/A	<0.00020	N/A	<0.00020	N/A	0.00020	9556380
Phenols									
2,3,4-trichlorophenol	mg/L	<0.00010	N/A	<0.00010	N/A	<0.00010	N/A	0.00010	9556829
Cresols	mg/L	<0.00014	N/A	<0.00014	N/A	0.0018	N/A	0.00014	9555422
Phenol	mg/L	<0.00010	N/A	<0.00010	N/A	0.00010	+/- <RDL	0.00010	9556829
3 & 4-chlorophenol	mg/L	<0.00010	N/A	<0.00010	N/A	<0.00010	N/A	0.00010	9556829
2,3,5,6-tetrachlorophenol	mg/L	<0.00010	N/A	<0.00010	N/A	<0.00010	N/A	0.00010	9556829

RDL = Reportable Detection Limit
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N/A = Not Applicable

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SEMIVOLATILE ORGANICS BY GC-MS (WATER)

BV Labs ID		WI1960		WI1961		WI1962			
Sampling Date		2019/08/15 14:27		2019/08/16 09:10		2019/08/16 10:45			
COC Number		M085562		M085562		M085562			
	UNITS	GW-QC-02	MU	MW13-7	MU	MW13-9	MU	RDL	QC Batch
2,3,4,6-tetrachlorophenol	mg/L	<0.00010	N/A	<0.00010	N/A	<0.00010	N/A	0.00010	9556829
2,4,5-trichlorophenol	mg/L	<0.00010	N/A	<0.00010	N/A	<0.00010	N/A	0.00010	9556829
2,4,6-trichlorophenol	mg/L	<0.00010	N/A	<0.00010	N/A	<0.00010	N/A	0.00010	9556829
2,3,5-trichlorophenol	mg/L	<0.00010	N/A	<0.00010	N/A	<0.00010	N/A	0.00010	9556829
2,4-dichlorophenol	mg/L	<0.00010	N/A	<0.00010	N/A	<0.00010	N/A	0.00010	9556829
2,4-dimethylphenol	mg/L	<0.00010	N/A	<0.00010	N/A	<0.00010	N/A	0.00010	9556829
2,4-dinitrophenol	mg/L	<0.0010	N/A	<0.0010	N/A	<0.0010	N/A	0.0010	9556829
2,6-dichlorophenol	mg/L	<0.00010	N/A	<0.00010	N/A	<0.00010	N/A	0.00010	9556829
2-chlorophenol	mg/L	<0.00010	N/A	<0.00010	N/A	<0.00010	N/A	0.00010	9556829
2-methylphenol	mg/L	<0.00010	N/A	<0.00010	N/A	<0.00010	N/A	0.00010	9556829
2-nitrophenol	mg/L	<0.0010	N/A	<0.0010	N/A	<0.0010	N/A	0.0010	9556829
3 & 4-methylphenol	mg/L	<0.00010	N/A	<0.00010	N/A	0.0018	+/- 0.00055	0.00010	9556829
4,6-dinitro-2-methylphenol	mg/L	<0.0010	N/A	<0.0010	N/A	<0.0010	N/A	0.0010	9556829
4-chloro-3-methylphenol	mg/L	<0.00010	N/A	<0.00010	N/A	<0.00010	N/A	0.00010	9556829
4-nitrophenol	mg/L	<0.0010	N/A	<0.0010	N/A	<0.0010	N/A	0.0010	9556829
Pentachlorophenol	mg/L	<0.00010	N/A	<0.00010	N/A	<0.00010	N/A	0.00010	9556829
Surrogate Recovery (%)									
D10-ANTHRACENE (sur.)	%	101	N/A	102	N/A	103	N/A	N/A	9556380
D8-ACENAPHTHYLENE (sur.)	%	103	N/A	105	N/A	102	N/A	N/A	9556380
D8-NAPHTHALENE (sur.)	%	100	N/A	103	N/A	101	N/A	N/A	9556380
TERPHENYL-D14 (sur.)	%	116	N/A	118	N/A	117	N/A	N/A	9556380
2,4,6-TRIBROMOPHENOL (sur.)	%	119	N/A	120	N/A	127	N/A	N/A	9556829
2,4-DIBROMOPHENOL (sur.)	%	101	N/A	103	N/A	108	N/A	N/A	9556829

RDL = Reportable Detection Limit
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N/A = Not Applicable

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SUBCONTRACTED ANALYSIS (WATER)

BV Labs ID		WI1957			WI1958			WI1959			
Sampling Date		2019/08/15 12:45			2019/08/15 14:25			2019/08/15 16:25			
COC Number		M085562			M085562			M085562			
	UNITS	MW13-5	MU	RDL	MW13-3	MU	RDL	MW13-1	MU	RDL	QC Batch
MISCELLANEOUS											
Perfluorobutanoic acid	ug/L	0.052	+/- 0.053	0.020	1.3	+/- 0.21	0.040	0.033	+/- 0.052	0.020	9575499
Perfluoropentanoic Acid (PFPeA)	ug/L	0.30	+/- 0.071	0.020	5.1	+/- 0.84	0.40	0.15	+/- 0.056	0.020	9575499
Perfluorohexanoic Acid (PFHxA)	ug/L	0.15	+/- 0.075	0.020	2.9	+/- 0.51	0.40	0.10	+/- 0.072	0.020	9575499
Perfluoroheptanoic Acid (PFHpA)	ug/L	0.022	+/- 0.055	0.020	0.67	+/- 0.13	0.040	0.050	+/- 0.056	0.020	9575499
Perfluorooctanoic Acid (PFOA)	ug/L	<0.020	N/A	0.020	0.26	N/A	0.040	<0.020	N/A	0.020	9575499
Perfluorononanoic Acid (PFNA)	ug/L	<0.020	N/A	0.020	<0.040	N/A	0.040	<0.020	N/A	0.020	9575499
Perfluorodecanoic Acid (PFDA)	ug/L	<0.020	N/A	0.020	<0.040	N/A	0.040	<0.020	N/A	0.020	9575499
Perfluoroundecanoic Acid (PFUnA)	ug/L	<0.020	N/A	0.020	<0.040	N/A	0.040	<0.020	N/A	0.020	9575499
Perfluorododecanoic Acid (PFDoA)	ug/L	<0.020	N/A	0.020	<0.040	N/A	0.040	<0.020	N/A	0.020	9575499
Perfluorotridecanoic Acid	ug/L	<0.020	N/A	0.020	<0.040	N/A	0.040	<0.020	N/A	0.020	9575499
Perfluorotetradecanoic Acid	ug/L	<0.020	N/A	0.020	<0.040	N/A	0.040	<0.020	N/A	0.020	9575499
Perfluorobutanesulfonic acid	ug/L	<0.020	N/A	0.020	0.075	N/A	0.040	<0.020	N/A	0.020	9575499
Perfluoropentanesulfonic acid	ug/L	<0.020	N/A	0.020	0.056	N/A	0.040	<0.020	N/A	0.020	9575499
Perfluorohexanesulfonic acid	ug/L	0.027	N/A	0.020	0.40	N/A	0.040	0.058	N/A	0.020	9575499
Perfluoroheptanesulfonic acid	ug/L	<0.020	N/A	0.020	<0.040	N/A	0.040	<0.020	N/A	0.020	9575499
Perfluorooctanesulfonic acid	ug/L	<0.020	N/A	0.020	0.24	N/A	0.040	<0.020	N/A	0.020	9575499
Perfluorononanesulfonic acid	ug/L	<0.020	N/A	0.020	<0.040	N/A	0.040	<0.020	N/A	0.020	9575499
Perfluorodecanesulfonic acid (PFDS)	ug/L	<0.020	N/A	0.020	<0.040	N/A	0.040	<0.020	N/A	0.020	9575499
Perfluorooctane Sulfonamide (PFOSA)	ug/L	<0.020	N/A	0.020	<0.040	N/A	0.040	<0.020	N/A	0.020	9575499
Surrogate Recovery (%)											
13C2-Perfluorodecanoic acid	%	87	N/A	N/A	85	N/A	N/A	82	N/A	N/A	9575499
13C2-Perfluorododecanoic acid	%	77	N/A	N/A	77	N/A	N/A	73	N/A	N/A	9575499
13C2-Perfluorohexanoic acid	%	96	N/A	N/A	113	N/A	N/A	87	N/A	N/A	9575499
13C2-perfluorotetradecanoic acid	%	64	N/A	N/A	74	N/A	N/A	60	N/A	N/A	9575499
13C2-Perfluoroundecanoic acid	%	84	N/A	N/A	80	N/A	N/A	78	N/A	N/A	9575499
13C3-Perfluorobutanesulfonic acid	%	88	N/A	N/A	89	N/A	N/A	75	N/A	N/A	9575499
13C4-Perfluorobutanoic acid	%	91	N/A	N/A	87	N/A	N/A	78	N/A	N/A	9575499
13C4-Perfluoroheptanoic acid	%	98	N/A	N/A	96	N/A	N/A	90	N/A	N/A	9575499
13C4-Perfluorooctanesulfonic acid	%	85	N/A	N/A	84	N/A	N/A	80	N/A	N/A	9575499
13C4-Perfluorooctanoic acid	%	95	N/A	N/A	94	N/A	N/A	87	N/A	N/A	9575499

RDL = Reportable Detection Limit
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N/A = Not Applicable

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SUBCONTRACTED ANALYSIS (WATER)

BV Labs ID		WI1957			WI1958			WI1959			
Sampling Date		2019/08/15 12:45			2019/08/15 14:25			2019/08/15 16:25			
COC Number		M085562			M085562			M085562			
	UNITS	**MW13-5**	**MU**	**RDL**	**MW13-3**	**MU**	**RDL**	**MW13-1**	**MU**	**RDL**	**QC Batch**
13C5-Perfluorononanoic acid	%	93	N/A	N/A	93	N/A	N/A	87	N/A	N/A	9575499
13C5-Perfluoropentanoic acid	%	76	N/A	N/A	108	N/A	N/A	54	N/A	N/A	9575499
13C8-Perfluorooctane Sulfonamide	%	84	N/A	N/A	81	N/A	N/A	81	N/A	N/A	9575499
18O2-Perfluorohexanesulfonic acid	%	93	N/A	N/A	92	N/A	N/A	85	N/A	N/A	9575499

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

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SUBCONTRACTED ANALYSIS (WATER)

BV Labs ID		WI1960			WI1961		WI1962			
Sampling Date		2019/08/15 14:27			2019/08/16 09:10		2019/08/16 10:45			
COC Number		M085562			M085562		M085562			
	UNITS	GW-QC-02	MU	RDL	MW13-7	MU	MW13-9	MU	RDL	QC Batch
MISCELLANEOUS										
Perfluorobutanoic acid	ug/L	1.4	+/- 0.23	0.040	0.081	+/- 0.054	0.18	+/- 0.059	0.020	9575499
Perfluoropentanoic Acid (PFPeA)	ug/L	5.1	+/- 0.84	0.40	0.68	+/- 0.12	0.68	+/- 0.12	0.020	9575499
Perfluorohexanoic Acid (PFHxA)	ug/L	2.9	+/- 0.50	0.40	0.32	+/- 0.090	0.20	+/- 0.078	0.020	9575499
Perfluoroheptanoic Acid (PFHpA)	ug/L	0.73	+/- 0.14	0.040	0.028	+/- 0.055	0.035	+/- 0.055	0.020	9575499
Perfluorooctanoic Acid (PFOA)	ug/L	0.29	N/A	0.040	<0.020	N/A	<0.020	N/A	0.020	9575499
Perfluorononanoic Acid (PFNA)	ug/L	<0.040	N/A	0.040	<0.020	N/A	<0.020	N/A	0.020	9575499
Perfluorodecanoic Acid (PFDA)	ug/L	<0.040	N/A	0.040	<0.020	N/A	<0.020	N/A	0.020	9575499
Perfluoroundecanoic Acid (PFUnA)	ug/L	<0.040	N/A	0.040	<0.020	N/A	<0.020	N/A	0.020	9575499
Perfluorododecanoic Acid (PFDoA)	ug/L	<0.040	N/A	0.040	<0.020	N/A	<0.020	N/A	0.020	9575499
Perfluorotridecanoic Acid	ug/L	<0.040	N/A	0.040	<0.020	N/A	<0.020	N/A	0.020	9575499
Perfluorotetradecanoic Acid	ug/L	<0.040	N/A	0.040	<0.020	N/A	<0.020	N/A	0.020	9575499
Perfluorobutanesulfonic acid	ug/L	0.075	N/A	0.040	<0.020	N/A	<0.020	N/A	0.020	9575499
Perfluoropentanesulfonic acid	ug/L	0.074	N/A	0.040	<0.020	N/A	<0.020	N/A	0.020	9575499
Perfluorohexanesulfonic acid	ug/L	0.45	N/A	0.040	0.029	N/A	<0.020	N/A	0.020	9575499
Perfluoroheptanesulfonic acid	ug/L	<0.040	N/A	0.040	<0.020	N/A	<0.020	N/A	0.020	9575499
Perfluorooctanesulfonic acid	ug/L	0.26	N/A	0.040	0.087	N/A	<0.020	N/A	0.020	9575499
Perfluorononanesulfonic acid	ug/L	<0.040	N/A	0.040	<0.020	N/A	<0.020	N/A	0.020	9575499
Perfluorodecanesulfonic acid (PFDS)	ug/L	<0.040	N/A	0.040	<0.020	N/A	<0.020	N/A	0.020	9575499
Perfluorooctane Sulfonamide (PFOSA)	ug/L	<0.040	N/A	0.040	<0.020	N/A	<0.020	N/A	0.020	9575499
Surrogate Recovery (%)										
13C2-Perfluorodecanoic acid	%	86	N/A	N/A	87	N/A	83	N/A	N/A	9575499
13C2-Perfluorododecanoic acid	%	75	N/A	N/A	77	N/A	75	N/A	N/A	9575499
13C2-Perfluorohexanoic acid	%	109	N/A	N/A	92	N/A	83	N/A	N/A	9575499
13C2-perfluorotetradecanoic acid	%	73	N/A	N/A	52	N/A	67	N/A	N/A	9575499
13C2-Perfluoroundecanoic acid	%	80	N/A	N/A	84	N/A	77	N/A	N/A	9575499
13C3-Perfluorobutanesulfonic acid	%	88	N/A	N/A	82	N/A	70	N/A	N/A	9575499
13C4-Perfluorobutanoic acid	%	87	N/A	N/A	70	N/A	4.8 (1)	N/A	N/A	9575499

RDL = Reportable Detection Limit
MU = Measurement Uncertainty
N/A = Not Applicable
(1) Extracted internal standard analyte recovery was below the defined lower control limit (LCL). Laboratory spiked water resulted in satisfactory recovery of the extracted internal standard analyte. When considered together, these QC data suggest that matrix interferences may be increasing the variability of the associated native analyte result (Perfluorobutanoic acid).

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SUBCONTRACTED ANALYSIS (WATER)

BV Labs ID		WI1960			WI1961		WI1962			
Sampling Date		2019/08/15 14:27			2019/08/16 09:10		2019/08/16 10:45			
COC Number		M085562			M085562		M085562			
	UNITS	GW-QC-02	MU	RDL	MW13-7	MU	MW13-9	MU	RDL	QC Batch
13C4-Perfluoroheptanoic acid	%	97	N/A	N/A	97	N/A	93	N/A	N/A	9575499
13C4-Perfluorooctanesulfonic acid	%	87	N/A	N/A	84	N/A	78	N/A	N/A	9575499
13C4-Perfluorooctanoic acid	%	96	N/A	N/A	95	N/A	91	N/A	N/A	9575499
13C5-Perfluorononanoic acid	%	94	N/A	N/A	92	N/A	89	N/A	N/A	9575499
13C5-Perfluoropentanoic acid	%	101	N/A	N/A	55	N/A	35 (1)	N/A	N/A	9575499
13C8-Perfluorooctane Sulfonamide	%	81	N/A	N/A	81	N/A	81	N/A	N/A	9575499
18O2-Perfluorohexanesulfonic acid	%	92	N/A	N/A	91	N/A	89	N/A	N/A	9575499

RDL = Reportable Detection Limit
MU = Measurement Uncertainty
N/A = Not Applicable
(1) Extracted internal standard analyte recovery was below the defined lower control limit (LCL). Laboratory spiked water resulted in satisfactory recovery of the extracted internal standard analyte. When considered together, these QC data suggest that matrix interferences may be increasing the variability of the associated native analyte result (Perfluoropentanoic acid).

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GENERAL COMMENTS

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

Package 1	6.1°C
Package 2	9.3°C
Package 3	11.6°C
Package 4	7.2°C
Package 5	6.2°C

Sample WI1957 [MW13-5] : Sample was analyzed past method specified hold time for Nitrogen (Nitrite - Nitrate) by IC. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.

Sample WI1958 [MW13-3] : Sample was analyzed past method specified hold time for Nitrogen (Nitrite - Nitrate) by IC. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Per- and polyfluoroalkyl substances (PFAS): Due to high concentrations of the target analytes, a reduced sample volume was extracted and analyzed. Detection limits were adjusted accordingly.

Sample WI1959 [MW13-1] : Sample was analyzed past method specified hold time for Nitrogen (Nitrite - Nitrate) by IC. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.

Sample WI1960 [GW-QC-02] : Sample was analyzed past method specified hold time for Nitrogen (Nitrite - Nitrate) by IC. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Per- and polyfluoroalkyl substances (PFAS): Due to high concentrations of the target analytes, a reduced sample volume was extracted and analyzed. Detection limits were adjusted accordingly.

Sample WI1961 [MW13-7] : Nitrogen (Nitrite - Nitrate) by IC completed within 48h after laboratory receipt to a maximum of five days from sampling. Data are satisfactory for compliance purposes.

Sample WI1962 [MW13-9] : Sample was analyzed past method specified hold time for Nitrogen (Nitrite - Nitrate) by IC. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Detection limits raised due to sample matrix. Parameters affected are dissolved Ca, Fe, K, Mg, Mn and total B, Ba, Ca, Fe, K, Li, Mg, Mn, P, S, Si, Sr.

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
9556380	KHO	Matrix Spike	D10-ANTHRACENE (sur.)	2019/08/21		103	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2019/08/21		102	%	50 - 130
			D8-NAPHTHALENE (sur.)	2019/08/21		100	%	50 - 130
			TERPHENYL-D14 (sur.)	2019/08/21		111	%	50 - 130
			Acenaphthene	2019/08/21		92	%	50 - 130
			Acenaphthylene	2019/08/21		99	%	50 - 130
			Acridine	2019/08/21		88	%	50 - 130
			Anthracene	2019/08/21		98	%	50 - 130
			Benzo(a)anthracene	2019/08/21		94	%	50 - 130
			Benzo(b&j)fluoranthene	2019/08/21		91	%	50 - 130
			Benzo(k)fluoranthene	2019/08/21		92	%	50 - 130
			Benzo(g,h,i)perylene	2019/08/21		97	%	50 - 130
			Benzo(c)phenanthrene	2019/08/21		98	%	50 - 130
			Benzo(a)pyrene	2019/08/21		95	%	50 - 130
			Benzo(e)pyrene	2019/08/21		102	%	50 - 130
			Chrysene	2019/08/21		94	%	50 - 130
			Dibenz(a,h)anthracene	2019/08/21		100	%	50 - 130
			Fluoranthene	2019/08/21		93	%	50 - 130
			Fluorene	2019/08/21		94	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2019/08/21		94	%	50 - 130
			1-Methylnaphthalene	2019/08/21		100	%	50 - 130
			2-Methylnaphthalene	2019/08/21		101	%	50 - 130
			Naphthalene	2019/08/21		100	%	50 - 130
			Phenanthrene	2019/08/21		94	%	50 - 130
			Perylene	2019/08/21		105	%	50 - 130
			Pyrene	2019/08/21		91	%	50 - 130
			Quinoline	2019/08/21		117	%	50 - 130
9556380	KHO	Spiked Blank	D10-ANTHRACENE (sur.)	2019/08/21		91	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2019/08/21		92	%	50 - 130
			D8-NAPHTHALENE (sur.)	2019/08/21		90	%	50 - 130
			TERPHENYL-D14 (sur.)	2019/08/21		100	%	50 - 130
			Acenaphthene	2019/08/21		90	%	50 - 130
			Acenaphthylene	2019/08/21		92	%	50 - 130
			Acridine	2019/08/21		84	%	50 - 130
			Anthracene	2019/08/21		76	%	50 - 130
			Benzo(a)anthracene	2019/08/21		100	%	50 - 130
			Benzo(b&j)fluoranthene	2019/08/21		99	%	50 - 130
			Benzo(k)fluoranthene	2019/08/21		96	%	50 - 130
			Benzo(g,h,i)perylene	2019/08/21		100	%	50 - 130
			Benzo(c)phenanthrene	2019/08/21		103	%	50 - 130
			Benzo(a)pyrene	2019/08/21		96	%	50 - 130
			Benzo(e)pyrene	2019/08/21		109	%	50 - 130
			Chrysene	2019/08/21		100	%	50 - 130
			Dibenz(a,h)anthracene	2019/08/21		105	%	50 - 130
			Fluoranthene	2019/08/21		98	%	50 - 130
			Fluorene	2019/08/21		96	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2019/08/21		100	%	50 - 130
			1-Methylnaphthalene	2019/08/21		89	%	50 - 130
			2-Methylnaphthalene	2019/08/21		88	%	50 - 130
			Naphthalene	2019/08/21		90	%	50 - 130
			Phenanthrene	2019/08/21		94	%	50 - 130
			Perylene	2019/08/21		108	%	50 - 130
			Pyrene	2019/08/21		97	%	50 - 130
			Quinoline	2019/08/21		129	%	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
9556380	KHO	Method Blank	D10-ANTHRACENE (sur.)	2019/08/23		106	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2019/08/23		107	%	50 - 130
			D8-NAPHTHALENE (sur.)	2019/08/23		99	%	50 - 130
			TERPHENYL-D14 (sur.)	2019/08/23		122	%	50 - 130
			Acenaphthene	2019/08/23	<0.00010		mg/L	
			Acenaphthylene	2019/08/23	<0.00010		mg/L	
			Acridine	2019/08/23	<0.000040		mg/L	
			Anthracene	2019/08/23	<0.000010		mg/L	
			Benzo(a)anthracene	2019/08/23	<0.0000085		mg/L	
			Benzo(b&j)fluoranthene	2019/08/23	<0.0000085		mg/L	
			Benzo(k)fluoranthene	2019/08/23	<0.0000085		mg/L	
			Benzo(g,h,i)perylene	2019/08/23	<0.0000085		mg/L	
			Benzo(c)phenanthrene	2019/08/23	<0.000050		mg/L	
			Benzo(a)pyrene	2019/08/23	<0.0000075		mg/L	
			Benzo(e)pyrene	2019/08/23	<0.000050		mg/L	
			Chrysene	2019/08/23	<0.0000085		mg/L	
			Dibenz(a,h)anthracene	2019/08/23	<0.0000075		mg/L	
			Fluoranthene	2019/08/23	<0.000010		mg/L	
			Fluorene	2019/08/23	<0.000050		mg/L	
			Indeno(1,2,3-cd)pyrene	2019/08/23	<0.0000085		mg/L	
			1-Methylnaphthalene	2019/08/23	<0.00010		mg/L	
			2-Methylnaphthalene	2019/08/23	<0.00010		mg/L	
			Naphthalene	2019/08/23	<0.00010		mg/L	
			Phenanthrene	2019/08/23	<0.000050		mg/L	
			Perylene	2019/08/23	<0.000050		mg/L	
			Pyrene	2019/08/23	<0.000020		mg/L	
			Quinoline	2019/08/23	<0.00020		mg/L	
9556380	KHO	RPD	Acenaphthene	2019/08/21	NC		%	30
			Acenaphthylene	2019/08/21	NC		%	30
			Acridine	2019/08/21	NC		%	30
			Anthracene	2019/08/21	NC		%	30
			Benzo(a)anthracene	2019/08/21	NC		%	30
			Benzo(b&j)fluoranthene	2019/08/21	NC		%	30
			Benzo(k)fluoranthene	2019/08/21	NC		%	30
			Benzo(g,h,i)perylene	2019/08/21	NC		%	30
			Benzo(c)phenanthrene	2019/08/21	NC		%	30
			Benzo(a)pyrene	2019/08/21	NC		%	30
			Benzo(e)pyrene	2019/08/21	NC		%	30
			Chrysene	2019/08/21	NC		%	30
			Dibenz(a,h)anthracene	2019/08/21	NC		%	30
			Fluoranthene	2019/08/21	NC		%	30
			Fluorene	2019/08/21	NC		%	30
			Indeno(1,2,3-cd)pyrene	2019/08/21	NC		%	30
			1-Methylnaphthalene	2019/08/21	NC		%	30
			2-Methylnaphthalene	2019/08/21	NC		%	30
			Naphthalene	2019/08/21	NC		%	30
			Phenanthrene	2019/08/21	NC		%	30
			Perylene	2019/08/21	NC		%	30
			Pyrene	2019/08/21	NC		%	30
			Quinoline	2019/08/21	NC		%	30
9556395	GG3	Matrix Spike	O-TERPHENYL (sur.)	2019/08/21		97	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2019/08/21		105	%	60 - 140
9556395	GG3	Spiked Blank	O-TERPHENYL (sur.)	2019/08/21		97	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2019/08/21		105	%	60 - 140

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
9556395	GG3	Method Blank	O-TERPHENYL (sur.)	2019/08/21		93	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2019/08/21	<0.10		mg/L	
9556395	GG3	RPD	F2 (C10-C16 Hydrocarbons)	2019/08/21	NC		%	30
9556449	AAZ	Matrix Spike	Total Suspended Solids	2019/08/21		97	%	80 - 120
9556449	AAZ	Spiked Blank	Total Suspended Solids	2019/08/21		100	%	80 - 120
9556449	AAZ	Method Blank	Total Suspended Solids	2019/08/21	<1.0		mg/L	
9556449	AAZ	RPD	Total Suspended Solids	2019/08/21	NC		%	20
9556451	AAZ	Matrix Spike	Total Suspended Solids	2019/08/21		95	%	80 - 120
9556451	AAZ	Spiked Blank	Total Suspended Solids	2019/08/21		96	%	80 - 120
9556451	AAZ	Method Blank	Total Suspended Solids	2019/08/21	<1.0		mg/L	
9556451	AAZ	RPD	Total Suspended Solids	2019/08/21	18		%	20
9556599	NBA	Matrix Spike [WI1958-10]	1,4-Difluorobenzene (sur.)	2019/08/21		97	%	50 - 140
			4-Bromofluorobenzene (sur.)	2019/08/21		102	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2019/08/21		100	%	50 - 140
			Benzene	2019/08/21		79	%	50 - 140
			Toluene	2019/08/21		75	%	50 - 140
			Ethylbenzene	2019/08/21		83	%	50 - 140
			m & p-Xylene	2019/08/21		82	%	50 - 140
			o-Xylene	2019/08/21		79	%	50 - 140
			F1 (C6-C10)	2019/08/21		101	%	60 - 140
9556599	NBA	Spiked Blank	1,4-Difluorobenzene (sur.)	2019/08/21		98	%	50 - 140
			4-Bromofluorobenzene (sur.)	2019/08/21		101	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2019/08/21		96	%	50 - 140
			Benzene	2019/08/21		75	%	60 - 130
			Toluene	2019/08/21		72	%	60 - 130
			Ethylbenzene	2019/08/21		80	%	60 - 130
			m & p-Xylene	2019/08/21		79	%	60 - 130
			o-Xylene	2019/08/21		75	%	60 - 130
			F1 (C6-C10)	2019/08/21		119	%	60 - 140
9556599	NBA	Method Blank	1,4-Difluorobenzene (sur.)	2019/08/21		102	%	50 - 140
			4-Bromofluorobenzene (sur.)	2019/08/21		97	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2019/08/21		99	%	50 - 140
			Benzene	2019/08/21	<0.00040		mg/L	
			Toluene	2019/08/21	<0.00040		mg/L	
			Ethylbenzene	2019/08/21	<0.00040		mg/L	
			m & p-Xylene	2019/08/21	<0.00080		mg/L	
			o-Xylene	2019/08/21	<0.00040		mg/L	
			F1 (C6-C10)	2019/08/21	<0.10		mg/L	
9556599	NBA	RPD [WI1957-10]	Benzene	2019/08/21	NC		%	30
			Toluene	2019/08/21	NC		%	30
			Ethylbenzene	2019/08/21	NC		%	30
			m & p-Xylene	2019/08/21	NC		%	30
			o-Xylene	2019/08/21	NC		%	30
			F1 (C6-C10)	2019/08/21	NC		%	30
9556679	JHS	Matrix Spike [WI1960-03]	Total Aluminum (Al)	2019/08/21		125 (1)	%	80 - 120
			Total Antimony (Sb)	2019/08/21		111	%	80 - 120
			Total Arsenic (As)	2019/08/21		96	%	80 - 120
			Total Beryllium (Be)	2019/08/21		107	%	80 - 120
			Total Cadmium (Cd)	2019/08/21		102	%	80 - 120
			Total Chromium (Cr)	2019/08/21		94	%	80 - 120
			Total Cobalt (Co)	2019/08/21		92	%	80 - 120
			Total Copper (Cu)	2019/08/21		85	%	80 - 120
			Total Lead (Pb)	2019/08/21		94	%	80 - 120
			Total Molybdenum (Mo)	2019/08/21		114	%	80 - 120

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Nickel (Ni)	2019/08/21		86	%	80 - 120
			Total Selenium (Se)	2019/08/21		100	%	80 - 120
			Total Silver (Ag)	2019/08/21		98	%	80 - 120
			Total Thallium (Tl)	2019/08/21		95	%	80 - 120
			Total Tin (Sn)	2019/08/21		115	%	80 - 120
			Total Titanium (Ti)	2019/08/21		96	%	80 - 120
			Total Uranium (U)	2019/08/21		96	%	80 - 120
			Total Vanadium (V)	2019/08/21		101	%	80 - 120
			Total Zinc (Zn)	2019/08/21		87	%	80 - 120
9556679	JHS	Spiked Blank	Total Aluminum (Al)	2019/08/21		95	%	80 - 120
			Total Antimony (Sb)	2019/08/21		101	%	80 - 120
			Total Arsenic (As)	2019/08/21		95	%	80 - 120
			Total Beryllium (Be)	2019/08/21		101	%	80 - 120
			Total Cadmium (Cd)	2019/08/21		97	%	80 - 120
			Total Chromium (Cr)	2019/08/21		95	%	80 - 120
			Total Cobalt (Co)	2019/08/21		94	%	80 - 120
			Total Copper (Cu)	2019/08/21		92	%	80 - 120
			Total Lead (Pb)	2019/08/21		97	%	80 - 120
			Total Molybdenum (Mo)	2019/08/21		101	%	80 - 120
			Total Nickel (Ni)	2019/08/21		93	%	80 - 120
			Total Selenium (Se)	2019/08/21		95	%	80 - 120
			Total Silver (Ag)	2019/08/21		97	%	80 - 120
			Total Thallium (Tl)	2019/08/21		97	%	80 - 120
			Total Tin (Sn)	2019/08/21		104	%	80 - 120
			Total Titanium (Ti)	2019/08/21		93	%	80 - 120
			Total Uranium (U)	2019/08/21		94	%	80 - 120
			Total Vanadium (V)	2019/08/21		98	%	80 - 120
			Total Zinc (Zn)	2019/08/21		90	%	80 - 120
9556679	JHS	Method Blank	Total Aluminum (Al)	2019/08/21	<0.0030		mg/L	
			Total Antimony (Sb)	2019/08/21	<0.00060		mg/L	
			Total Arsenic (As)	2019/08/21	<0.00020		mg/L	
			Total Beryllium (Be)	2019/08/21	<0.0010		mg/L	
			Total Cadmium (Cd)	2019/08/21	<0.000020		mg/L	
			Total Chromium (Cr)	2019/08/21	<0.0010		mg/L	
			Total Cobalt (Co)	2019/08/21	<0.00030		mg/L	
			Total Copper (Cu)	2019/08/21	<0.00020		mg/L	
			Total Lead (Pb)	2019/08/21	<0.00020		mg/L	
			Total Molybdenum (Mo)	2019/08/21	<0.00020		mg/L	
			Total Nickel (Ni)	2019/08/21	<0.00050		mg/L	
			Total Selenium (Se)	2019/08/21	<0.00020		mg/L	
			Total Silver (Ag)	2019/08/21	<0.00010		mg/L	
			Total Thallium (Tl)	2019/08/21	<0.00020		mg/L	
			Total Tin (Sn)	2019/08/21	<0.0010		mg/L	
			Total Titanium (Ti)	2019/08/21	<0.0010		mg/L	
			Total Uranium (U)	2019/08/21	<0.00010		mg/L	
			Total Vanadium (V)	2019/08/21	<0.0010		mg/L	
			Total Zinc (Zn)	2019/08/21	<0.0030		mg/L	
9556679	JHS	RPD [WI1962-03]	Total Aluminum (Al)	2019/08/22	1.8		%	20
			Total Antimony (Sb)	2019/08/22	NC		%	20
			Total Arsenic (As)	2019/08/22	12		%	20
			Total Beryllium (Be)	2019/08/22	NC		%	20
			Total Cadmium (Cd)	2019/08/22	NC		%	20
			Total Chromium (Cr)	2019/08/22	NC		%	20
			Total Cobalt (Co)	2019/08/22	0.49		%	20

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Copper (Cu)	2019/08/22	1.4		%	20
			Total Lead (Pb)	2019/08/22	1.2		%	20
			Total Molybdenum (Mo)	2019/08/22	3.0		%	20
			Total Nickel (Ni)	2019/08/22	1.2		%	20
			Total Selenium (Se)	2019/08/22	92 (1)		%	20
			Total Silver (Ag)	2019/08/22	NC		%	20
			Total Thallium (Tl)	2019/08/22	NC		%	20
			Total Tin (Sn)	2019/08/22	NC		%	20
			Total Titanium (Ti)	2019/08/22	19		%	20
			Total Uranium (U)	2019/08/22	0.32		%	20
			Total Vanadium (V)	2019/08/22	0.80		%	20
			Total Zinc (Zn)	2019/08/22	0.63		%	20
9556687	REL	Matrix Spike [WI1961-03]	Total Barium (Ba)	2019/08/22		96	%	80 - 120
			Total Boron (B)	2019/08/22		105	%	80 - 120
			Total Calcium (Ca)	2019/08/22		NC	%	80 - 120
			Total Iron (Fe)	2019/08/22		100	%	80 - 120
			Total Lithium (Li)	2019/08/22		93	%	80 - 120
			Total Magnesium (Mg)	2019/08/22		NC	%	80 - 120
			Total Manganese (Mn)	2019/08/22		NC	%	80 - 120
			Total Phosphorus (P)	2019/08/22		100	%	80 - 120
			Total Potassium (K)	2019/08/22		100	%	80 - 120
			Total Silicon (Si)	2019/08/22		101	%	80 - 120
			Total Sodium (Na)	2019/08/22		NC	%	80 - 120
			Total Strontium (Sr)	2019/08/22		90	%	80 - 120
			Total Sulphur (S)	2019/08/22		NC	%	80 - 120
9556687	REL	Spiked Blank	Total Barium (Ba)	2019/08/22		95	%	80 - 120
			Total Boron (B)	2019/08/22		103	%	80 - 120
			Total Calcium (Ca)	2019/08/22		93	%	80 - 120
			Total Iron (Fe)	2019/08/22		101	%	80 - 120
			Total Lithium (Li)	2019/08/22		94	%	80 - 120
			Total Magnesium (Mg)	2019/08/22		100	%	80 - 120
			Total Manganese (Mn)	2019/08/22		94	%	80 - 120
			Total Phosphorus (P)	2019/08/22		97	%	80 - 120
			Total Potassium (K)	2019/08/22		98	%	80 - 120
			Total Silicon (Si)	2019/08/22		99	%	80 - 120
			Total Sodium (Na)	2019/08/22		101	%	80 - 120
			Total Strontium (Sr)	2019/08/22		96	%	80 - 120
			Total Sulphur (S)	2019/08/22		109	%	80 - 120
9556687	REL	Method Blank	Total Barium (Ba)	2019/08/22	<0.010		mg/L	
			Total Boron (B)	2019/08/22	<0.020		mg/L	
			Total Calcium (Ca)	2019/08/22	<0.30		mg/L	
			Total Iron (Fe)	2019/08/22	<0.060		mg/L	
			Total Lithium (Li)	2019/08/22	<0.020		mg/L	
			Total Magnesium (Mg)	2019/08/22	<0.20		mg/L	
			Total Manganese (Mn)	2019/08/22	<0.0040		mg/L	
			Total Phosphorus (P)	2019/08/22	<0.10		mg/L	
			Total Potassium (K)	2019/08/22	<0.30		mg/L	
			Total Silicon (Si)	2019/08/22	<0.10		mg/L	
			Total Sodium (Na)	2019/08/22	<0.50		mg/L	
			Total Strontium (Sr)	2019/08/22	<0.020		mg/L	
			Total Sulphur (S)	2019/08/22	<0.20		mg/L	
9556687	REL	RPD [WI1962-03]	Total Barium (Ba)	2019/08/23	NC		%	20
			Total Boron (B)	2019/08/23	4.4		%	20
			Total Calcium (Ca)	2019/08/23	4.6		%	20

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QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Iron (Fe)	2019/08/23	2.3		%	20
			Total Lithium (Li)	2019/08/23	9.5		%	20
			Total Magnesium (Mg)	2019/08/23	2.8		%	20
			Total Manganese (Mn)	2019/08/23	4.0		%	20
			Total Phosphorus (P)	2019/08/23	NC		%	20
			Total Potassium (K)	2019/08/23	3.8		%	20
			Total Silicon (Si)	2019/08/23	2.7		%	20
			Total Sodium (Na)	2019/08/23	1.3 (2)		%	20
			Total Strontium (Sr)	2019/08/23	2.6		%	20
			Total Sulphur (S)	2019/08/23	2.9		%	20
9556746	NB7	Spiked Blank	Extractable (n-Hex.) Oil and grease	2019/08/21		101	%	70 - 130
9556746	NB7	Method Blank	Extractable (n-Hex.) Oil and grease	2019/08/21	<2.0		mg/L	
9556829	LZ3	Spiked Blank	2,3,4-trichlorophenol	2019/08/22		104	%	50 - 140
			2,4,6-TRIBROMOPHENOL (sur.)	2019/08/22		119	%	50 - 140
			2,4-DIBROMOPHENOL (sur.)	2019/08/22		106	%	50 - 140
			Phenol	2019/08/22		52	%	30 - 130
			3 & 4-chlorophenol	2019/08/22		88	%	50 - 140
			2,3,5,6-tetrachlorophenol	2019/08/22		124	%	50 - 140
			2,3,4,6-tetrachlorophenol	2019/08/22		124	%	50 - 140
			2,4,5-trichlorophenol	2019/08/22		96	%	50 - 140
			2,4,6-trichlorophenol	2019/08/22		120	%	50 - 140
			2,3,5-trichlorophenol	2019/08/22		104	%	50 - 140
			2,4-dichlorophenol	2019/08/22		96	%	50 - 140
			2,4-dimethylphenol	2019/08/22		80	%	50 - 140
			2,4-dinitrophenol	2019/08/22		124	%	30 - 130
			2,6-dichlorophenol	2019/08/22		104	%	50 - 140
			2-chlorophenol	2019/08/22		84	%	50 - 140
			2-methylphenol	2019/08/22		64	%	50 - 140
			2-nitrophenol	2019/08/22		100	%	50 - 140
			3 & 4-methylphenol	2019/08/22		76	%	50 - 140
			4,6-dinitro-2-methylphenol	2019/08/22		112	%	30 - 130
			4-chloro-3-methylphenol	2019/08/22		84	%	50 - 140
			4-nitrophenol	2019/08/22		56	%	50 - 140
			Pentachlorophenol	2019/08/22		64	%	50 - 140
9556829	LZ3	Method Blank	2,3,4-trichlorophenol	2019/08/22	<0.00010		mg/L	
			2,4,6-TRIBROMOPHENOL (sur.)	2019/08/22		105	%	50 - 140
			2,4-DIBROMOPHENOL (sur.)	2019/08/22		88	%	50 - 140
			Phenol	2019/08/22	<0.00010		mg/L	
			3 & 4-chlorophenol	2019/08/22	<0.00010		mg/L	
			2,3,5,6-tetrachlorophenol	2019/08/22	<0.00010		mg/L	
			2,3,4,6-tetrachlorophenol	2019/08/22	<0.00010		mg/L	
			2,4,5-trichlorophenol	2019/08/22	<0.00010		mg/L	
			2,4,6-trichlorophenol	2019/08/22	<0.00010		mg/L	
			2,3,5-trichlorophenol	2019/08/22	<0.00010		mg/L	
			2,4-dichlorophenol	2019/08/22	<0.00010		mg/L	
			2,4-dimethylphenol	2019/08/22	<0.00010		mg/L	
			2,4-dinitrophenol	2019/08/22	<0.0010		mg/L	
			2,6-dichlorophenol	2019/08/22	<0.00010		mg/L	
			2-chlorophenol	2019/08/22	<0.00010		mg/L	
			2-methylphenol	2019/08/22	<0.00010		mg/L	
			2-nitrophenol	2019/08/22	<0.0010		mg/L	
			3 & 4-methylphenol	2019/08/22	<0.00010		mg/L	
			4,6-dinitro-2-methylphenol	2019/08/22	<0.0010		mg/L	
			4-chloro-3-methylphenol	2019/08/22	<0.00010		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
			4-nitrophenol	2019/08/22	<0.0010		mg/L	
			Pentachlorophenol	2019/08/22	<0.00010		mg/L	
9557061	CAR	Matrix Spike	Dissolved Nitrite (N)	2019/08/21		109	%	80 - 120
			Dissolved Nitrate (N)	2019/08/21		102	%	80 - 120
9557061	CAR	Spiked Blank	Dissolved Nitrite (N)	2019/08/21		100	%	80 - 120
			Dissolved Nitrate (N)	2019/08/21		101	%	80 - 120
9557061	CAR	Method Blank	Dissolved Nitrite (N)	2019/08/21	<0.010		mg/L	
			Dissolved Nitrate (N)	2019/08/21	<0.010		mg/L	
9557061	CAR	RPD	Dissolved Nitrite (N)	2019/08/21	NC		%	20
			Dissolved Nitrate (N)	2019/08/21	NC		%	20
9557150	MA4	Spiked Blank	pH	2019/08/21		100	%	97 - 103
9557150	MA4	RPD	pH	2019/08/21	0.16		%	N/A
9557152	MA4	Spiked Blank	Alkalinity (Total as CaCO3)	2019/08/21		99	%	80 - 120
9557152	MA4	Method Blank	Alkalinity (PP as CaCO3)	2019/08/21	<1.0		mg/L	
			Alkalinity (Total as CaCO3)	2019/08/21	<1.0		mg/L	
			Bicarbonate (HCO3)	2019/08/21	<1.0		mg/L	
			Carbonate (CO3)	2019/08/21	<1.0		mg/L	
			Hydroxide (OH)	2019/08/21	<1.0		mg/L	
9557152	MA4	RPD	Alkalinity (PP as CaCO3)	2019/08/21	NC		%	20
			Alkalinity (Total as CaCO3)	2019/08/21	NC		%	20
			Bicarbonate (HCO3)	2019/08/21	NC		%	20
			Carbonate (CO3)	2019/08/21	NC		%	20
			Hydroxide (OH)	2019/08/21	NC		%	20
9557154	MA4	Spiked Blank	Conductivity	2019/08/21		100	%	90 - 110
9557154	MA4	Method Blank	Conductivity	2019/08/21	<2.0		uS/cm	
9557154	MA4	RPD	Conductivity	2019/08/21	NC		%	10
9557413	CH7	Matrix Spike	Total Ammonia (N)	2019/08/21		109	%	80 - 120
9557413	CH7	Spiked Blank	Total Ammonia (N)	2019/08/21		98	%	80 - 120
9557413	CH7	Method Blank	Total Ammonia (N)	2019/08/21	<0.015		mg/L	
9557413	CH7	RPD	Total Ammonia (N)	2019/08/21	9.8		%	20
9558287	MA4	Spiked Blank	pH	2019/08/22		100	%	97 - 103
9558287	MA4	RPD	pH	2019/08/22	1.2		%	N/A
9558290	MSD	Matrix Spike	Dissolved Calcium (Ca)	2019/08/22		89	%	80 - 120
			Dissolved Iron (Fe)	2019/08/22		93	%	80 - 120
			Dissolved Magnesium (Mg)	2019/08/22		96	%	80 - 120
			Dissolved Manganese (Mn)	2019/08/22		91	%	80 - 120
			Dissolved Potassium (K)	2019/08/22		96	%	80 - 120
			Dissolved Sodium (Na)	2019/08/22		92	%	80 - 120
9558290	MSD	Spiked Blank	Dissolved Calcium (Ca)	2019/08/22		93	%	80 - 120
			Dissolved Iron (Fe)	2019/08/22		98	%	80 - 120
			Dissolved Magnesium (Mg)	2019/08/22		101	%	80 - 120
			Dissolved Manganese (Mn)	2019/08/22		95	%	80 - 120
			Dissolved Potassium (K)	2019/08/22		98	%	80 - 120
			Dissolved Sodium (Na)	2019/08/22		100	%	80 - 120
9558290	MSD	Method Blank	Dissolved Calcium (Ca)	2019/08/22	<0.30		mg/L	
			Dissolved Iron (Fe)	2019/08/22	<0.060		mg/L	
			Dissolved Magnesium (Mg)	2019/08/22	<0.20		mg/L	
			Dissolved Manganese (Mn)	2019/08/22	<0.0040		mg/L	
			Dissolved Potassium (K)	2019/08/22	<0.30		mg/L	
			Dissolved Sodium (Na)	2019/08/22	<0.50		mg/L	
9558290	MSD	RPD	Dissolved Calcium (Ca)	2019/08/22	0.21		%	20
			Dissolved Iron (Fe)	2019/08/22	0.65		%	20
			Dissolved Magnesium (Mg)	2019/08/22	0.55		%	20
			Dissolved Manganese (Mn)	2019/08/22	NC		%	20

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Potassium (K)	2019/08/22	0.11		%	20
			Dissolved Sodium (Na)	2019/08/22	0.087		%	20
9558292	MA4	Spiked Blank	Alkalinity (Total as CaCO3)	2019/08/22		101	%	80 - 120
9558292	MA4	Method Blank	Alkalinity (PP as CaCO3)	2019/08/22	<1.0		mg/L	
			Alkalinity (Total as CaCO3)	2019/08/22	<1.0		mg/L	
			Bicarbonate (HCO3)	2019/08/22	<1.0		mg/L	
			Carbonate (CO3)	2019/08/22	<1.0		mg/L	
			Hydroxide (OH)	2019/08/22	<1.0		mg/L	
9558292	MA4	RPD	Alkalinity (PP as CaCO3)	2019/08/22	NC		%	20
			Alkalinity (Total as CaCO3)	2019/08/22	0.19		%	20
			Bicarbonate (HCO3)	2019/08/22	0.19		%	20
			Carbonate (CO3)	2019/08/22	NC		%	20
			Hydroxide (OH)	2019/08/22	NC		%	20
9558293	MA4	Spiked Blank	Conductivity	2019/08/22		99	%	90 - 110
9558293	MA4	Method Blank	Conductivity	2019/08/22	<2.0		uS/cm	
9558293	MA4	RPD	Conductivity	2019/08/22	0.47		%	10
9558715	MA4	Spiked Blank	pH	2019/08/22		100	%	97 - 103
9558715	MA4	RPD [WI1959-01]	pH	2019/08/22	0.33		%	N/A
9558717	MA4	Spiked Blank	Alkalinity (Total as CaCO3)	2019/08/22		101	%	80 - 120
9558717	MA4	Method Blank	Alkalinity (PP as CaCO3)	2019/08/22	<1.0		mg/L	
			Alkalinity (Total as CaCO3)	2019/08/22	<1.0		mg/L	
			Bicarbonate (HCO3)	2019/08/22	<1.0		mg/L	
			Carbonate (CO3)	2019/08/22	<1.0		mg/L	
			Hydroxide (OH)	2019/08/22	<1.0		mg/L	
9558717	MA4	RPD [WI1959-01]	Alkalinity (PP as CaCO3)	2019/08/22	NC		%	20
			Alkalinity (Total as CaCO3)	2019/08/22	3.8		%	20
			Bicarbonate (HCO3)	2019/08/22	3.8		%	20
			Carbonate (CO3)	2019/08/22	NC		%	20
			Hydroxide (OH)	2019/08/22	NC		%	20
9558719	MA4	Spiked Blank	Conductivity	2019/08/22		100	%	90 - 110
9558719	MA4	Method Blank	Conductivity	2019/08/22	<2.0		uS/cm	
9558719	MA4	RPD [WI1959-01]	Conductivity	2019/08/22	0.35		%	10
9558774	MRD	Matrix Spike [WI1959-01]	Dissolved Chloride (Cl)	2019/08/22		NC	%	80 - 120
			Dissolved Sulphate (SO4)	2019/08/22		NC	%	80 - 120
9558774	MRD	Spiked Blank	Dissolved Chloride (Cl)	2019/08/22		106	%	80 - 120
			Dissolved Sulphate (SO4)	2019/08/22		104	%	80 - 120
9558774	MRD	Method Blank	Dissolved Chloride (Cl)	2019/08/22	<1.0		mg/L	
			Dissolved Sulphate (SO4)	2019/08/22	<1.0		mg/L	
9558774	MRD	RPD [WI1959-01]	Dissolved Chloride (Cl)	2019/08/22	2.4		%	20
			Dissolved Sulphate (SO4)	2019/08/22	0.49		%	20
9575499	éDH	Spiked Blank	13C2-Perfluorodecanoic acid	2019/08/31		100	%	50 - 150
			13C2-Perfluorododecanoic acid	2019/08/31		93	%	50 - 150
			13C2-Perfluorohexanoic acid	2019/08/31		105	%	50 - 150
			13C2-perfluorotetradecanoic acid	2019/08/31		88	%	50 - 150
			13C2-Perfluoroundecanoic acid	2019/08/31		99	%	50 - 150
			13C3-Perfluorobutanesulfonic acid	2019/08/31		103	%	50 - 150
			13C4-Perfluorobutanoic acid	2019/08/31		107	%	50 - 150
			13C4-Perfluoroheptanoic acid	2019/08/31		106	%	50 - 150
			13C4-Perfluorooctanesulfonic acid	2019/08/31		99	%	50 - 150
			13C4-Perfluorooctanoic acid	2019/08/31		105	%	50 - 150
			13C5-Perfluorononanoic acid	2019/08/31		102	%	50 - 150
			13C5-Perfluoropentanoic acid	2019/08/31		106	%	50 - 150
			13C8-Perfluorooctane Sulfonamide	2019/08/31		94	%	50 - 150
			18O2-Perfluorohexanesulfonic acid	2019/08/31		102	%	50 - 150

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Perfluorobutanoic acid	2019/08/31		102	%	70 - 130
			Perfluoropentanoic Acid (PFPeA)	2019/08/31		102	%	70 - 130
			Perfluorohexanoic Acid (PFHxA)	2019/08/31		103	%	70 - 130
			Perfluoroheptanoic Acid (PFHpA)	2019/08/31		102	%	70 - 130
			Perfluorooctanoic Acid (PFOA)	2019/08/31		105	%	70 - 130
			Perfluorononanoic Acid (PFNA)	2019/08/31		105	%	70 - 130
			Perfluorodecanoic Acid (PFDA)	2019/08/31		105	%	70 - 130
			Perfluoroundecanoic Acid (PFUnA)	2019/08/31		105	%	70 - 130
			Perfluorododecanoic Acid (PFDoA)	2019/08/31		101	%	70 - 130
			Perfluorotridecanoic Acid	2019/08/31		103	%	70 - 130
			Perfluorotetradecanoic Acid	2019/08/31		100	%	70 - 130
			Perfluorobutanesulfonic acid	2019/08/31		101	%	70 - 130
			Perfluoropentanesulfonic acid	2019/08/31		101	%	70 - 130
			Perfluorohexanesulfonic acid	2019/08/31		103	%	70 - 130
			Perfluoroheptanesulfonic acid	2019/08/31		97	%	70 - 130
			Perfluorooctanesulfonic acid	2019/08/31		102	%	70 - 130
			Perfluorononanesulfonic acid	2019/08/31		96	%	70 - 130
			Perfluorodecanesulfonic acid (PFDS)	2019/08/31		99	%	70 - 130
			Perfluorooctane Sulfonamide (PFOSA)	2019/08/31		98	%	70 - 130
9575499	éDH	RPD	Perfluorobutanoic acid	2019/08/31	1.9		%	30
			Perfluoropentanoic Acid (PFPeA)	2019/08/31	1.7		%	30
			Perfluorohexanoic Acid (PFHxA)	2019/08/31	1.1		%	30
			Perfluoroheptanoic Acid (PFHpA)	2019/08/31	2.3		%	30
			Perfluorooctanoic Acid (PFOA)	2019/08/31	1.3		%	30
			Perfluorononanoic Acid (PFNA)	2019/08/31	0.012		%	30
			Perfluorodecanoic Acid (PFDA)	2019/08/31	1.7		%	30
			Perfluoroundecanoic Acid (PFUnA)	2019/08/31	3.2		%	30
			Perfluorododecanoic Acid (PFDoA)	2019/08/31	1.9		%	30
			Perfluorotridecanoic Acid	2019/08/31	0.12		%	30
			Perfluorotetradecanoic Acid	2019/08/31	0.82		%	30
			Perfluorobutanesulfonic acid	2019/08/31	1.9		%	30
			Perfluoropentanesulfonic acid	2019/08/31	2.7		%	30
			Perfluorohexanesulfonic acid	2019/08/31	0.54		%	30
			Perfluoroheptanesulfonic acid	2019/08/31	0.35		%	30
			Perfluorooctanesulfonic acid	2019/08/31	5.0		%	30
			Perfluorononanesulfonic acid	2019/08/31	1.2		%	30
			Perfluorodecanesulfonic acid (PFDS)	2019/08/31	0.49		%	30
			Perfluorooctane Sulfonamide (PFOSA)	2019/08/31	2.6		%	30
9575499	éDH	Method Blank	13C2-Perfluorodecanoic acid	2019/08/31		95	%	50 - 150
			13C2-Perfluorododecanoic acid	2019/08/31		84	%	50 - 150
			13C2-Perfluorohexanoic acid	2019/08/31		106	%	50 - 150
			13C2-perfluorotetradecanoic acid	2019/08/31		80	%	50 - 150
			13C2-Perfluoroundecanoic acid	2019/08/31		87	%	50 - 150
			13C3-Perfluorobutanesulfonic acid	2019/08/31		102	%	50 - 150
			13C4-Perfluorobutanoic acid	2019/08/31		104	%	50 - 150
			13C4-Perfluoroheptanoic acid	2019/08/31		105	%	50 - 150
			13C4-Perfluorooctanesulfonic acid	2019/08/31		92	%	50 - 150
			13C4-Perfluorooctanoic acid	2019/08/31		102	%	50 - 150
			13C5-Perfluorononanoic acid	2019/08/31		101	%	50 - 150
			13C5-Perfluoropentanoic acid	2019/08/31		105	%	50 - 150
			13C8-Perfluorooctane Sulfonamide	2019/08/31		88	%	50 - 150
			18O2-Perfluorohexanesulfonic acid	2019/08/31		100	%	50 - 150
			Perfluorobutanoic acid	2019/08/31	<0.020		ug/L	
			Perfluoropentanoic Acid (PFPeA)	2019/08/31	<0.020		ug/L	

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Perfluorohexanoic Acid (PFHxA)	2019/08/31	<0.020		ug/L	
			Perfluoroheptanoic Acid (PFHpA)	2019/08/31	<0.020		ug/L	
			Perfluorooctanoic Acid (PFOA)	2019/08/31	<0.020		ug/L	
			Perfluorononanoic Acid (PFNA)	2019/08/31	<0.020		ug/L	
			Perfluorodecanoic Acid (PFDA)	2019/08/31	<0.020		ug/L	
			Perfluoroundecanoic Acid (PFUnA)	2019/08/31	<0.020		ug/L	
			Perfluorododecanoic Acid (PFDoA)	2019/08/31	<0.020		ug/L	
			Perfluorotridecanoic Acid	2019/08/31	<0.020		ug/L	
			Perfluorotetradecanoic Acid	2019/08/31	<0.020		ug/L	
			Perfluorobutanesulfonic acid	2019/08/31	<0.020		ug/L	
			Perfluoropentanesulfonic acid	2019/08/31	<0.020		ug/L	
			Perfluorohexanesulfonic acid	2019/08/31	<0.020		ug/L	
			Perfluoroheptanesulfonic acid	2019/08/31	<0.020		ug/L	
			Perfluorooctanesulfonic acid	2019/08/31	<0.020		ug/L	
			Perfluorononanesulfonic acid	2019/08/31	<0.020		ug/L	
			Perfluorodecanesulfonic acid (PFDS)	2019/08/31	<0.020		ug/L	
			Perfluorooctane Sulfonamide (PFOSA)	2019/08/31	<0.020		ug/L	

N/A = Not Applicable

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

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

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

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

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

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

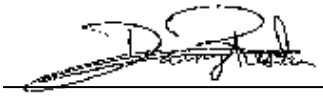
NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

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

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

VALIDATION SIGNATURE PAGE

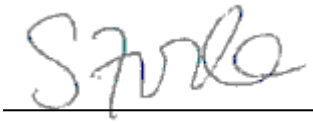
The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



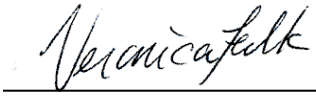
Daniel Reslan, cCT, QP, Organics Manager

Colm McNamara, Senior Analyst, Liquid Chromatography

Justin Geisel, B.Sc., Organics Supervisor



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



Veronica Falk, B.Sc., P.Chem., QP, Scientific Specialist, Organics

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

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

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ADDITIONAL COOLER TEMPERATURE RECORD

CHAIN-OF-CUSTODY RECORD

CHAIN OF CUSTODY #	
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COOLER OBSERVATIONS:

MAXXAM JOB#: B969005

CUSTODY SEAL	YES	NO	COOLER ID	TEMP 1	TEMP 2	TEMP 3
PRESENT	✓			2	4	5
INTACT	✓					
ICE PRESENT	✓					
PRESENT	✓			1	3	2
INTACT	✓					
ICE PRESENT	✓					
PRESENT	✓			2	1	5
INTACT	✓					
ICE PRESENT	✓					
PRESENT	✓			1	-1	0
INTACT	✓					
ICE PRESENT	✓					
PRESENT	✓			1	0	0
INTACT	✓					
ICE PRESENT	✓					
(blank)						
(blank)						
(blank)						

CUSTODY SEAL	YES	NO	COOLER ID	TEMP 1	TEMP 2	TEMP 3
PRESENT / INTACT / ICE PRESENT (blank, 8 coolers)						

RECEIVED BY (SIGN & PRINT)	DATE (YYYY/MM/DD)	TIME (HH:MM)
DAISE MATHEW	2019/08/20	11:39

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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
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CHAIN OF CUSTODY RECORD M 085562

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Invoice Information	Report Information (if differs from invoice)	Project Information	Turnaround Time (TAT) Required
Company: Stantec	Company:	Quotation #: B71723	[x] 5 - 7 Days Regular (Most analyses)
Contact Name: Lindsay Van Noortwyk	Contact Name:	P.O. #/ AFE#: 110220369	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 500-10220 103 Ave NW Edmonton AB T5J0K4	Address:	Project #: 110220369	Rush TAT (Surcharges will be applied)
Phone: 780 232 1114	Phone:	Site Location: CBA Apron	[ ] 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	Temp		
Seal Present						
Seal Intact						
Cooling Media						

	YES	NO	Cooler ID	Temp		
Seal Present						
Seal Intact						
Cooling Media						

Received in Yellowknife
Depot Reception
By:
ice-yes cs-yes
AUG 19 2019 @ 11:32

Temp:			
	4.3	7.1	6.9
	8.9	9.9	9.1
	10.7	11.3	12.9
	7.3	5.9	8.4
	6.9	7.5	4.3

Analysis Requested

Regulatory Criteria

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

Special Instructions

Total metals only, no dissolved

	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 [x] Diss Tot	Mercury [ ] Dissolved Total	Salinity 4	Sieve (75 micron)	Texture (% Sand, Silt, Clay)	Basic Class II Landfill	PAH by GC/MS	TSS	Ammonia-N (Total)	Phenols (Semi-volatile)	Oil + Grease	PFOS + PFOA				HOLD - DO NOT ANALYZE
1	MW13-5		2019/08/15	1245	W	15		x		x	x						x	x	x	x	x	x				
2	MW13-3			1425	W	15		x		x	x						x	x	x	x	x	x				
3	MW13-1			1625	W	15		x		x	x						x	x	x	x	x	x				
4	GW-QC-02		2019/08/15	1427	W	15		x		x	x						x	x	x	x	x	x				
5	MW13-7		2019/08/16	0910	W	14		x		x	x						x	x	x	x	x	x				
6	MW13-9		2019/08/16	1045	W	15		x		x	x						x	x	x	x	x	x				
7																										
8																										
9																										
10																										

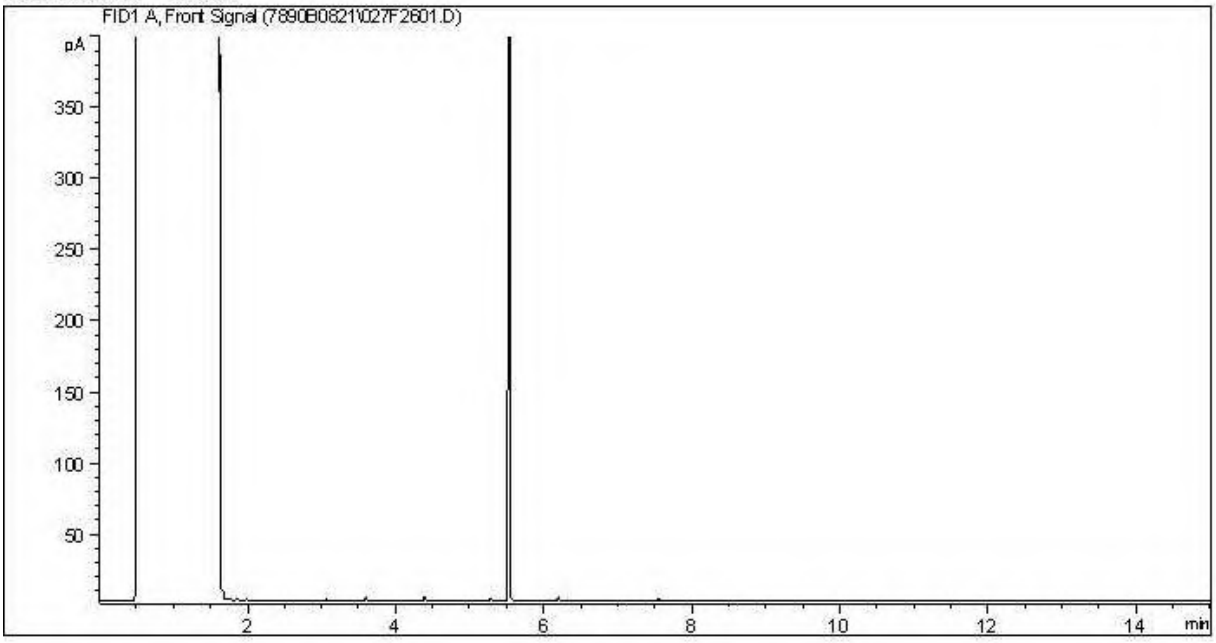
Please indicate Filtered, Preserved or Both (F, P, F/P)

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	2019/08/16	1130	RAISE MATHEW	2019/08/20	11:39	B969005

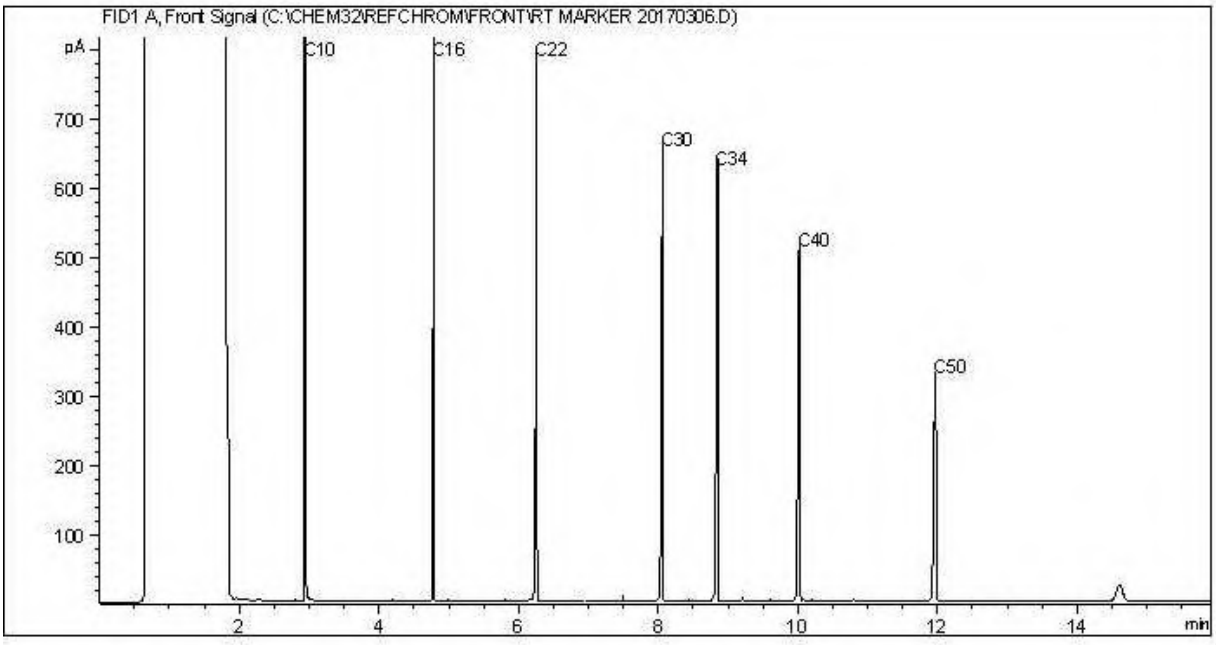
AB FCD-00331/7

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

Instrument: 7890B



Carbon Range Distribution - Reference Chromatogram



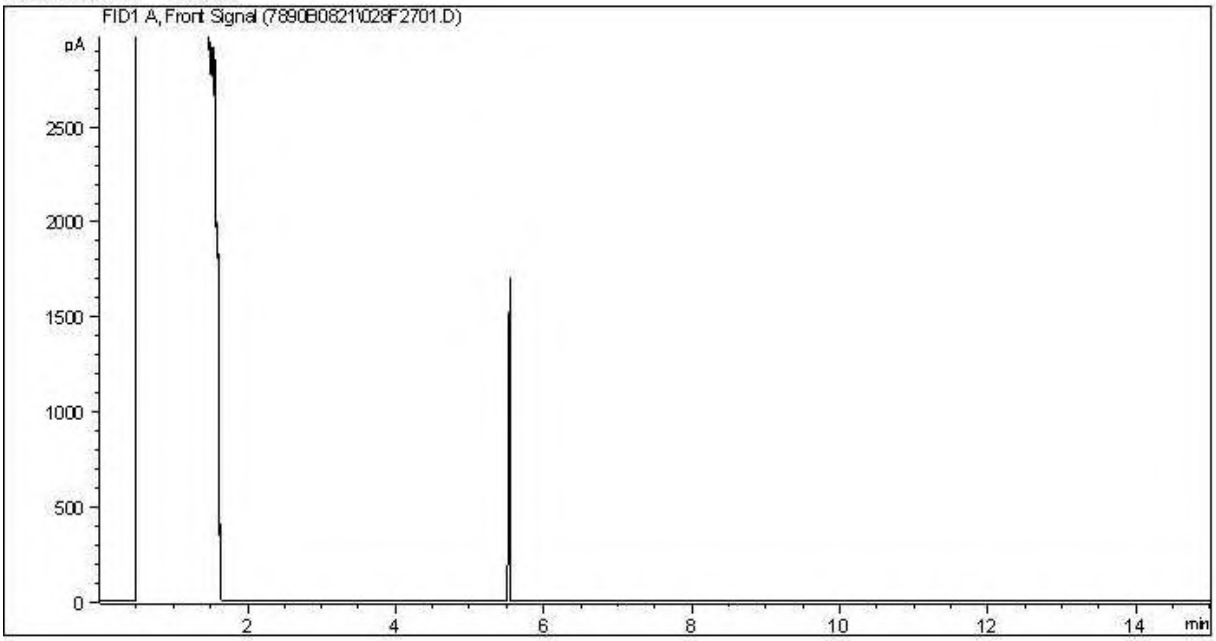
TYPICAL PRODUCT CARBON NUMBER RANGES

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

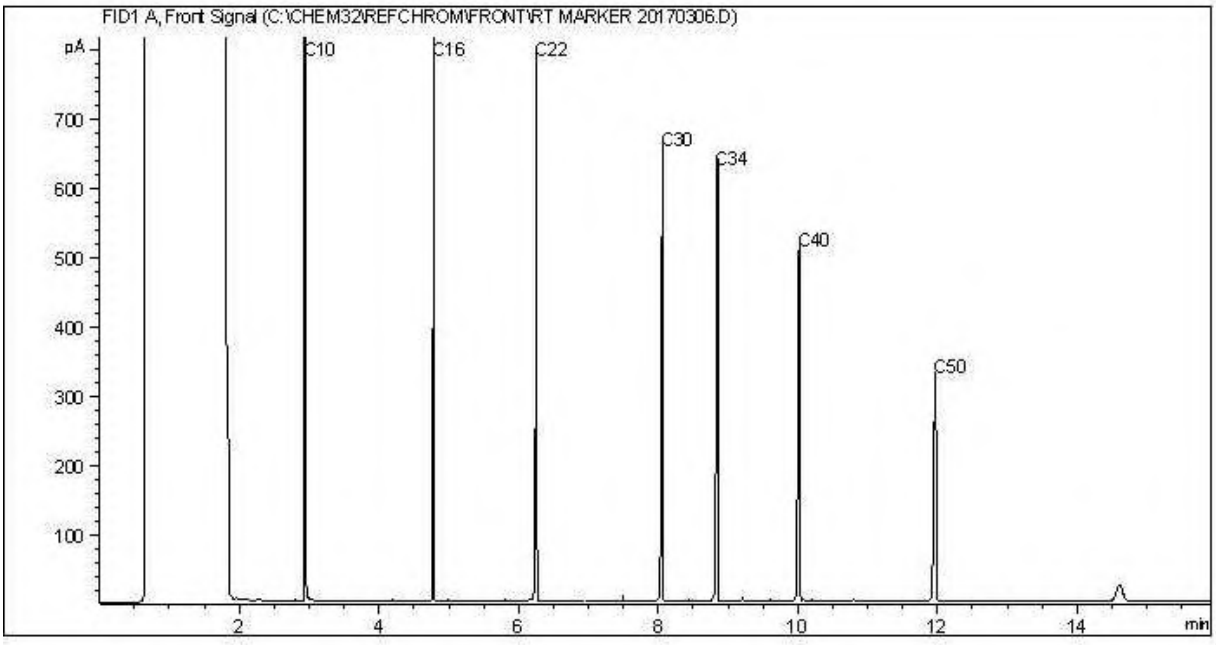
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

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

Instrument: 7890B



Carbon Range Distribution - Reference Chromatogram



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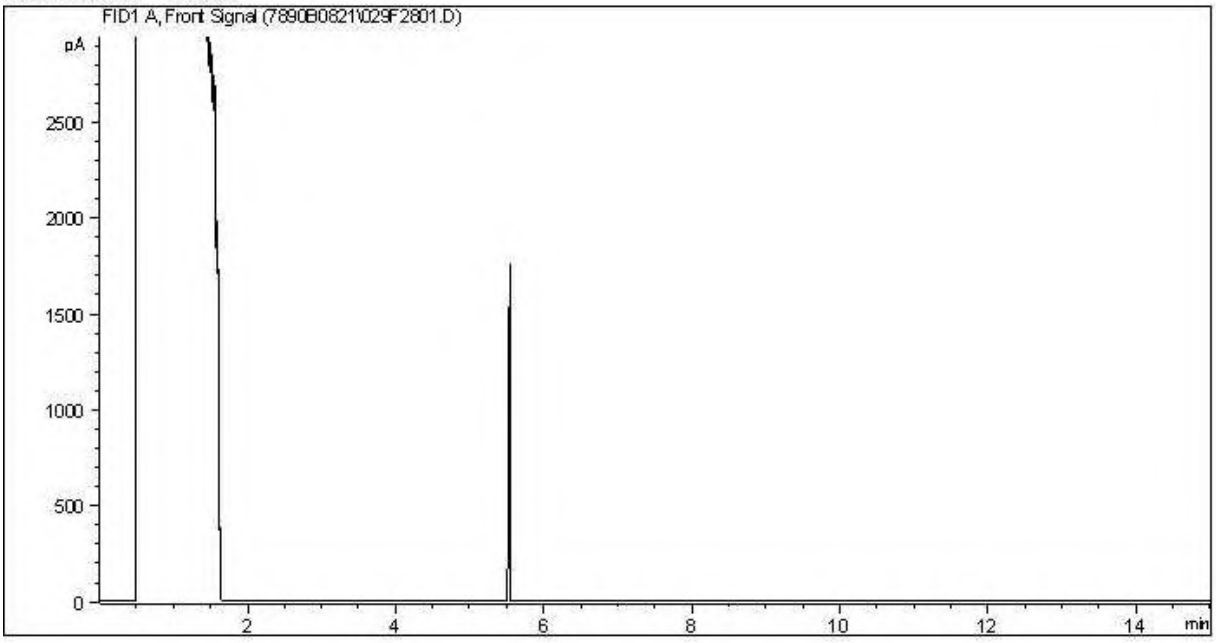
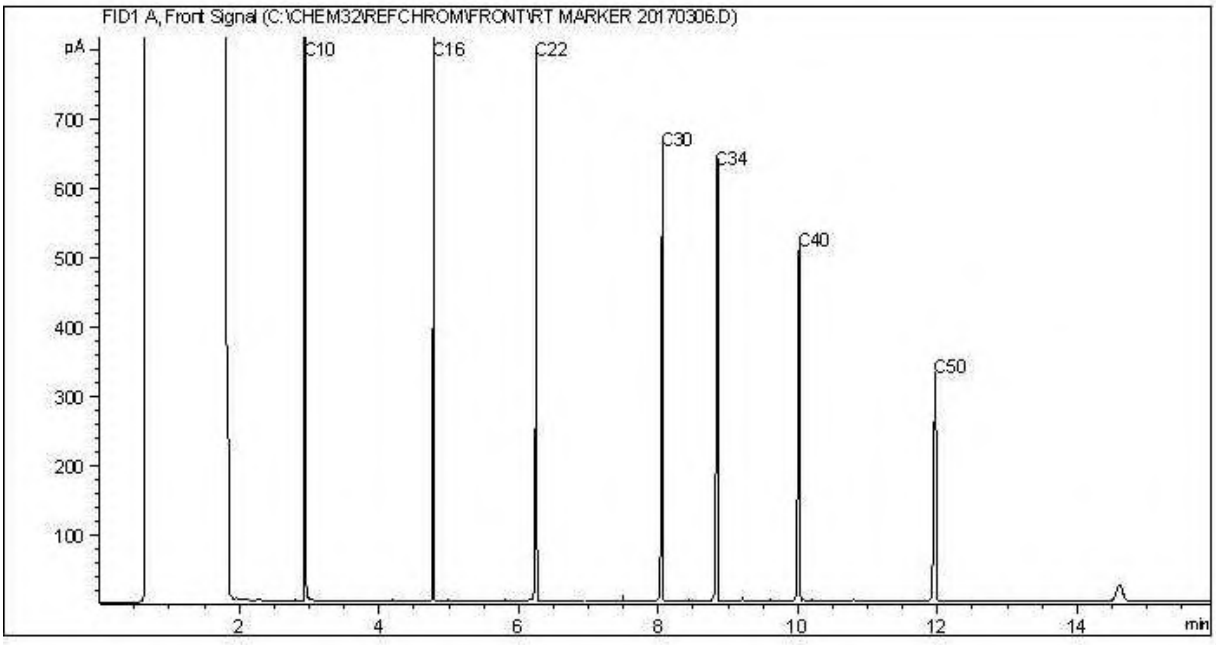
Instrument: 7890B



Carbon Range Distribution - Reference Chromatogram



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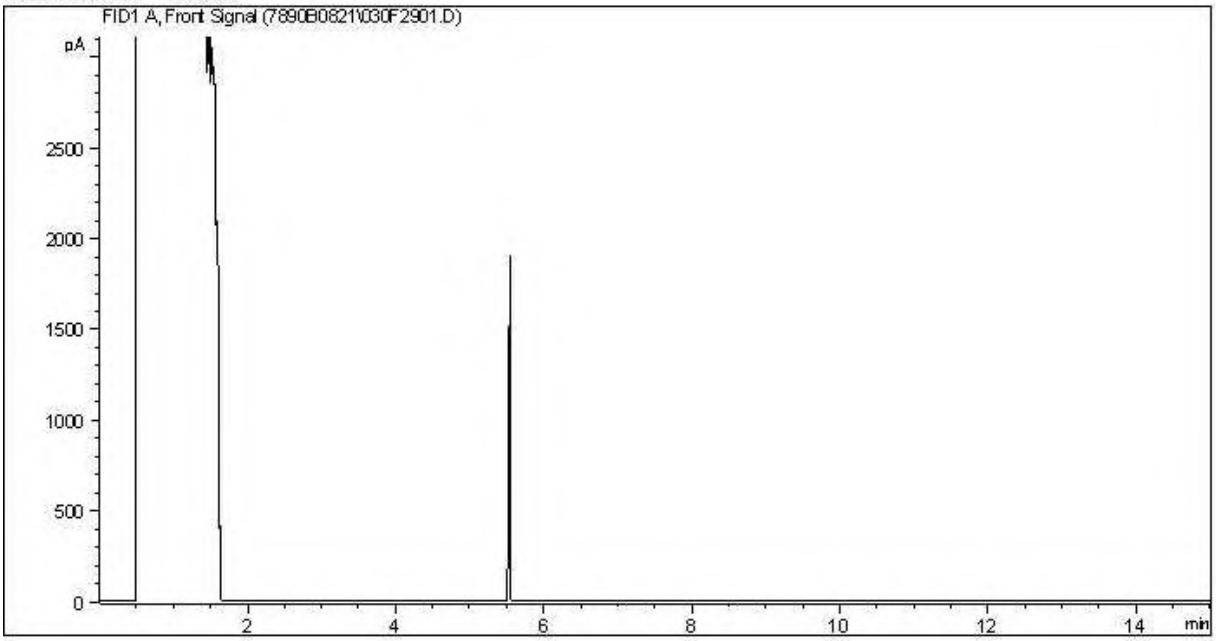
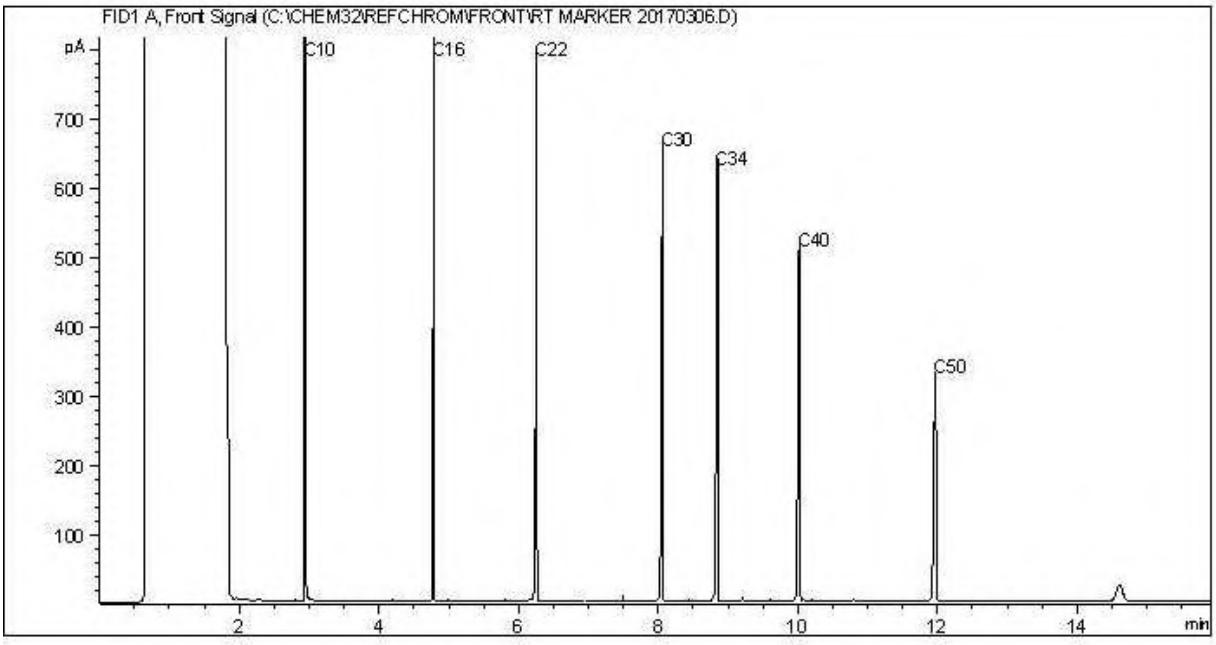


Carbon Range Distribution - Reference Chromatogram



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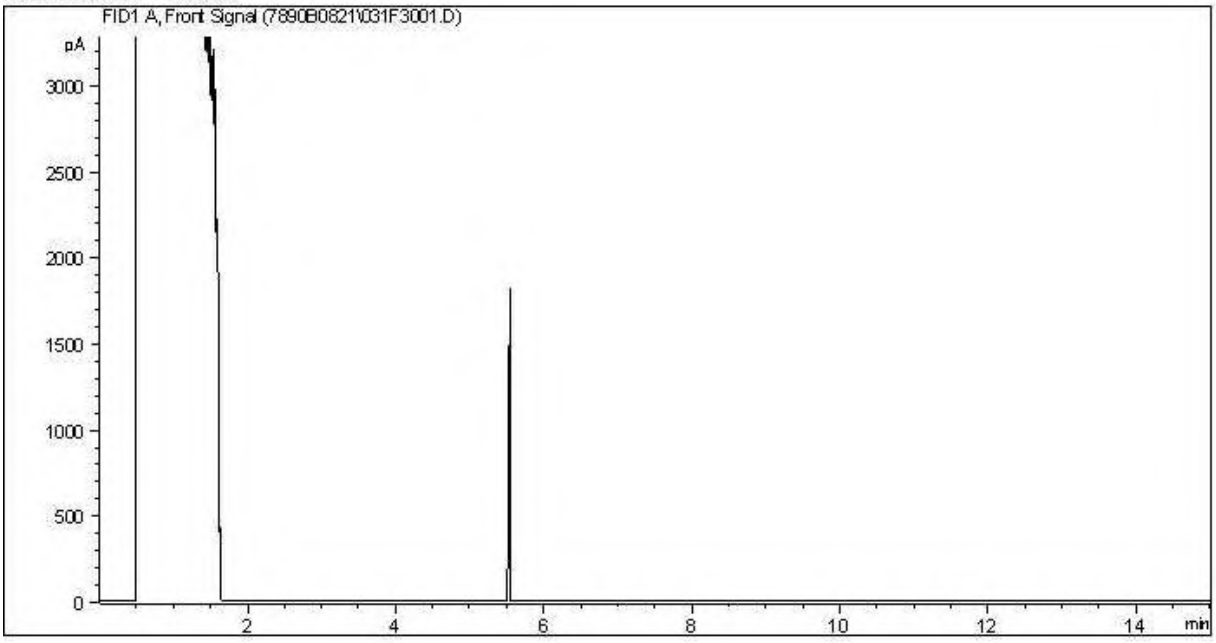
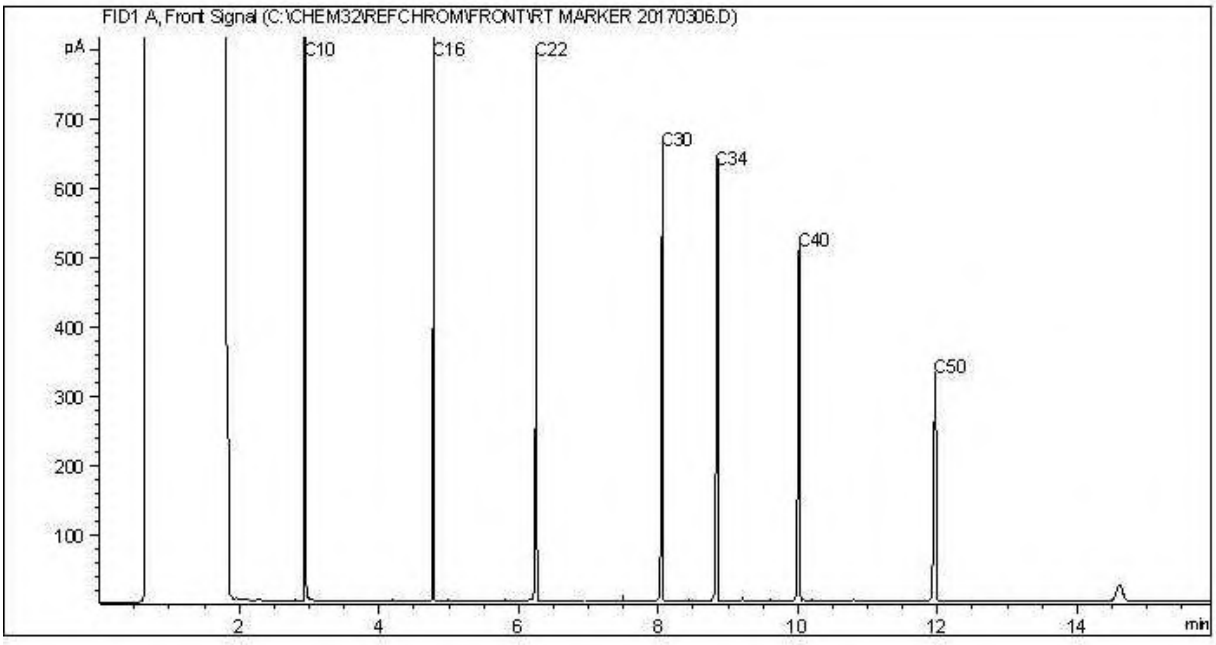
Instrument: 7890B



Carbon Range Distribution - Reference Chromatogram



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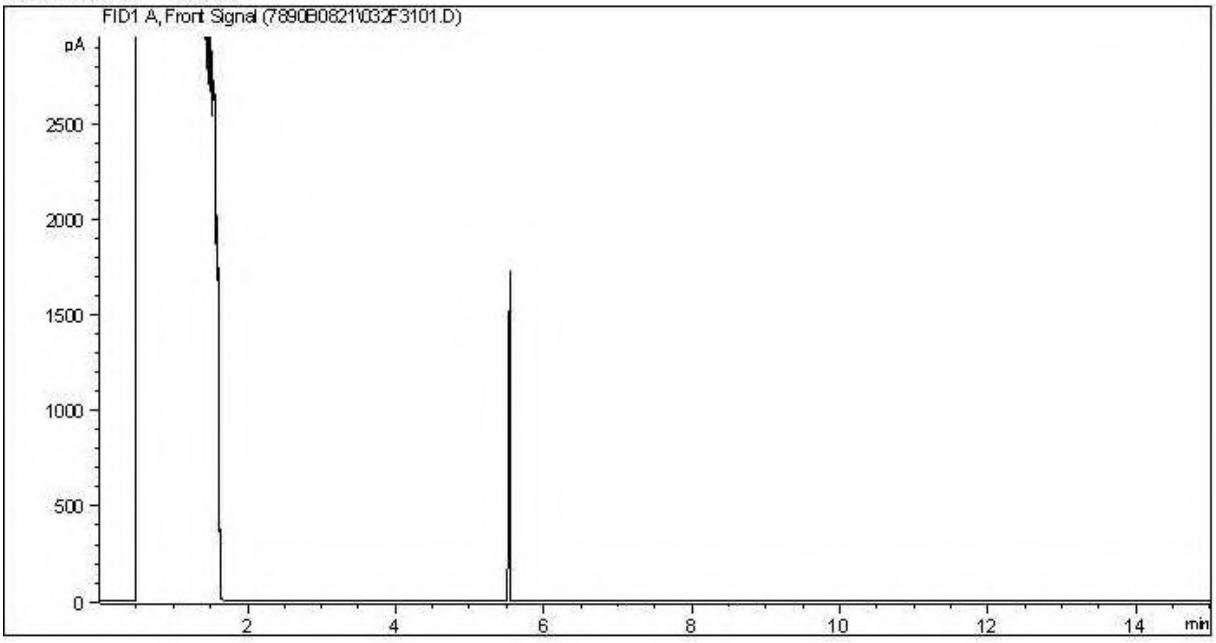
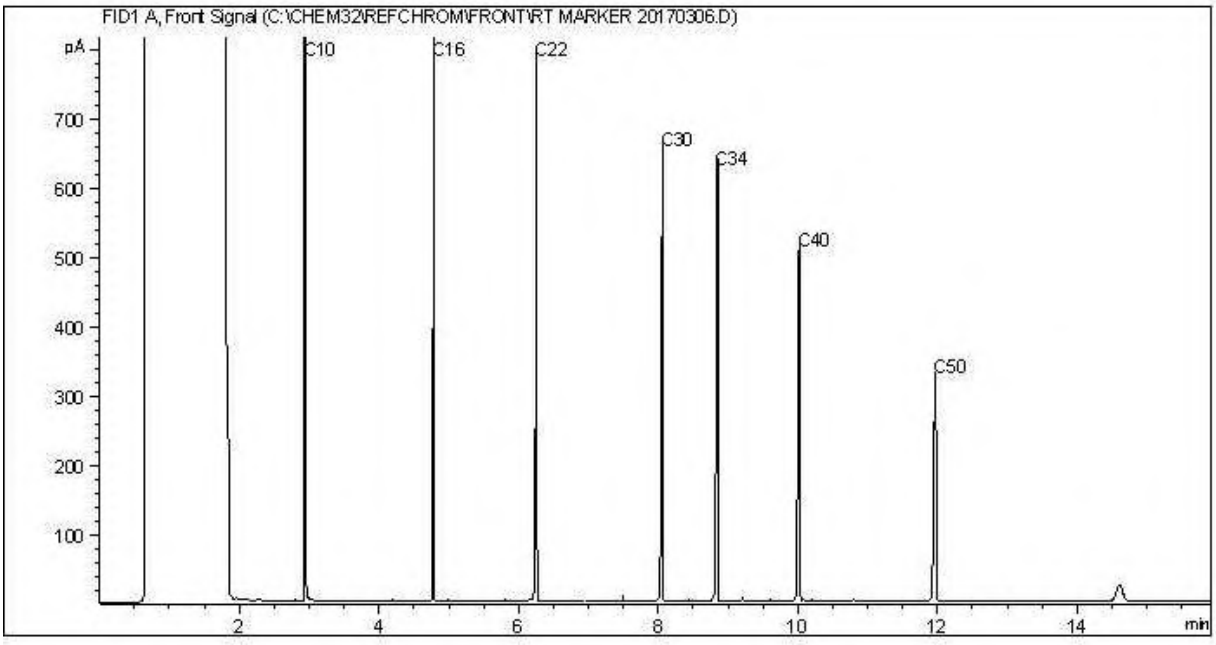
Instrument: 7890B



Carbon Range Distribution - Reference Chromatogram



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

Your Project #: 110220369
Site Location: CBA APRON
Your C.O.C. #: M067078, M040812

Attention: LINDSAY VAN NOORTWYK

STANTEC CONSULTING LTD
#400, 10220 - 103 Avenue NW
EDMONTON, AB
CANADA T5J 0K4

Report Date: 2019/11/14
Report #: R2810601
Version: 3 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BV LABS JOB #: B967692
Received: 2019/08/14, 11:42

Sample Matrix: Soil
Samples Received: 6

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
BTEX/F1 by HS GC/MS/FID (MeOH extract) (1, 2)	5	N/A	2019/08/20	AB SOP-00039	CCME CWS/EPA 8260d m
BTEX/F1 by HS GC/MS/FID (MeOH extract) (1, 2)	1	N/A	2019/08/21	AB SOP-00039	CCME CWS/EPA 8260d m
F1-BTEX (1)	6	N/A	2019/08/21		Auto Calc
CCME Hydrocarbons (F2-F4 in soil) (1, 3)	6	2019/08/17	2019/08/18	AB SOP-00036 / AB SOP-00040	CCME PHC-CWS m
Moisture (1)	6	N/A	2019/08/18	AB SOP-00002	CCME PHC-CWS m
Lead (1)	2	2019/08/20	2019/08/20	AB SOP-00001 / AB SOP-00043	EPA 6020b R2 m
Lead (1)	4	2019/08/21	2019/08/21	AB SOP-00001 / AB SOP-00043	EPA 6020b R2 m
Polychlorinated Biphenyls in Soil	6	2019/08/18	2019/08/19	CAL SOP-00149	EPA 8082A R1 m
Total PCBs in Soil	6	N/A	2019/08/21		Auto Calc

Remarks:

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

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

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

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

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by BV Labs Edmonton Environmental

Your Project #: 110220369
Site Location: CBA APRON
Your C.O.C. #: M067078, M040812

Attention: LINDSAY VAN NOORTWYK

STANTEC CONSULTING LTD
#400, 10220 - 103 Avenue NW
EDMONTON, AB
CANADA T5J 0K4

Report Date: 2019/11/14
Report #: R2810601
Version: 3 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BV LABS JOB #: B967692
Received: 2019/08/14, 11:42

(2) No lab extraction date is given for F1BTEX & VOC samples that are field preserved with methanol. Extraction date is date sampled unless otherwise stated.
(3) All CCME results met required criteria unless otherwise stated in the report. The CWS PHC methods employed by Bureau Veritas Laboratories conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following Alberta Environment's Interpretation of the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil, Validation of Performance-Based Alternative Methods September 2003. Documentation is available upon request. Modifications from Reference Method for the Canada-wide Standard for Petroleum Hydrocarbons in Soil-Tier 1 Method: F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Geraldlyn Gouthro, Key Account Specialist
Email: geraldlyn.gouthro@bvlabs.com
Phone# (780)577-7173
==========
BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

BV Labs Job #: B967692
Report Date: 2019/11/14

STANTEC CONSULTING LTD
Client Project #: 110220369
Site Location: CBA APRON
Sampler Initials: LA

AT1 BTEX AND F1-F4 IN SOIL (VIALS)

BV Labs ID		WH5578			WH5579		WH5580			
Sampling Date		2019/08/10 08:30			2019/08/10 08:40		2019/08/10 08:50			
COC Number		M067078			M067078		M067078			
	UNITS	APR-SO1	MU	QC Batch	APR-SO2	MU	APR-SO3	MU	RDL	QC Batch
Ext. Pet. Hydrocarbon										
F2 (C10-C16 Hydrocarbons)	mg/kg	50	+/- 20	9552799	29	+/- 14	1500	+/- 480	10	9552799
F3 (C16-C34 Hydrocarbons)	mg/kg	170	+/- 61	9552799	180	+/- 63	290	+/- 99	50	9552799
F4 (C34-C50 Hydrocarbons)	mg/kg	<50	N/A	9552799	<50	N/A	<50	N/A	50	9552799
Reached Baseline at C50	mg/kg	Yes	N/A	9552799	Yes	N/A	Yes	N/A	N/A	9552799
Volatiles										
Xylenes (Total)	mg/kg	<0.045	N/A	9552181	<0.045	N/A	0.36	N/A	0.045	9552181
F1 (C6-C10) - BTEX	mg/kg	16	N/A	9552181	<10	N/A	580	N/A	10	9552181
Field Preserved Volatiles										
Benzene	mg/kg	<0.0050	N/A	9552766	<0.0050	N/A	<0.0050	N/A	0.0050	9552769
Toluene	mg/kg	<0.050	N/A	9552766	<0.050	N/A	<0.050	N/A	0.050	9552769
Ethylbenzene	mg/kg	<0.010	N/A	9552766	<0.010	N/A	<0.010	N/A	0.010	9552769
m & p-Xylene	mg/kg	<0.040	N/A	9552766	<0.040	N/A	0.18 (1)	+/- 0.042	0.040	9552769
o-Xylene	mg/kg	<0.020	N/A	9552766	<0.020	N/A	0.19	+/- 0.044	0.020	9552769
F1 (C6-C10)	mg/kg	16	+/- <RDL	9552766	<10	N/A	580	+/- 140	10	9552769
Surrogate Recovery (%)										
1,4-Difluorobenzene (sur.)	%	95	N/A	9552766	100	N/A	99	N/A	N/A	9552769
4-Bromofluorobenzene (sur.)	%	102	N/A	9552766	100	N/A	108	N/A	N/A	9552769
D10-o-Xylene (sur.)	%	116	N/A	9552766	108	N/A	120	N/A	N/A	9552769
D4-1,2-Dichloroethane (sur.)	%	101	N/A	9552766	97	N/A	97	N/A	N/A	9552769
O-TERPHENYL (sur.)	%	103	N/A	9552799	90	N/A	99	N/A	N/A	9552799

RDL = Reportable Detection Limit
MU = Measurement Uncertainty
N/A = Not Applicable
(1) Tentatively identified result and may be potentially biased high due to matrix interference.

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

BV Labs Job #: B967692
Report Date: 2019/11/14

STANTEC CONSULTING LTD
Client Project #: 110220369
Site Location: CBA APRON
Sampler Initials: LA

AT1 BTEX AND F1-F4 IN SOIL (VIALS)

BV Labs ID		WH5581		WH5581		WH5582		WH5583			
Sampling Date		2019/08/10 09:15		2019/08/10 09:15		2019/08/10 09:30		2019/08/10 09:50			
COC Number		M067078		M067078		M067078		M067078			
	UNITS	APR-SO4	MU	APR-SO4 Lab-Dup	MU	APR-SO5	MU	APR-SO6	MU	RDL	QC Batch
Ext. Pet. Hydrocarbon											
F2 (C10-C16 Hydrocarbons)	mg/kg	32	+/- 15	N/A	N/A	<10	N/A	2300	+/- 730	10	9552799
F3 (C16-C34 Hydrocarbons)	mg/kg	1000	+/- 330	N/A	N/A	300	+/- 100	660	+/- 220	50	9552799
F4 (C34-C50 Hydrocarbons)	mg/kg	700	+/- 260	N/A	N/A	220	+/- 85	110	+/- <RDL	50	9552799
Reached Baseline at C50	mg/kg	Yes	N/A	N/A	N/A	Yes	N/A	Yes	N/A	N/A	9552799
Volatiles											
Xylenes (Total)	mg/kg	<0.045	N/A	N/A	N/A	<0.045	N/A	<0.045	N/A	0.045	9552181
F1 (C6-C10) - BTEX	mg/kg	<10	N/A	N/A	N/A	<10	N/A	<10	N/A	10	9552181
Field Preserved Volatiles											
Benzene	mg/kg	<0.0050	N/A	<0.0050	N/A	<0.0050	N/A	<0.0050	N/A	0.0050	9552769
Toluene	mg/kg	<0.050	N/A	<0.050	N/A	<0.050	N/A	<0.050	N/A	0.050	9552769
Ethylbenzene	mg/kg	<0.010	N/A	<0.010	N/A	<0.010	N/A	<0.010	N/A	0.010	9552769
m & p-Xylene	mg/kg	<0.040	N/A	<0.040	N/A	<0.040	N/A	<0.040	N/A	0.040	9552769
o-Xylene	mg/kg	<0.020	N/A	<0.020	N/A	<0.020	N/A	<0.020	N/A	0.020	9552769
F1 (C6-C10)	mg/kg	<10	N/A	<10	N/A	<10	N/A	<10	N/A	10	9552769
Surrogate Recovery (%)											
1,4-Difluorobenzene (sur.)	%	100	N/A	102	N/A	100	N/A	100	N/A	N/A	9552769
4-Bromofluorobenzene (sur.)	%	106	N/A	100	N/A	98	N/A	101	N/A	N/A	9552769
D10-o-Xylene (sur.)	%	116	N/A	111	N/A	108	N/A	112	N/A	N/A	9552769
D4-1,2-Dichloroethane (sur.)	%	94	N/A	99	N/A	96	N/A	96	N/A	N/A	9552769
O-TERPHENYL (sur.)	%	101	N/A	N/A	N/A	96	N/A	114	N/A	N/A	9552799

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

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

BV Labs Job #: B967692
Report Date: 2019/11/14

STANTEC CONSULTING LTD
Client Project #: 110220369
Site Location: CBA APRON
Sampler Initials: LA

POLYCHLORINATED BIPHENYLS BY GC-ECD (SOIL)

BV Labs ID		WH5578		WH5579			WH5580			WH5581			
Sampling Date		2019/08/10 08:30		2019/08/10 08:40			2019/08/10 08:50			2019/08/10 09:15			
COC Number		M067078		M067078			M067078			M067078			
	UNITS	APR-SO1	MU	APR-SO2	MU	RDL	APR-SO3	MU	RDL	APR-SO4	MU	RDL	QC Batch
Polychlorinated Biphenyls													
Aroclor 1016	mg/kg	<0.050	N/A	<0.050	N/A	0.050	<0.10	N/A	0.10	<0.010	N/A	0.010	9553065
Aroclor 1221	mg/kg	<0.050	N/A	<0.050	N/A	0.050	<0.10	N/A	0.10	<0.010	N/A	0.010	9553065
Aroclor 1232	mg/kg	<0.050	N/A	<0.050	N/A	0.050	<0.10	N/A	0.10	<0.010	N/A	0.010	9553065
Aroclor 1242	mg/kg	<0.050	N/A	<0.050	N/A	0.050	<0.10	N/A	0.10	<0.010	N/A	0.010	9553065
Aroclor 1248	mg/kg	<0.050	N/A	<0.050	N/A	0.050	<0.10	N/A	0.10	<0.010	N/A	0.010	9553065
Aroclor 1254	mg/kg	<0.050	N/A	<0.050	N/A	0.050	<0.10	N/A	0.10	<0.010	N/A	0.010	9553065
Aroclor 1260	mg/kg	<0.050	N/A	<0.050	N/A	0.050	<0.10	N/A	0.10	<0.010	N/A	0.010	9553065
Aroclor 1262	mg/kg	<0.050	N/A	<0.050	N/A	0.050	<0.10	N/A	0.10	<0.010	N/A	0.010	9553065
Aroclor 1268	mg/kg	<0.050	N/A	<0.050	N/A	0.050	<0.10	N/A	0.10	<0.010	N/A	0.010	9553065
Total PCB	mg/kg	<0.050	N/A	<0.050	N/A	0.050	<0.10	N/A	0.10	<0.010	N/A	0.010	9552226
Surrogate Recovery (%)													
NONACHLOROBIPHENYL (sur.)	%	97	N/A	104	N/A	N/A	97	N/A	N/A	97	N/A	N/A	9553065

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

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

BV Labs Job #: B967692
Report Date: 2019/11/14

STANTEC CONSULTING LTD
Client Project #: 110220369
Site Location: CBA APRON
Sampler Initials: LA

POLYCHLORINATED BIPHENYLS BY GC-ECD (SOIL)

BV Labs ID		WH5582		WH5582			WH5583			
Sampling Date		2019/08/10 09:30		2019/08/10 09:30			2019/08/10 09:50			
COC Number		M067078		M067078			M067078			
	UNITS	APR-SO5	MU	APR-SO5 Lab-Dup	MU	RDL	APR-SO6	MU	RDL	QC Batch
Polychlorinated Biphenyls										
Aroclor 1016	mg/kg	<0.010	N/A	<0.010	N/A	0.010	<0.10	N/A	0.10	9553065
Aroclor 1221	mg/kg	<0.010	N/A	<0.010	N/A	0.010	<0.10	N/A	0.10	9553065
Aroclor 1232	mg/kg	<0.010	N/A	<0.010	N/A	0.010	<0.10	N/A	0.10	9553065
Aroclor 1242	mg/kg	<0.010	N/A	<0.010	N/A	0.010	<0.10	N/A	0.10	9553065
Aroclor 1248	mg/kg	<0.010	N/A	<0.010	N/A	0.010	<0.10	N/A	0.10	9553065
Aroclor 1254	mg/kg	<0.010	N/A	<0.010	N/A	0.010	<0.10	N/A	0.10	9553065
Aroclor 1260	mg/kg	<0.010	N/A	<0.010	N/A	0.010	<0.10	N/A	0.10	9553065
Aroclor 1262	mg/kg	<0.010	N/A	<0.010	N/A	0.010	<0.10	N/A	0.10	9553065
Aroclor 1268	mg/kg	<0.010	N/A	<0.010	N/A	0.010	<0.10	N/A	0.10	9553065
Total PCB	mg/kg	<0.010	N/A	N/A	N/A	0.010	<0.10	N/A	0.10	9552226
Surrogate Recovery (%)										
NONACHLOROBIPHENYL (sur.)	%	99	N/A	96	N/A	N/A	93	N/A	N/A	9553065

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

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Client Project #: 110220369
Site Location: CBA APRON
Sampler Initials: LA

PHYSICAL TESTING (SOIL)

BV Labs ID		WH5578		WH5579		WH5580		WH5581			
Sampling Date		2019/08/10 08:30		2019/08/10 08:40		2019/08/10 08:50		2019/08/10 09:15			
COC Number		M067078		M067078		M067078		M067078			
	UNITS	APR-SO1	MU	APR-SO2	MU	APR-SO3	MU	APR-SO4	MU	RDL	QC Batch
Physical Properties											
Moisture	%	7.7	+/- 0.57	8.6	+/- 0.63	9.8	+/- 0.72	11	+/- 0.81	0.30	9552719

RDL = Reportable Detection Limit
MU = Measurement Uncertainty

BV Labs ID		WH5582		WH5583			
Sampling Date		2019/08/10 09:30		2019/08/10 09:50			
COC Number		M067078		M067078			
	UNITS	APR-SO5	MU	APR-SO6	MU	RDL	QC Batch
Physical Properties							
Moisture	%	8.5	+/- 0.63	9.5	+/- 0.70	0.30	9552719

RDL = Reportable Detection Limit
MU = Measurement Uncertainty

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Sampler Initials: LA

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

BV Labs ID		WH5578			WH5579			WH5580			
Sampling Date		2019/08/10 08:30			2019/08/10 08:40			2019/08/10 08:50			
COC Number		M067078			M067078			M067078			
	UNITS	APR-SO1	MU	QC Batch	APR-SO2	MU	QC Batch	APR-SO3	MU	RDL	QC Batch
Elements											
Total Lead (Pb)	mg/kg	7.7	+/- 1.4	9554533	6.0	+/- 1.1	9556443	13	+/- 2.4	0.50	9554533

RDL = Reportable Detection Limit
MU = Measurement Uncertainty

BV Labs ID		WH5581		WH5582		WH5583			
Sampling Date		2019/08/10 09:15		2019/08/10 09:30		2019/08/10 09:50			
COC Number		M067078		M067078		M067078			
	UNITS	APR-SO4	MU	APR-SO5	MU	APR-SO6	MU	RDL	QC Batch
Elements									
Total Lead (Pb)	mg/kg	5.3	+/- 0.98	5.4	+/- 1.0	9.1	+/- 1.7	0.50	9556443

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	6.5°C
Package 2	5.1°C
Package 3	8.1°C
Package 4	4.2°C

As per client request, additional analysis has been completed. 4 x NPK & TKN. The client request was received 2019/08/26.

Version 3: Select samples included in report as per client request received 2019/11/14.

POLYCHLORINATED BIPHENYLS BY GC-ECD (SOIL) Comments

Sample WH5578 [APR-SO1] Polychlorinated Biphenyls in Soil: Detection limits raised due to matrix interference.
Sample WH5579 [APR-SO2] Polychlorinated Biphenyls in Soil: Detection limits raised due to matrix interference.
Sample WH5580 [APR-SO3] Polychlorinated Biphenyls in Soil: Detection limits raised due to matrix interference.
Sample WH5583 [APR-SO6] Polychlorinated Biphenyls in Soil: Detection limits raised due to matrix interference.

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
9552719	RM4	Method Blank	Moisture	2019/08/18	<0.30		%	
9552719	RM4	RPD	Moisture	2019/08/18	1.1		%	20
9552766	HG3	Matrix Spike	1,4-Difluorobenzene (sur.)	2019/08/21		92	%	50 - 140
			4-Bromofluorobenzene (sur.)	2019/08/21		104	%	50 - 140
			D10-o-Xylene (sur.)	2019/08/21		120	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2019/08/21		95	%	50 - 140
			Benzene	2019/08/21		110	%	50 - 140
			Toluene	2019/08/21		113	%	50 - 140
			Ethylbenzene	2019/08/21		120	%	50 - 140
			m & p-Xylene	2019/08/21		121	%	50 - 140
			o-Xylene	2019/08/21		114	%	50 - 140
			F1 (C6-C10)	2019/08/21		131	%	60 - 140
9552766	HG3	Spiked Blank	1,4-Difluorobenzene (sur.)	2019/08/21		96	%	50 - 140
			4-Bromofluorobenzene (sur.)	2019/08/21		100	%	50 - 140
			D10-o-Xylene (sur.)	2019/08/21		111	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2019/08/21		100	%	50 - 140
			Benzene	2019/08/21		111	%	60 - 130
			Toluene	2019/08/21		109	%	60 - 130
			Ethylbenzene	2019/08/21		112	%	60 - 130
			m & p-Xylene	2019/08/21		114	%	60 - 130
			o-Xylene	2019/08/21		107	%	60 - 130
			F1 (C6-C10)	2019/08/21		110	%	60 - 140
9552766	HG3	Method Blank	1,4-Difluorobenzene (sur.)	2019/08/21		97	%	50 - 140
			4-Bromofluorobenzene (sur.)	2019/08/21		101	%	50 - 140
			D10-o-Xylene (sur.)	2019/08/21		115	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2019/08/21		97	%	50 - 140
			Benzene	2019/08/21	<0.0050		mg/kg	
			Toluene	2019/08/21	<0.050		mg/kg	
			Ethylbenzene	2019/08/21	<0.010		mg/kg	
			m & p-Xylene	2019/08/21	<0.040		mg/kg	
			o-Xylene	2019/08/21	<0.020		mg/kg	
			F1 (C6-C10)	2019/08/21	<10		mg/kg	
9552766	HG3	RPD	Benzene	2019/08/21	NC		%	50
			Toluene	2019/08/21	NC		%	50
			Ethylbenzene	2019/08/21	NC		%	50
			m & p-Xylene	2019/08/21	NC		%	50
			o-Xylene	2019/08/21	NC		%	50
			F1 (C6-C10)	2019/08/21	NC		%	30
9552769	HG3	Matrix Spike [WH5581-04]	1,4-Difluorobenzene (sur.)	2019/08/20		98	%	50 - 140
			4-Bromofluorobenzene (sur.)	2019/08/20		101	%	50 - 140
			D10-o-Xylene (sur.)	2019/08/20		113	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2019/08/20		95	%	50 - 140
			Benzene	2019/08/20		103	%	50 - 140
			Toluene	2019/08/20		103	%	50 - 140
			Ethylbenzene	2019/08/20		109	%	50 - 140
			m & p-Xylene	2019/08/20		109	%	50 - 140
			o-Xylene	2019/08/20		105	%	50 - 140
			F1 (C6-C10)	2019/08/20		129	%	60 - 140
9552769	HG3	Spiked Blank	1,4-Difluorobenzene (sur.)	2019/08/20		100	%	50 - 140
			4-Bromofluorobenzene (sur.)	2019/08/20		102	%	50 - 140
			D10-o-Xylene (sur.)	2019/08/20		108	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2019/08/20		96	%	50 - 140

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Benzene	2019/08/20		101	%	60 - 130
			Toluene	2019/08/20		101	%	60 - 130
			Ethylbenzene	2019/08/20		104	%	60 - 130
			m & p-Xylene	2019/08/20		107	%	60 - 130
			o-Xylene	2019/08/20		101	%	60 - 130
			F1 (C6-C10)	2019/08/20		115	%	60 - 140
9552769	HG3	Method Blank	1,4-Difluorobenzene (sur.)	2019/08/20		101	%	50 - 140
			4-Bromofluorobenzene (sur.)	2019/08/20		101	%	50 - 140
			D10-o-Xylene (sur.)	2019/08/20		104	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2019/08/20		97	%	50 - 140
			Benzene	2019/08/20	<0.0050		mg/kg	
			Toluene	2019/08/20	<0.050		mg/kg	
			Ethylbenzene	2019/08/20	<0.010		mg/kg	
			m & p-Xylene	2019/08/20	<0.040		mg/kg	
			o-Xylene	2019/08/20	<0.020		mg/kg	
			F1 (C6-C10)	2019/08/20	<10		mg/kg	
9552769	HG3	RPD [WH5581-04]	Benzene	2019/08/20	NC		%	50
			Toluene	2019/08/20	NC		%	50
			Ethylbenzene	2019/08/20	NC		%	50
			m & p-Xylene	2019/08/20	NC		%	50
			o-Xylene	2019/08/20	NC		%	50
			F1 (C6-C10)	2019/08/20	NC		%	30
9552799	GG3	Matrix Spike [WH5589-02]	O-TERPHENYL (sur.)	2019/08/18		92	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2019/08/18		93	%	60 - 140
			F3 (C16-C34 Hydrocarbons)	2019/08/18		91	%	60 - 140
			F4 (C34-C50 Hydrocarbons)	2019/08/18		90	%	60 - 140
9552799	GG3	Spiked Blank	O-TERPHENYL (sur.)	2019/08/17		97	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2019/08/17		98	%	60 - 140
			F3 (C16-C34 Hydrocarbons)	2019/08/17		99	%	60 - 140
			F4 (C34-C50 Hydrocarbons)	2019/08/17		98	%	60 - 140
9552799	GG3	Method Blank	O-TERPHENYL (sur.)	2019/08/17		118	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2019/08/17	<10		mg/kg	
			F3 (C16-C34 Hydrocarbons)	2019/08/17	<50		mg/kg	
			F4 (C34-C50 Hydrocarbons)	2019/08/17	<50		mg/kg	
9552799	GG3	RPD [WH5589-02]	F2 (C10-C16 Hydrocarbons)	2019/08/18	NC		%	40
			F3 (C16-C34 Hydrocarbons)	2019/08/18	9.7		%	40
			F4 (C34-C50 Hydrocarbons)	2019/08/18	15		%	40
9553065	LZ3	Matrix Spike [WH5582-03]	Aroclor 1260	2019/08/19		105	%	50 - 130
			NONACHLOROBIPHENYL (sur.)	2019/08/19		101	%	50 - 130
9553065	LZ3	Spiked Blank	Aroclor 1260	2019/08/19		96	%	50 - 130
			NONACHLOROBIPHENYL (sur.)	2019/08/19		94	%	50 - 130
9553065	LZ3	Method Blank	Aroclor 1016	2019/08/19	<0.010		mg/kg	
			Aroclor 1221	2019/08/19	<0.010		mg/kg	
			Aroclor 1232	2019/08/19	<0.010		mg/kg	
			Aroclor 1242	2019/08/19	<0.010		mg/kg	
			Aroclor 1248	2019/08/19	<0.010		mg/kg	
			Aroclor 1254	2019/08/19	<0.010		mg/kg	
			Aroclor 1260	2019/08/19	<0.010		mg/kg	
			Aroclor 1262	2019/08/19	<0.010		mg/kg	
			Aroclor 1268	2019/08/19	<0.010		mg/kg	
			NONACHLOROBIPHENYL (sur.)	2019/08/19		97	%	50 - 130

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Sampler Initials: LA

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
9553065	LZ3	RPD [WH5582-03]	Aroclor 1016	2019/08/19	NC		%	50
			Aroclor 1221	2019/08/19	NC		%	50
			Aroclor 1232	2019/08/19	NC		%	50
			Aroclor 1242	2019/08/19	NC		%	50
			Aroclor 1248	2019/08/19	NC		%	50
			Aroclor 1254	2019/08/19	NC		%	50
			Aroclor 1260	2019/08/19	NC		%	50
			Aroclor 1262	2019/08/19	NC		%	50
			Aroclor 1268	2019/08/19	NC		%	50
9554533	JHS	Matrix Spike	Total Lead (Pb)	2019/08/20		90	%	75 - 125
9554533	JHS	QC Standard	Total Lead (Pb)	2019/08/20		99	%	79 - 121
9554533	JHS	Spiked Blank	Total Lead (Pb)	2019/08/20		96	%	80 - 120
9554533	JHS	Method Blank	Total Lead (Pb)	2019/08/20	<0.50		mg/kg	
9554533	JHS	RPD	Total Lead (Pb)	2019/08/20	4.8		%	35
9556443	JHS	Matrix Spike	Total Lead (Pb)	2019/08/21		82	%	75 - 125
9556443	JHS	QC Standard	Total Lead (Pb)	2019/08/21		97	%	79 - 121
9556443	JHS	Spiked Blank	Total Lead (Pb)	2019/08/21		94	%	80 - 120
9556443	JHS	Method Blank	Total Lead (Pb)	2019/08/21	<0.50		mg/kg	
9556443	JHS	RPD	Total Lead (Pb)	2019/08/21	4.6		%	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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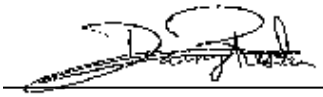
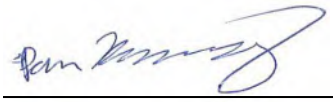
VALIDATION SIGNATURE PAGE

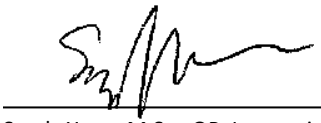
The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



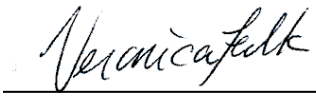
Daniel Reslan, cCT, QP, Organics Manager



Pamela Kimmerly, Chem. Tech., Team Lead



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



Veronica Falk, B.Sc., P.Chem., QP, Scientific Specialist, Organics

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

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Maxxam
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ADDITIONAL COOLER TEMPERATURE RECORD

CHAIN-OF-CUSTODY RECORD

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COOLER OBSERVATIONS:

MAXXAM JOB#: B967692

CUSTODY SEAL	YES	NO	COOLER ID	JN		
PRESENT		✓	TEMP	5	8	7
INTACT		✓		1	2	3
ICE PRESENT	✓					
CUSTODY SEAL	**YES**	**NO**	**COOLER ID**	bag		
PRESENT		✓	TEMP	14	14	17
INTACT		✓		1	2	3
ICE PRESENT	✓					
CUSTODY SEAL	**YES**	**NO**	**COOLER ID**	JN		
PRESENT		✓	TEMP	3	5	5
INTACT		✓		1	2	3
ICE PRESENT	✓					
CUSTODY SEAL	**YES**	**NO**	**COOLER ID**	bag		
PRESENT		✓	TEMP	14	13	13
INTACT		✓		1	2	3
ICE PRESENT	✓					
CUSTODY SEAL	**YES**	**NO**	**COOLER ID**	bottles		
PRESENT		✓	TEMP	3	3	3
INTACT		✓		1	2	3
ICE PRESENT	✓					
CUSTODY SEAL	**YES**	**NO**	**COOLER ID**			
PRESENT			TEMP			
INTACT				1	2	3
ICE PRESENT						
CUSTODY SEAL	**YES**	**NO**	**COOLER ID**			
PRESENT			TEMP			
INTACT				1	2	3
ICE PRESENT						
CUSTODY SEAL	**YES**	**NO**	**COOLER ID**			
PRESENT			TEMP			
INTACT				1	2	3
ICE PRESENT						
CUSTODY SEAL	**YES**	**NO**	**COOLER ID**			
PRESENT			TEMP			
INTACT				1	2	3
ICE PRESENT						
CUSTODY SEAL	**YES**	**NO**	**COOLER ID**			
PRESENT			TEMP			
INTACT				1	2	3
ICE PRESENT						

CUSTODY SEAL	YES	NO	COOLER ID			
PRESENT			TEMP			
INTACT				1	2	3
ICE PRESENT						
CUSTODY SEAL	**YES**	**NO**	**COOLER ID**			
PRESENT			TEMP			
INTACT				1	2	3
ICE PRESENT						
CUSTODY SEAL	**YES**	**NO**	**COOLER ID**			
PRESENT			TEMP			
INTACT				1	2	3
ICE PRESENT						
CUSTODY SEAL	**YES**	**NO**	**COOLER ID**			
PRESENT			TEMP			
INTACT				1	2	3
ICE PRESENT						
CUSTODY SEAL	**YES**	**NO**	**COOLER ID**			
PRESENT			TEMP			
INTACT				1	2	3
ICE PRESENT						
CUSTODY SEAL	**YES**	**NO**	**COOLER ID**			
PRESENT			TEMP			
INTACT				1	2	3
ICE PRESENT						
CUSTODY SEAL	**YES**	**NO**	**COOLER ID**			
PRESENT			TEMP			
INTACT				1	2	3
ICE PRESENT						
CUSTODY SEAL	**YES**	**NO**	**COOLER ID**			
PRESENT			TEMP			
INTACT				1	2	3
ICE PRESENT						
CUSTODY SEAL	**YES**	**NO**	**COOLER ID**			
PRESENT			TEMP			
INTACT				1	2	3
ICE PRESENT						
CUSTODY SEAL	**YES**	**NO**	**COOLER ID**			
PRESENT			TEMP			
INTACT				1	2	3
ICE PRESENT						

RECEIVED BY (SIGN & PRINT)		DATE (YYYY/MM/DD)	TIME (HH:MM)
[signature]	DE JI WU	2019/08/15	12:37

DW
2019/08/15

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

M067078

Invoice Information	Report Information (if differs from invoice)	Project Information	Turnaround Time (TAT) Required
Company: Stantec	Company:	Quotation #: B71723	[x] 5 - 7 Days Regular (Most analyses)
Contact Name: Lindsay Van Noortwyk	Contact Name:	P.O. #/ AFE#: 110220369	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 500-10220 103 Ave NW Edmonton AB T5J 0K4	Address:	Project #: 110220369	Rush TAT (Surcharges will be applied)
Phone: 780 232 1114	Phone:	Site Location: CBA Apron	[ ] 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 — Received in Yellowknife By: Sara Depot Reception

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

ice-yes cs-yes
AUG 14 2019 @11.42
Temp: 6.1 7.9 5.6 / 6.7 4.4 4.1 / 8.8 8.3 7.3 / 4.8 5.1 2.6

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

Special Instructions

	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 [ ] Diss [ ] Tot	Mercury [ ] Dissolved [ ] Total	Salinity 4	Sieve (75 micron)	Texture (% Sand, Silt, Clay)	Basic Class II Landfill	Lead	PCBs	PFOS / PFOA	HOLD - DO NOT ANALYZE
1	APR-S01	0.5	2019/08/10	830	S	5			x								x	x		
2	APR-S02	↓	↓	840	↓	↓			x								x	x		
3	APR-S03			850					x								x	x		
4	APR-S04			915					x								x	x		
5	APR-S05	↓		930					x								x	x		
6	APR-S06	0.5		950		↓			x								x	x		
7	QC-APR-01	—		—		5			x								x	x		
8	APR-S07	0.5		1030		6			x								x	x	x	
9	APR-S08	0.5	↓	1040	↓	6			x								x	x	x	
10	APR-S09	0.5	2019/08/10	1052	S	6			x								x	x	x	

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

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	2019/08/12	0707	DEJI WU	2019/08/13	12:37	B967692

AB FCD-00331/7

Xxam
eau 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

M040812

Page 2 of 2

Report Information

Company: Stantec
Contact: Lindsay Van Noortwyk
Phone: 780 232 1114
Email: Lindsay.VanNoortwyk@stantec.com
Sampled by: LA

Comments

Same as CoC: M067078

Project/LSD: 1102720369

Special Instructions

	Sample Identification	Depth (mbgs)	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	PCBs	PFOS/PFOA	TKN	TOC	Phosphorous	pH	Moisture	HOLD - DO NOT ANALYZE
11	APR-S10	0.5	2019/08/10	1100	S	6			x								x	x	x						
12	APR-S11	0.5		1112		6			x								x	x	x						
13	APR-S12	0.5		1137		6			x								x	x	x						
14	QC-APR-02	—		—		6			x								x	x	x						
15	APR-Comp1			1545		5			x											x	x	x	x	x	
16	APR-Comp2			1550		5			x											x	x	x	x	x	
17	APR-Comp3			1555		5			x											x	x	x	x	x	
18	APR-Comp4		2019/08/10	1600	S	5			x											x	x	x	x	x	
19																									
20																									
21																									
22																									
23																									
24																									
25																									
26																									
27																									
28																									
29																									
30																									

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

Received in Yellowknife
By: [signature]
ice-yes cs-yes
AUG 14 2019 @ 11:42

Temp: 6.1 7.9 5.6 / 6.7 4.4 4.1 / 8.8 8.3 7.3 / 4.8 5.1 7.6

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	2019/08/12	0707	DEJI WU	2019/08/13	12:37	B967692

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

Automatic reply: Analysis confirmation for soil_RE: Need cost estimate ASAP

Child

Geraldlyn Gouthro reported via phone

Response Due

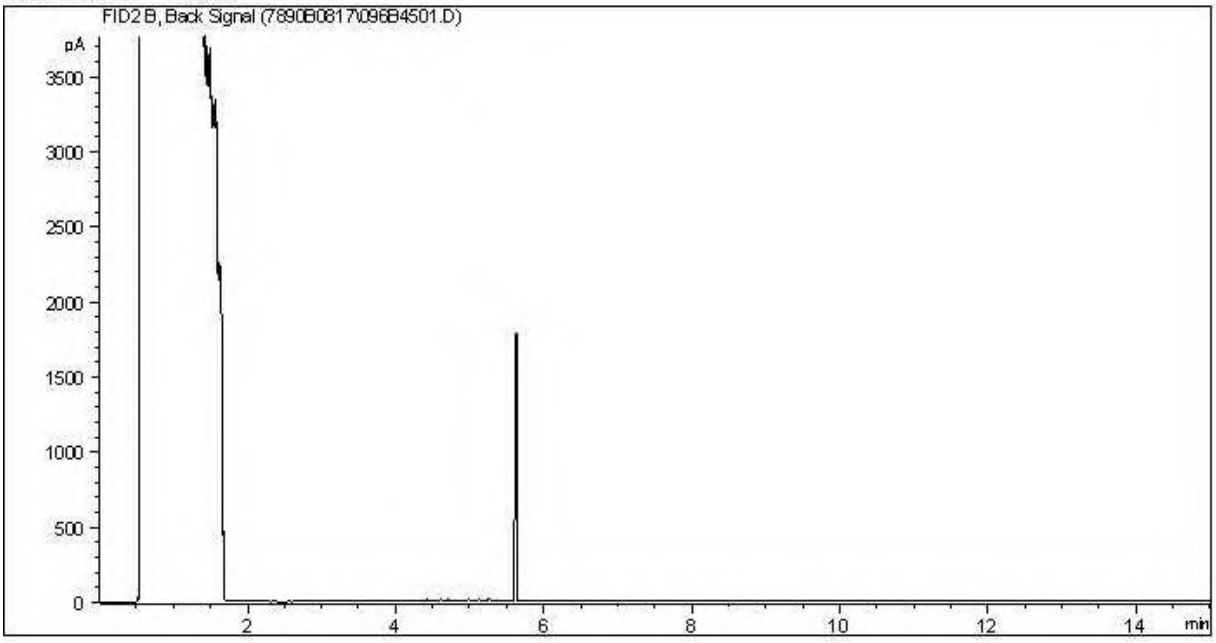
K

Kim Mohr added a private note, an hour ago (Mon, 26 Aug 2019 at 1:56 PM)

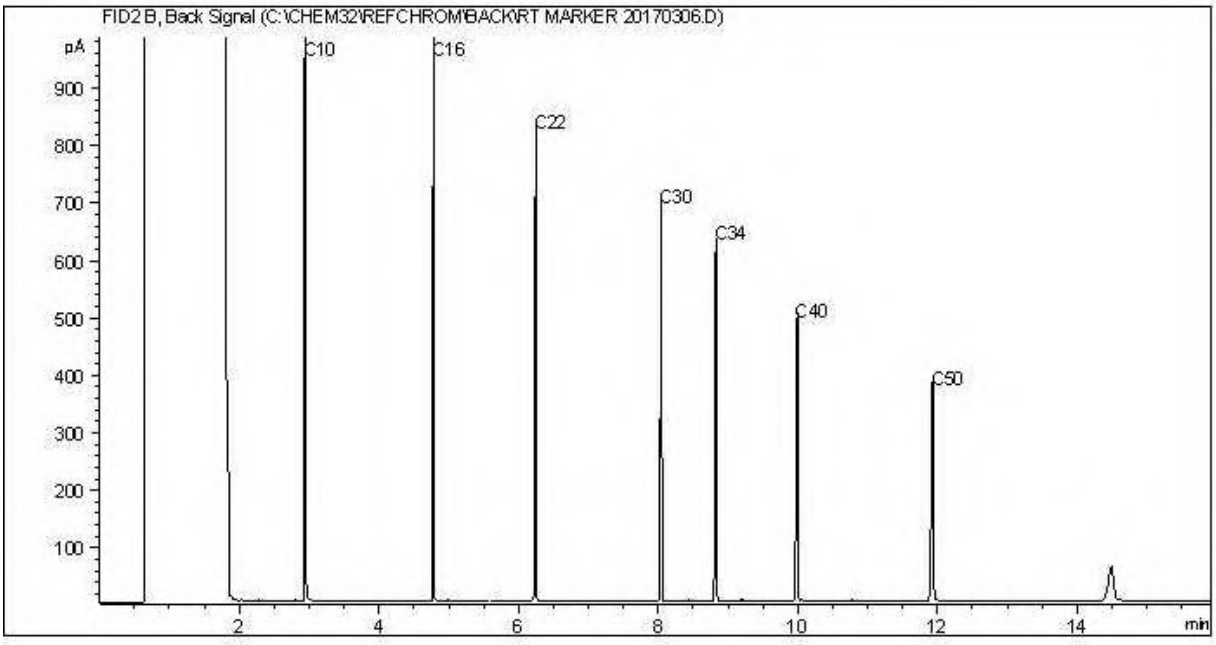
Add available NPK and Available TKN to WH5592, 93, 94 and 95. Regular tat.

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890B



Carbon Range Distribution - Reference Chromatogram



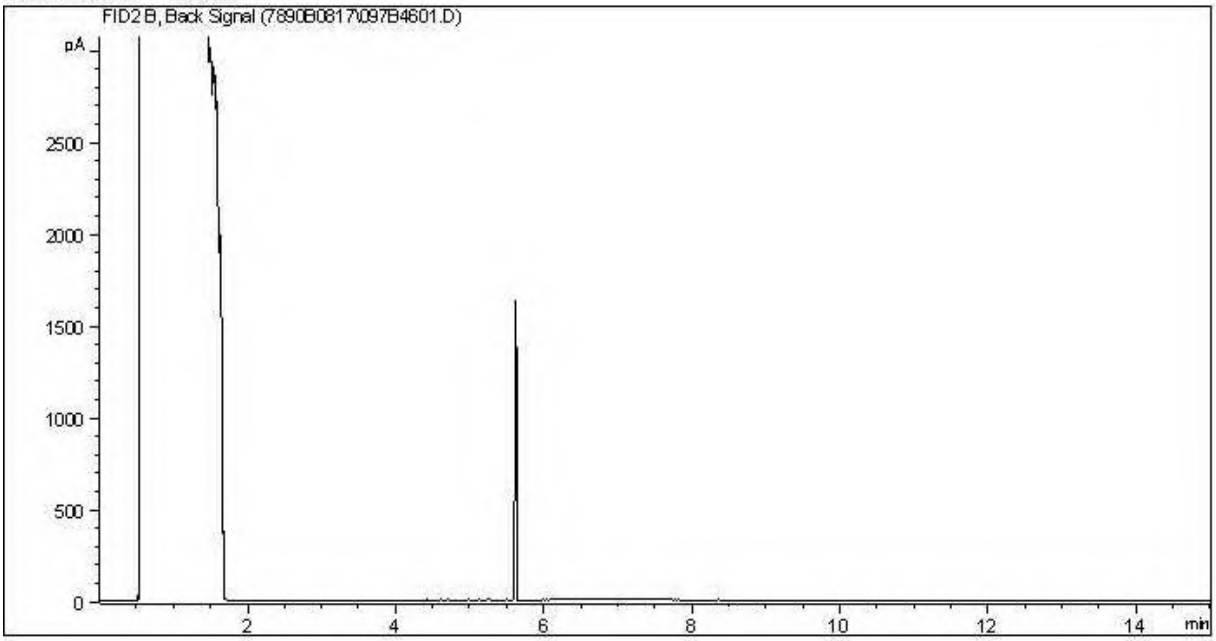
TYPICAL PRODUCT CARBON NUMBER RANGES

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

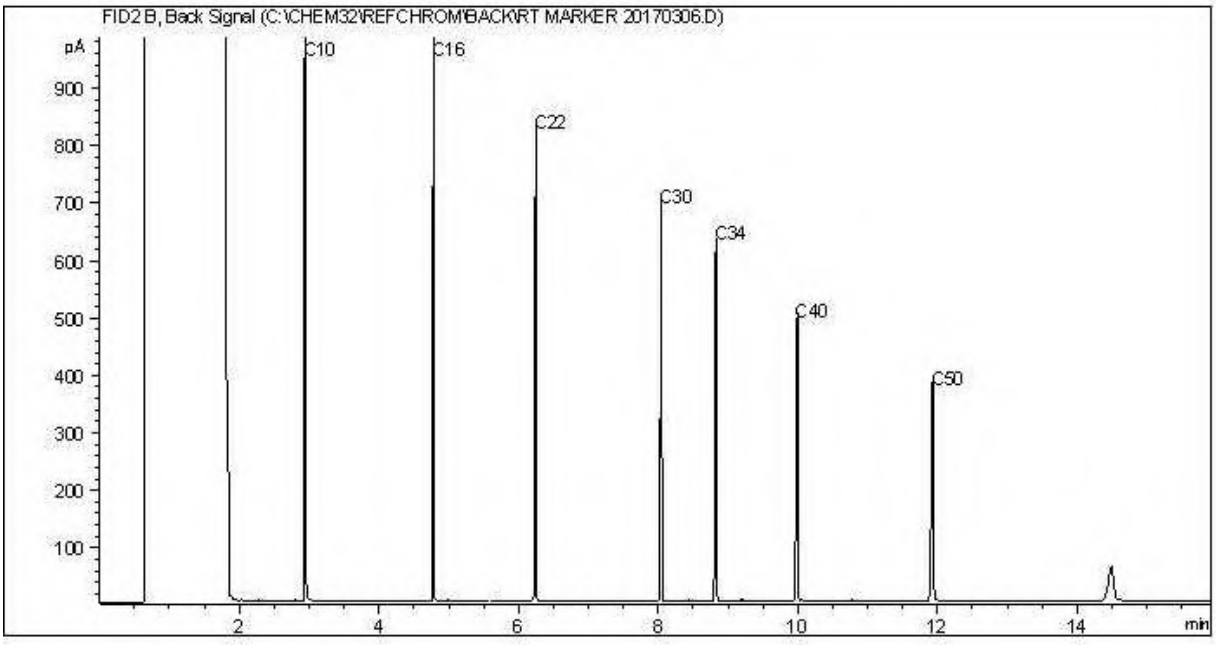
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890B



Carbon Range Distribution - Reference Chromatogram



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Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
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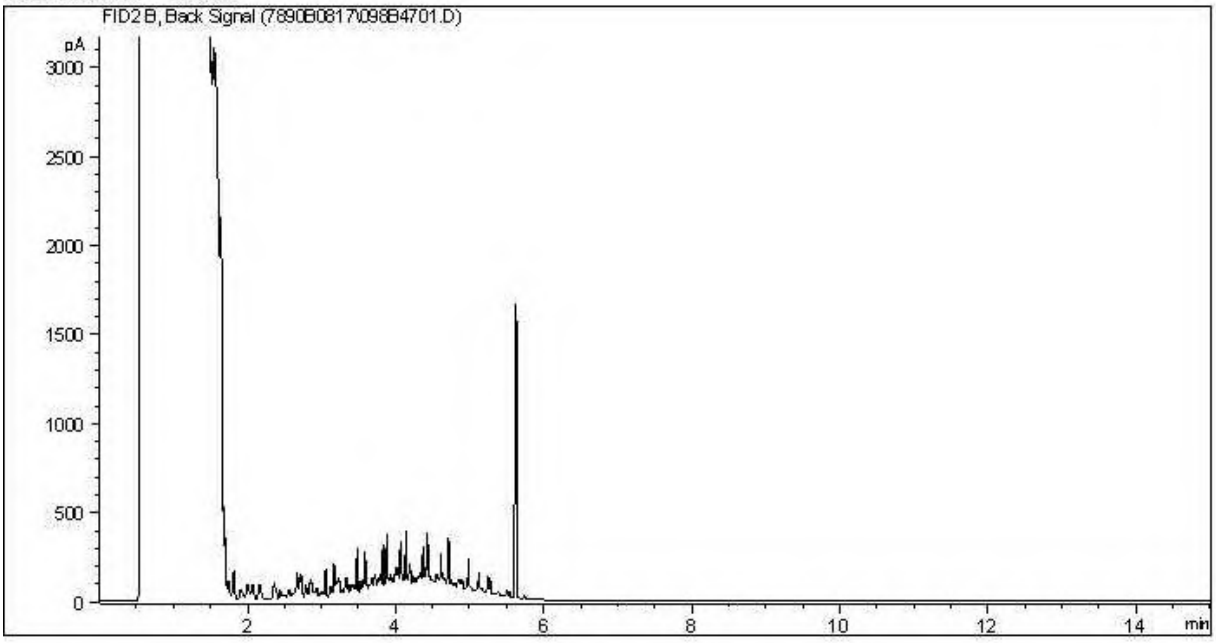
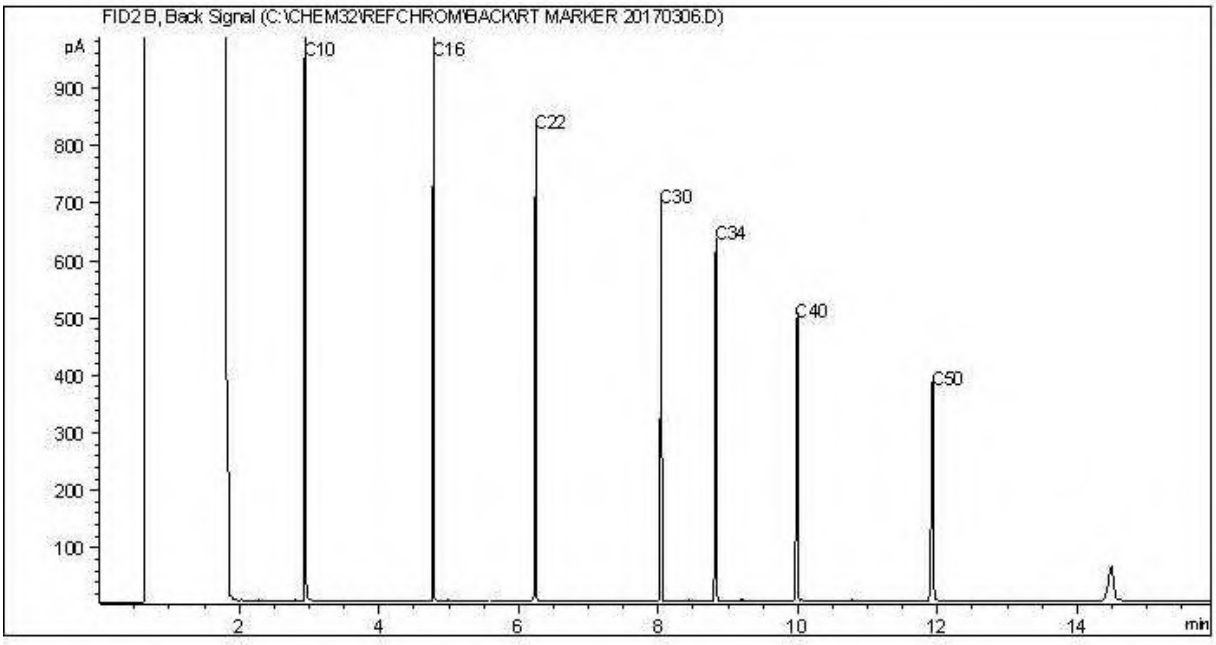
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890B



Carbon Range Distribution - Reference Chromatogram



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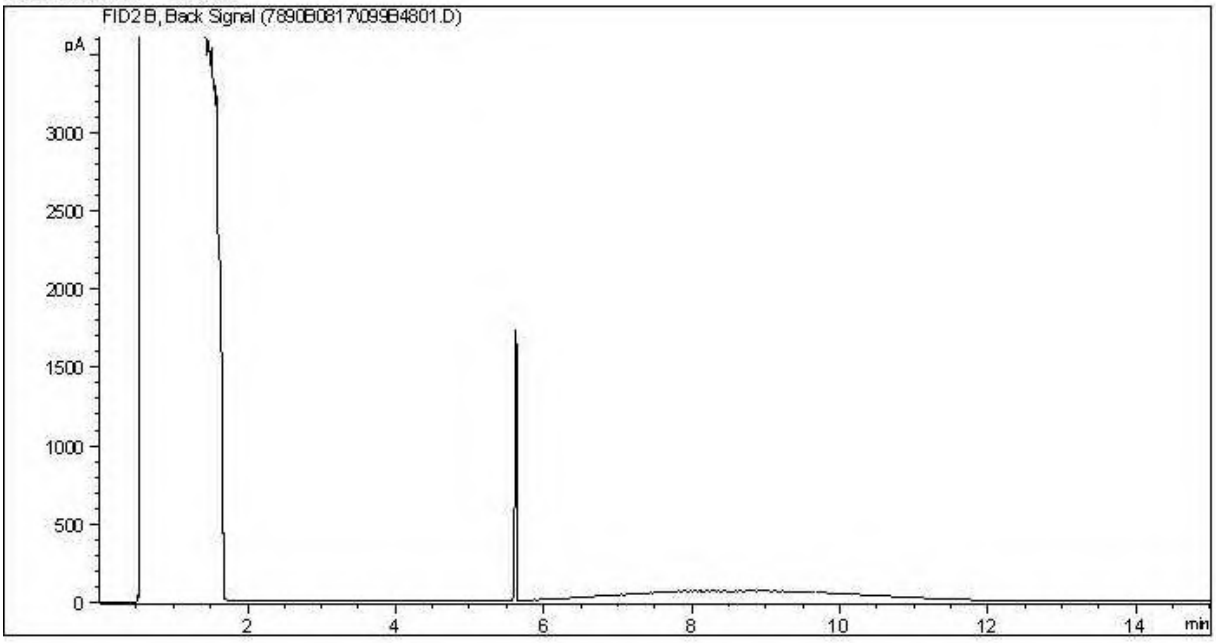
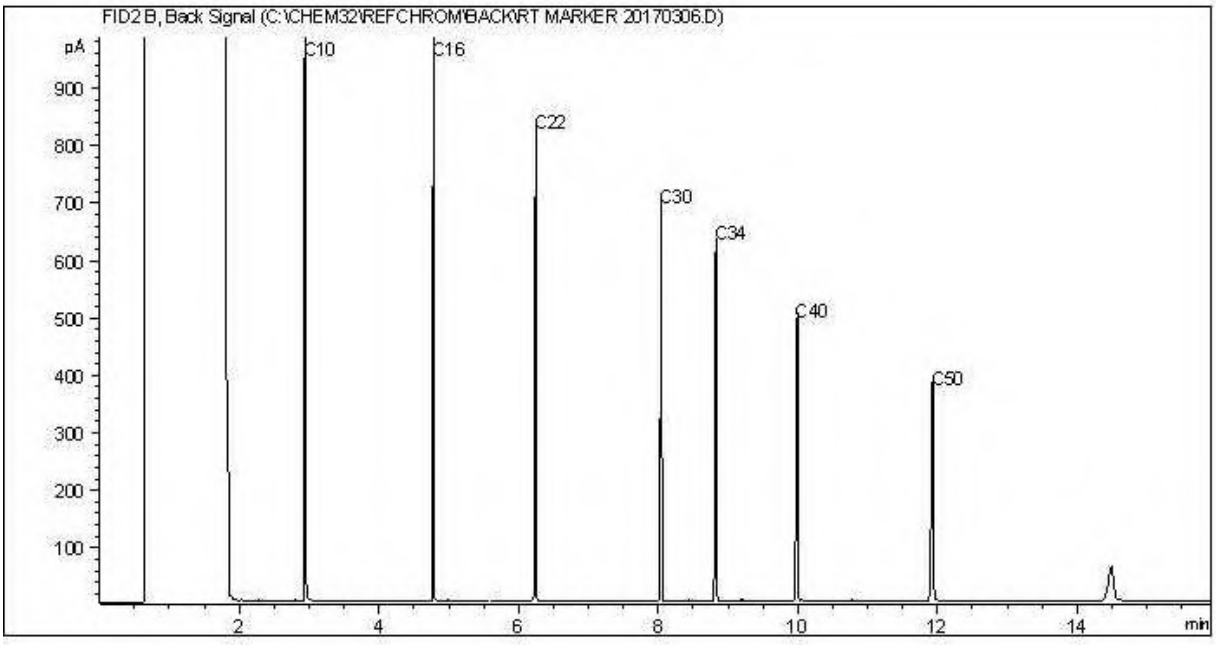
CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890B



Carbon Range Distribution - Reference Chromatogram



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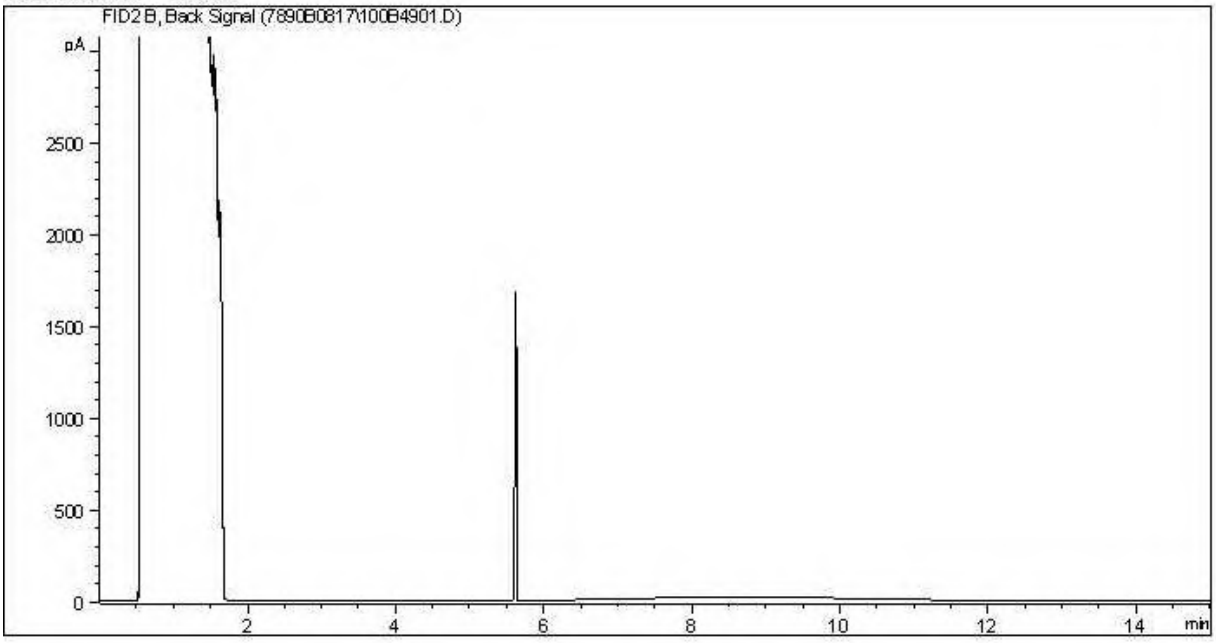
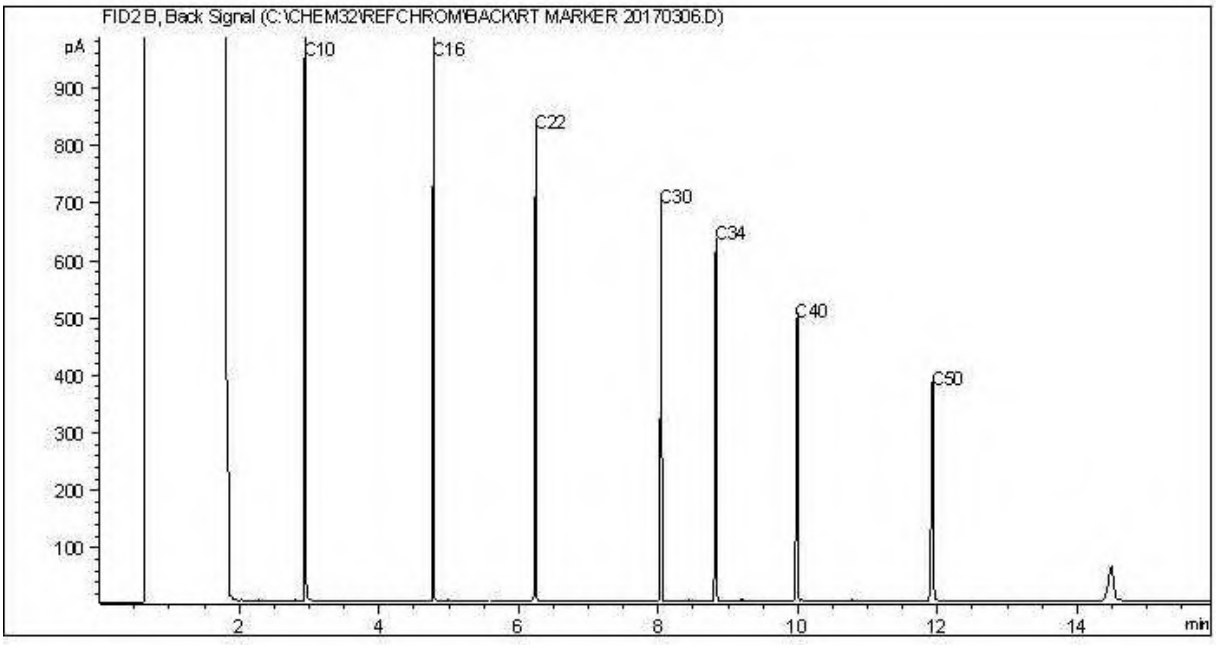
CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890B



Carbon Range Distribution - Reference Chromatogram



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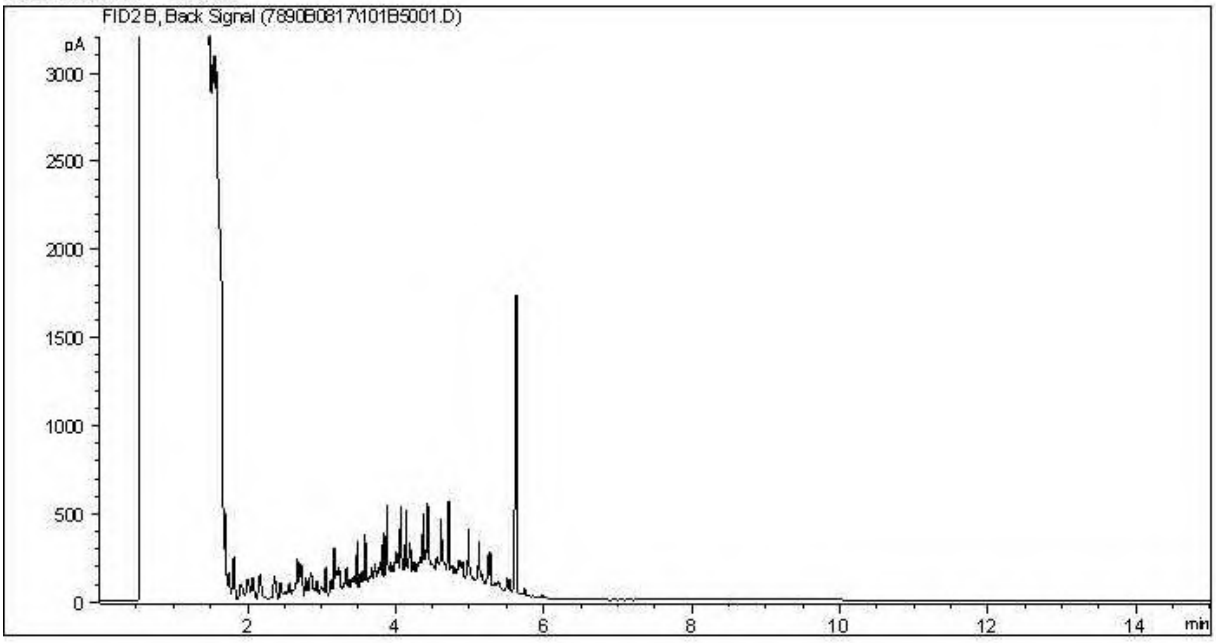
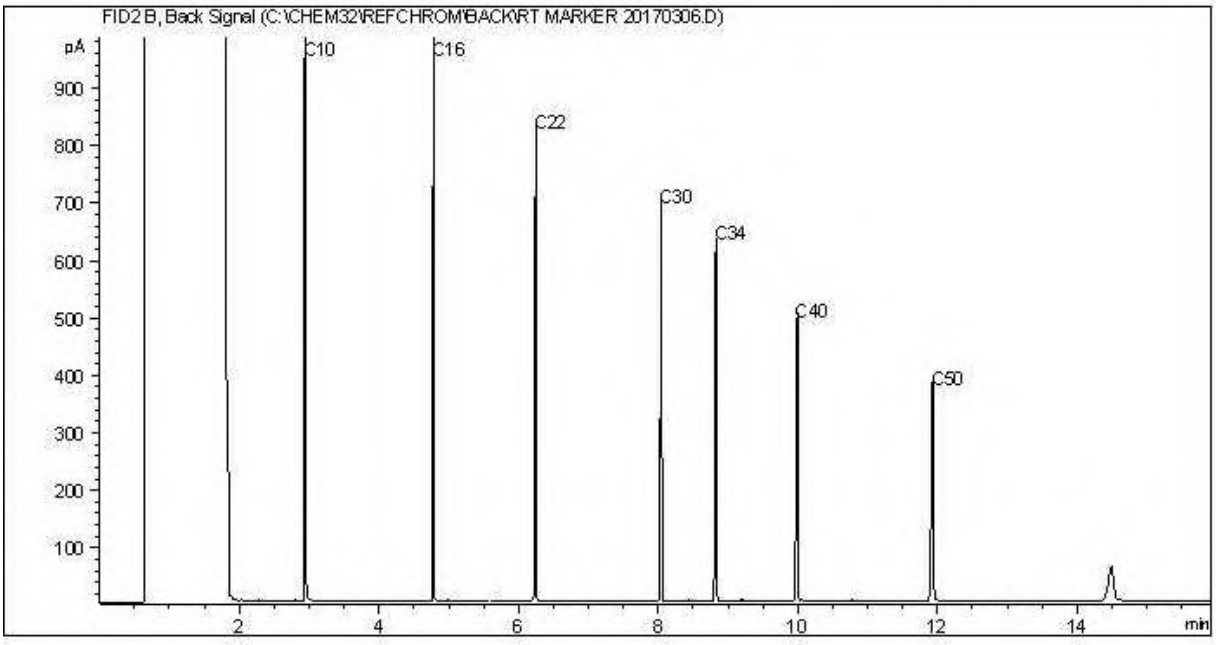
CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890B



Carbon Range Distribution - Reference Chromatogram



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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.

Your Project #: 110220369
Site Location: CBA
Your C.O.C. #: M067076

Attention: LINDSAY VAN NOORTWYK

STANTEC CONSULTING LTD
#400, 10220 - 103 Avenue NW
EDMONTON, AB
CANADA T5J 0K4

Report Date: 2019/09/04
Report #: R2776087
Version: 2 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B967665
Received: 2019/08/14, 11:42

Sample Matrix: Soil
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
CCME Hydrocarbons (F2-F4 in soil) (2)	1	2019/08/21	2019/08/21	AB SOP-00036 / AB SOP-00040	CCME PHC-CWS m
Moisture	1	N/A	2019/08/22	AB SOP-00002	CCME PHC-CWS m
Lead	1	2019/08/22	2019/08/22	AB SOP-00001 / AB SOP-00043	EPA 6020b R2 m
Polychlorinated Biphenyls in Soil (1)	1	2019/08/22	2019/08/22	CAL SOP-00149	EPA 8082A R1 m
Total PCBs in Soil (1)	1	N/A	2019/08/23		Auto Calc

Sample Matrix: Water
Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
BTEX/F1 in Water by HS GC/MS/FID	1	N/A	2019/08/22	AB SOP-00039	CCME CWS/EPA 8260d m
F1-BTEX	1	N/A	2019/08/22		Auto Calc
CCME Hydrocarbons (F2-F4 in water) (4)	1	2019/08/21	2019/08/21	AB SOP-00037 / AB SOP-00040	CCME PHC-CWS m
Lead (Total)	1	2019/08/21	2019/08/21	AB SOP-00014 / AB SOP-00043	EPA 6020b R2 m
PFOS and PFOA in water by SPE/LCMS (3, 5)	2	2019/08/23	2019/08/24	CAM SOP-00894	EPA 537 m

Remarks:

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

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

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

Your Project #: 110220369
Site Location: CBA
Your C.O.C. #: M067076

Attention: LINDSAY VAN NOORTWYK

STANTEC CONSULTING LTD
#400, 10220 - 103 Avenue NW
EDMONTON, AB
CANADA T5J 0K4

Report Date: 2019/09/04
Report #: R2776087
Version: 2 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B967665
Received: 2019/08/14, 11:42

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) This test was performed by BV Labs Calgary Environmental

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

(3) This test was performed by BV Labs Ontario (From Edmonton)

(4) Silica gel clean up employed.

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

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Geraldlyn Gouthro, Key Account Specialist
Email: geraldlyn.gouthro@bvlabs.com
Phone# (403)735-2230

==========

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

AT1 BTEX AND F1-F4 IN WATER (WATER)

BV Labs ID		WH5507			
Sampling Date		2019/08/10 14:15			
COC Number		M067076			
	UNITS	EB-05	MU	RDL	QC Batch
Ext. Pet. Hydrocarbon					
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	N/A	0.10	9555552
F3 (C16-C34 Hydrocarbons)	mg/L	<0.10	N/A	0.10	9555552
F4 (C34-C50 Hydrocarbons)	mg/L	<0.20	N/A	0.20	9555552
Volatiles					
Benzene	mg/L	<0.00040	N/A	0.00040	9556617
Toluene	mg/L	<0.00040	N/A	0.00040	9556617
Ethylbenzene	mg/L	<0.00040	N/A	0.00040	9556617
m & p-Xylene	mg/L	<0.00080	N/A	0.00080	9556617
o-Xylene	mg/L	<0.00040	N/A	0.00040	9556617
Xylenes (Total)	mg/L	<0.00089	N/A	0.00089	9556613
F1 (C6-C10) - BTEX	mg/L	<0.10	N/A	0.10	9556613
F1 (C6-C10)	mg/L	<0.10	N/A	0.10	9556617
Surrogate Recovery (%)					
1,4-Difluorobenzene (sur.)	%	102	N/A	N/A	9556617
4-Bromofluorobenzene (sur.)	%	99	N/A	N/A	9556617
D4-1,2-Dichloroethane (sur.)	%	100	N/A	N/A	9556617
O-TERPHENYL (sur.)	%	87	N/A	N/A	9555552

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

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

BV Labs Job #: B967665
Report Date: 2019/09/04

STANTEC CONSULTING LTD
Client Project #: 110220369
Site Location: CBA

PETROLEUM HYDROCARBONS (CCME)

BV Labs ID		WH5508			
Sampling Date		2019/08/10 14:20			
COC Number		M067076			
	UNITS	TB-04	MU	RDL	QC Batch
Ext. Pet. Hydrocarbon					
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	N/A	10	9556833
F3 (C16-C34 Hydrocarbons)	mg/kg	<50	N/A	50	9556833
F4 (C34-C50 Hydrocarbons)	mg/kg	<50	N/A	50	9556833
Reached Baseline at C50	mg/kg	Yes	N/A	N/A	9556833
Surrogate Recovery (%)					
O-TERPHENYL (sur.)	%	97	N/A	N/A	9556833

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

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

POLYCHLORINATED BIPHENYLS BY GC-ECD (SOIL)

BV Labs ID		WH5508			
Sampling Date		2019/08/10 14:20			
COC Number		M067076			
	UNITS	TB-04	MU	RDL	QC Batch
Polychlorinated Biphenyls					
Aroclor 1016	mg/kg	<0.010	N/A	0.010	9556514
Aroclor 1221	mg/kg	<0.010	N/A	0.010	9556514
Aroclor 1232	mg/kg	<0.010	N/A	0.010	9556514
Aroclor 1242	mg/kg	<0.010	N/A	0.010	9556514
Aroclor 1248	mg/kg	<0.010	N/A	0.010	9556514
Aroclor 1254	mg/kg	<0.010	N/A	0.010	9556514
Aroclor 1260	mg/kg	<0.010	N/A	0.010	9556514
Aroclor 1262	mg/kg	<0.010	N/A	0.010	9556514
Aroclor 1268	mg/kg	<0.010	N/A	0.010	9556514
Total PCB	mg/kg	<0.010	N/A	0.010	9556440
Surrogate Recovery (%)					
NONACHLOROBIPHENYL (sur.)	%	74	N/A	N/A	9556514

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

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

PHYSICAL TESTING (SOIL)

BV Labs ID		WH5508			
Sampling Date		2019/08/10 14:20			
COC Number		M067076			
	UNITS	TB-04	MU	RDL	QC Batch
Physical Properties					
Moisture	%	<0.30	N/A	0.30	9556612

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

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

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

BV Labs ID		WH5508			
Sampling Date		2019/08/10 14:20			
COC Number		M067076			
	UNITS	TB-04	MU	RDL	QC Batch
Elements					
Total Lead (Pb)	mg/kg	<0.50	N/A	0.50	9558014

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

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

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

BV Labs ID		WH5507			
Sampling Date		2019/08/10 14:15			
COC Number		M067076			
	UNITS	EB-05	MU	RDL	QC Batch
Elements					
Total Lead (Pb)	mg/L	<0.00020	N/A	0.00020	9556825

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

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

BV Labs Job #: B967665
Report Date: 2019/09/04

STANTEC CONSULTING LTD
Client Project #: 110220369
Site Location: CBA

SUBCONTRACTED ANALYSIS (WATER)

BV Labs ID		WH5505		WH5506			
Sampling Date		2019/08/10 14:05		2019/08/10 14:10			
COC Number		M067076		M067076			
	UNITS	EB-04	MU	TB-03	MU	RDL	QC Batch
MISCELLANEOUS							
Perfluorobutanoic acid	ug/L	<0.020	N/A	<0.020	N/A	0.020	9563600
Perfluoropentanoic Acid (PFPeA)	ug/L	<0.020	N/A	<0.020	N/A	0.020	9563600
Perfluorohexanoic Acid (PFHxA)	ug/L	<0.020	N/A	<0.020	N/A	0.020	9563600
Perfluoroheptanoic Acid (PFHpA)	ug/L	<0.020	N/A	<0.020	N/A	0.020	9563600
Perfluorooctanoic Acid (PFOA)	ug/L	<0.020	N/A	<0.020	N/A	0.020	9563600
Perfluorononanoic Acid (PFNA)	ug/L	<0.020	N/A	<0.020	N/A	0.020	9563600
Perfluorodecanoic Acid (PFDA)	ug/L	<0.020	N/A	<0.020	N/A	0.020	9563600
Perfluoroundecanoic Acid (PFUnA)	ug/L	<0.020	N/A	<0.020	N/A	0.020	9563600
Perfluorododecanoic Acid (PFDoA)	ug/L	<0.020	N/A	<0.020	N/A	0.020	9563600
Perfluorotridecanoic Acid	ug/L	<0.020	N/A	<0.020	N/A	0.020	9563600
Perfluorotetradecanoic Acid	ug/L	<0.020	N/A	<0.020	N/A	0.020	9563600
Perfluorobutanesulfonic acid	ug/L	<0.020	N/A	<0.020	N/A	0.020	9563600
Perfluoropentanesulfonic acid	ug/L	<0.020	N/A	<0.020	N/A	0.020	9563600
Perfluorohexanesulfonic acid	ug/L	<0.020	N/A	<0.020	N/A	0.020	9563600
Perfluoroheptanesulfonic acid	ug/L	<0.020	N/A	<0.020	N/A	0.020	9563600
Perfluorooctanesulfonic acid	ug/L	<0.020	N/A	<0.020	N/A	0.020	9563600
Perfluorononanesulfonic acid	ug/L	<0.020	N/A	<0.020	N/A	0.020	9563600
Perfluorodecanesulfonic acid (PFDS)	ug/L	<0.020	N/A	<0.020	N/A	0.020	9563600
Perfluorooctane Sulfonamide (PFOSA)	ug/L	<0.020	N/A	<0.020	N/A	0.020	9563600
Surrogate Recovery (%)							
13C2-Perfluorodecanoic acid	%	85	N/A	94	N/A	N/A	9563600
13C2-Perfluorododecanoic acid	%	80	N/A	83	N/A	N/A	9563600
13C2-Perfluorohexanoic acid	%	97	N/A	105	N/A	N/A	9563600
13C2-perfluorotetradecanoic acid	%	74	N/A	75	N/A	N/A	9563600
13C2-Perfluoroundecanoic acid	%	80	N/A	88	N/A	N/A	9563600
13C3-Perfluorobutanesulfonic acid	%	97	N/A	103	N/A	N/A	9563600
13C4-Perfluorobutanoic acid	%	93	N/A	100	N/A	N/A	9563600
13C4-Perfluoroheptanoic acid	%	95	N/A	101	N/A	N/A	9563600
13C4-Perfluorooctanesulfonic acid	%	86	N/A	94	N/A	N/A	9563600
13C4-Perfluorooctanoic acid	%	93	N/A	100	N/A	N/A	9563600

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SUBCONTRACTED ANALYSIS (WATER)

BV Labs ID		WH5505		WH5506			
Sampling Date		2019/08/10 14:05		2019/08/10 14:10			
COC Number		M067076		M067076			
	UNITS	EB-04	MU	TB-03	MU	RDL	QC Batch
13C5-Perfluorononanoic acid	%	92	N/A	98	N/A	N/A	9563600
13C5-Perfluoropentanoic acid	%	93	N/A	99	N/A	N/A	9563600
13C8-Perfluorooctane Sulfonamide	%	81	N/A	85	N/A	N/A	9563600
18O2-Perfluorohexanesulfonic acid	%	96	N/A	100	N/A	N/A	9563600

RDL = Reportable Detection Limit
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GENERAL COMMENTS

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

Package 1	6.5°C
Package 2	5.1°C
Package 3	8.1°C
Package 4	4.2°C

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
9555552	GG3	Matrix Spike	O-TERPHENYL (sur.)	2019/08/20		92	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2019/08/20		99	%	60 - 140
			F3 (C16-C34 Hydrocarbons)	2019/08/20		104	%	60 - 140
			F4 (C34-C50 Hydrocarbons)	2019/08/20		100	%	60 - 140
9555552	GG3	Spiked Blank	O-TERPHENYL (sur.)	2019/08/20		96	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2019/08/20		105	%	60 - 140
			F3 (C16-C34 Hydrocarbons)	2019/08/20		108	%	60 - 140
			F4 (C34-C50 Hydrocarbons)	2019/08/20		108	%	60 - 140
9555552	GG3	Method Blank	O-TERPHENYL (sur.)	2019/08/20		95	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2019/08/20	<0.10		mg/L	
			F3 (C16-C34 Hydrocarbons)	2019/08/20	<0.10		mg/L	
			F4 (C34-C50 Hydrocarbons)	2019/08/20	<0.20		mg/L	
9555552	GG3	RPD	F2 (C10-C16 Hydrocarbons)	2019/08/20	NC		%	30
			F3 (C16-C34 Hydrocarbons)	2019/08/20	57 (1)		%	30
			F4 (C34-C50 Hydrocarbons)	2019/08/20	NC		%	30
9556514	LZ3	Matrix Spike	Aroclor 1260	2019/08/21		95	%	50 - 130
			NONACHLOROBIPHENYL (sur.)	2019/08/21		97	%	50 - 130
9556514	LZ3	Spiked Blank	Aroclor 1260	2019/08/21		82	%	50 - 130
			NONACHLOROBIPHENYL (sur.)	2019/08/21		87	%	50 - 130
9556514	LZ3	Method Blank	Aroclor 1016	2019/08/21	<0.010		mg/kg	
			Aroclor 1221	2019/08/21	<0.010		mg/kg	
			Aroclor 1232	2019/08/21	<0.010		mg/kg	
			Aroclor 1242	2019/08/21	<0.010		mg/kg	
			Aroclor 1248	2019/08/21	<0.010		mg/kg	
			Aroclor 1254	2019/08/21	<0.010		mg/kg	
			Aroclor 1260	2019/08/21	<0.010		mg/kg	
			Aroclor 1262	2019/08/21	<0.010		mg/kg	
			Aroclor 1268	2019/08/21	<0.010		mg/kg	
			NONACHLOROBIPHENYL (sur.)	2019/08/21		94	%	50 - 130
9556514	LZ3	RPD	Aroclor 1016	2019/08/21	NC		%	50
			Aroclor 1221	2019/08/21	NC		%	50
			Aroclor 1232	2019/08/21	NC		%	50
			Aroclor 1242	2019/08/21	NC		%	50
			Aroclor 1248	2019/08/21	NC		%	50
			Aroclor 1254	2019/08/21	NC		%	50
			Aroclor 1260	2019/08/21	NC		%	50
			Aroclor 1262	2019/08/21	NC		%	50
			Aroclor 1268	2019/08/21	NC		%	50
9556612	HKG	Method Blank	Moisture	2019/08/22	<0.30		%	
9556612	HKG	RPD	Moisture	2019/08/22	4.0		%	20
9556617	NBA	Matrix Spike	1,4-Difluorobenzene (sur.)	2019/08/22		102	%	50 - 140
			4-Bromofluorobenzene (sur.)	2019/08/22		100	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2019/08/22		96	%	50 - 140
			Benzene	2019/08/22		87	%	50 - 140
			Toluene	2019/08/22		88	%	50 - 140
			Ethylbenzene	2019/08/22		91	%	50 - 140
			m & p-Xylene	2019/08/22		92	%	50 - 140
			o-Xylene	2019/08/22		89	%	50 - 140
			F1 (C6-C10)	2019/08/22		99	%	60 - 140
9556617	NBA	Spiked Blank	1,4-Difluorobenzene (sur.)	2019/08/22		101	%	50 - 140
			4-Bromofluorobenzene (sur.)	2019/08/22		99	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2019/08/22		97	%	50 - 140
			Benzene	2019/08/22		86	%	60 - 130
			Toluene	2019/08/22		85	%	60 - 130

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Ethylbenzene	2019/08/22		90	%	60 - 130
			m & p-Xylene	2019/08/22		90	%	60 - 130
			o-Xylene	2019/08/22		87	%	60 - 130
			F1 (C6-C10)	2019/08/22		103	%	60 - 140
9556617	NBA	Method Blank	1,4-Difluorobenzene (sur.)	2019/08/22		105	%	50 - 140
			4-Bromofluorobenzene (sur.)	2019/08/22		100	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2019/08/22		100	%	50 - 140
			Benzene	2019/08/22	<0.00040		mg/L	
			Toluene	2019/08/22	<0.00040		mg/L	
			Ethylbenzene	2019/08/22	<0.00040		mg/L	
			m & p-Xylene	2019/08/22	<0.00080		mg/L	
			o-Xylene	2019/08/22	<0.00040		mg/L	
			F1 (C6-C10)	2019/08/22	<0.10		mg/L	
9556617	NBA	RPD	Benzene	2019/08/22	NC		%	30
			Toluene	2019/08/22	NC		%	30
			Ethylbenzene	2019/08/22	NC		%	30
			m & p-Xylene	2019/08/22	NC		%	30
			o-Xylene	2019/08/22	NC		%	30
			F1 (C6-C10)	2019/08/22	NC		%	30
9556825	JHS	Matrix Spike	Total Lead (Pb)	2019/08/21		97	%	80 - 120
9556825	JHS	Spiked Blank	Total Lead (Pb)	2019/08/21		97	%	80 - 120
9556825	JHS	Method Blank	Total Lead (Pb)	2019/08/21	<0.00020		mg/L	
9556825	JHS	RPD	Total Lead (Pb)	2019/08/21	10		%	20
9556833	JR1	Matrix Spike	O-TERPHENYL (sur.)	2019/08/22		88	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2019/08/22		101	%	60 - 140
			F3 (C16-C34 Hydrocarbons)	2019/08/22		103	%	60 - 140
			F4 (C34-C50 Hydrocarbons)	2019/08/22		100	%	60 - 140
9556833	JR1	Spiked Blank	O-TERPHENYL (sur.)	2019/08/21		97	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2019/08/21		117	%	60 - 140
			F3 (C16-C34 Hydrocarbons)	2019/08/21		120	%	60 - 140
			F4 (C34-C50 Hydrocarbons)	2019/08/21		115	%	60 - 140
9556833	JR1	Method Blank	O-TERPHENYL (sur.)	2019/08/21		93	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2019/08/21	<10		mg/kg	
			F3 (C16-C34 Hydrocarbons)	2019/08/21	<50		mg/kg	
			F4 (C34-C50 Hydrocarbons)	2019/08/21	<50		mg/kg	
9556833	JR1	RPD	F2 (C10-C16 Hydrocarbons)	2019/08/21	NC		%	40
			F3 (C16-C34 Hydrocarbons)	2019/08/21	NC		%	40
			F4 (C34-C50 Hydrocarbons)	2019/08/21	NC		%	40
9558014	JHS	Matrix Spike	Total Lead (Pb)	2019/08/22		86	%	75 - 125
9558014	JHS	QC Standard	Total Lead (Pb)	2019/08/22		94	%	79 - 121
9558014	JHS	Spiked Blank	Total Lead (Pb)	2019/08/22		95	%	80 - 120
9558014	JHS	Method Blank	Total Lead (Pb)	2019/08/22	<0.50		mg/kg	
9558014	JHS	RPD	Total Lead (Pb)	2019/08/22	8.0		%	35
9563600	éDH	Matrix Spike	13C2-Perfluorodecanoic acid	2019/08/24		94	%	50 - 150
			13C2-Perfluorododecanoic acid	2019/08/24		84	%	50 - 150
			13C2-Perfluorohexanoic acid	2019/08/24		87	%	50 - 150
			13C2-perfluorotetradecanoic acid	2019/08/24		76	%	50 - 150
			13C2-Perfluoroundecanoic acid	2019/08/24		89	%	50 - 150
			13C3-Perfluorobutanesulfonic acid	2019/08/24		96	%	50 - 150
			13C4-Perfluorobutanoic acid	2019/08/24		87	%	50 - 150
			13C4-Perfluoroheptanoic acid	2019/08/24		91	%	50 - 150
			13C4-Perfluorooctanesulfonic acid	2019/08/24		80	%	50 - 150
			13C4-Perfluorooctanoic acid	2019/08/24		92	%	50 - 150
			13C5-Perfluorononanoic acid	2019/08/24		92	%	50 - 150

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			13C5-Perfluoropentanoic acid	2019/08/24		81	%	50 - 150
			13C8-Perfluorooctane Sulfonamide	2019/08/24		84	%	50 - 150
			18O2-Perfluorohexanesulfonic acid	2019/08/24		92	%	50 - 150
			Perfluorobutanoic acid	2019/08/24		NC	%	70 - 130
			Perfluoropentanoic Acid (PFPeA)	2019/08/24		NC	%	70 - 130
			Perfluorohexanoic Acid (PFHxA)	2019/08/24		NC	%	70 - 130
			Perfluoroheptanoic Acid (PFHpA)	2019/08/24		112	%	70 - 130
			Perfluorooctanoic Acid (PFOA)	2019/08/24		113	%	70 - 130
			Perfluorononanoic Acid (PFNA)	2019/08/24		112	%	70 - 130
			Perfluorodecanoic Acid (PFDA)	2019/08/24		109	%	70 - 130
			Perfluoroundecanoic Acid (PFUnA)	2019/08/24		111	%	70 - 130
			Perfluorododecanoic Acid (PFDoA)	2019/08/24		111	%	70 - 130
			Perfluorotridecanoic Acid	2019/08/24		114	%	70 - 130
			Perfluorotetradecanoic Acid	2019/08/24		111	%	70 - 130
			Perfluorobutanesulfonic acid	2019/08/24		112	%	70 - 130
			Perfluoropentanesulfonic acid	2019/08/24		125	%	70 - 130
			Perfluorohexanesulfonic acid	2019/08/24		NC	%	70 - 130
			Perfluoroheptanesulfonic acid	2019/08/24		110	%	70 - 130
			Perfluorooctanesulfonic acid	2019/08/24		NC	%	70 - 130
			Perfluorononanesulfonic acid	2019/08/24		110	%	70 - 130
			Perfluorodecanesulfonic acid (PFDS)	2019/08/24		100	%	70 - 130
			Perfluorooctane Sulfonamide (PFOSA)	2019/08/24		107	%	70 - 130
9563600	éDH	Spiked Blank	13C2-Perfluorodecanoic acid	2019/08/24		93	%	50 - 150
			13C2-Perfluorododecanoic acid	2019/08/24		83	%	50 - 150
			13C2-Perfluorohexanoic acid	2019/08/24		94	%	50 - 150
			13C2-perfluorotetradecanoic acid	2019/08/24		78	%	50 - 150
			13C2-Perfluoroundecanoic acid	2019/08/24		91	%	50 - 150
			13C3-Perfluorobutanesulfonic acid	2019/08/24		98	%	50 - 150
			13C4-Perfluorobutanoic acid	2019/08/24		96	%	50 - 150
			13C4-Perfluoroheptanoic acid	2019/08/24		92	%	50 - 150
			13C4-Perfluorooctanesulfonic acid	2019/08/24		93	%	50 - 150
			13C4-Perfluorooctanoic acid	2019/08/24		94	%	50 - 150
			13C5-Perfluorononanoic acid	2019/08/24		95	%	50 - 150
			13C5-Perfluoropentanoic acid	2019/08/24		97	%	50 - 150
			13C8-Perfluorooctane Sulfonamide	2019/08/24		84	%	50 - 150
			18O2-Perfluorohexanesulfonic acid	2019/08/24		96	%	50 - 150
			Perfluorobutanoic acid	2019/08/24		109	%	70 - 130
			Perfluoropentanoic Acid (PFPeA)	2019/08/24		108	%	70 - 130
			Perfluorohexanoic Acid (PFHxA)	2019/08/24		108	%	70 - 130
			Perfluoroheptanoic Acid (PFHpA)	2019/08/24		110	%	70 - 130
			Perfluorooctanoic Acid (PFOA)	2019/08/24		109	%	70 - 130
			Perfluorononanoic Acid (PFNA)	2019/08/24		108	%	70 - 130
			Perfluorodecanoic Acid (PFDA)	2019/08/24		109	%	70 - 130
			Perfluoroundecanoic Acid (PFUnA)	2019/08/24		109	%	70 - 130
			Perfluorododecanoic Acid (PFDoA)	2019/08/24		113	%	70 - 130
			Perfluorotridecanoic Acid	2019/08/24		109	%	70 - 130
			Perfluorotetradecanoic Acid	2019/08/24		109	%	70 - 130
			Perfluorobutanesulfonic acid	2019/08/24		110	%	70 - 130
			Perfluoropentanesulfonic acid	2019/08/24		109	%	70 - 130
			Perfluorohexanesulfonic acid	2019/08/24		108	%	70 - 130
			Perfluoroheptanesulfonic acid	2019/08/24		107	%	70 - 130
			Perfluorooctanesulfonic acid	2019/08/24		112	%	70 - 130
			Perfluorononanesulfonic acid	2019/08/24		104	%	70 - 130
			Perfluorodecanesulfonic acid (PFDS)	2019/08/24		104	%	70 - 130

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Perfluorooctane Sulfonamide (PFOSA)	2019/08/24		104	%	70 - 130
9563600	éDH	Method Blank	13C2-Perfluorodecanoic acid	2019/08/24		98	%	50 - 150
			13C2-Perfluorododecanoic acid	2019/08/24		91	%	50 - 150
			13C2-Perfluorohexanoic acid	2019/08/24		103	%	50 - 150
			13C2-perfluorotetradecanoic acid	2019/08/24		83	%	50 - 150
			13C2-Perfluoroundecanoic acid	2019/08/24		95	%	50 - 150
			13C3-Perfluorobutanesulfonic acid	2019/08/24		103	%	50 - 150
			13C4-Perfluorobutanoic acid	2019/08/24		100	%	50 - 150
			13C4-Perfluoroheptanoic acid	2019/08/24		100	%	50 - 150
			13C4-Perfluorooctanesulfonic acid	2019/08/24		97	%	50 - 150
			13C4-Perfluorooctanoic acid	2019/08/24		98	%	50 - 150
			13C5-Perfluorononanoic acid	2019/08/24		98	%	50 - 150
			13C5-Perfluoropentanoic acid	2019/08/24		99	%	50 - 150
			13C8-Perfluorooctane Sulfonamide	2019/08/24		87	%	50 - 150
			18O2-Perfluorohexanesulfonic acid	2019/08/24		101	%	50 - 150
			Perfluorobutanoic acid	2019/08/24	<0.020		ug/L	
			Perfluoropentanoic Acid (PFPeA)	2019/08/24	<0.020		ug/L	
			Perfluorohexanoic Acid (PFHxA)	2019/08/24	<0.020		ug/L	
			Perfluoroheptanoic Acid (PFHpA)	2019/08/24	<0.020		ug/L	
			Perfluorooctanoic Acid (PFOA)	2019/08/24	<0.020		ug/L	
			Perfluorononanoic Acid (PFNA)	2019/08/24	<0.020		ug/L	
			Perfluorodecanoic Acid (PFDA)	2019/08/24	<0.020		ug/L	
			Perfluoroundecanoic Acid (PFUnA)	2019/08/24	<0.020		ug/L	
			Perfluorododecanoic Acid (PFDoA)	2019/08/24	<0.020		ug/L	
			Perfluorotridecanoic Acid	2019/08/24	<0.020		ug/L	
			Perfluorotetradecanoic Acid	2019/08/24	<0.020		ug/L	
			Perfluorobutanesulfonic acid	2019/08/24	<0.020		ug/L	
			Perfluoropentanesulfonic acid	2019/08/24	<0.020		ug/L	
			Perfluorohexanesulfonic acid	2019/08/24	<0.020		ug/L	
			Perfluoroheptanesulfonic acid	2019/08/24	<0.020		ug/L	
			Perfluorooctanesulfonic acid	2019/08/24	<0.020		ug/L	
			Perfluorononanesulfonic acid	2019/08/24	<0.020		ug/L	
			Perfluorodecanesulfonic acid (PFDS)	2019/08/24	<0.020		ug/L	
			Perfluorooctane Sulfonamide (PFOSA)	2019/08/24	<0.020		ug/L	

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

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

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

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

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

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

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

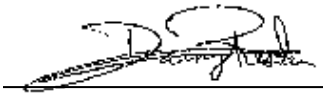
NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

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

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

VALIDATION SIGNATURE PAGE

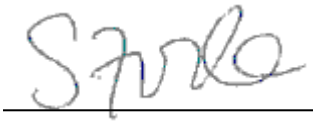
The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



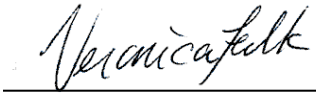
Daniel Reslan, cCT, QP, Organics Manager

Colm McNamara, Senior Analyst, Liquid Chromatography

Justin Geisel, B.Sc., Organics Supervisor



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



Veronica Falk, B.Sc., P.Chem., QP, Scientific Specialist, Organics

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

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776 (5)

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ADDITIONAL COOLER TEMPERATURE RECORD

CHAIN-OF-CUSTODY RECORD

CHAIN OF CUSTODY #	
Page 1 of 1	M067076
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COOLER OBSERVATIONS:

MAXXAM JOB#: B967665

COOLER ID	CUSTODY SEAL PRESENT (YES/NO)	CUSTODY SEAL INTACT (YES/NO)	ICE PRESENT (YES/NO)	TEMP 1	TEMP 2	TEMP 3
J/V	NO ✓	NO ✓	YES ✓	5	8	7
bag	NO ✓	NO ✓	YES ✓	14	14	17
J/V	NO ✓	NO ✓	YES ✓	3	5	5
bag	NO ✓	NO ✓	YES ✓	14	13	13
bottles	NO ✓	NO ✓	YES ✓	3	3	3

RECEIVED BY (SIGN & PRINT)		DATE (YYYY/MM/DD)	TIME (HH:MM)
[signature]	DE JI WU	2019/08/15	12:37

DWz
2019/08/15

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 067076

Page 1 of 1

Invoice Information	Report Information (if differs from invoice)	Project Information	Turnaround Time (TAT) Required
Company: Stantec	Company:	Quotation #: B71723	[X] 5 - 7 Days Regular (Most analyses)
Contact Name: Lindsay Van Noortwyk	Contact Name:	P.O. #/ AFE#: 110220369	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 500-10220 103 Ave NW Edmonton AB T5J0K4	Address:	Project #: 110220369	Rush TAT (Surcharges will be applied)
Phone: 780 232 1114	Phone:	Site Location: CBA	[ ] 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

Received in Yellowknife
By: Depot Reception
ice-yes cs-yes
AUG 14 2019 @ 11:42

	YES	NO	Cooler ID			
Seal Present						
Seal Intact			Temp	See		
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						

Temp: 6.1 / 7.9 / 5.6
6.7 / 4.4 / 4.1
8.8 / 8.3 / 7.3
4.8 / 5.1 / 2.6

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	PFOS; PFOA	Lead	PCBs	HOLD - DO NOT ANALYZE
1	EB-04		2019/08/10	1405	W	3											X			
2	TB-03		"	1410	W	3											X			
3	EB-05		"	1415	W	8			X									X	X	
4	TB-04		2019/08/10	1420	S	3			X									X	X	
5																				
6																				
7																				
8																				
9																				
10																				

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

Regulatory Criteria

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

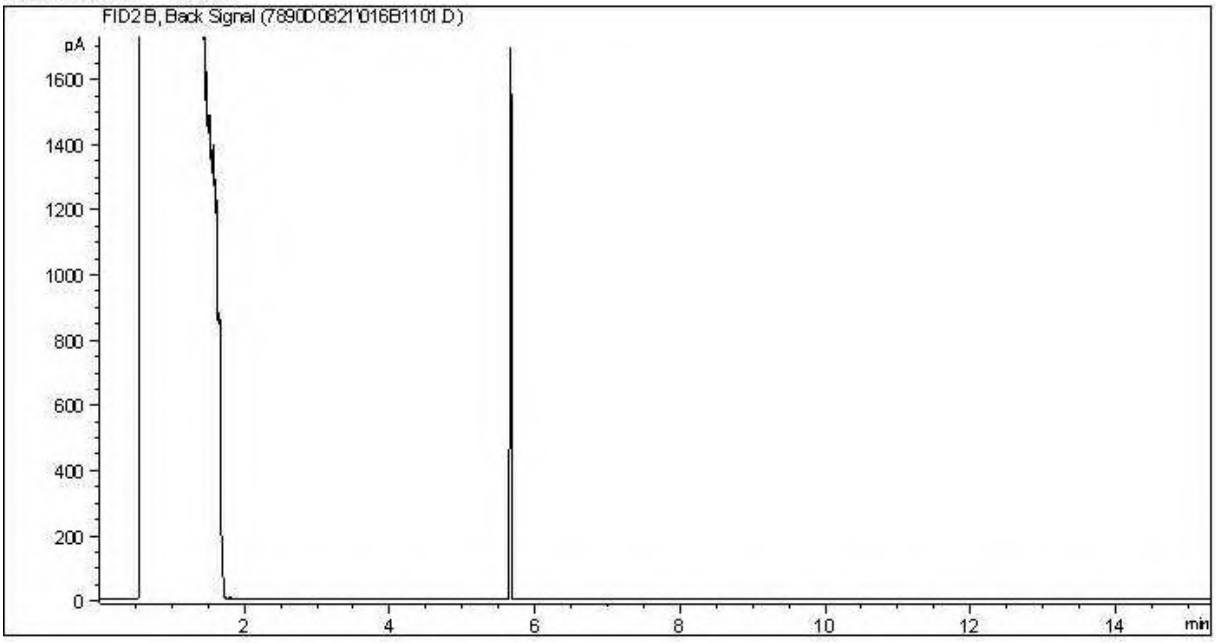
Special Instructions

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 Anderson	2019/08/12	0707	DEJ WV	2019/08/15	12:37	B967665

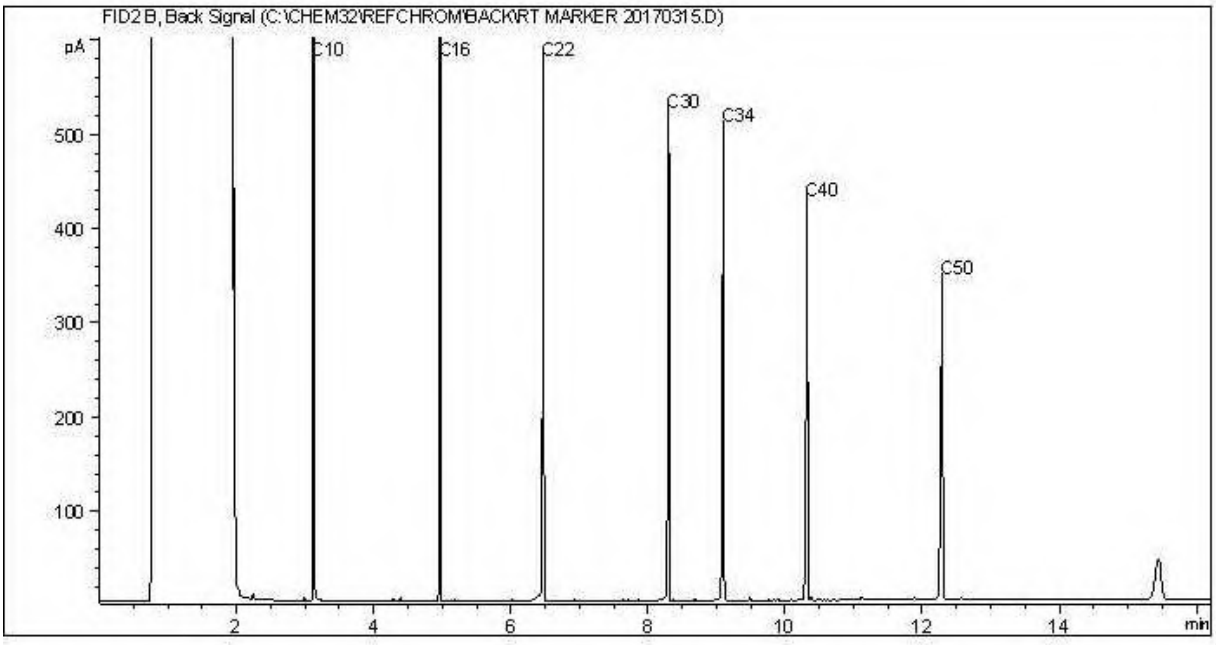
AB FCD-00331/7

CCME Hydrocarbons (F2-F4 in water) 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+

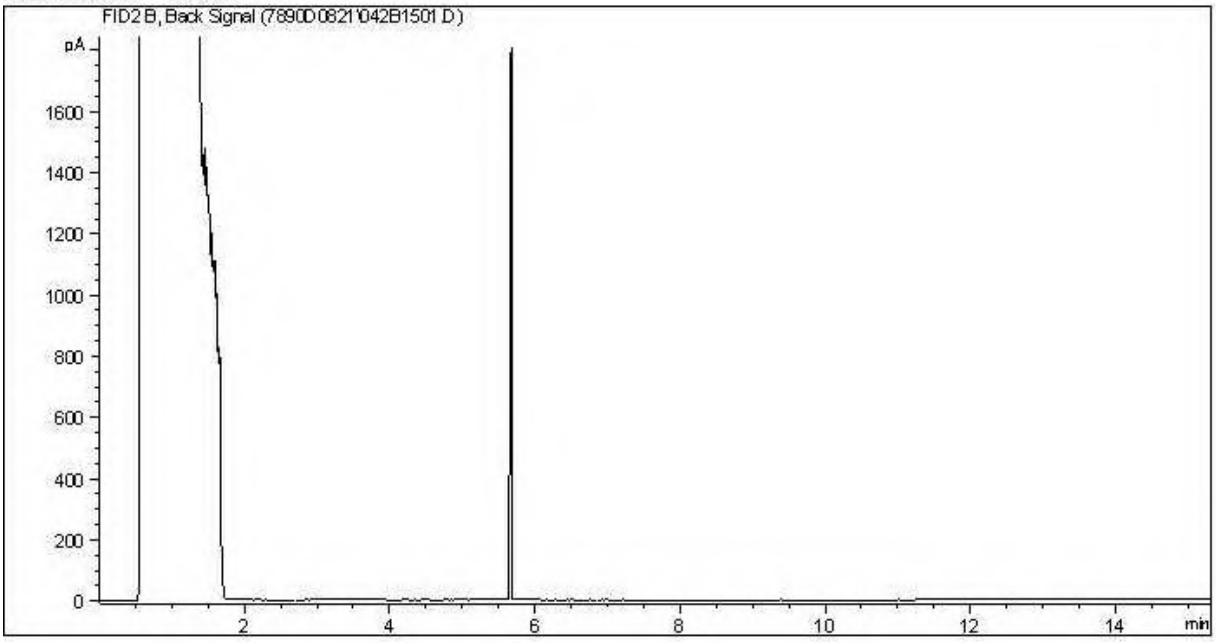
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

BV Labs Job #: B967665
Report Date: 2019/09/04
BV Labs Sample: WH5508

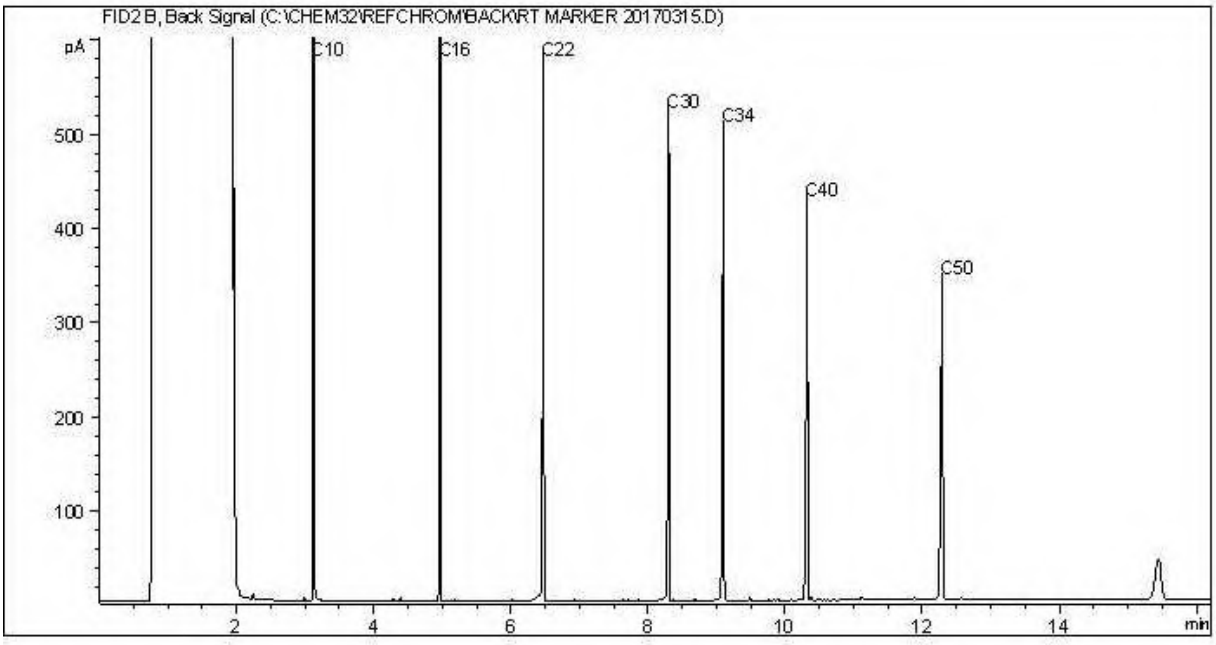
STANTEC CONSULTING LTD
Client Project #: 110220369
Site Reference: CBA
Client ID: TB-04

CCME Hydrocarbons (F2-F4 in soil) 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.

Your Project #: 110220369
Site Location: CBA
Your C.O.C. #: M085560

Attention: LINDSAY VAN NOORTWYK

STANTEC CONSULTING LTD
#400, 10220 - 103 Avenue NW
EDMONTON, AB
CANADA T5J 0K4

Report Date: 2019/09/03
Report #: R2775715
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B968954
Received: 2019/08/19, 11:32

Sample Matrix: Water
Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
PFOS and PFOA in water by SPE/LCMS (1, 2)	3	2019/08/28	2019/08/31	CAM SOP-00894	EPA 537 m

Remarks:

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

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

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

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

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by BV Labs Ontario (From Edmonton)
(2) Per- and polyfluoroalkyl substances (PFAS) identified as surrogates on the certificate of analysis represent the extracted internal standard.

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

Your Project #: 110220369
Site Location: CBA
Your C.O.C. #: M085560

Attention: LINDSAY VAN NOORTWYK

STANTEC CONSULTING LTD
#400, 10220 - 103 Avenue NW
EDMONTON, AB
CANADA T5J 0K4

Report Date: 2019/09/03
Report #: R2775715
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B968954
Received: 2019/08/19, 11:32

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Geraldlyn Gouthro, Key Account Specialist
Email: geraldlyn.gouthro@bvlabs.com
Phone# (403)735-2230
==========
This report has been generated and distributed using a secure automated process.
BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

BV Labs Job #: B968954
Report Date: 2019/09/03

STANTEC CONSULTING LTD
Client Project #: 110220369
Site Location: CBA

SUBCONTRACTED ANALYSIS (WATER)

BV Labs ID		WI1643		WI1644		WI1645			
Sampling Date		2019/08/15 13:05		2019/08/16 10:00		2019/08/16 10:05			
COC Number		M085560		M085560		M085560			
	UNITS	EB-06	MU	EB-07	MU	TB-05	MU	RDL	QC Batch
MISCELLANEOUS									
Perfluorobutanoic acid	ug/L	<0.020	N/A	<0.020	N/A	<0.020	N/A	0.020	9573164
Perfluoropentanoic Acid (PFPeA)	ug/L	<0.020	N/A	<0.020	N/A	<0.020	N/A	0.020	9573164
Perfluorohexanoic Acid (PFHxA)	ug/L	<0.020	N/A	<0.020	N/A	<0.020	N/A	0.020	9573164
Perfluoroheptanoic Acid (PFHpA)	ug/L	<0.020	N/A	<0.020	N/A	<0.020	N/A	0.020	9573164
Perfluorooctanoic Acid (PFOA)	ug/L	<0.020	N/A	<0.020	N/A	<0.020	N/A	0.020	9573164
Perfluorononanoic Acid (PFNA)	ug/L	<0.020	N/A	<0.020	N/A	<0.020	N/A	0.020	9573164
Perfluorodecanoic Acid (PFDA)	ug/L	<0.020	N/A	<0.020	N/A	<0.020	N/A	0.020	9573164
Perfluoroundecanoic Acid (PFUnA)	ug/L	<0.020	N/A	<0.020	N/A	<0.020	N/A	0.020	9573164
Perfluorododecanoic Acid (PFDoA)	ug/L	<0.020	N/A	<0.020	N/A	<0.020	N/A	0.020	9573164
Perfluorotridecanoic Acid	ug/L	<0.020	N/A	<0.020	N/A	<0.020	N/A	0.020	9573164
Perfluorotetradecanoic Acid	ug/L	<0.020	N/A	<0.020	N/A	<0.020	N/A	0.020	9573164
Perfluorobutanesulfonic acid	ug/L	<0.020	N/A	<0.020	N/A	<0.020	N/A	0.020	9573164
Perfluoropentanesulfonic acid	ug/L	<0.020	N/A	<0.020	N/A	<0.020	N/A	0.020	9573164
Perfluorohexanesulfonic acid	ug/L	<0.020	N/A	<0.020	N/A	<0.020	N/A	0.020	9573164
Perfluoroheptanesulfonic acid	ug/L	<0.020	N/A	<0.020	N/A	<0.020	N/A	0.020	9573164
Perfluorooctanesulfonic acid	ug/L	<0.020	N/A	<0.020	N/A	<0.020	N/A	0.020	9573164
Perfluorononanesulfonic acid	ug/L	<0.020	N/A	<0.020	N/A	<0.020	N/A	0.020	9573164
Perfluorodecanesulfonic acid (PFDS)	ug/L	<0.020	N/A	<0.020	N/A	<0.020	N/A	0.020	9573164
Perfluorooctane Sulfonamide (PFOSA)	ug/L	<0.020	N/A	<0.020	N/A	<0.020	N/A	0.020	9573164
Surrogate Recovery (%)									
13C2-Perfluorodecanoic acid	%	92	N/A	92	N/A	89	N/A	N/A	9573164
13C2-Perfluorododecanoic acid	%	87	N/A	84	N/A	84	N/A	N/A	9573164
13C2-Perfluorohexanoic acid	%	95	N/A	99	N/A	99	N/A	N/A	9573164
13C2-perfluorotetradecanoic acid	%	84	N/A	81	N/A	68	N/A	N/A	9573164
13C2-Perfluoroundecanoic acid	%	89	N/A	87	N/A	86	N/A	N/A	9573164
13C3-Perfluorobutanesulfonic acid	%	99	N/A	97	N/A	97	N/A	N/A	9573164
13C4-Perfluorobutanoic acid	%	96	N/A	97	N/A	97	N/A	N/A	9573164
13C4-Perfluoroheptanoic acid	%	98	N/A	100	N/A	101	N/A	N/A	9573164
13C4-Perfluorooctanesulfonic acid	%	91	N/A	93	N/A	89	N/A	N/A	9573164
13C4-Perfluorooctanoic acid	%	95	N/A	96	N/A	96	N/A	N/A	9573164

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

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BV Labs Job #: B968954
Report Date: 2019/09/03

STANTEC CONSULTING LTD
Client Project #: 110220369
Site Location: CBA

SUBCONTRACTED ANALYSIS (WATER)

BV Labs ID		WI1643		WI1644		WI1645			
Sampling Date		2019/08/15 13:05		2019/08/16 10:00		2019/08/16 10:05			
COC Number		M085560		M085560		M085560			
	UNITS	EB-06	MU	EB-07	MU	TB-05	MU	RDL	QC Batch
13C5-Perfluorononanoic acid	%	97	N/A	98	N/A	95	N/A	N/A	9573164
13C5-Perfluoropentanoic acid	%	98	N/A	98	N/A	99	N/A	N/A	9573164
13C8-Perfluorooctane Sulfonamide	%	85	N/A	86	N/A	89	N/A	N/A	9573164
18O2-Perfluorohexanesulfonic acid	%	97	N/A	99	N/A	97	N/A	N/A	9573164

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	6.1°C
Package 2	9.3°C
Package 3	11.6°C
Package 4	7.2°C
Package 5	6.2°C

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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BV Labs Job #: B968954
Report Date: 2019/09/03

STANTEC CONSULTING LTD
Client Project #: 110220369
Site Location: CBA

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
9573164	éDH	Spiked Blank	13C2-Perfluorodecanoic acid	2019/08/31		92	%	50 - 150
			13C2-Perfluorododecanoic acid	2019/08/31		87	%	50 - 150
			13C2-Perfluorohexanoic acid	2019/08/31		93	%	50 - 150
			13C2-perfluorotetradecanoic acid	2019/08/31		85	%	50 - 150
			13C2-Perfluoroundecanoic acid	2019/08/31		89	%	50 - 150
			13C3-Perfluorobutanesulfonic acid	2019/08/31		93	%	50 - 150
			13C4-Perfluorobutanoic acid	2019/08/31		93	%	50 - 150
			13C4-Perfluoroheptanoic acid	2019/08/31		93	%	50 - 150
			13C4-Perfluorooctanesulfonic acid	2019/08/31		90	%	50 - 150
			13C4-Perfluorooctanoic acid	2019/08/31		92	%	50 - 150
			13C5-Perfluorononanoic acid	2019/08/31		92	%	50 - 150
			13C5-Perfluoropentanoic acid	2019/08/31		94	%	50 - 150
			13C8-Perfluorooctane Sulfonamide	2019/08/31		84	%	50 - 150
			18O2-Perfluorohexanesulfonic acid	2019/08/31		93	%	50 - 150
			Perfluorobutanoic acid	2019/08/31		100	%	70 - 130
			Perfluoropentanoic Acid (PFPeA)	2019/08/31		100	%	70 - 130
			Perfluorohexanoic Acid (PFHxA)	2019/08/31		101	%	70 - 130
			Perfluoroheptanoic Acid (PFHpA)	2019/08/31		100	%	70 - 130
			Perfluorooctanoic Acid (PFOA)	2019/08/31		102	%	70 - 130
			Perfluorononanoic Acid (PFNA)	2019/08/31		102	%	70 - 130
			Perfluorodecanoic Acid (PFDA)	2019/08/31		102	%	70 - 130
			Perfluoroundecanoic Acid (PFUnA)	2019/08/31		102	%	70 - 130
			Perfluorododecanoic Acid (PFDoA)	2019/08/31		97	%	70 - 130
			Perfluorotridecanoic Acid	2019/08/31		96	%	70 - 130
			Perfluorotetradecanoic Acid	2019/08/31		96	%	70 - 130
			Perfluorobutanesulfonic acid	2019/08/31		101	%	70 - 130
			Perfluoropentanesulfonic acid	2019/08/31		102	%	70 - 130
			Perfluorohexanesulfonic acid	2019/08/31		101	%	70 - 130
			Perfluoroheptanesulfonic acid	2019/08/31		97	%	70 - 130
			Perfluorooctanesulfonic acid	2019/08/31		103	%	70 - 130
			Perfluorononanesulfonic acid	2019/08/31		98	%	70 - 130
			Perfluorodecanesulfonic acid (PFDS)	2019/08/31		97	%	70 - 130
			Perfluorooctane Sulfonamide (PFOSA)	2019/08/31		94	%	70 - 130
9573164	éDH	RPD	Perfluorobutanoic acid	2019/08/31	7.8		%	30
			Perfluoropentanoic Acid (PFPeA)	2019/08/31	7.9		%	30
			Perfluorohexanoic Acid (PFHxA)	2019/08/31	7.2		%	30
			Perfluoroheptanoic Acid (PFHpA)	2019/08/31	6.9		%	30
			Perfluorooctanoic Acid (PFOA)	2019/08/31	7.7		%	30
			Perfluorononanoic Acid (PFNA)	2019/08/31	7.3		%	30
			Perfluorodecanoic Acid (PFDA)	2019/08/31	5.9		%	30
			Perfluoroundecanoic Acid (PFUnA)	2019/08/31	7.5		%	30
			Perfluorododecanoic Acid (PFDoA)	2019/08/31	9.4		%	30
			Perfluorotridecanoic Acid	2019/08/31	10		%	30
			Perfluorotetradecanoic Acid	2019/08/31	10		%	30
			Perfluorobutanesulfonic acid	2019/08/31	7.7		%	30
			Perfluoropentanesulfonic acid	2019/08/31	7.1		%	30
			Perfluorohexanesulfonic acid	2019/08/31	6.9		%	30
			Perfluoroheptanesulfonic acid	2019/08/31	5.7		%	30
			Perfluorooctanesulfonic acid	2019/08/31	8.1		%	30
			Perfluorononanesulfonic acid	2019/08/31	7.3		%	30
			Perfluorodecanesulfonic acid (PFDS)	2019/08/31	5.6		%	30
			Perfluorooctane Sulfonamide (PFOSA)	2019/08/31	8.7		%	30
9573164	éDH	Method Blank	13C2-Perfluorodecanoic acid	2019/08/31		92	%	50 - 150
			13C2-Perfluorododecanoic acid	2019/08/31		86	%	50 - 150

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

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			13C2-Perfluorohexanoic acid	2019/08/31		96	%	50 - 150
			13C2-perfluorotetradecanoic acid	2019/08/31		52	%	50 - 150
			13C2-Perfluoroundecanoic acid	2019/08/31		87	%	50 - 150
			13C3-Perfluorobutanesulfonic acid	2019/08/31		97	%	50 - 150
			13C4-Perfluorobutanoic acid	2019/08/31		95	%	50 - 150
			13C4-Perfluoroheptanoic acid	2019/08/31		98	%	50 - 150
			13C4-Perfluorooctanesulfonic acid	2019/08/31		93	%	50 - 150
			13C4-Perfluorooctanoic acid	2019/08/31		94	%	50 - 150
			13C5-Perfluorononanoic acid	2019/08/31		96	%	50 - 150
			13C5-Perfluoropentanoic acid	2019/08/31		97	%	50 - 150
			13C8-Perfluorooctane Sulfonamide	2019/08/31		85	%	50 - 150
			18O2-Perfluorohexanesulfonic acid	2019/08/31		98	%	50 - 150
			Perfluorobutanoic acid	2019/08/31	<0.020		ug/L	
			Perfluoropentanoic Acid (PFPeA)	2019/08/31	<0.020		ug/L	
			Perfluorohexanoic Acid (PFHxA)	2019/08/31	<0.020		ug/L	
			Perfluoroheptanoic Acid (PFHpA)	2019/08/31	<0.020		ug/L	
			Perfluorooctanoic Acid (PFOA)	2019/08/31	<0.020		ug/L	
			Perfluorononanoic Acid (PFNA)	2019/08/31	<0.020		ug/L	
			Perfluorodecanoic Acid (PFDA)	2019/08/31	<0.020		ug/L	
			Perfluoroundecanoic Acid (PFUnA)	2019/08/31	<0.020		ug/L	
			Perfluorododecanoic Acid (PFDoA)	2019/08/31	<0.020		ug/L	
			Perfluorotridecanoic Acid	2019/08/31	<0.020		ug/L	
			Perfluorotetradecanoic Acid	2019/08/31	<0.020		ug/L	
			Perfluorobutanesulfonic acid	2019/08/31	<0.020		ug/L	
			Perfluoropentanesulfonic acid	2019/08/31	<0.020		ug/L	
			Perfluorohexanesulfonic acid	2019/08/31	<0.020		ug/L	
			Perfluoroheptanesulfonic acid	2019/08/31	<0.020		ug/L	
			Perfluorooctanesulfonic acid	2019/08/31	<0.020		ug/L	
			Perfluorononanesulfonic acid	2019/08/31	<0.020		ug/L	
			Perfluorodecanesulfonic acid (PFDS)	2019/08/31	<0.020		ug/L	
			Perfluorooctane Sulfonamide (PFOSA)	2019/08/31	<0.020		ug/L	

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.

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

BV Labs Job #: B968954
Report Date: 2019/09/03

STANTEC CONSULTING LTD
Client Project #: 110220369
Site Location: CBA

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

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

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ADDITIONAL COOLER TEMPERATURE RECORD

CHAIN-OF-CUSTODY RECORD

CHAIN OF CUSTODY #	
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COOLER OBSERVATIONS:

MAXXAM JOB#: B968954

CUSTODY SEAL	YES	NO	COOLER ID	TEMP 1	TEMP 2	TEMP 3
PRESENT / INTACT / ICE PRESENT	✓ / ✓ / ✓			2	4	5
PRESENT / INTACT / ICE PRESENT	✓ / ✓ / ✓			1	3	2
PRESENT / INTACT / ICE PRESENT	✓ / ✓ / ✓			2	1	5
PRESENT / INTACT / ICE PRESENT	✓ / ✓ / ✓			1	-1	0
PRESENT / INTACT / ICE PRESENT	✓ / ✓ / ✓			1	0	0
PRESENT / INTACT / ICE PRESENT						
PRESENT / INTACT / ICE PRESENT						
PRESENT / INTACT / ICE PRESENT						
PRESENT / INTACT / ICE PRESENT						
PRESENT / INTACT / ICE PRESENT						

CUSTODY SEAL	YES	NO	COOLER ID	TEMP 1	TEMP 2	TEMP 3
PRESENT / INTACT / ICE PRESENT						
PRESENT / INTACT / ICE PRESENT						
PRESENT / INTACT / ICE PRESENT						
PRESENT / INTACT / ICE PRESENT						
PRESENT / INTACT / ICE PRESENT						
PRESENT / INTACT / ICE PRESENT						
PRESENT / INTACT / ICE PRESENT						
PRESENT / INTACT / ICE PRESENT						
PRESENT / INTACT / ICE PRESENT						
PRESENT / INTACT / ICE PRESENT						

RECEIVED BY (SIGN & PRINT)		DATE (YYYY/MM/DD)	TIME (HH:MM)
[signature]	DAISE MATHEW	2019/08/20	11:39

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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

971 (5)

CHAIN OF CUSTODY RECORD

M 085560

Page 1 of 1

Invoice Information	Report Information (if differs from invoice)	Project Information	Turnaround Time (TAT) Required
Company: Stantec	Company:	Quotation #: B71723	[x] 5 - 7 Days Regular (Most analyses)
Contact Name: Lindsay Van Noortwyk	Contact Name:	P.O. #/ AFE#: 1102220369	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 500-10220 103 Ave NW Edmonton AB T5J 0K4	Address:	Project #: 1102220369	Rush TAT (Surcharges will be applied)
Phone: 780 232 1114	Phone:	Site Location: CBA	[ ] 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				See ACTR
Seal Intact				
Cooling Media				
	YES	NO	Cooler ID	Temp
Seal Present				
Seal Intact				
Cooling Media				
	YES	NO	Cooler ID	Temp
Seal Present				
Seal Intact				
Cooling Media				

Received in Yellowknife
Depot Reception
By: Laura
ice-yes cs-yes
AUG 19 2019 @ 11:32
Temp: 4.3 7.1 6.9 / 8.9 9.9 9.1 / 10.7 11.3 12.9 / 7.3 5.9 8.4 / 6.9 7.5 8.3

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	PFOS/PFOA	HOLD - DO NOT ANALYZE
1 EB-06		2019/08/15	1305	W	2											X	
2 EB-07		2019/08/16	1000	W	2											X	
3 TB-05		2019/08/16	1005	W	2											X	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

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 Anderson	2019/08/16	1130	DARSE MATHEW	2019/08/20	11:39	B968954

AB FCD-00331/7