2019 Environmental Monitoring Program, Resolute Bay Airport Land Treatment Unit, Cornwallis Island, Nunavut

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Prepared by:

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Sign-off Sheet

This document entitled 2019 Environmental Monitoring Program, Resolute Bay Airport Land Treatment Unit, Cornwallis Island, Nunavut was prepared by Stantec Consulting Ltd. ("Stantec") for the account of Public Services and Procurement Canada on behalf of Transport Canada (the "Client").

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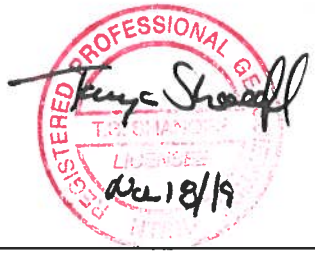

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Executive Summary

Stantec Consulting Ltd. (Stantec) completed the 2019 Environmental Monitoring Program (the Program) at two Land Treatment Units (LTUs) located at the northern portion of the Resolute Bay Airport on Cornwallis Island, Nunavut (the Site). The Program was completed from July 26 to July 28, 2019 with the authorization of Public Services and Procurement Canada (PSPC) on behalf of Transport Canada (TC). The program consisted of groundwater monitoring/assessment activities to meet licensing requirements (Nunavut Water Board (NWB) Licence No. IBR-RLF1520) and a visual assessment of the LTU liners and berms to assess for potential seepage issues. The monitoring work was also modified with the collection of surface water samples to supplement limited groundwater at the Site.

Stantec monitored six groundwater monitoring wells surrounding LTU 1 (MW 1 to MW3) and 2 (MW4 to MW6). At LTU 2, only one monitoring well (MW 5) of the three installed at the LTU remains operable. This monitoring well is located hydraulically downgradient at the southwest corner of the LTU 2. None of the monitoring wells contained sufficient groundwater to allow for sampling. Therefore, four surface water samples (SW1 to SW4) were collected from accumulated surface water at the Site as substitutes for groundwater samples in order to meet the NWB licence requirements and assess LTU integrity. A surface water sample was also duplicated in the field for quality assurance, quality control (QA/QC) purposes. The field duplicate was analyzed for the NWB Licence groundwater parameters.

A summary of guideline / standards exceedances is provided below:

Sample Location	Parameter Category	Individual Parameter	Applicable Guideline Exceeded
SW-1 South (down-gradient) of LTU 1 and west (cross-gradient) from LTU 2	Metals	Lead	CCME The lead concentration (11.5 µg/L) was 3.75 times higher than the CCME guideline (3.03 µg/L).
SW3 and Duplicate Along the west side of LTU 2 (cross-gradient), near a potential berm breach identified by Stantec in 2019. Surface water was also observed at this location in 2018.	Metals / BTEX	Lead Toluene	CCME The lead concentrations (6.89 µg/L and 7.02 µg/L) were approximately 2.3 times higher than the CCME guideline (3.03 µg/L). The toluene concentrations (3.6 µg/L) were approximately 1.8 times the CCME guideline (2 µg/L) but satisfied the MECP SCS for groundwater (18,000 µg/L).

Sample Location	Parameter Category	Individual Parameter	Applicable Guideline Exceeded
SW4 South of LTU 2 (down-gradient) near MW5 and down-gradient of a low area against the inside berm. Surface water was also observed at this location in 2018.	Metals	Aluminum	CCME The aluminum concentration (138 µg/L) was approximately 1.4 times greater than the CCME guideline (100 µg/L). Surface water samples collected in 2018 at the Site did not contain concentrations exceeding the CCME guidelines. As there was only one sample containing an aluminum concentration exceeding the CCME guidelines at the Site in 2019, the concentration may be anomalous. The CCME guideline is based on the protection of freshwater aquatic life. As are no freshwater aquatic life receptors at the Site, the aluminum exceedances is not an environmental concern.

During the 2018 site visit, a weathered drum labelled as containing aviation fuel was observed on the Site west of LTU 3, a weathered 1 m^3 bag containing salt was observed on the Site south of LTU 1, and a pile of construction debris was observed located inside the berms of LTU 1. A similar pile of construction debris was observed at the Site within LTU 2 during the 2018 site visit. The airport authority had committed to removing the waste materials in 2018, but they were still on-site when Stantec returned in 2019.

During the program, Stantec personnel estimated the surface water drainage direction at the Site to be generally in southerly and westerly directions in the areas surrounding the LTUs. The groundwater flow direction in the vicinity of the Site is unknown; however, based on local topography, Stantec inferred the shallow groundwater flow direction to be southerly.

Accumulated surface water was observed immediately northwest of LTU 1 (against the berm), southeast of LTU 1, between LTU 3 and 4, west of LTU 2, south of LTU 2, and inside LTU along the northern portion of the east berm. One area of accumulated surface water was observed north of LTU 2, but it evaporated between July 26 and 27, 2019. A small vegetated area was observed outside the southwest berm of LTU 1. A second vegetated area was observed southeast to southwest of LTU 1. Vegetated areas were also present along the west berm of LTU 2.

While onsite, Stantec personnel visually assessed the condition of the exposed portions geomembrane liners and berms of both LTUs. Six areas with liner deficiencies were observed at LTU 1 (liner deficiencies 1 through 6). The liner deficiencies at LTU 1 consisted of tears ranging in size from 4 to 45 centimetres (cm). Fifteen (15) areas with liner deficiencies (liner deficiencies 7 through 21) were observed at LTU 2. The liner deficiencies at LTU 2 consisted of tears ranging in size from 6 cm to 400 cm, areas of low berm located north and south of the LTU access ramp on the west side of LTU 2, pooling water against the inside berm (along the east berm in the northern portion of LTU 2), and a low area inside the berm (along the south berm of LTU 2). The liner deficiencies were in similar locations to those observed in 2019. Standing surface water against the inside berms of the LTUs may spill over low berms or accumulate and migrate outside of the LTUs.

Surface water has accumulated adjacent to the outside of the west berm of LTU 2 (adjacent to the low areas). This surface water accumulation was also observed in 2018. One sample (SW3) was collected from the surface water accumulated in the area. The total lead and dissolved toluene concentrations exceeded the standards/guidelines. The dissolved toluene did not exceed the standards / guidelines in the other surface water samples collected during the program. The low berm, accumulated surface water, and the presence of toluene exceeding the guidelines /standards may indicate that surface water is not being contained within LTU 2.

Based on the results of the 2019 Program, Stantec recommends the following:

1. Due to heaving, monitoring wells MW4 and MW6 are damaged and should be removed from the Program and decommissioned.
2. Due to guideline/standard exceedances in surface water, conduct additional background surface water and soil sampling to determine if lead exceedances are a result of anthropogenic activities, and/or are associated with the LTUs.
3. Due to guideline exceedances in surface water and because surface water samples were collected in lieu of groundwater samples, conduct additional background surface water sampling for total and dissolved metals concentrations.
4. Develop a program, including costs, to assess the engineering options for improving / building up the berms to prevent accumulated surface water from overflowing and/or blowing over the berm and impacting soil and groundwater outside LTU 1 and LTU 2.
5. Retain a third party to repair the liner deficiencies to manufacturer specifications.
6. PSPC and/or TC follow up with the airport authority regarding removal of construction debris observed in July 2019 in LTU 1.
7. PSPC and/or TC follow up with the airport authority regarding removal of the weathered drum containing aviation fuel and the soil bag containing salt that were left at the Site.
8. Install “No Dumping” signs in the vicinity of LTU 1 and LTU 2 to deter illegal dumping at the Site.
9. Consult with the NWB regarding amending the licence to evaluate options for sampling accumulated surface water, decommissioning the groundwater monitoring wells that do not appear to contain sufficient groundwater for monitoring or sampling on an annual basis/that are consistently frozen, and re-evaluating the list of parameters analyzed to align with COCs for the soils contained in the LTUs.

The statements made in the Executive Summary are subject to the same limitations included in the Limitations Section 8.0 and are to be read in conjunction with the remainder of this report.

1.0 INTRODUCTION

Stantec Consulting Ltd. (Stantec) completed the 2019 Site Environmental Monitoring Program (the Program) at the Land Treatment Units (LTUs) located at the northern portion of the Resolute Bay Airport on Cornwallis Island, Nunavut (hereinafter referred to as the Site). 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 are as follows:

- Complete a groundwater monitoring program at the Site to assess for dissolved chemicals of concern in groundwater to meet Nunavut Water Board (NWB) Licence 1BR-RLF1520 Requirements.
- Assess LTUs 1 and 2 to visually evaluate the integrity of the LTU liners and condition of the Site monitoring well network.

1.2 BACKGROUND

The history and background of the Site provided by PSPC, including previous assessments, are summarized below:

- The Resolute Bay Airport has been in operation since 1949. It was originally constructed by the Royal Canadian Air Force. Ownership was transferred to the Government of Canada in 1964 and it was operated by Transport Canada (TC) until July 1, 1995. Ownership was transferred to the Government of the Northwest Territories in 1999 and then to the Government of Nunavut.
- In 2002, Winnipeg Environmental Remediation Inc (WERI) and Eng-Tech Consulting Ltd. supervised the construction of two LTUs (LTUs 1 and 2) that were constructed of 20 mil Oil resistant reinforced polyethylene (RPE) liner to contain and treat petroleum hydrocarbon (PHC) impacted soil from a former above ground storage tank (AST) farm that stored bulk fuel and a former fire mock-up training area (FTA). LTU 1 was subdivided into three (3) cells (numbered 1 to 3 from west to east). Zone 3 occupies approximate the eastern half of LTU 1 and contains lighter hydrocarbon impacted soils. The two western cells contained heavier fraction hydrocarbon impacted soil. Approximately 5,500 cubic metres (m^3) of PHC impacted soil was excavated from the FTA and approximately 300 m^3 of PHC impacted soil was excavated from the AST farm for treatment in the LTUs. The LTUs were filled to an approximate height of 1.3 metres. Nutrients were added to both LTUs. 145 kg of 38-0-0 Nitrogen –Phosphous-Potassium was added to LTU 1 and 2,273 kg was added LTU 2. Approximately 40 kg of surfactant (“cyclone white”) was also added to a depth of 0.3 m below the surface of LTU 2.
- In September 2003, a soil monitoring program was completed to assess the effectiveness of the nutrient amendment program. A ground heating system was also installed in the northern portion of LTU 2 to conduct a pilot project to enhance bioremediation in northern half of the LTU. The infrastructure of the heating system consisted of pipes, junction boxes, and air exchange housing. The impacted soil was covered and remains covered today by a geomembrane to contain the heat generated by the heating system.
- In August 2004, 400 kg of 38-0-0 (zones 1 and 2 of LTU 1), 600 kg of 38-0-0 nutrients (uncovered LTU 2 area) and 100 kg of surfactants in zone 1 of LTU 1 were applied to the LTUs. The heating system was operated between August to early October.

- In 2005, a soil sampling program was completed to assess remediation at the LTUs. According to TC personnel, the heating system was only operated for two field seasons between 2004 and 2005 and has not been functional since 2005.
- In 2005, a soil sampling program (39 soil samples analyzed for petroleum hydrocarbon) was completed at both LTUs to assess the effectiveness of nutrient amendment under heated conditions and non-heated conditions. The report results concluded bioremediation was occurring; however, the results were inconclusive to the effectiveness of either method being better than the other.
- Two smaller LTUs (LTU 3 and 4) are also present at the Site; however, there is no background information regarding the origin of these LTUs. TC is not the custodian of LTUs 3 and 4, and these LTUs are not included in the scope of work presented herein.
- In 2015, Arcadis Canada conducted the first annual groundwater and soil monitoring program to meet NWB Licensing requirements in late September. Additional soil sampling occurred at LTUs 3 and 4 to assess for contaminants of concern within the LTUs. The maximum soil sample depth investigated was approximately 0.7 m below ground surface (mbgs). One soil sample was collected per test pit excavated at the respective LTUs (five test pits at LTU 1 and four test pits at LTU 2). The soil sampling program confirmed the presence of perfluorooctanesulfonic acid (PFOS), one of the per and poly-fluorinated alkyl substances (PFAS), exceeding interim federal guidelines in the LTU soils. Concentration exceedances ranged between seven and 22 times the interim guideline value. The 13 soil samples collected contained PHC concentrations exceeding applicable federal guidelines in the LTU soils. The LTUs were also assessed for capacity and it was determined that no additional impacted soil should be added to the LTUs.
- In 2016-2017 the condition of six existing monitoring wells was inspected (MW1 through MW6), and the liner integrity was also assessed at both LTUs. In 2017, only one groundwater sample could be collected. Surface water samples were also collected around the LTU perimeter to assess for potential impacts to compensate for the lack of groundwater samples. Monitoring wells MW4 and MW6 (located upgradient and downgradient of LTU 2), were reported to have heaved and were not considered viable for future sampling.
- In 2018-2019, Stantec conducted an annual monitoring and inspection program for the two LTUs as well as a Preliminary Quantitative Human Health and Ecological Risk Assessment (PQRA). The six monitoring wells onsite were monitored; however, only one well (MW1) contained sufficient groundwater to sample. The remaining monitoring wells did not contain sufficient water for sampling (MW2 and MW6), were concluded to be compromised as the screen was partially above the surface (MW4 and MW6), were inaccessible due to a frozen bailer within the monitoring well standpipe (MW5), or were dry (MW3). Surface water samples from ponded water at the Site were collected as substitutes for groundwater samples to meet licence requirements. In addition, shallow soil samples were collected to assess for potential seepage issues at the west side and southwest corner of LTU 2, and to support the PQRA. During the PQRA, Stantec reviewed the information available from previous environmental investigations to perform a preliminary quantitative evaluation for the potential for human and ecological risks associated with the contaminants of concern (COCs) excluding PFAS at the Site. The PQRA concluded that unacceptable risks were not anticipated for human and ecological receptors at the Site. Should site conditions change (e.g., loss of integrity of the LTUs liners and berms or construction of a building at the Site), the results of the risk assessment may need to be revisited to assess/confirm there are no additional or increased risks to potential receptors.

An operating licence for the historical LTU (LTU 1 and 2) was obtained by TC through the Nunavut Water Board (NWB) in 2015 (Licence No. IBR-RLF1520) and requires annual or semi-annual groundwater monitoring and sampling, depending on site activities. The NWB licence dictates soil sampling requirements should the soil be added to, removed from, or treated in the LTUs. Consequently, soil sampling did not take place in 2019/20.

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 – Groundwater Monitoring and Sampling

- Retain a local field assistant to provide support to Stantec staff.
- Monitor the existing groundwater monitoring wells (MW1, MW2, MW3, and MW5) for depth to liquid petroleum hydrocarbons (if present), depth to water, and field parameters.
- Document the condition of existing groundwater monitoring wells onsite (MW1, MW2, MW3, MW4, MW5, and MW6).
- Purge the existing monitoring wells and collect four groundwater samples and one field duplicate sample.
- Submit the samples to Bureau Veritas Canada (2019) Inc. (Bureau Veritas), formerly Maxxam Analytics International Corporation, of Ottawa, ON for analysis of the parameters specified in the NWB Licence (and Section 3.4 of this report).
- Attempt to make one existing monitoring well (MW5) serviceable without sampling (removing the bailer which was previously noted as frozen within the standpipe).
- Georeference monitoring well locations.
- Provide a letter from Bureau Veritas confirming review of the quality control sampling plan (**Appendix B**).

1.3.3 Deviations from Scope of Work

- Due to shipping delays, groundwater monitoring equipment did not arrive to the Site during the field program. A consultant working at an adjacent site for PSPC (Outcome Consultants Inc.) was able to provide an RKI Eagle I™ (limited to combustible headspace [CHV] concentrations) and an interface probe for Stantec's use during groundwater monitoring and sampling program. A YSI Multi Parameter Water Quality Metre (or equivalent) was not available; therefore, field measurements for temperature, pH, redox potential, electrical conductivity (EC), and dissolved oxygen could not be collected.
- The existing groundwater monitoring wells (MW1, MW2, MW3, and MW5) did not contain sufficient water to allow for sample collection; therefore, four samples were collected from accumulated surface water at the Site and submitted for laboratory analysis of the NWB Licence parameters (added as Task 3). Due to the locations of accumulated surface water, the samples could not be co-located with the locations of the groundwater monitoring wells with the exception of one sample (SW4) which was located south of MW5.

2.0 REGULATORY FRAMEWORK

The NWB Licence provides guidelines for effluent released from the Site. As there was no effluent released from the Site in 2019, the NWB Licence guidelines were not considered applicable to the Site during the Program.

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 property, 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 for groundwater are not dependent on land use.

The NWB Licence does not specify guidelines for evaluation of surface water. To evaluate surface water during the program, the Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guidelines (CWQG) were considered applicable to the Site during the Program. As the Site is located more than 1 kilometer (km) from the ocean, the CWQG for protection of Marine Life were not included for comparison to surface water samples.

The MECP Table 3 SCS are not intended for use when evaluating parameter concentrations in surface water. However, they were provided for reference purposes as the surface water samples were collected in lieu of groundwater samples.

The guidelines and standards considered applicable to the program are summarized in Table 2-1, below and exerts are provided in **Appendix D**.

Table 2-1 Summary of Applicable Guidelines and Standards

Source	Guidelines / Standards
Groundwater	MECP Table 3 SCS
Surface Water	CCME Canadian Water Quality Guidelines for Freshwater Aquatic Life (CWQG) MECP Table 3 SCS

3.0 METHODOLOGY

3.1 TASK 1 – HEALTH AND SAFETY

Stantec prepared a site-specific health and safety plan (HSP) to address site specific hazards. The HSP was submitted to PSPC on July 22, 2019 prior to the initiation of field activities.

3.2 TASK 2 – GROUNDWATER MONITORING

The groundwater monitoring portion of the Program was completed on July 26, 2019. The bailer, previously noted as frozen into MW5, was removed by hooking it with a fishhook and pulling it out of the well. It was re-attached to the well cap for future use. The depth to groundwater in the existing groundwater monitoring wells (MW1, MW2, MW3, and MW5) was measured using an interface probe, CHV concentrations were measured using an RKI Eagle 1™, and the monitoring well locations were georeferenced using a handheld GPS unit with an estimated accuracy of ± 5 m.

The existing monitoring wells did not contain sufficient water to allow for sample collection; therefore, the locations of accumulated surface water were noted and presented to PSPC as alternatives for water sample collection. Two monitoring wells (MW4 and MW6) at LTU 2 were confirmed to be heaved and were not considered to be acceptable for monitoring or sample collection as the well screen was partially above the ground surface; therefore, water within the well was likely influenced by surface water.

Refer to Figures 2 and 3, **Appendix A** for locations of the monitoring wells and accumulated surface water at the Site and to Table 1, **Appendix B** for field observations at monitoring well locations. The GPS coordinates of the groundwater monitoring wells are presented in Table 2, **Appendix E**.

3.3 TASK 3 – SURFACE WATER SAMPLING

The surface water sampling portion of the Program was completed on July 26, 2019. Multiple locations of accumulated surface water were observed in the vicinity of the LTUs during the site visit. Because the intent of the licence is to monitor the integrity of the LTUs, Stantec took into consideration the following factors when selecting a sampling location:

- Standing water available to sample
- Topography and distance from LTUs and monitoring wells
- Possible locations for berm over-flow
- Proximity of standing water to existing groundwater monitoring wells

The surface water sampling locations were georeferenced using a handheld GPS unit with an estimated accuracy of ± 5 m. The approximate locations of accumulated surface water and surface water samples are depicted on Figures 2 and 3, **Appendix A**. The GPS coordinates of the surface water samples are presented in Table 2, **Appendix E**.

Stantec collected four surface water samples and one blind field duplicate for laboratory analysis of the NWB Licence parameters. The samples were collected by dipping laboratory-provided bottles directly into the surface water. One equipment rinsate blank (equipment blank) sample was prepared by Stantec personnel by pouring laboratory-provided water over the sampling equipment into laboratory supplied bottles for laboratory analysis of the NWB Licence parameters for quality assurance and quality control (QA/QC) purposes. One laboratory-prepared trip blank was shipped with the samples and analyzed for NWB Licence parameters for QA/QC purposes.

The samples were stored in an ice-chilled cooler prior to and during transportation to the laboratory. The samples were shipped by air by First Air Cargo to Bureau Veritas's laboratory in Ottawa, Ontario.

The surface water sample locations are summarized in Table 3-1, below and are presented on Figures 2 and 3, **Appendix A**.

Table 3-1 Surface Water Sample Locations

Sample ID	Purpose	Location/Rationale
SW1	Licence substitution	South (down-gradient) of LTU 1 and west (cross-gradient) from LTU 2
SW2	Licence substitution	Immediately north (up-gradient) of the northwest berm of LTU 1.
SW3/Field Duplicate	Licence substitution	Along the west side of LTU 2 (cross-gradient), near a potential berm breach identified by Stantec in 2019. Surface water was also observed at this location in 2018.
SW4	Licence substitution / co-located with MW5	South of LTU 2 (down-gradient) near MW5 and down-gradient of a low area against the inside berm. Surface water was also observed at this location in 2018.

3.3.1 Laboratory Program

The laboratory analytical program is summarized in Table 3-2, below.

Table 3-2 Laboratory Program Summary

Source	Laboratory Analysis
Surface Water SW1 to SW4, Field Duplicate (at SW3), Equipment Rinsate Blank, Trip Blank	Total Suspended Solids (TSS) Polycyclic Aromatic Hydrocarbons (PAH) Benzene, toluene, ethylbenzene, xylenes (BTEX) Total extractable hydrocarbons (TEH) Oil and Grease Total Phenols Total Metals (aluminum, cadmium, copper, lead, nickel, silver, zinc, arsenic, cobalt, iron, molybdenum, selenium, titanium) Routine parameters (total hardness, conductivity, calcium, sodium, chloride, magnesium, potassium, sulphate, total alkalinity, nitrate-nitrite, ammonia nitrogen, and pH)

3.3.2 Quality Assurance and Quality Control

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

- Groundwater monitoring and surface water sample collection equipment decontamination was completed in general accordance with Stantec's Standard Operating Procedures (SOPs)
- Equipment was calibrated by Stantec personnel prior to fieldwork
- Surface water samples were stored in ice-chilled coolers prior to and during transportation to the laboratory
- Surface water 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 blind field duplicate surface water sample was collected by Stantec and analyzed by Bureau Veritas. The analytical results were compared to those of the parent sample using the method of relative percent difference (RPD) to evaluate precision
- One trip blank and one equipment blank were collected by Stantec and analyzed by Bureau Veritas

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.

3.3.3 Liner Visual Assessment

While at the Site, Stantec personnel visually assessed the condition of the exposed portions of the geomembrane liners and the berms of LTU 1 and LTU 2 for evidence of overflow and visible indications of tearing or material distress. The locations of observed areas of concern were measured from the corners of the LTUs and their coordinates were recorded using a handheld GPS with an estimated accuracy of ±5 m.

The locations of observed liner deficiencies are indicated on Figures 4 and 5, **Appendix A**.

4.0 RESULTS

The 2019 field program was conducted from July 26 to July 28, 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 below:

Description	Figures or Tables and Associated Appendix
Site Features and Surface Water Drainage	Figure 2, **Appendix A**
Groundwater Monitoring Results	Table 1, **Appendix E**
Surface Water Sample Locations	Figure 3, **Appendix A** and Table 2, **Appendix E**
GPS Coordinates of Monitoring and Sampling Locations, as well as Site Features	Table 2, **Appendix E**
Analytical Results (including QA/QC samples)	Table 3, **Appendix E**
Observed Liner Deficiencies at LTU 1	Figure 4, **Appendix A**
Observed Liner and Berm Deficiencies at LTU 2	Figure 5, **Appendix A**
Photographic Log	**Appendix F**
Copies of Laboratory Certificates of Analysis	**Appendix G**

4.1 SITE CONDITIONS

The temperature ranged from 15 degrees Celsius (^{0}C) on July 26 to 5 ^{0}C on July 28. Conditions were generally sunny and partly cloudy with light rain in the morning of July 28, 2019.

During the 2018 site visit, a weathered drum labelled as containing aviation fuel was observed on the Site west of LTU 3, a weathered 1 m^3 bag containing salt was observed on the Site south of LTU 1, and a pile of construction debris was observed located inside the berms of LTU 1. A similar pile of construction debris was observed at the Site within LTU 2 during the 2018 site visit. Stantec had coordinated the removal of that pile with the airport authority in 2018. However, the weathered drum and bag of salt observed during the 2018 site visit had not been removed when Stantec returned to the Site in 2019 (the airport authority had committed to removing the materials in 2018, but they were still onsite).

Accumulated surface water was observed immediately northwest of LTU 1 (against the berm), southeast of LTU 1, between LTU 3 and 4, west of LTU 2, and south of LTU 2. One area of accumulated surface water was observed north of LTU 2, but it evaporated sometime between July 26 and 27, 2019. Accumulated surface water was also observed inside the northern portion of the east berm of LTU 2.

A small vegetated area was observed outside of the southwest berm of LTU 1. A second vegetated area was observed southeast and southwest of LTU 1. Vegetated areas were also present along the west berm of LTU 2.

During the program, Stantec personnel estimated the surface water drainage direction at the Site to be generally in southerly and westerly directions in the areas surrounding the LTUs. The groundwater flow direction in the vicinity of the Site is unknown; however, based on local topography, Stantec estimated the shallow groundwater flow direction to be southerly.

The observed surface water drainage directions, accumulated surface water, and vegetated areas are shown on Figure 2, **Appendix A.**

4.2 GEOLOGY AND SURFICIAL GEOLOGY

The surficial geology in the area of the Site consists of colluvial deposits that are residual materials deposited as veneers and blankets of debris through downslope movement and in-place disintegration of bedrock, including areas of rock outcrop (Arcadis, 2017). The colluvial rubble reportedly contains rubble and silt derived from carbonate and consolidated fine clastic sedimentary rock substrate (Canada-Nunavut Geoscience Office, 2006a). The bedrock of the Site is of Paleozoic era, specifically the Arctic Platform and is composed of Silurian carbonate and siliciclastic rocks (Canada-Nunavut Geoscience Office, 2006b).

Resolute Bay is subject to continuous permafrost, and groundwater is not used as potable water (Arcadis, 2017).

4.3 GROUNDWATER MONITORING

Stantec observed the condition of six groundwater monitoring wells (MW1 through MW6) surrounding LTU 1 and 2 and monitored four (MW1, MW3, MW3, and MW5). MW5 was monitored after the bailer was removed from the standpipe and re-installed above the water / freezing level of the well for potential future use. Stantec personnel labelled the inside of the well caps with the monitoring well ID and added a reference marker to the outside of the monitoring well standpipes to indicate where the depth to water and depth to bottom in each well were measured from using a Sharpie™ marker. The reference markers were added to the highest point on the standpipe if the standpipe was cut unevenly.

Two of the six monitoring wells (MW4 and MW6) were confirmed to be heaved so that the well screen was above the ground surface and were not considered suitable for groundwater monitoring or sampling (Photos 4 and 6, **Appendix F**). The remaining monitoring wells (MW1, MW2, MW3, and MW5) did not contain sufficient water for sample collection.

The depth to water in MW1, MW2, MW5, and MW6 ranged from 0.916 metres below top of casing (mBTOC) in MW1 to 1.327 mBTOC in MW5 on July 26, 2010. Frozen wells were not encountered during the event.

Combustible headspace vapour (CHV) concentrations ranged from 15 parts per million (ppm) in MW1 to 25 ppm in MW2 and MW3. Volatile headspace vapour (VHV) concentrations and other parameters including temperature, specific conductance, pH, oxidation reduction potential, and dissolved oxygen could not be measured as the required equipment was not available. The groundwater monitoring results are summarized in Table 1, **Appendix E**.

4.4 SURFACE WATER SAMPLING

Stantec collected four surface water samples and one field duplicate sample from accumulated surface water at the Site in lieu of groundwater samples as the monitoring wells did not contain sufficient water for sample collection. Because the locations of the accumulated surface water were not consistent with the surface water samples collected during the 2018 Program, the laboratory analytical results cannot be directly compared to previous results by location. The surface water samples were analyzed for the NWB Licence Parameters to replace/substitute for the groundwater samples.

In general, the reported concentrations of the parameters analyzed were below the applicable guidelines, with the exception of those shown in Table 4-1, below.

Table 4-1 Summary of Surface Water Parameters Exceeding Applicable Guidelines from 2019 Sampling Event

Sample Location	Parameter Category	Individual Parameter	Applicable Guideline Exceeded
SW-1 South (down-gradient) of LTU 1 and west (cross-gradient) from LTU 2	Metals	Lead	CCME The lead concentration (11.5 µg/L) was 3.75 times higher than the CCME guideline (3.03 µg/L).
SW3 and Duplicate Along the west side of LTU 2 (cross-gradient), near a potential berm breach identified by Stantec in 2019. Surface water was also observed at this location in 2018.	Metals / BTEX	Lead Toluene	CCME The lead concentrations (6.89 µg/L and 7.02 µg/L) were approximately 2.3 times higher than the CCME guideline (3.03 µg/L). The toluene concentrations (3.6 µg/L) were approximately 1.8 times the CCME guideline (2 µg/L) but satisfied the MECP SCS for groundwater (18,000 µg/L).
SW4 South of LTU 2 (down-gradient) near MW5 and down-gradient of a low area against the inside berm. Surface water was also observed at this location in 2018.	Metals	Aluminum	CCME The aluminum concentration (138 µg/L) was approximately 1.4 times greater than the CCME guideline (100 µg/L). Surface water samples collected in 2018 at the Site did not contain concentrations exceeding the CCME guidelines. As there was only one sample containing an aluminum concentration exceeding the CCME guidelines at the Site in 2019, the concentration may be anomalous. The CCME guideline is based on the protection of freshwater aquatic life. As are no freshwater aquatic life receptors at the Site, the aluminum exceedance does not pose an environmental concern to the Site.

The concentrations of BTEX in SW2 and SW4 were below the RDLs. In SW1, xylene was detected at three orders of magnitude below the MECP SCS. In SW3, benzene, toluene, and xylene were detected. The detected benzene concentration was three orders of magnitude lower than the CCME guideline and the NWB Effluent Quality Limit, and

two orders of magnitude lower than the MECP SCS. The detected xylene concentration was three orders of magnitude lower than the MECP SCS. The toluene concentration at SW3 (as described in Table 4-1 above) was 1.8 times greater (within the same order of magnitude) than the CCME guideline and the NWB Effluent Quality Limit but was four orders of magnitude lower than the MECP SCS.

Concentrations of petroleum hydrocarbons (fractions 1 and 2) were below the laboratory RDLs in SW2 and SW4 but were detected in SW1 and SW3. In SW1 and its field duplicate sample, the detected concentrations of PHC F1 were 6.8 times lower than the MECP SCS, and the detected concentration of PHC F2 was 1.25 times lower than the MECP SCS. In SW3 and its field duplicate sample, the PHC F1 concentrations were approximately 29 times lower than the MECP SCS and the PHC F2 concentrations were below the laboratory RDL.

The concentrations of PAH parameters were generally below the laboratory reportable detection limit (RDL) with the exception of 1-Methylnaphthalene, 2-Methylnaphthalene, and Naphthalene in SW3 and its field duplicate sample. There are no CCME guidelines or MECP SCS for 1- and 2- Methylnaphthalene, but there is a CCME guideline for naphthalene. The reported naphthalene concentrations in SW3 and its duplicate sample were an order of magnitude lower than the CCME guideline.

The concentrations of phenols were less than the laboratory RDLs and therefore less than the CCME guidelines and MECP SCS.

Total oil and grease was detected in in SW1 and SW4. The concentrations were one order of magnitude below the NWB Effluent Quality Limit.

Where total metals and routine parameter concentrations were detectable but less than the applicable guidelines / standards, the reported concentrations generally ranged from two orders of magnitude below the applicable guidelines/standards/limits to the same order of magnitude as the applicable guidelines/standards/limits.

The surface water analytical results for this program as compared to the applicable guidelines/standards/limits are summarized in Table 2, **Appendix B** and are shown on Figure 3, **Appendix A**.

4.5 LINER VISUAL ASSESSMENT

While at the Site, Stantec personnel visually assessed the condition of the exposed portions of the geomembrane liners and berms of LTU 1 and LTU 2.

4.5.1 LTU 1

In LTU 1, liner deficiencies were observed in six locations. The liner deficiencies are summarized in Table 4-2, below.

Table 4-2 LTU 1 Observed Liner Deficiencies

Deficiency Number	Location	Deficiency	Deficiency Length (cm)
1	0-1 m west of northeast corner	Multiple tears	5-17
2	3m south of northwest corner	3 tears	15, 15, 15
3	5 m south of northwest corner	2 tears	45, 10
4	3 m west of southeast corner	3 tears	5, 5, 5
5	8 m north of southeast corner	1 tear	15
6	15 m north of southeast corner	1 tear	14

The observed liner deficiencies in LTU 1 are shown on Figure 4, **Appendix A** and photos 13 through 18 in **Appendix F**.

4.5.2 LTU 2

In LTU 2, liner and berm deficiencies were observed at 15 locations. The LTU 2 liner and berm deficiencies are summarized in Table 4-3, below.

Table 4-3 LTU 2 Observed Liner and Berm Deficiencies

Deficiency Number	Location	Deficiency	Deficiency Length (cm)
7	11.5 m W of NE corner	1 tear	20
8	13 m S of NW corner	1 tear	7
9	32 m S of NW corner	2 tears	6, 6
10	37 m S of NW corner	1 tear	7
11	16-17 m E of SW corner	3 tears	32, 30, 15
12	13-17 m S of NE corner	1 tear	400
13	2-2.5 m S of NE corner	2 tears	15, 10
14	5 m S of NE corner	1 tear	45
15	7 m S of NE corner	4 tears	10, 15, 15, 10
16	9 m S of NE corner	1 tear	15
17	11 m S of NE corner	2 tears	16, 11
18	0-13 m north of approach to LTU 2 (west side)	Low berm	1300
19	0-15 m south of approach to LTU 2	Low berm	1600
20	North portion of east berm	Pooling water against inside berm	na
21	South berm	Low area against inside berm	na

The observed liner and berm deficiencies in LTU 2 are shown on Figure 5, **Appendix A** and Photos 11and 19 through 30, **Appendix F**.

5.0 QUALITY ASSURANCE / QUALITY CONTROL

A QA/QC program was conducted to assess data reliability. Surface water samples were collected in general accordance with Stantec's SOPs, were uniquely labelled, and control was maintained using chain-of-custody forms. Surface water 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 / standards.

5.1 SAMPLE HOLD TIMES

Samples submitted to the laboratory were analyzed within the recommended hold times described in the CCME 2016 Guidance Manual for Environmental Site Characterization in Support of Environmental and Human Health Risk Assessment, Volume 4 Analytical Methods (CCME, 2016a).

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 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 40%

for field duplicated water samples described by the CCME Guidance Manual for Environmental Site Characterization in Support of Environmental and Human Health Risk Assessment, Volume 1 Guidance Manual (CCME, 2016b).

QC19-01 was a blind field duplicate surface water sample collected from SW3. Where they could be calculated, the RPD's ranged from 0% (total alkalinity as $CaCO_3$ and toluene) to 9% (o-xylene). The calculated RPDs were within the generally accepted industry standard for acceptable RPDs.

The RPD results are summarized on Table 2, **Appendix E**.

5.4 TRIP BLANK

The trip blank (QC19-02) consisted of de-ionized water prepared by the laboratory. The trip blank sample was submitted for analysis of the NWB Licence parameters. The laboratory analytical results indicated that the reported concentrations were less than the laboratory RDL and the pH was consistent with that expected of the de-ionized water. As such, the trip blank results indicate that sample shipping did not influence the surface water analytical results.

The trip blank results are summarized on Table 2, **Appendix E**.

5.5 EQUIPMENT BLANK

The equipment blank (QC19-03), was prepared by Stantec personnel using deionized water provided by the laboratory. The equipment blank sample was packaged in laboratory-supplied bottles in the field by Stantec using the same equipment used to collect the surface water samples. The equipment blank sample was submitted for analysis of NWB Licence parameters. Laboratory analytical results indicated the reported concentrations of the tested parameters were less than the laboratory RDLs. The laboratory pH of the equipment blank was consistent with that expected of the de-ionized water. As such, the equipment blank results indicate that sample handling and sampling equipment did not influence the surface water analytical results.

The equipment rinsate blank results are summarized on Table 2, **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 general, the laboratory QA/QC results were considered acceptable with the exception of the following:

- The surrogate recovery was below the lower control limit due to matrix interference for 2-Fluorophenol. This may represent a lower bias in some results for phenols.
  - The laboratory reported concentrations of phenols were less than the laboratory RDLs with the exception of 2,4-Dimethylphenol which exceeded the RDL but was four orders of magnitude lower than the guidelines / standards.
- The recovery was below the lower control limit for 2-Chlorophenol. This may represent a low bias in some results for 2-Chlorophenol.

  - The laboratory reported concentrations of 2-Chlorophenol were less than the laboratory RDL which was one order of magnitude lower than the guidelines / standards.
- The matrix spike recovery for silver was outside of the control limits.
  - Bureau Veritas indicated that the overall quality control for this analysis met acceptability criteria.
  - The laboratory concentrations of silver were less than the laboratory RDL which was one order of magnitude below the CCME guidelines.

Because the concentrations of the analytes affected were below the laboratory RDLs or four orders of magnitude below the standards / guidelines, the low surrogate recovery of 2-Fluorophenol, the low recover of 2-Chlorophenol, and the low matrix recover for silver did not affect the interpretation of the data from the surface water samples.

The laboratory QA/QC results are presented as part of laboratory certificates of analysis in **Appendix G.**

5.7 SUMMARY

Based on the results of the assessment above, the DQO for the Program was considered to have been met and the data were considered valid.

6.0 DISCUSSION

Stantec completed the 2019 Site Environmental Monitoring Program at the LTUs located at the Resolute Bay Airport on Cornwallis Island, Nunavut in July 2019. The findings of the Program are summarized below.

Site Conditions

A weathered drum labelled as containing aviation fuel was observed on the Site west of LTU 3, a weathered 1 m^3 bag containing salt was observed on the Site south of LTU 1, and a pile of construction debris was observed located inside the berms of LTU 1 during the 2018 site visit. A similar pile of construction debris was observed at the Site within LTU 2 during the 2018 program. Stantec had coordinated the removal of that pile with the airport authority in 2018. The weathered drum and the bag of salt observed during the 2018 site visit had not been removed when Stantec returned to the Site in 2019 (the airport authority had committed to removing the materials in 2018, but they were still onsite).

The presence of bag of salt and a drum of aviation fuel present a potential environmental concern for soil and groundwater at the Site.

Groundwater Monitoring

Stantec observed the condition of six groundwater monitoring wells (MW1 through MW6) surrounding LTU 1 and 2 and monitored four (MW1, MW3, MW3, and MW5). MW5 was monitored after the bailer (which had previously been stuck in frozen water in the well) was removed from the standpipe.

Two of the six monitoring wells (MW4 and MW6) were observed to be heaved so that the well screen was above the ground surface and were not considered suitable for groundwater monitoring or sampling. The remaining monitoring wells (MW1, MW2, MW3, and MW5) did not contain sufficient water for sample collection.

Surface Water Sampling

Stantec collected four surface water samples and one field duplicate sample from accumulated surface water at the Site in lieu of groundwater samples. Because the locations of the accumulated surface water were not consistent with the surface water samples collected during previous programs, the laboratory analytical results cannot be directly compared to previous sample results.

In general, the reported concentrations of the parameters analyzed in the surface water samples satisfied the applicable guidelines / standards with the exception of total lead, total aluminum, and toluene. The toluene exceedance was in surface water at location SW3, located west of LTU 2 adjacent to an area of low berm. The total aluminum concentration exceeded the CCME guideline in SW4, located south (down-gradient) of LTU 2. The total aluminum concentration was 1.4 times greater than the CCME guideline (within the same order of magnitude) during the 2019 program but was one order of magnitude lower than the CCME guideline in the remaining surface water samples collected at the Site during the 2019 program and in the surface water samples collected at the Site during the 2018 Environmental Monitoring Program (Stantec, 2019a). Aluminum is not a COC associated with the soils in

the LTU. Further, the CCME guideline for aluminum is based on the protection of freshwater aquatic life. As there are no freshwater aquatic life receptors at the Site and aluminum is not a COC associated with the soils in the LTU, the aluminum concentration exceeding the CCME guidelines are not considered to pose an environmental concern for the Site and are not considered to be a result of the LTUs on the Site.

Quality Assurance / Quality Control

Based on the results of the field and laboratory QA/QC program, the DQO for the Program was considered to have been met.

Liner Visual Assessment

While at the Site, Stantec personnel visually assessed the condition of the exposed portions of the geomembrane liners and berms of the two LTUs. Surface water was observed to be accumulating against the inside berms of LTU 2 at two locations (along the south berm, and along the northern portion of the east berm). Two areas of low berm were observed adjacent to the access ramp of LTU 2.

Numerous rips and tears of the liners were observed at both LTU 1 and LTU 2. The largest tear was located 13 m south of the northeast corner of LTU 2 and measured approximately 4.0 m in length.

LTU Integrity

Based on the results of the surface water sampling and the visual assessment of the LTUs and liners, the following areas of concern for LTU integrity were noted:

- Surface water is accumulated west of LTU 2. The surface water is associated with an area of low berm adjacent to the access ramp to LTU 2. The corresponding surface water sample (SW3) indicated a toluene concentration exceeding the guidelines / standards. Toluene was reported at concentrations less than the guidelines / standards in the remaining surface water samples collected from the Site.
  - The low berm and toluene exceedance may be an indication of a breach along the west berm of LTU 2 as the soil within LTU 2 is impacted with PHCs.
  - Accumulated surface water was observed in this location in 2018.
- A low area where surface water may accumulate was observed inside the south berm of LTU 2. Accumulated surface water along the inside berm of the LTU has the potential to overflow and/or be blown over the berm during high wind events and accumulate outside of the LTU. This low area inside the berm is associated with an area of low berm observed by Stantec in 2018.
  - Accumulated surface water was observed south (down-gradient) of LTU 2 (south of the low area inside the berm). The corresponding surface water sample (SW4) indicated parameter concentrations were below the guidelines / standards / limits with the exception of aluminum which exceeded the CCME guideline. Aluminum is not a COC associated with the contaminated soil within the LTU; therefore, the accumulated surface water south of LTU does not appear to originate from inside the LTU.
  - The CCME guideline for aluminum is based on freshwater aquatic receptors which are not present at the Site; therefore, the aluminum exceedance in SW4 is not considered to pose an environmental concern for the Site.
- Surface water was observed to be pooling against the inside east berm of LTU 2 in the northern portion of the LTU. This area is also associated with an approximately 4.0m tear in the liner.

7.0 RECOMMENDATIONS

Based on the results of the 2019 Program, Stantec recommends the following:

1. Due to heaving, monitoring wells MW4 and MW6 are damaged and should be removed from the Program and decommissioned.
2. Due to guideline/standard exceedances in surface water, conduct additional background surface water and soil sampling to determine if lead exceedances are a result of anthropogenic activities, and/or are associated with the LTUs.
3. Due to guideline exceedances in surface water and because surface water samples were collected in lieu of groundwater samples, conduct additional background surface water sampling for total and dissolved metals concentrations.
4. Develop a program, including costs, to assess the engineering options for improving / building up the berms to prevent accumulated surface water from overflowing and/or blowing over the berm and impacting soil and groundwater outside LTU 1 and LTU 2.
5. Retain a third party to repair the liner deficiencies to manufacturer specifications.
6. PSPC and/or TC follow up with the airport authority regarding removal of construction debris observed in July 2019 in LTU 1.
7. PSPC and/or TC follow up with the airport authority regarding removal of the weathered drum containing aviation fuel and the soil bag containing salt that were left at the Site.
8. Install “No Dumping” signs in the vicinity of LTU 1 and LTU 2 to deter illegal dumping at the Site.
9. Consult with the NWB regarding amending the licence to evaluate options for sampling accumulated surface water, decommissioning the groundwater monitoring wells that do not appear to contain sufficient groundwater for monitoring or sampling on an annual basis/that are consistently frozen, and re-evaluating the list of parameters analyzed to align with COCs for the soils contained in the LTUs.

8.0 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 PSPC and TC 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.
- Areas of the liner that were covered with soil could not be visually assessed.

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

Limitations
November 2019

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

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

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References
November 2019

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APPENDIX A

Figures

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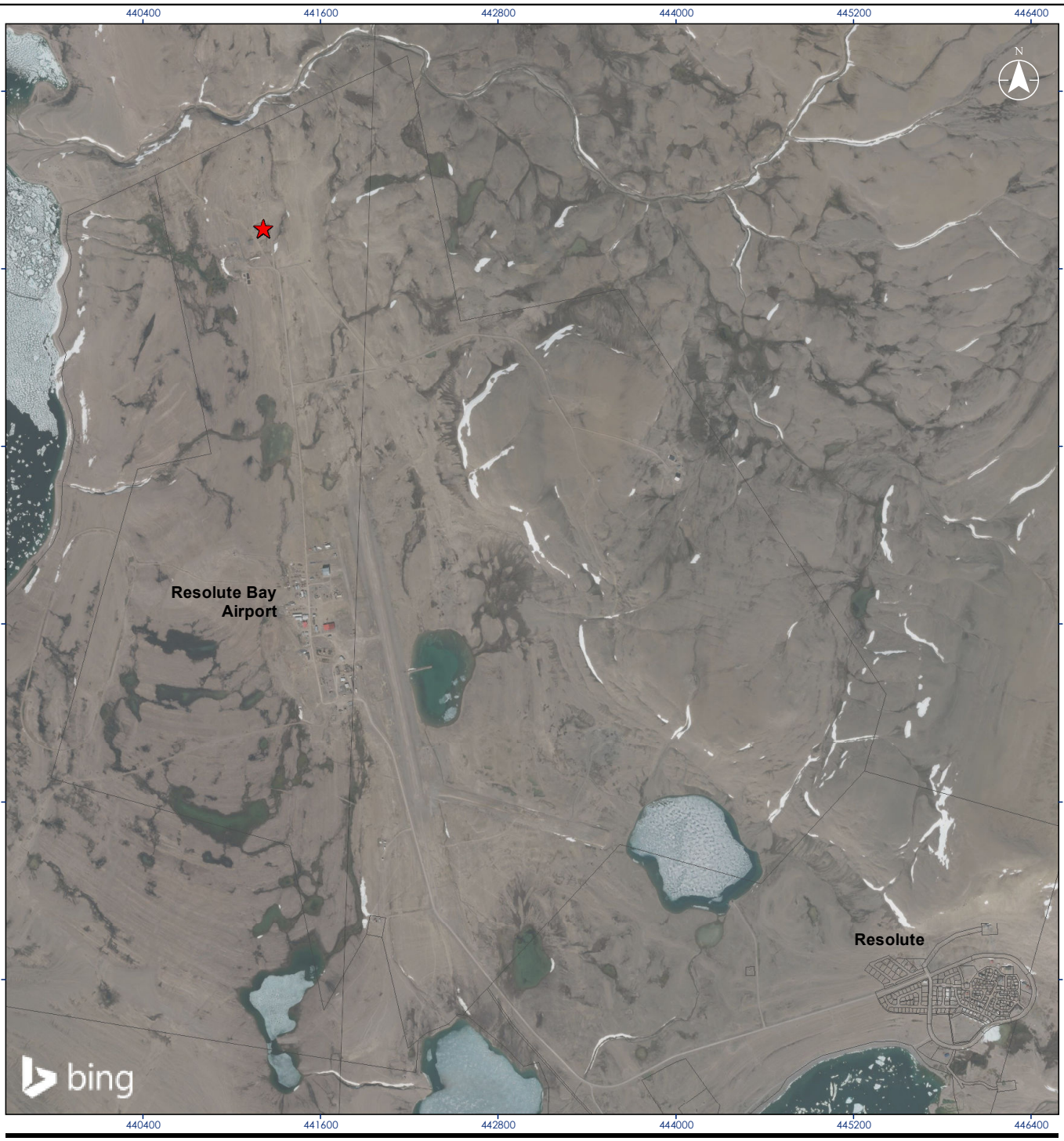
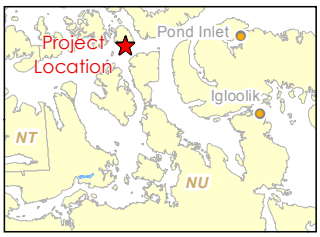




Site Location

Land Parcel

PSPC: Public Services and Procurement Canada

0 600 1,200 metres

1:40,000 (at original document size of 8.5x11)

Stantec

Project Location
Cornwallis Island, Nunavut

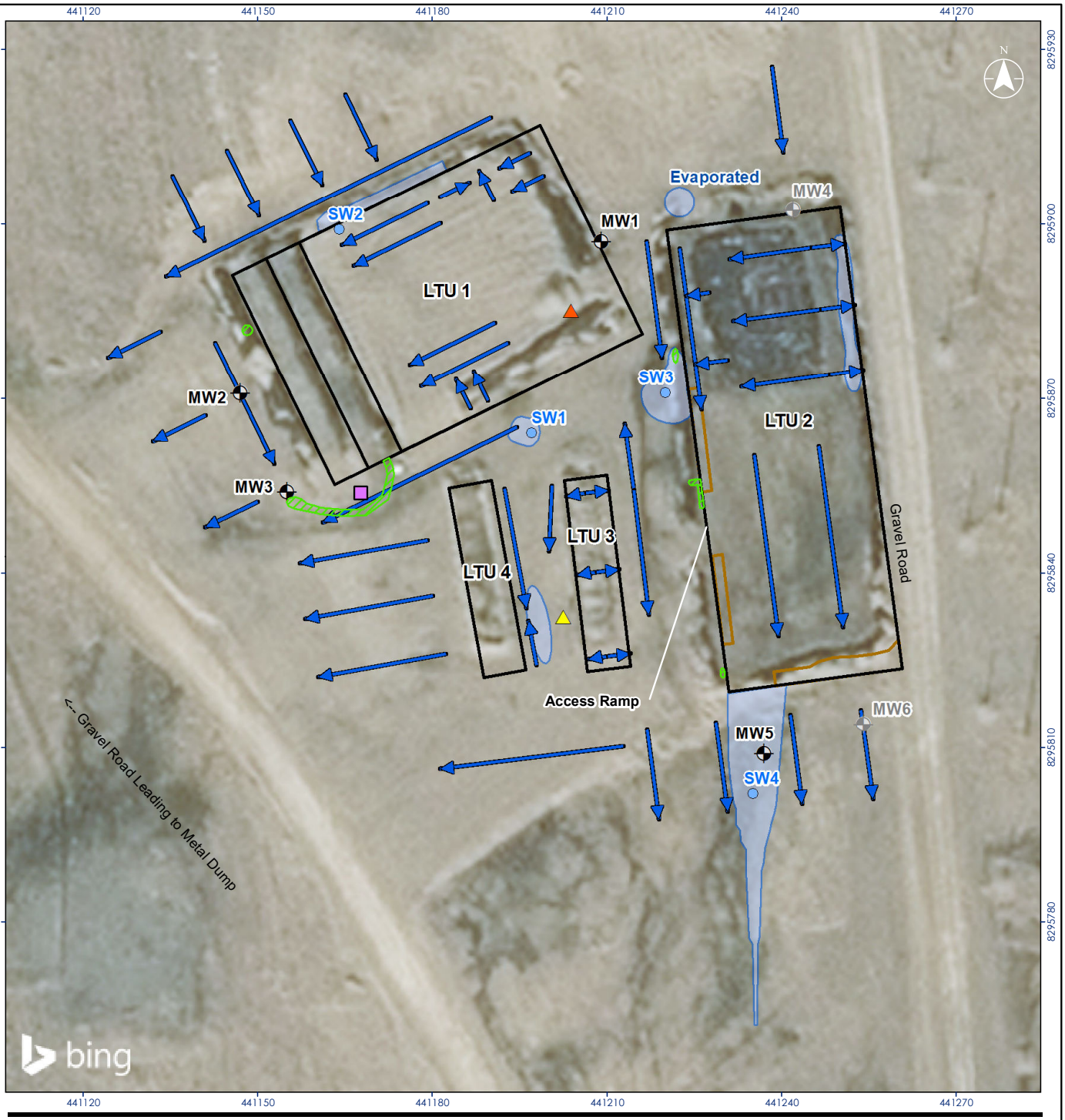
110220370
Prepared by DJ on 2019-25-09
Quality Review by LVN on 2019-25-09
Approved by TS on 2019-09-25

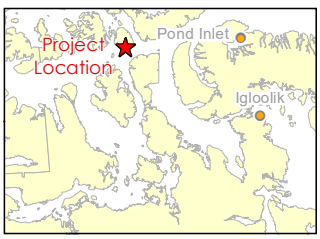
Client/Project
PSPC for Transport Canada
2019 Environmental Monitoring Program
Resolute Bay Airport Land Treatment Unit

Figure No.
1

Title
Site Location Plan

Notes
1. Coordinate System: NAD 1983 UTM Zone 15N
2. Base features: Geogratis, ©Department of Natural Resources Canada, All rights reserved.
3. Imagery: Microsoft Bing product screen shot(s) reprinted with permission from Microsoft Corporation.
4. Parcels: Canada Lands Digital Cadastral Data,©Her Majesty the Queen in Right of Canada, Department of Natural Resources. All rights reserved.





- Monitoring Well Location
- Monitoring Well Location - Screen Heaved above surface, Not Suitable for Sample Collection
- Surface Water Sample Location
- Bag of Weathered Salt
- Soil and Construction Debris Pile
- Aviation Fuel Drum
- Observed Surface Drainage Flow Direction Based on Toporgraphy
- Land Treatment Unit (LTU)
- Vegetated Areas
- Accumulated Surface Water
- Approximate Low Berm Location

PSPC: Public Services and Procurement Canada

0 15 30 metres

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

Notes

1. Coordinate System: NAD 1983 UTM Zone 15N
2. Base features: Geogratis, ©Department of Natural Resources Canada. All rights reserved.
3. Imagery: Microsoft Bing product screen shot(s) reprinted with ermission from Microsoft Corporation.

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

Ontario SCS Soil, Ground Water and Sediment Standards for Use under Part XV.I of the Environmental Protection Act (MOE, 2011) Site Condition Standards (SCS)

[C] Table 3 - All Types of Property Use - Coarse Textured Soils

NWB Nunavut Water Board License No. 1BR-RLF1520

[D] Nunavut Water Board License No. 1BR-RLF1520 requirements for effluent discharged from a sump at the Land farm Facility.

Stantec

Project Location
Cornwallis Island, Nunavut

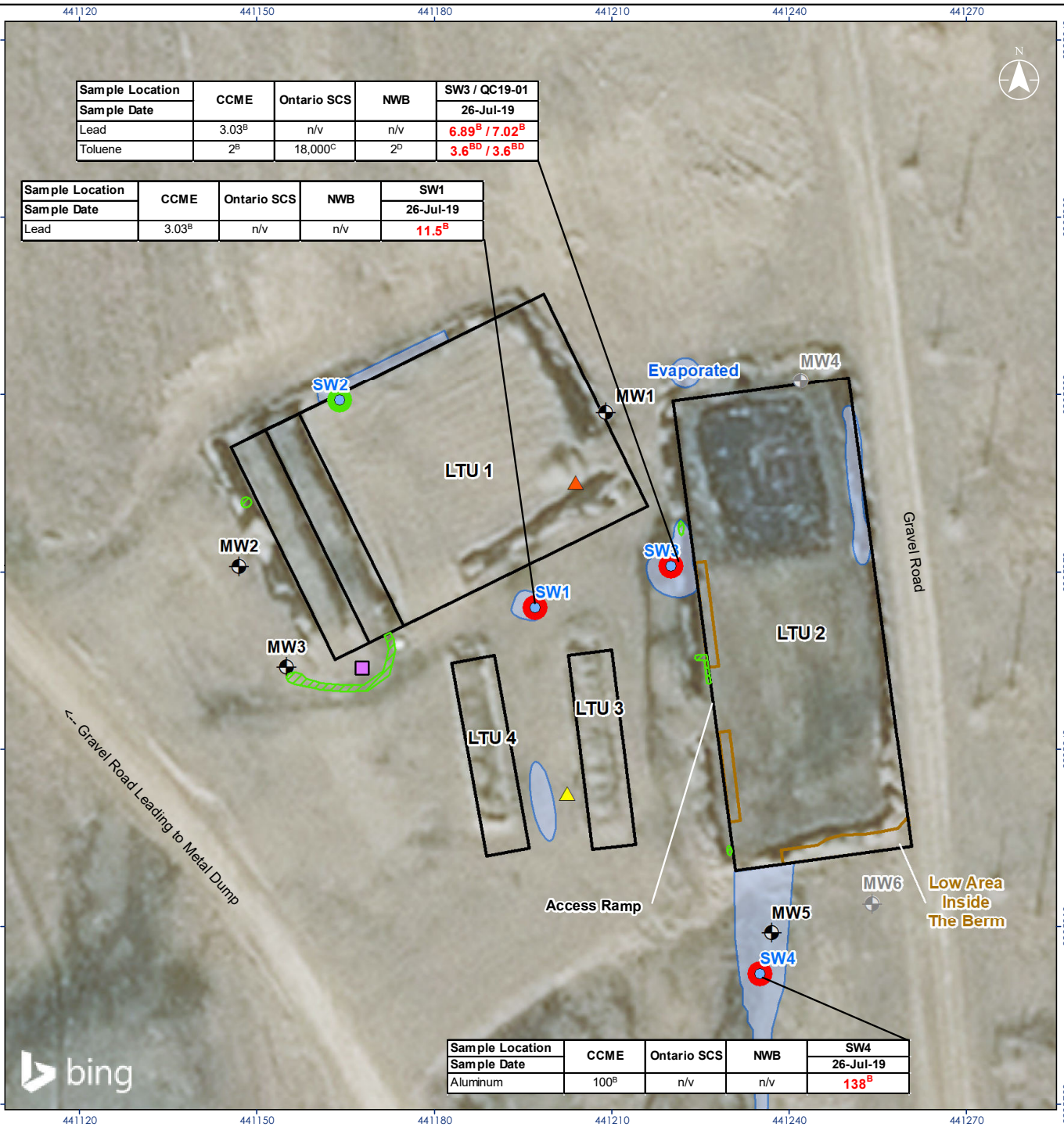
110220180
Prepared by DJ on 2019-25-09
Quality Review by LVN on 2019-25-09
Approved by TS on 2019-09-25

Client/Project
PSPC for Transport Canada
2018 Environmental Monitoring Program
Resolute Bay Airport Land Treatment Unit

Figure No.
2

Title
Site Plan Showing Site Features

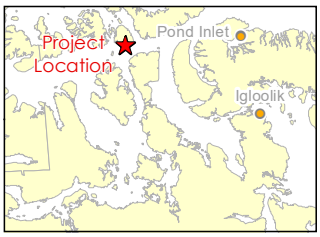
\\Cd1001-c200\workgroup\1102\active\110220370\gis\figures\fig_2_site_features_and_surface_water_drainage.mxd Revised: 2019-10-24 By: djenkins



Sample Location	CCME	Ontario SCS	NWB	SW3 / QC19-01
Sample Date				26-Jul-19
Lead	3.03[B]	n/v	n/v	**6.89[B] / 7.02[B]**
Toluene	2[B]	18,000[C]	2[D]	**3.6[BD] / 3.6[BD]**

Sample Location	CCME	Ontario SCS	NWB	SW1
Sample Date				26-Jul-19
Lead	3.03[B]	n/v	n/v	**11.5[B]**

Sample Location	CCME	Ontario SCS	NWB	SW4
Sample Date				26-Jul-19
Aluminum	100[B]	n/v	n/v	**138[B]**



- Bag of Weathered Salt
- Soil and Construction Debris Pile
- Aviation Fuel Drum
- Monitoring Well Location
- Monitoring Well Location - Screen Heaved above surface, Not Suitable for Sample Collection
- Surface Water Sample Location
- Concentrations Below Applicable Guidelines / Standards
- Concentrations Above Applicable Guidelines / Standards
- Land Treatment Unit (LTU)
- Accumulated Surface Water
- Approximate Low Berm Location
- Vegetated Areas

PSPC: Public Services and Procurement Canada

0 15 30 metres

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

Notes

1. Coordinate System: NAD 1983 UTM Zone 15N
2. Base features: Geogratis, ©Department of Natural Resources Canada. All rights reserved.
3. Imagery: Microsoft Bing product screen shot(s) reprinted with ermission from Microsoft Corporation.

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

Ontario SCS Soil, Ground Water and Sediment Standards for Use under Part XV.I of the Environmental Protection Act (MOE, 2011) Site Condition Standards (SCS)

[C] Table 3 - All Types of Property Use - Coarse Textured Soils

NWB Nunavut Water Board License No. 1BR-RLF1520

[D] Nunavut Water Board License No. 1BR-RLF1520 requirements for effluent discharged from a sump at the Land farm Facility.

Stantec

Project Location
Cornwallis Island, Nunavut

110220180
Prepared by DJ on 2019-25-09
Quality Review by LVN on 2019-25-09
Approved by TS on 2019-09-25

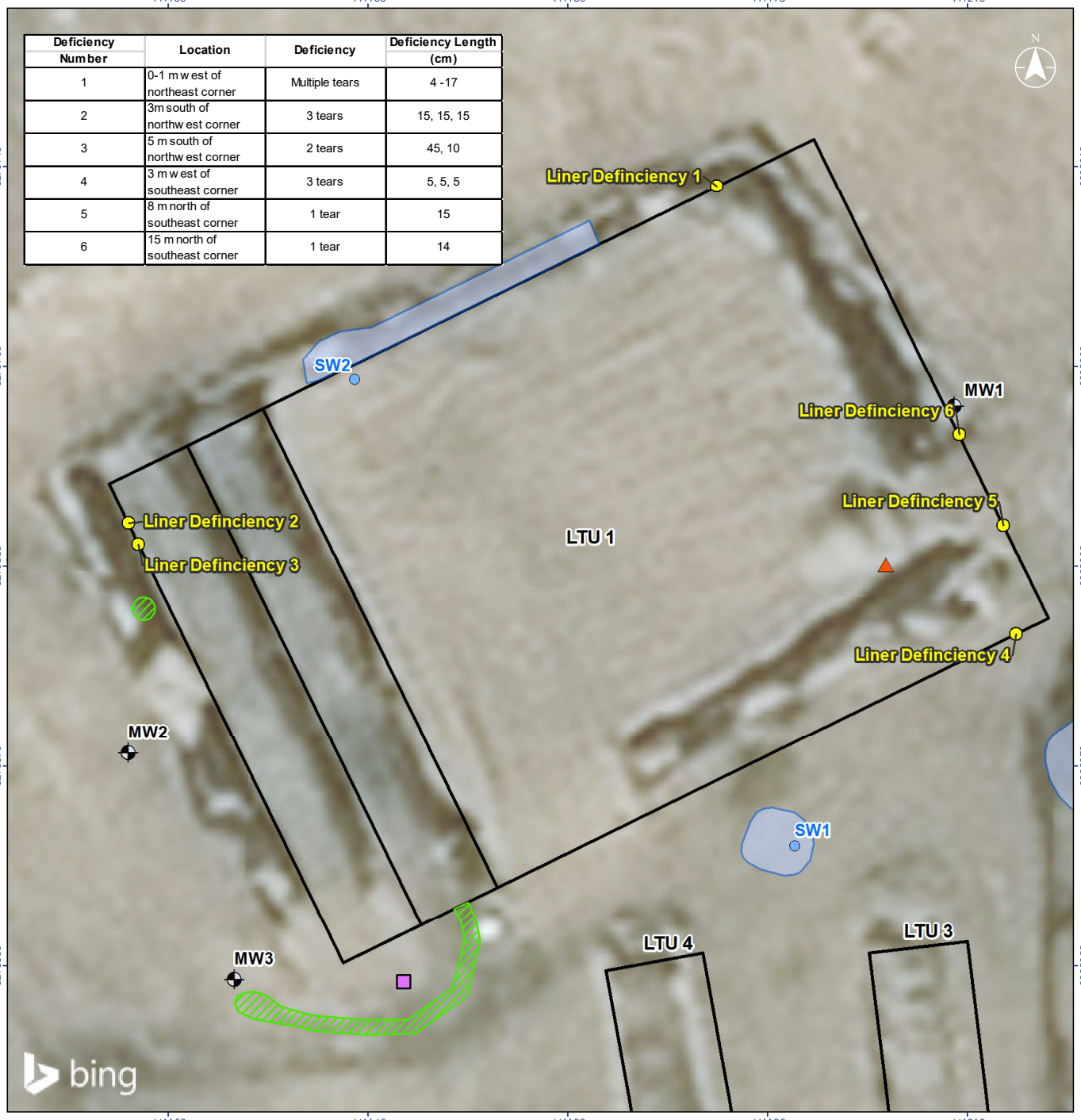
Client/Project
PSPC for Transport Canada
2018 Environmental Monitoring Program
Resolute Bay Airport Land Treatment Unit

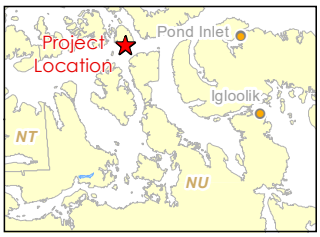
Figure No.
3

Title
Site Plan Showing Surface Water Sample Locations and Analytical Results

\\Cd1001-c200\workgroup\1102\active\110220370\gis\figures\Fig_3_surface_water_sampling_loc_and_analytical_results.mxd Revised: 2019-10-24 By: dienkins

Deficiency Number	Location	Deficiency	Deficiency Length (cm)
1	0-1 m west of northeast corner	Multiple tears	4 -17
2	3m south of northwest corner	3 tears	15, 15, 15
3	5 m south of northwest corner	2 tears	45, 10
4	3 m west of southeast corner	3 tears	5, 5, 5
5	8 m north of southeast corner	1 tear	15
6	15 m north of southeast corner	1 tear	14





- Bag of Weathered Salt
- Soil and Construction Debris Pile
- Monitoring Well Location
- Surface Water Sample Location
- Linear Deficiency
- Accumulated Surface Water
- Vegetated Areas

PSPC: Public Services and Procurement Canada

0 7.5 15 metres

1:450 (at original document size of 8.5x11)

Notes
1. Coordinate System: NAD 1983 UTM Zone 15N
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3. Imagery: Microsoft Bing product screen shot(s) reprinted with ermission from Microsoft Corporation.

[A] Nunavut Water Board License No. 1BR-RLF1520 requirements for effluent discharted from a sump at the Landfarm Facility, Part D, Item 6.
[B] Ontario Ministry of the Environment and Climate Change (now referred to as the Ministry of Environment, Conservation, and Parks). Soil, Groundwater, and Sediment Standards for use under Part XV.1 of the Environmental Protection Act. Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Groundwater Condition.

Stantec

Project Location
Cornwallis Island, Nunavut

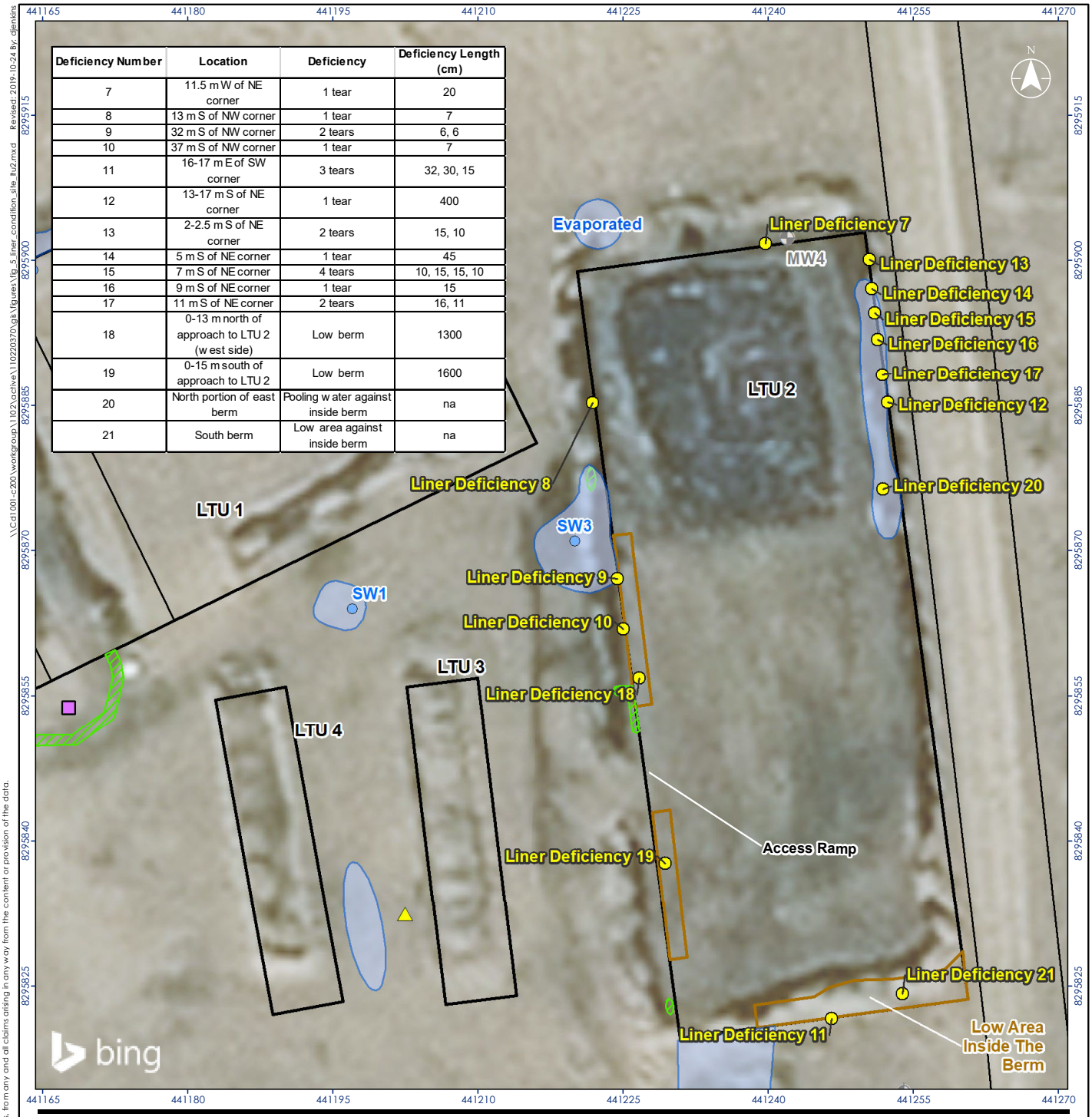
110220180
Prepared by DJ on 2019-25-09
Quality Review by LVN on 2019-25-09
Approved by TS on 2019-09-25

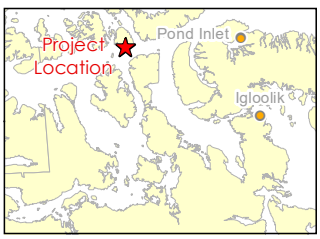
Client/Project
PSPC for Transport Canada
2018 Environmental Monitoring Program
Resolute Bay Airport Land Treatment Unit

Figure No.
4

Title
Site Plan Showing LTU 1 Observed Liner Deficiencies

Deficiency Number	Location	Deficiency	Deficiency Length (cm)
7	11.5 m W of NE corner	1 tear	20
8	13 m S of NW corner	1 tear	7
9	32 m S of NW corner	2 tears	6, 6
10	37 m S of NW corner	1 tear	7
11	16-17 m E of SW corner	3 tears	32, 30, 15
12	13-17 m S of NE corner	1 tear	400
13	2-2.5 m S of NE corner	2 tears	15, 10
14	5 m S of NE corner	1 tear	45
15	7 m S of NE corner	4 tears	10, 15, 15, 10
16	9 m S of NE corner	1 tear	15
17	11 m S of NE corner	2 tears	16, 11
18	0-13 m north of approach to LTU 2 (west side)	Low berm	1300
19	0-15 m south of approach to LTU 2	Low berm	1600
20	North portion of east berm	Pooling water against inside berm	na
21	South berm	Low area against inside berm	na





- Linear Deficiency
- Monitoring Well Location
- Monitoring Well Location - Screen Heaved above surface, Not Suitable for Sample Collection
- Surface Water Sample Location
- Bag of Weathered Salt
- Soil and Construction Debris Pile
- Aviation Fuel Drum
- Land Treatment Unit (LTU)
- Approximate Low Berm Location
- Vegetated Areas

PSPC: Public Services and Procurement Canada

0 10 20 metres

1:600 (at original document size of 8.5x11)

Notes

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[A] Nunavut Water Board License No. 1BR-RLF1520 requirements for effluent discharted from a sump at the Landfarm Facility, Part D, Item 6.

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

Stantec

Project Location
Cornwallis Island, Nunavut

110220180
Prepared by DJ on 2019-25-09
Quality Review by LVN on 2019-25-09
Approved by TS on 2019-09-25

Client/Project
PSPC for Transport Canada
2018 Environmental Monitoring Program
Resolute Bay Airport Land Treatment Unit

Figure No.
5

Title
Site Plan Showing LTU 2 Observed Liner and Berm Deficiencies

\\Cd1001-c200.workgroup.\1102\active\110220370\gis\Figures\Fig_5_liner_condition_site_ltu2.mxd Revised: 2019-10-24 By: djenkins

APPENDIX B

Laboratory Review of QA/QC Plan

2019/10/21

Stantec
10160 112 Street
Edmonton AB T5K 2L6 CA

Attn: Lindsay van Noortwyk , Associate / Project Manager

Re: Resolute Bay Airport LTU Sampling Plan (as provided by Stantec)

Dear Ms van Noortwyk

As requested, Bureau Veritas Laboratories has reviewed the Resolute Airport LTU Sampling Plan (appended). In our opinion the Plan meets the CCME requirements for field QC, including field and trip blanks for BTEX. .

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

4606 Canada Way
Burnaby, British Columbia V5G 1K5
Tel: +1 604 734-7276

Source	Location	Laboratory Analysis
Groundwater	MW1 MW2 MW3 MW5 Field Duplicate Trip Blank Field Blank	Total Suspended Solids (TSS) Polycyclic Aromatic Hydrocarbons (PAH) Benzene, toluene, ethylbenzene, xylenes (BTEX) Total extractable hydrocarbons (TEH) Oil and Grease Total Phenols Total Metals (aluminum, cadmium, copper, lead, nickel, silver, zinc, arsenic, cobalt, iron, molybdenum, selenium, titanium) Routine parameters (total hardness, conductivity, calcium, sodium, chloride, magnesium, potassium, sulphate, total alkalinity, nitrate-nitrite, ammonia nitrogen, and pH)
Surface Water	4 locations around the perimeter of LTU 2 Field Duplicate	BTEX TEH Routine Parameters (including fertilizer) Note: If monitoring wells are noted as dry, surface water samples will be submitted for groundwater parameter analysis.
Surface Soil	4 locations around the perimeter of LTU 2 Field Duplicate	BTEX* PHC fractions 1 through 4 (PHC F1-F4) Nutrients (nitrogen, phosphorous, potassium)
LTU	1 location from 0.45-0.6 metres below ground surface within LTU 2	Nutrients (nitrogen, phosphorous, potassium)
Data Gap / Risk Assessment	LTU 2 (> 5 cm, ideally 45-60 cm depth). 7 locations around perimeter of LTUs Background Field Duplicate	BTEX, PHC F1-F4, PHC aliphatic/aromatic subfraction analysis (sample from LTU2 only)

4606 Canada Way
Burnaby, British Columbia V5G 1K5
Tel: +1 604 734-7276

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
> jackie.barker@tc.gc.ca / Tél : 204-979-1739 / ATS : 1-888-675-6863

APPENDIX D

Applicable Standards and Guidelines

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.

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
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*

APPENDIX E

Tables

Table 1 - Summary of Groundwater Monitoring Results
2019 Environmental Monitoring Program
Resolute Bay Airport, Land Treatment Unit
Public Services and Procurement Canada for Transport Canada
110220370

Monitoring Well ID	Date	Well Condition	CHV (ppm)	Top of Casing (m AGS)	Water Level (m BGS)	Total Depth (m BTOC)
MW1	26-Jul-19	Good (no repairs required)	15	0.71	0.906	0.916
MW2	26-Jul-19	Good (no repairs required)	25	0.77	1.181	1.188
MW3	26-Jul-19	Dry (no repairs required)	25	0.79	Dry	1.236
MW4*	26-Jul-19	Confirmed Heaved (remove from program / decommission)	-	-	-	-
MW5	26-Jul-19	Good (A bailer that was frozen into the well was removed, no further repairs required)	20	0.87	1.301	1.327
MW6*	26-Jul-19	Confirmed Heaved (remove from program / decommission)	-	-	-	-

Notes:
*Well was heaved so the screen was above the surface; therefore, groundwater monitoring and sampling was not completed.

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

Table 2 - Summary of Surface Water Analytical Results (NWB Licence Parameters)
2019 Environmental Monitoring Program
Resolute Bay Airport Land Treatment Unit
Cornwallis Island, Nunavut
110220370

Sample Location				SW1		SW2		SW3				SW4	EQUIPMENT RINSATE BLANK		TRIP BLANK	
Sample Date				26-Jul-19	26-Jul-19	26-Jul-19	26-Jul-19	26-Jul-19	26-Jul-19		26-Jul-19 QC19-01 Lab-Dup	26-Jul-19	26-Jul-19	26-Jul-19 QC19-03 Lab-Dup	26-Jul-19	26-Jul-19 QC19-02 Lab-Dup
Sample ID		CCME CWQG for Protection of Freshwater Aquatic Life	MECP Ontario SCS, Table 3: Full Depth Generic SCS in a Non-Potable Groundwater Condition	SW1	SW1 Lab-Dup	SW2	SW2 Lab-Dup	SW3	QC19-01			SW4	QC19-03		QC19-02	
Sampling Company				STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC			STANTEC	STANTEC	STANTEC	STANTEC	STANTEC
Laboratory				BV	BV	BV	BV	BV	BV			BV	BV	BV	BV	BV
Laboratory Work Order				B9K9571	B9K9571	B9K9571	B9K9571	B9K9571	B9K9571			B9K9571	B9K9571	B9K9571	B9K9571	B9K9571
Laboratory Sample ID				KJW017	KJW017	KJW018	KJW018	KJW019	KJW021			KJW020	KJW023	KJW023	KJW022	KJW022
Sample Type	Units				Lab Replicate		Lab Replicate		Field Duplicate	RPD (%)	Lab Replicate		Field Blank	Lab Replicate	Trip Blank	Lab Replicate
Total Suspended Solids	mg/L	$_{SN}$[F]	n/v	2	-	13	16	<1	2	nc	2	16	<1	<1	<1	-
pH, lab	S.U.	6.5-9.0[B]	n/v	8.71	8.76	7.87	-	7.96	8.03	nc	-	8.38	**5.85**[BD]	-	**6.27**[B]	-
Hardness (as CaCO3)	mg/L	n/v	n/v	188	-	96.3	-	174	173	1%	-	153	<0.50	-	<0.50	-
Alkalinity, Total (as CaCO3)	mg/L	n/v	n/v	180	180	110	-	180	180	0%	-	140	<1.0	-	1.4	-
Electrical Conductivity, Lab	mS/cm	n/a[C]	n/v	0.364	0.367	0.215	-	0.345	0.349	1%	-	0.292	<0.001	-	<0.001	-
Nitrate + Nitrite (as N)	mg/L	n/v	n/v	<0.10	-	<0.10	<0.10	0.11	0.12	nc	0.12	0.31	<0.10	-	<0.10	-
Nitrate (as N)	mg/L	124[A] 3.0[B]	n/v	<0.10	-	<0.10	<0.10	<0.10	<0.10	nc	<0.10	0.30	<0.10	-	<0.10	-
Nitrite (as N)	mg/L	0.06[B]	n/v	<0.010	-	<0.010	<0.010	0.032	0.033	nc	0.033	0.010	<0.010	-	<0.010	-
Ammonia (as N)	mg/L	0.86$_{TCC}$[B]	n/v	0.051	-	<0.050	-	0.48	0.46	4%	-	0.12	<0.050	-	0.063	-
Chloride	mg/L	640[A] 120[B]	2,300[C]	13	-	4.3	-	4.9	4.7	nc	-	6.3	<1.0	-	<1.0	-
Oil and Grease, Total	mg/L	n/v	n/v	0.80	-	<0.50	-	<0.50	<0.50	nc	-	0.70	<0.50	-	<0.50	-
Phenol	µg/L	4[B]	12,000[C]	<0.5	-	<0.5	-	<0.5	<0.5	nc	-	<0.5	<0.5	-	<0.5	-
Calcium	mg/L	n/v	n/v	30.9	-	24.0	-	46.6	47.0	1%	-	34.5	<0.050	-	<0.050	-
Magnesium	mg/L	n/v	n/v	26.9	-	8.82	-	13.9	13.5	3%	-	16.1	<0.050	-	<0.050	-
Sodium	mg/L	n/v	n/v	11.4	-	6.46	-	4.84	4.72	3%	-	7.37	<0.050	-	<0.050	-
Potassium	mg/L	n/v	n/v	1.57	-	1.05	-	1.67	1.63	2%	-	3.17	<0.050	-	<0.050	-
Sulfate	mg/L	n/v	n/v	11	-	2.9	-	1.7	1.7	nc	-	6.0	<1.0	-	<1.0	-
Metals																
Aluminum	µg/L	100$_{VAR1}$[B]	n/v	15.6	-	13.7	-	7.1	7.4	nc	-	**138**[B]	<3.0	-	<3.0	<3.0
Arsenic	µg/L	5[B]	n/v	1.39	-	0.12	-	0.33	0.32	nc	-	0.63	<0.10	-	<0.10	<0.10
Cadmium	µg/L	2.0$_{STB}$[A] 0.15$_{LTG}$[B]	n/v	<0.010	-	<0.010	-	0.014	0.018	nc	-	0.012	<0.010	-	<0.010	<0.010
Cobalt	µg/L	n/v	n/v	0.64	-	<0.20	-	<0.20	<0.20	nc	-	0.31	<0.20	-	<0.20	<0.20
Copper	µg/L	2.23$_{LTG}$[B]	n/v	1.59	-	<0.50	-	<0.50	<0.50	nc	-	1.28	<0.50	-	<0.50	<0.50
Iron	µg/L	300[B]	n/v	287	-	<10	-	12	12	nc	-	191	<10	-	<10	<10
Lead	µg/L	3.03$_{LTG}$[B]	n/v	**11.5**[B]	-	<0.20	-	**6.89**[B]	**7.02**[B]	2%	-	2.17	<0.20	-	<0.20	<0.20
Molybdenum	µg/L	73[B]	n/v	1.1	-	1.0	-	1.3	1.3	nc	-	<1.0	<1.0	-	<1.0	<1.0
Nickel	µg/L	92.88$_{LTG}$[B]	n/v	6.8	-	<1.0	-	<1.0	<1.0	nc	-	2.0	<1.0	-	<1.0	<1.0
Selenium	µg/L	1[B]	n/v	0.37	-	<0.10	-	0.12	0.11	nc	-	0.13	<0.10	-	<0.10	<0.10
Silver	µg/L	0.25[B]	n/v	<0.020	-	<0.020	-	<0.020	<0.020	nc	-	<0.020	<0.020	-	<0.020 EJ	<0.020
Titanium	µg/L	n/v	n/v	<5.0	-	<5.0	-	<5.0	<5.0	nc	-	5.6	<5.0	-	<5.0	<5.0
Zinc	µg/L	37$_{STB2}$[A] 7.0$_{LTG2}$[B]	n/v	<5.0	-	<5.0	-	<5.0	<5.0	nc	-	<5.0	<5.0	-	<5.0	<5.0
Total Extractable Hydrocarbons																
PHC F1 (C6-C10 range)	µg/L	n/v	$_{s1}$[C]	110	100	<25	-	34	33	nc	-	<25	<25	-	<25	-
PHC F1 (C6-C10 range) minus BTEX	µg/L	n/v	750$_{s1}$[C]	110	99	<25	-	26	26	nc	-	<25	<25	-	<25	-
PHC F2 (>C10-C16 range)	µg/L	n/v	150$_{s15}$[C]	120	-	<100	-	<100	<100	nc	-	<100	<100	-	<100	-
Polycyclic Aromatic Hydrocarbons																
Acenaphthene	µg/L	5.8[B]	600[C]	<0.10	-	<0.10	-	<0.10	<0.10	nc	-	<0.10	<0.10	-	<0.10	-
Acenaphthylene	µg/L	n/v	1.8[C]	<0.10	-	<0.10	-	<0.10	<0.10	nc	-	<0.10	<0.10	-	<0.10	-
Acridine	µg/L	4.4[B]	n/v	<0.040	-	<0.040	-	<0.040	<0.040	nc	-	<0.040	<0.040	-	<0.040	-
Anthracene	µg/L	0.012[AB]	2.4[C]	<0.010	-	<0.010	-	<0.010	<0.010	nc	-	<0.010	<0.010	-	<0.010	-
Benzo(a)anthracene	µg/L	0.018[B]	4.7[C]	<0.0085	-	<0.0085	-	<0.0085	<0.0085	nc	-	<0.0085	<0.0085	-	<0.0085	-
Benzo(a)pyrene	µg/L	0.015[B]	0.81[C]	<0.0075	-	<0.0075	-	<0.0075	<0.0075	nc	-	<0.0075	<0.0075	-	<0.0075	-
Benzo(a)pyrene Total Potency Equivalents	µg/L	n/v	n/v	<0.010	-	<0.010	-	<0.010	<0.010	nc	-	<0.010	<0.010	-	<0.010	-
Benzo(b)pyridine (Quinoline)	µg/L	3.4[B]	n/v	<0.20	-	<0.20	-	<0.20	<0.20	nc	-	<0.20	<0.20	-	<0.20	-
Benzo(b)fluoranthene	µg/L	n/v	0.75$_{s2}$[C]	<0.0085	-	<0.0085	-	<0.0085	<0.0085	nc	-	<0.0085	<0.0085	-	<0.0085	-
Benzo(c)phenanthrene	µg/L	n/v	n/v	<0.050	-	<0.050	-	<0.050	<0.050	nc	-	<0.050	<0.050	-	<0.050	-
Benzo(e)pyrene	µg/L	n/v	n/v	<0.050	-	<0.050	-	<0.050	<0.050	nc	-	<0.050	<0.050	-	<0.050	-
Benzo(g,h,i)perylene	µg/L	n/v	0.2[C]	<0.0085	-	<0.0085	-	<0.0085	<0.0085	nc	-	<0.0085	<0.0085	-	<0.0085	-
Benzo(k)fluoranthene	µg/L	n/v	0.4[C]	<0.0085	-	<0.0085	-	<0.0085	<0.0085	nc	-	<0.0085	<0.0085	-	<0.0085	-
Chrysene	µg/L	n/v	1[C]	<0.0085	-	<0.0085	-	<0.0085	<0.0085	nc	-	<0.0085	<0.0085	-	<0.0085	-
Dibenzo(a,h)anthracene	µg/L	n/v	0.52[C]	<0.0075	-	<0.0075	-	<0.0075	<0.0075	nc	-	<0.0075	<0.0075	-	<0.0075	-
Fluoranthene	µg/L	0.04[B]	130[C]	<0.010	-	<0.010	-	<0.010	<0.010	nc	-	<0.010	<0.010	-	<0.010	-
Fluorene	µg/L	3[B]	400[C]	<0.050	-	<0.050	-	<0.050	<0.050	nc	-	<0.050	<0.050	-	<0.050	-
Indeno(1,2,3-cd)pyrene	µg/L	n/v	0.2[C]	<0.0085	-	<0.0085	-	<0.0085	<0.0085	nc	-	<0.0085	<0.0085	-	<0.0085	-
Methylnaphthalene, 1-	µg/L	n/v	$_{s3}$[C]	<0.10	-	<0.10	-	0.13	0.14	nc	-	<0.10	<0.10	-	<0.10	-
Methylnaphthalene, 2-	µg/L	n/v	$_{s3}$[C]	<0.10	-	<0.10	-	0.11	0.11	nc	-	<0.10	<0.10	-	<0.10	-
Naphthalene	µg/L	1.1[B]	1,400[C]	<0.10	-	<0.10	-	0.11	0.13	nc	-	<0.10	<0.10	-	<0.10	-
Perylene	µg/L	n/v	n/v	<0.050	-	<0.050	-	<0.050	<0.050	nc	-	<0.050	<0.050	-	<0.050	-
Phenanthrene	µg/L	0.4[B]	580[C]	<0.050	-	<0.050	-	<0.050	<0.050	nc	-	<0.050	<0.050	-	<0.050	-
Pyrene	µg/L	0.025[B]	68[C]	<0.020	-	<0.020	-	<0.020	<0.020	nc	-	<0.020	<0.020	-	<0.020	-
Bezene, Toluene, Ethylbenzene, Xylene (BTEX)																
Benzene	µg/L	370[B]	44[C]	<0.20	<0.20	<0.20	-	0.47	0.43	nc	-	<0.20	<0.20	-	<0.20	-
Toluene	µg/L	2[B]	18,000[C]	<0.20	<0.20	<0.20	-	**3.6**[BD]	**3.6**[BD]	0%	-	<0.20	<0.20	-	<0.20	-
Ethylbenzene	µg/L	90[B]	2,300[C]	<0.20	<0.20	<0.20	-	<0.20	<0.20	nc	-	<0.20	<0.20	-	<0.20	-
Xylene, m & p-	µg/L	n/v	$_{s1}$[C]	0.73	0.65	<0.40	-	1.3	1.2	nc	-	<0.40	<0.40	-	<0.40	-
Xylene, o-	µg/L	n/v	$_{s1}$[C]	0.29	0.30	<0.20	-	2.4	2.2	9%	-	<0.20	<0.20	-	<0.20	-
Xylenes, Total	µg/L	n/v	4,200$_{s1}$[C]	1.0	0.95	<0.40	-	3.6	3.5	3%	-	<0.40	<0.40	-	<0.40	-

Notes:

CCME	Canadian Council of Ministers of the Environment
CWQG	Canadian Water Quality Guidelines
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 Ministery of the Environment, Conservation and Parks
Ontario SCS	Soil, Ground Water and Sediment Standards for Use under Part XV.I of the Environmental Protection Act (MOE, 2011) Site Condition Standards (SCS)
SCS	Site Condition Standards
C	Table 3 - All Types of Property Use - Coarse Textured Soils
NWB	Nunavut Water Board License No. 1BR-RLF1520
SN	see Narrative
n/a	Not applicable.
LTG2	The long term exposure guideline for zinc is calculated based on hardness (CaCO3) and dissolved organic carbon (DOC), because DOC concentrations were not available, the LTG provided in the CCME Summary table was applied.
-	Parameter not analyzed / not available.
15.2	Measured concentration did not exceed the indicated standard.
TBC1	Value is minimum value available. Sample-specific value to be calculated (equation).
EJ	Matrix Spike outside acceptance criteria due to sample matrix interference.
LTG	The long term exposure guideline was calculated using a water hardness as CaCO3 of 96.3 mg/L.
MI	Detection limit was raised due to matrix interferences.
61%	RPD exceeds data quality objective of 40%.
mg/L	Milligrams per litre
S.U.	Standard units
s7	Standard is applicable to PHC in the F1 range minus BTEX.
n/v	No standard/guideline value.
s2	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.
s1	Standard is applicable to total xylenes, and m & p-xylenes and o-xylenes should be summed for comparison.
s3	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.
TBC2	The total amonia as N quideline was calcuaged by mutiplying the total amonia as NH3 guideline by 0.8224. The NH3 guideline was calcuated usinq an estimated temprature of 10°C and a pH of 8.0.
VAR1	Variable, 5 µg/L if pH < 6.5 and 100 µg/L if pH > 6.5
s15	Standard is applicable to PHC in the F2 range minus naphthalene. If naphthalene was not analyzed, the standard is applied to F2.
RPD	Relative Percent Difference.
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 detection limit.
ug/L	Micrograms per litre

Stantec

Table 3 - GPS Locations of Monitoring Wells, Sample Locations, and Site Features
2019 Environmental Monitoring Program
Resolute Bay Airport, Land Treatment Unit
Public Services and Procurement Canada for Transport Canada
110220370

Description	Easting	Northing
SW1	441197	8295864
SW2	441164	8295899
SW3	441220	8295871
SW4	441235	8295802
MW1	441209	8295897
MW2	441147	8295871
MW3	441155	8295854
MW4	441424	8295902
MW5	441237	8295809
MW6	441254	8295814
Soil bag	441177	8295853
Soil pile	441203	8295881
North boundary between LTU 1 Zone 2 and 3	441158	8295891
North boundary between LTU 1 Zone 1 and 2	441152	8295888
South boundary between LTU 1 Zone 1 and 2	441168	8295853
South boundary between LTU 1 Zone 2 and 3	441174	8295858
Pooling water in north portion of LTU2	441241	8295896
Boundary of low area against berm where water could potentially pond (south berm of LTU 2)	441235	8295817
Boundary of low area against berm where water could potentially pond (south berm of LTU 2)	441249	8295821
Low area where water could pool against perm in LTU1 zone 1	441151	8295886
Low area where water could pool against perm in LTU1 zone 2	441155	8295889
Liner tear 1	441193	8295908
Liner tear 2	441146	8295887
Liner tear 3	441147	8295884
Liner tear 4	441210	8295879
Liner tear 5	441206	8295886
Liner tear 6	441204	8295893
Liner tear 7	441238	8295900
Liner tear 8	441224	8295881
Liner tear 9	441225	8295864
Liner tear 10	441228	8295858
Liner tear 11	441247	8295818
Liner tear 12	441249	8295885
Liner tear 13	441247	8295897
Liner tear 14	441249	8295894
Liner tear 15	441248	8295891
Liner tear 16	441249	8295889
Liner tear 17	441250	8295888
Waste barrel	441204	8295826
North extent of low berm to north of approach in LTU2	441226	8295859
South extent of low berm to north of approach in LTU2	441226	8295841
North extent of low berm to south of approach in LTU2	441225	8295835
South extent of low berm to south of approach in LTU2	441226	8295823
Nort extent of low berm in LTU1 west edge (south extent is the SW corner)	441154	8295870

Notes:
Lattitude / Longitude expressed per NAD 83, Zone 15X
GPS Model: garmin GPSMAP 62 So
Estimated Accuracy: ±5m

APPENDIX F

Photographic Log

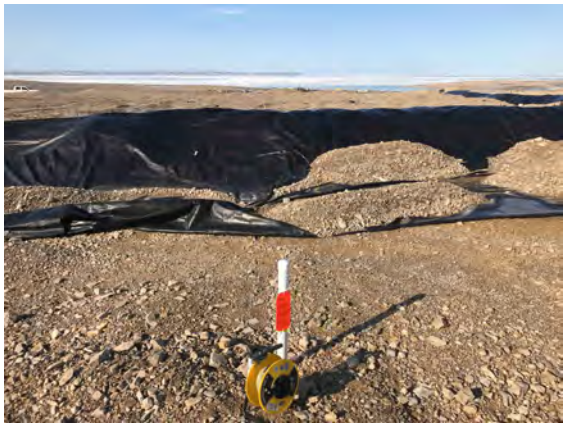

Photo 1 View of MW1 looking west

Photo 2 View of MW2 looking east

Photo 3 View of MW3 looking east

Photo 4 View of MW4 looking west(heaved well screen is visible)

Photo 5 Bailer removed from MW5

Photo 6 MW6 (heaved well screen is visible)

Photo 7 View of SW1 looking east

Photo 8 View of SW2 looking west

Photo 9 View of SW3 looking east

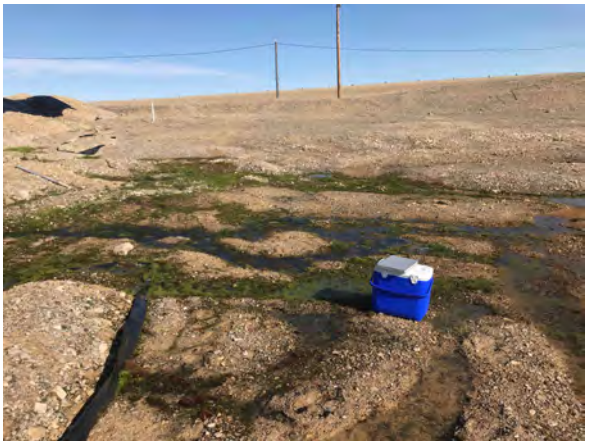

Photo 10 View of SW4 looking east

Photo 11 View of accumulated surface water in LTU 2 (along east berm) looking south (Liner Deficiency 20)

Photo 12 View of vegetated area south of LTU 2 looking southwest

Photo 13 Liner tears near north corner of LTU 1 (Liner Deficiency 1)

Photo 14 Liner tears near northwest corner of LTU 1 (Liner Deficiency 2)

Photo 15 Liner tears near northwest corner of LTU 1 (Liner Deficiency 3)

Photo 16 Liner tears near southeast corner of LTU 1 (Liner Deficiency 4)

Photo 17 Liner tear north of southeast corner of LTU 1 (Liner Deficiency 5)

Photo 18 Liner tear north of southeast corner of LTU 1 (Liner Deficiency 6)

Photo 19 Liner tear 11.5 west of the northeast corner of LTU 2 (Liner Deficiency 7)

Photo 20 Liner Tear 13 m south of northwest corner of LTU 2 (Liner Deficiency 8)

Photo 21 Liner tears 32 m south of northwest corner of LTU 2 (Liner Deficiency 10)

Photo 22 Liner tears 16-17 m east of southwest corner of LTU 2 (Liner Deficiency 11)

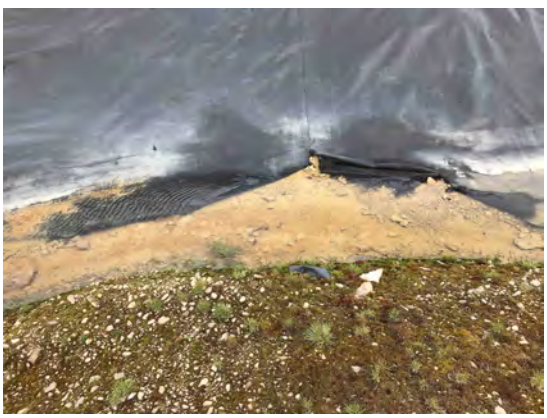

Photo 23 Liner tear 13-17 m south of northeast corner of LTU 2 (Liner Deficiency 12)

Photo 24 Liner tears 2-2.5 m south of northeast corner of LTU 2 (Liner Deficiency 13)

Photo 25 Liner tear 5 m south of northeast corner of LTU 2 (Liner Deficiency 14)

Photo 26 Liner tears 7 m south of northeast corner of LTU 2 (Liner Deficiency 15)

Photo 27 Liner tear 9 m south of northeast corner of LTU 2 (Liner Deficiency 16)

Photo 28 Liner tears 11 m south of northeast corner of LTU 2 (Liner Deficiency 17)

Photo 29 West view of low berm area south of access to LTU 2 on west berm (Liner Deficiency 18)

Photo 30 North view of low berm north of access to LTU 2 on west berm (Liner Deficiency 19)

APPENDIX G

Copies of Laboratory Analytical Results

Your Project #: 110220370
Your C.O.C. #: 727759-01-01

Attention: Lindsay Van Noortwyk

Stantec Consulting Ltd
PO Box 1680
Yellowknife, NT
CANADA X1A2P3

Report Date: 2019/08/08
Report #: R5831434
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9K9571
Received: 2019/07/30, 11:50

Sample Matrix: Water
Samples Received: 7

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Alkalinity (1)	7	N/A	2019/07/31	CAM SOP-00448	SM 23 2320 B m
Chloride by Automated Colourimetry (1)	7	N/A	2019/08/01	CAM SOP-00463	SM 4500-Cl E m
Conductivity (1)	7	N/A	2019/07/31	CAM SOP-00414	SM 23 2510 m
Acid Extractables by GC/MS (1)	7	2019/07/31	2019/08/01	CAM SOP-00332	EPA 8270 m
Petroleum Hydro. CCME F1 & BTEX in Water (1)	7	N/A	2019/08/02	CAM SOP-00315	CCME PHC-CWS m
Petroleum Hydrocarbons F2-F4 in Water (1, 4)	7	2019/08/02	2019/08/02	CAM SOP-00316	CCME PHC-CWS m
Hardness Total (calculated as CaCO3) (2, 5)	6	N/A	2019/08/02	BBY WI-00033	Auto Calc
Hardness Total (calculated as CaCO3) (2, 5)	1	N/A	2019/08/08	BBY WI-00033	Auto Calc
Na, K, Ca, Mg, S by CRC ICPMS (total) (2)	6	2019/07/31	2019/08/02	BBY7SOP-00002	EPA 6020B R2 m
Na, K, Ca, Mg, S by CRC ICPMS (total) (2)	1	2019/08/07	2019/08/08	BBY7SOP-00002	EPA 6020B R2 m
Elements by CRC ICPMS (total) (2)	6	2019/08/01	2019/08/02	BBY7SOP-00003/02	EPA 6020B R2 m
Elements by CRC ICPMS (total) (2)	1	2019/08/08	2019/08/08	BBY7SOP-00003/02	EPA 6020B R2 m
B[a]P Total Potency Equivalent (3, 6)	7	N/A	2019/08/06		CCME
PAH in Water by GC/MS (3)	7	2019/08/01	2019/08/02	AB SOP-00037/AB SOP-00003	EPA 3510C/8270E m
Total Ammonia-N (1)	1	N/A	2019/08/01	CAM SOP-00441	USGS I-2522-90 m
Total Ammonia-N (1)	6	N/A	2019/08/02	CAM SOP-00441	USGS I-2522-90 m
Nitrate (NO3) and Nitrite (NO2) in Water (1, 7)	7	N/A	2019/08/01	CAM SOP-00440	SM 23 4500-NO3I/NO2B
Total Oil and Grease (1)	7	2019/08/06	2019/08/06	CAM SOP-00326	EPA1664B m,SM5520A m
pH (1)	7	2019/07/31	2019/07/31	CAM SOP-00413	SM 4500H+ B m
Sulphate by Automated Colourimetry (1)	7	N/A	2019/08/01	CAM SOP-00464	EPA 375.4 m
Low Level Total Suspended Solids (1)	1	2019/07/31	2019/08/01	CAM SOP-00428	SM 23 2540D m
Low Level Total Suspended Solids (1)	1	2019/08/01	2019/08/01	CAM SOP-00428	SM 23 2540D m
Low Level Total Suspended Solids (1)	5	2019/08/01	2019/08/02	CAM SOP-00428	SM 23 2540D 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

Your Project #: 110220370
Your C.O.C. #: 727759-01-01

Attention: Lindsay Van Noortwyk

Stantec Consulting Ltd
PO Box 1680
Yellowknife, NT
CANADA X1A2P3

Report Date: 2019/08/08
Report #: R5831434
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9K9571
Received: 2019/07/30, 11:50

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 Bureau Veritas Laboratories Mississauga
(2) This test was performed by Campo to Burnaby - Offsite
(3) This test was performed by Campo to Edm Env - Offsite
(4) All CCME PHC results met required criteria unless otherwise stated in the report. The CWS PHC methods employed by Bureau Veritas Laboratories conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following “Alberta Environment’s Interpretation of the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil Validation of Performance-Based Alternative Methods September 2003”. Documentation is available upon request. Modifications from Reference Method for the Canada-wide Standard for Petroleum Hydrocarbons in Soil-Tier 1 Method: F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction.
(5) "Total Hardness" was calculated from Total Ca and Mg concentrations and may be biased high (Hardness, or Dissolved Hardness, calculated from Dissolved Ca and Mg, should be used for compliance if available).
(6) 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.
(7) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Augustyna Dobosz, Project Manager
Email: Augustyna.Dobosz@bvlabs.com
Phone# (905)817-5798
==========
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 #: B9K9571
Report Date: 2019/08/08

Stantec Consulting Ltd
Client Project #: 110220370
Sampler Initials: LA

RESULTS OF ANALYSES OF WATER

BV Labs ID		KJW017			KJW017			KJW018		
Sampling Date		2019/07/26 14:15			2019/07/26 14:15			2019/07/26 14:28		
COC Number		727759-01-01			727759-01-01			727759-01-01		
	UNITS	SW1	RDL	QC Batch	SW1 Lab-Dup	RDL	QC Batch	SW2	RDL	QC Batch
Inorganics										
Total Ammonia-N	mg/L	0.051	0.050	6259301				<0.050	0.050	6259284
Conductivity	mS/cm	0.364	0.001	6257839	0.367	0.001	6257839	0.215	0.001	6257839
pH	pH	8.71		6257840	8.76		6257840	7.87		6257840
Total Suspended Solids	mg/L	2	1	6259082				13	1	6259082
Dissolved Sulphate (SO4)	mg/L	11	1.0	6257871				2.9	1.0	6258017
Alkalinity (Total as CaCO3)	mg/L	180	1.0	6257838	180	1.0	6257838	110	1.0	6257838
Dissolved Chloride (Cl-)	mg/L	13	1.0	6257850				4.3	1.0	6258016
Nitrite (N)	mg/L	<0.010	0.010	6257874				<0.010	0.010	6257874
Nitrate (N)	mg/L	<0.10	0.10	6257874				<0.10	0.10	6257874
Nitrate + Nitrite (N)	mg/L	<0.10	0.10	6257874				<0.10	0.10	6257874
Metals										
Total Aluminum (Al)	ug/L	15.6	3.0	6262200				13.7	3.0	6262200
Total Arsenic (As)	ug/L	1.39	0.10	6262200				0.12	0.10	6262200
Total Cadmium (Cd)	ug/L	<0.010	0.010	6262200				<0.010	0.010	6262200
Total Cobalt (Co)	ug/L	0.64	0.20	6262200				<0.20	0.20	6262200
Total Copper (Cu)	ug/L	1.50	0.50	6262200				<0.50	0.50	6262200
Total Iron (Fe)	ug/L	287	10	6262200				<10	10	6262200
Total Lead (Pb)	ug/L	11.5	0.20	6262200				<0.20	0.20	6262200
Total Molybdenum (Mo)	ug/L	1.1	1.0	6262200				1.0	1.0	6262200
Total Nickel (Ni)	ug/L	6.8	1.0	6262200				<1.0	1.0	6262200
Total Selenium (Se)	ug/L	0.37	0.10	6262200				<0.10	0.10	6262200
Total Silver (Ag)	ug/L	<0.020	0.020	6262200				<0.020	0.020	6262200
Total Titanium (Ti)	ug/L	<5.0	5.0	6262200				<5.0	5.0	6262200
Total Zinc (Zn)	ug/L	<5.0	5.0	6262200				<5.0	5.0	6262200
Total Calcium (Ca)	mg/L	30.9	0.050	6262244				24.0	0.050	6262244
Total Magnesium (Mg)	mg/L	26.9	0.050	6262244				8.82	0.050	6262244
Total Potassium (K)	mg/L	1.57	0.050	6262244				1.05	0.050	6262244
Total Sodium (Na)	mg/L	11.4	0.050	6262244				6.46	0.050	6262244
Petroleum Hydrocarbons										
Total Oil & Grease	mg/L	0.80	0.50	6264305				<0.50	0.50	6264305

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

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

BV Labs Job #: B9K9571
Report Date: 2019/08/08

Stantec Consulting Ltd
Client Project #: 110220370
Sampler Initials: LA

RESULTS OF ANALYSES OF WATER

BV Labs ID		KJW018			KJW019		KJW020		
Sampling Date		2019/07/26 14:28			2019/07/26 14:50		2019/07/26 15:20		
COC Number		727759-01-01			727759-01-01		727759-01-01		
	UNITS	SW2 Lab-Dup	RDL	QC Batch	SW3	QC Batch	SW4	RDL	QC Batch
Inorganics									
Total Ammonia-N	mg/L				0.48	6259301	0.12	0.050	6259301
Conductivity	mS/cm				0.345	6257839	0.292	0.001	6257839
pH	pH				7.96	6257840	8.38		6257840
Total Suspended Solids	mg/L	16	1	6259082	<1	6259082	16	1	6259082
Dissolved Sulphate (SO4)	mg/L				1.7	6257871	6.0	1.0	6257871
Alkalinity (Total as CaCO3)	mg/L				180	6257838	140	1.0	6257838
Dissolved Chloride (Cl-)	mg/L				4.9	6257850	6.3	1.0	6257850
Nitrite (N)	mg/L	<0.010	0.010	6257874	0.032	6257874	0.010	0.010	6257833
Nitrate (N)	mg/L	<0.10	0.10	6257874	<0.10	6257874	0.30	0.10	6257833
Nitrate + Nitrite (N)	mg/L	<0.10	0.10	6257874	0.11	6257874	0.31	0.10	6257833
Metals									
Total Aluminum (Al)	ug/L				7.1	6262200	138	3.0	6262200
Total Arsenic (As)	ug/L				0.33	6262200	0.63	0.10	6262200
Total Cadmium (Cd)	ug/L				0.014	6262200	0.012	0.010	6262200
Total Cobalt (Co)	ug/L				<0.20	6262200	0.31	0.20	6262200
Total Copper (Cu)	ug/L				<0.50	6262200	1.28	0.50	6262200
Total Iron (Fe)	ug/L				12	6262200	191	10	6262200
Total Lead (Pb)	ug/L				6.89	6262200	2.17	0.20	6262200
Total Molybdenum (Mo)	ug/L				1.3	6262200	<1.0	1.0	6262200
Total Nickel (Ni)	ug/L				<1.0	6262200	2.0	1.0	6262200
Total Selenium (Se)	ug/L				0.12	6262200	0.13	0.10	6262200
Total Silver (Ag)	ug/L				<0.020	6262200	<0.020	0.020	6262200
Total Titanium (Ti)	ug/L				<5.0	6262200	5.6	5.0	6262200
Total Zinc (Zn)	ug/L				<5.0	6262200	<5.0	5.0	6262200
Total Calcium (Ca)	mg/L				46.6	6262244	34.5	0.050	6262244
Total Magnesium (Mg)	mg/L				13.9	6262244	16.1	0.050	6262244
Total Potassium (K)	mg/L				1.67	6262244	3.17	0.050	6262244
Total Sodium (Na)	mg/L				4.84	6262244	7.37	0.050	6262244
Petroleum Hydrocarbons									
Total Oil & Grease	mg/L				<0.50	6264305	0.70	0.50	6264305

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

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

BV Labs Job #: B9K9571
Report Date: 2019/08/08

Stantec Consulting Ltd
Client Project #: 110220370
Sampler Initials: LA

RESULTS OF ANALYSES OF WATER

BV Labs ID		KJW021			KJW021			KJW022		
Sampling Date		2019/07/26 14:52			2019/07/26 14:52			2019/07/26 14:55		
COC Number		727759-01-01			727759-01-01			727759-01-01		
	UNITS	QC19-01	RDL	QC Batch	QC19-01 Lab-Dup	RDL	QC Batch	QC19-02	RDL	QC Batch
Inorganics										
Total Ammonia-N	mg/L	0.46	0.050	6259301				0.063	0.050	6259301
Conductivity	mS/cm	0.349	0.001	6257839				<0.001	0.001	6257839
pH	pH	8.03		6257840				6.27		6257840
Total Suspended Solids	mg/L	2	1	6258889	2	1	6258889	<1	1	6259082
Dissolved Sulphate (SO4)	mg/L	1.7	1.0	6258017				<1.0	1.0	6258017
Alkalinity (Total as CaCO3)	mg/L	180	1.0	6257838				1.4	1.0	6257838
Dissolved Chloride (Cl-)	mg/L	4.7	1.0	6258016				<1.0	1.0	6258016
Nitrite (N)	mg/L	0.033	0.010	6257833	0.033	0.010	6257833	<0.010	0.010	6257874
Nitrate (N)	mg/L	<0.10	0.10	6257833	<0.10	0.10	6257833	<0.10	0.10	6257874
Nitrate + Nitrite (N)	mg/L	0.12	0.10	6257833	0.12	0.10	6257833	<0.10	0.10	6257874
Metals										
Total Aluminum (Al)	ug/L	7.4	3.0	6262200				<3.0	3.0	6270821
Total Arsenic (As)	ug/L	0.32	0.10	6262200				<0.10	0.10	6270821
Total Cadmium (Cd)	ug/L	0.018	0.010	6262200				<0.010	0.010	6270821
Total Cobalt (Co)	ug/L	<0.20	0.20	6262200				<0.20	0.20	6270821
Total Copper (Cu)	ug/L	<0.50	0.50	6262200				<0.50	0.50	6270821
Total Iron (Fe)	ug/L	12	10	6262200				<10	10	6270821
Total Lead (Pb)	ug/L	7.02	0.20	6262200				<0.20	0.20	6270821
Total Molybdenum (Mo)	ug/L	1.3	1.0	6262200				<1.0	1.0	6270821
Total Nickel (Ni)	ug/L	<1.0	1.0	6262200				<1.0	1.0	6270821
Total Selenium (Se)	ug/L	0.11	0.10	6262200				<0.10	0.10	6270821
Total Silver (Ag)	ug/L	<0.020	0.020	6262200				<0.020 (1)	0.020	6270821
Total Titanium (Ti)	ug/L	<5.0	5.0	6262200				<5.0	5.0	6270821
Total Zinc (Zn)	ug/L	<5.0	5.0	6262200				<5.0	5.0	6270821
Total Calcium (Ca)	mg/L	47.0	0.050	6262244				<0.050	0.050	6270820
Total Magnesium (Mg)	mg/L	13.5	0.050	6262244				<0.050	0.050	6270820
Total Potassium (K)	mg/L	1.63	0.050	6262244				<0.050	0.050	6270820
Total Sodium (Na)	mg/L	4.72	0.050	6262244				<0.050	0.050	6270820
Petroleum Hydrocarbons										
Total Oil & Grease	mg/L	<0.50	0.50	6264305				<0.50	0.50	6264305

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
(1) Matrix Spike outside acceptance criteria due to sample matrix interference.

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

BV Labs Job #: B9K9571
Report Date: 2019/08/08

Stantec Consulting Ltd
Client Project #: 110220370
Sampler Initials: LA

RESULTS OF ANALYSES OF WATER

BV Labs ID		KJW022			KJW023			KJW023		
Sampling Date		2019/07/26 14:55			2019/07/26 14:57			2019/07/26 14:57		
COC Number		727759-01-01			727759-01-01			727759-01-01		
	UNITS	QC19-02 Lab-Dup	RDL	QC Batch	QC19-03	RDL	QC Batch	QC19-03 Lab-Dup	RDL	QC Batch
Inorganics										
Total Ammonia-N	mg/L				<0.050	0.050	6259301			
Conductivity	mS/cm				<0.001	0.001	6257839			
pH	pH				5.85		6257840			
Total Suspended Solids	mg/L				<1	1	6257962	<1	1	6257962
Dissolved Sulphate (SO4)	mg/L				<1.0	1.0	6257871			
Alkalinity (Total as CaCO3)	mg/L				<1.0	1.0	6257838			
Dissolved Chloride (Cl-)	mg/L				<1.0	1.0	6257850			
Nitrite (N)	mg/L				<0.010	0.010	6257874			
Nitrate (N)	mg/L				<0.10	0.10	6257874			
Nitrate + Nitrite (N)	mg/L				<0.10	0.10	6257874			
Metals										
Total Aluminum (Al)	ug/L	<3.0	3.0	6270821	<3.0	3.0	6262200			
Total Arsenic (As)	ug/L	<0.10	0.10	6270821	<0.10	0.10	6262200			
Total Cadmium (Cd)	ug/L	<0.010	0.010	6270821	<0.010	0.010	6262200			
Total Cobalt (Co)	ug/L	<0.20	0.20	6270821	<0.20	0.20	6262200			
Total Copper (Cu)	ug/L	<0.50	0.50	6270821	<0.50	0.50	6262200			
Total Iron (Fe)	ug/L	<10	10	6270821	<10	10	6262200			
Total Lead (Pb)	ug/L	<0.20	0.20	6270821	<0.20	0.20	6262200			
Total Molybdenum (Mo)	ug/L	<1.0	1.0	6270821	<1.0	1.0	6262200			
Total Nickel (Ni)	ug/L	<1.0	1.0	6270821	<1.0	1.0	6262200			
Total Selenium (Se)	ug/L	<0.10	0.10	6270821	<0.10	0.10	6262200			
Total Silver (Ag)	ug/L	<0.020	0.020	6270821	<0.020	0.020	6262200			
Total Titanium (Ti)	ug/L	<5.0	5.0	6270821	<5.0	5.0	6262200			
Total Zinc (Zn)	ug/L	<5.0	5.0	6270821	<5.0	5.0	6262200			
Total Calcium (Ca)	mg/L				<0.050	0.050	6262244			
Total Magnesium (Mg)	mg/L				<0.050	0.050	6262244			
Total Potassium (K)	mg/L				<0.050	0.050	6262244			
Total Sodium (Na)	mg/L				<0.050	0.050	6262244			
Petroleum Hydrocarbons										
Total Oil & Grease	mg/L				<0.50	0.50	6264305			

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

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ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

BV Labs ID		KJW017	KJW018	KJW019	KJW020	KJW021		
Sampling Date		2019/07/26 14:15	2019/07/26 14:28	2019/07/26 14:50	2019/07/26 15:20	2019/07/26 14:52		
COC Number		727759-01-01	727759-01-01	727759-01-01	727759-01-01	727759-01-01		
	UNITS	SW1	SW2	SW3	SW4	QC19-01	RDL	QC Batch
Calculated Parameters								
Total Hardness (CaCO3)	mg/L	188	96.3	174	153	173	0.50	6262243

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

BV Labs ID		KJW022		KJW023		
Sampling Date		2019/07/26 14:55		2019/07/26 14:57		
COC Number		727759-01-01		727759-01-01		
	UNITS	QC19-02	QC Batch	QC19-03	RDL	QC Batch
Calculated Parameters						
Total Hardness (CaCO3)	mg/L	<0.50	6270819	<0.50	0.50	6262243

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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SEMI-VOLATILE ORGANICS BY GC-MS (WATER)

BV Labs ID		KJW017		KJW018		KJW019		KJW020		
Sampling Date		2019/07/26 14:15		2019/07/26 14:28		2019/07/26 14:50		2019/07/26 15:20		
COC Number		727759-01-01		727759-01-01		727759-01-01		727759-01-01		
	UNITS	SW1	RDL	SW2	RDL	SW3	RDL	SW4	RDL	QC Batch
Polyaromatic Hydrocarbons										
Benzo(a)pyrene Total Potency Equiv.	ug/L	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	6264920
Acenaphthene	ug/L	<0.10	0.10	<0.10	0.10	<0.10	0.10	<0.10	0.10	6264921
Acenaphthylene	ug/L	<0.10	0.10	<0.10	0.10	<0.10	0.10	<0.10	0.10	6264921
Acridine	ug/L	<0.040	0.040	<0.040	0.040	<0.040	0.040	<0.040	0.040	6264921
Anthracene	ug/L	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	6264921
Benzo(a)anthracene	ug/L	<0.0085	0.0085	<0.0085	0.0085	<0.0085	0.0085	<0.0085	0.0085	6264921
Benzo(b/j)fluoranthene	ug/L	<0.0085	0.0085	<0.0085	0.0085	<0.0085	0.0085	<0.0085	0.0085	6264921
Benzo(k)fluoranthene	ug/L	<0.0085	0.0085	<0.0085	0.0085	<0.0085	0.0085	<0.0085	0.0085	6264921
Benzo(g,h,i)perylene	ug/L	<0.0085	0.0085	<0.0085	0.0085	<0.0085	0.0085	<0.0085	0.0085	6264921
Benzo(c)phenanthrene	ug/L	<0.050	0.050	<0.050	0.050	<0.050	0.050	<0.050	0.050	6264921
Benzo(a)pyrene	ug/L	<0.0075	0.0075	<0.0075	0.0075	<0.0075	0.0075	<0.0075	0.0075	6264921
Benzo(e)pyrene	ug/L	<0.050	0.050	<0.050	0.050	<0.050	0.050	<0.050	0.050	6264921
Chrysene	ug/L	<0.0085	0.0085	<0.0085	0.0085	<0.0085	0.0085	<0.0085	0.0085	6264921
Dibenz(a,h)anthracene	ug/L	<0.0075	0.0075	<0.0075	0.0075	<0.0075	0.0075	<0.0075	0.0075	6264921
Fluoranthene	ug/L	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	6264921
Fluorene	ug/L	<0.050	0.050	<0.050	0.050	<0.050	0.050	<0.050	0.050	6264921
Indeno(1,2,3-cd)pyrene	ug/L	<0.0085	0.0085	<0.0085	0.0085	<0.0085	0.0085	<0.0085	0.0085	6264921
1-Methylnaphthalene	ug/L	<0.10	0.10	<0.10	0.10	0.13	0.10	<0.10	0.10	6264921
2-Methylnaphthalene	ug/L	<0.10	0.10	<0.10	0.10	0.11	0.10	<0.10	0.10	6264921
Naphthalene	ug/L	<0.10	0.10	<0.10	0.10	0.11	0.10	<0.10	0.10	6264921
Phenanthrene	ug/L	<0.050	0.050	<0.050	0.050	<0.050	0.050	<0.050	0.050	6264921
Perylene	ug/L	<0.050	0.050	<0.050	0.050	<0.050	0.050	<0.050	0.050	6264921
Pyrene	ug/L	<0.020	0.020	<0.020	0.020	<0.020	0.020	<0.020	0.020	6264921
Quinoline	ug/L	<0.20	0.20	<0.20	0.20	<0.20	0.20	<0.20	0.20	6264921
Phenolics										
2-Chlorophenol	ug/L	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	6257601
2,3,4,6-Tetrachlorophenol	ug/L	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	6257601
2,3,5-Trichlorophenol	ug/L	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	6257601
2,4-Dichlorophenol	ug/L	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	6257601
2,4-Dimethylphenol	ug/L	2	1	<1	1	<1	1	<1	1	6257601
2,4,6-Trichlorophenol	ug/L	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	6257601
2,6-Dichlorophenol	ug/L	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	6257601
4-Chloro-3-Methylphenol	ug/L	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	6257601
4-Nitrophenol	ug/L	<1	1	<1	1	<1	1	<1	1	6257601
m/p-Cresol	ug/L	<0.5	0.5	<0.5	0.5	<0.5	0.5	<0.5	0.5	6257601

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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SEMI-VOLATILE ORGANICS BY GC-MS (WATER)

BV Labs ID		KJW017		KJW018		KJW019		KJW020		
Sampling Date		2019/07/26 14:15		2019/07/26 14:28		2019/07/26 14:50		2019/07/26 15:20		
COC Number		727759-01-01		727759-01-01		727759-01-01		727759-01-01		
	UNITS	SW1	RDL	SW2	RDL	SW3	RDL	SW4	RDL	QC Batch
o-Cresol	ug/L	<0.5	0.5	<0.5	0.5	<0.5	0.5	<0.5	0.5	6257601
Pentachlorophenol	ug/L	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	6257601
Phenol	ug/L	<0.5	0.5	<0.5	0.5	<0.5	0.5	<0.5	0.5	6257601
2,3,4,5-Tetrachlorophenol	ug/L	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	6257601
2,3,5,6-Tetrachlorophenol	ug/L	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	6257601
2,3,4-Trichlorophenol	ug/L	<0.2 (1)	0.2	<0.1	0.1	<0.1	0.1	<0.2 (1)	0.2	6257601
2,3,6-Trichlorophenol	ug/L	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	6257601
2,4,5-Trichlorophenol	ug/L	<0.2 (1)	0.2	<0.1	0.1	<0.1	0.1	<0.1	0.1	6257601
3,4,5-Trichlorophenol	ug/L	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	6257601
2,4-Dinitrophenol	ug/L	<7 (1)	7	<1	1	<1	1	<1	1	6257601
2,3-Dichlorophenol	ug/L	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	6257601
2,5-Dichlorophenol	ug/L	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	6257601
3,4-Dichlorophenol	ug/L	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	6257601
3,5-Dichlorophenol	ug/L	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	6257601
4,6-Dinitro-2-methylphenol	ug/L	<1	1	<1	1	<1	1	<1	1	6257601
3 & 4-Chlorophenol	ug/L	<0.1	0.1	<0.1	0.1	<0.3 (1)	0.3	<2 (1)	2	6257601
2-Nitrophenol	ug/L	<1	1	<1	1	<1	1	<1	1	6257601
Surrogate Recovery (%)										
2,4,6-Tribromophenol	%	108		99		105		108		6257601
2-Fluorophenol	%	26 (2)		35 (2)		36 (2)		33 (2)		6257601
D5-Phenol	%	63		32		34		45		6257601
D10-Anthracene	%	88		86		87		87		6264921
D14-Terphenyl	%	109		110		105		105		6264921
D8-Acenaphthylene	%	88		89		86		86		6264921
D8-Naphthalene	%	79		85		81		81		6264921

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) Detection Limit was raised due to matrix interferences.
(2) Surrogate recovery was below the lower control limit due to matrix interference. This may represent a lower bias in some results.

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SEMI-VOLATILE ORGANICS BY GC-MS (WATER)

BV Labs ID		KJW021		KJW022	KJW023		
Sampling Date		2019/07/26 14:52		2019/07/26 14:55	2019/07/26 14:57		
COC Number		727759-01-01		727759-01-01	727759-01-01		
	UNITS	QC19-01	RDL	QC19-02	QC19-03	RDL	QC Batch
Polyaromatic Hydrocarbons							
Benzo(a)pyrene Total Potency Equiv.	ug/L	<0.010	0.010	<0.010	<0.010	0.010	6264920
Acenaphthene	ug/L	<0.10	0.10	<0.10	<0.10	0.10	6264921
Acenaphthylene	ug/L	<0.10	0.10	<0.10	<0.10	0.10	6264921
Acridine	ug/L	<0.040	0.040	<0.040	<0.040	0.040	6264921
Anthracene	ug/L	<0.010	0.010	<0.010	<0.010	0.010	6264921
Benzo(a)anthracene	ug/L	<0.0085	0.0085	<0.0085	<0.0085	0.0085	6264921
Benzo(b/j)fluoranthene	ug/L	<0.0085	0.0085	<0.0085	<0.0085	0.0085	6264921
Benzo(k)fluoranthene	ug/L	<0.0085	0.0085	<0.0085	<0.0085	0.0085	6264921
Benzo(g,h,i)perylene	ug/L	<0.0085	0.0085	<0.0085	<0.0085	0.0085	6264921
Benzo(c)phenanthrene	ug/L	<0.050	0.050	<0.050	<0.050	0.050	6264921
Benzo(a)pyrene	ug/L	<0.0075	0.0075	<0.0075	<0.0075	0.0075	6264921
Benzo(e)pyrene	ug/L	<0.050	0.050	<0.050	<0.050	0.050	6264921
Chrysene	ug/L	<0.0085	0.0085	<0.0085	<0.0085	0.0085	6264921
Dibenz(a,h)anthracene	ug/L	<0.0075	0.0075	<0.0075	<0.0075	0.0075	6264921
Fluoranthene	ug/L	<0.010	0.010	<0.010	<0.010	0.010	6264921
Fluorene	ug/L	<0.050	0.050	<0.050	<0.050	0.050	6264921
Indeno(1,2,3-cd)pyrene	ug/L	<0.0085	0.0085	<0.0085	<0.0085	0.0085	6264921
1-Methylnaphthalene	ug/L	0.14	0.10	<0.10	<0.10	0.10	6264921
2-Methylnaphthalene	ug/L	0.11	0.10	<0.10	<0.10	0.10	6264921
Naphthalene	ug/L	0.13	0.10	<0.10	<0.10	0.10	6264921
Phenanthrene	ug/L	<0.050	0.050	<0.050	<0.050	0.050	6264921
Perylene	ug/L	<0.050	0.050	<0.050	<0.050	0.050	6264921
Pyrene	ug/L	<0.020	0.020	<0.020	<0.020	0.020	6264921
Quinoline	ug/L	<0.20	0.20	<0.20	<0.20	0.20	6264921
Phenolics							
2-Chlorophenol	ug/L	<0.1	0.1	<0.1	<0.1	0.1	6257601
2,3,4,6-Tetrachlorophenol	ug/L	<0.1	0.1	<0.1	<0.1	0.1	6257601
2,3,5-Trichlorophenol	ug/L	<0.1	0.1	<0.1	<0.1	0.1	6257601
2,4-Dichlorophenol	ug/L	<0.1	0.1	<0.1	<0.1	0.1	6257601
2,4-Dimethylphenol	ug/L	<1	1	<1	<1	1	6257601
2,4,6-Trichlorophenol	ug/L	<0.1	0.1	<0.1	<0.1	0.1	6257601
2,6-Dichlorophenol	ug/L	<0.1	0.1	<0.1	<0.1	0.1	6257601
4-Chloro-3-Methylphenol	ug/L	<0.1	0.1	<0.1	<0.1	0.1	6257601
4-Nitrophenol	ug/L	<1	1	<1	<1	1	6257601
m/p-Cresol	ug/L	<0.5	0.5	<0.5	<0.5	0.5	6257601

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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SEMI-VOLATILE ORGANICS BY GC-MS (WATER)

BV Labs ID		KJW021		KJW022	KJW023		
Sampling Date		2019/07/26 14:52		2019/07/26 14:55	2019/07/26 14:57		
COC Number		727759-01-01		727759-01-01	727759-01-01		
	UNITS	QC19-01	RDL	QC19-02	QC19-03	RDL	QC Batch
o-Cresol	ug/L	<0.5	0.5	<0.5	<0.5	0.5	6257601
Pentachlorophenol	ug/L	<0.1	0.1	<0.1	<0.1	0.1	6257601
Phenol	ug/L	<0.5	0.5	<0.5	<0.5	0.5	6257601
2,3,4,5-Tetrachlorophenol	ug/L	<0.1	0.1	<0.1	<0.1	0.1	6257601
2,3,5,6-Tetrachlorophenol	ug/L	<0.1	0.1	<0.1	<0.1	0.1	6257601
2,3,4-Trichlorophenol	ug/L	<0.1	0.1	<0.1	<0.1	0.1	6257601
2,3,6-Trichlorophenol	ug/L	<0.1	0.1	<0.1	<0.1	0.1	6257601
2,4,5-Trichlorophenol	ug/L	<0.1	0.1	<0.1	<0.1	0.1	6257601
3,4,5-Trichlorophenol	ug/L	<0.1	0.1	<0.1	<0.1	0.1	6257601
2,4-Dinitrophenol	ug/L	<1	1	<1	<1	1	6257601
2,3-Dichlorophenol	ug/L	<0.1	0.1	<0.1	<0.1	0.1	6257601
2,5-Dichlorophenol	ug/L	<0.1	0.1	<0.1	<0.1	0.1	6257601
3,4-Dichlorophenol	ug/L	<0.1	0.1	<0.1	<0.1	0.1	6257601
3,5-Dichlorophenol	ug/L	<0.1	0.1	<0.1	<0.1	0.1	6257601
4,6-Dinitro-2-methylphenol	ug/L	<1	1	<1	<1	1	6257601
3 & 4-Chlorophenol	ug/L	<0.3 (1)	0.3	<0.1	<0.1	0.1	6257601
2-Nitrophenol	ug/L	<1	1	<1	<1	1	6257601
Surrogate Recovery (%)							
2,4,6-Tribromophenol	%	105		100	95		6257601
2-Fluorophenol	%	41 (2)		51	47 (2)		6257601
D5-Phenol	%	39		56	45		6257601
D10-Anthracene	%	86		87	90		6264921
D14-Terphenyl	%	100		106	107		6264921
D8-Acenaphthylene	%	84		90	93		6264921
D8-Naphthalene	%	80		86	89		6264921

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) Detection Limit was raised due to matrix interferences.
(2) Surrogate recovery was below the lower control limit due to matrix interference. This may represent a lower bias in some results.

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PETROLEUM HYDROCARBONS (CCME)

BV Labs ID		KJW017			KJW017			KJW018	KJW019		
Sampling Date		2019/07/26 14:15			2019/07/26 14:15			2019/07/26 14:28	2019/07/26 14:50		
COC Number		727759-01-01			727759-01-01			727759-01-01	727759-01-01		
	UNITS	SW1	RDL	QC Batch	SW1 Lab-Dup	RDL	QC Batch	SW2	SW3	RDL	QC Batch
BTEX & F1 Hydrocarbons											
Benzene	ug/L	<0.20	0.20	6261339	<0.20	0.20	6261339	<0.20	0.47	0.20	6261339
Toluene	ug/L	<0.20	0.20	6261339	<0.20	0.20	6261339	<0.20	3.6	0.20	6261339
Ethylbenzene	ug/L	<0.20	0.20	6261339	<0.20	0.20	6261339	<0.20	<0.20	0.20	6261339
o-Xylene	ug/L	0.29	0.20	6261339	0.30	0.20	6261339	<0.20	2.4	0.20	6261339
p+m-Xylene	ug/L	0.73	0.40	6261339	0.65	0.40	6261339	<0.40	1.3	0.40	6261339
Total Xylenes	ug/L	1.0	0.40	6261339	0.95	0.40	6261339	<0.40	3.6	0.40	6261339
F1 (C6-C10)	ug/L	110	25	6261339	100	25	6261339	<25	34	25	6261339
F1 (C6-C10) - BTEX	ug/L	110	25	6261339	99	25	6261339	<25	26	25	6261339
F2-F4 Hydrocarbons											
F2 (C10-C16 Hydrocarbons)	ug/L	120	100	6261077				<100	<100	100	6261077
Surrogate Recovery (%)											
1,4-Difluorobenzene	%	99		6261339	102		6261339	101	101		6261339
4-Bromofluorobenzene	%	100		6261339	99		6261339	96	97		6261339
D10-Ethylbenzene	%	100		6261339	103		6261339	101	103		6261339
D4-1,2-Dichloroethane	%	99		6261339	100		6261339	98	97		6261339
o-Terphenyl	%	90		6261077				97	94		6261077

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

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PETROLEUM HYDROCARBONS (CCME)

BV Labs ID		KJW020	KJW021	KJW022		KJW023		
Sampling Date		2019/07/26 15:20	2019/07/26 14:52	2019/07/26 14:55		2019/07/26 14:57		
COC Number		727759-01-01	727759-01-01	727759-01-01		727759-01-01		
	UNITS	SW4	QC19-01	QC19-02	QC Batch	QC19-03	RDL	QC Batch
BTEX & F1 Hydrocarbons								
Benzene	ug/L	<0.20	0.43	<0.20	6261339	<0.20	0.20	6261897
Toluene	ug/L	<0.20	3.6	<0.20	6261339	<0.20	0.20	6261897
Ethylbenzene	ug/L	<0.20	<0.20	<0.20	6261339	<0.20	0.20	6261897
o-Xylene	ug/L	<0.20	2.2	<0.20	6261339	<0.20	0.20	6261897
p+m-Xylene	ug/L	<0.40	1.2	<0.40	6261339	<0.40	0.40	6261897
Total Xylenes	ug/L	<0.40	3.5	<0.40	6261339	<0.40	0.40	6261897
F1 (C6-C10)	ug/L	<25	33	<25	6261339	<25	25	6261897
F1 (C6-C10) - BTEX	ug/L	<25	26	<25	6261339	<25	25	6261897
F2-F4 Hydrocarbons								
F2 (C10-C16 Hydrocarbons)	ug/L	<100	<100	<100	6261077	<100	100	6261077
Surrogate Recovery (%)								
1,4-Difluorobenzene	%	102	102	101	6261339	102		6261897
4-Bromofluorobenzene	%	98	98	97	6261339	98		6261897
D10-Ethylbenzene	%	104	102	102	6261339	87		6261897
D4-1,2-Dichloroethane	%	97	98	98	6261339	102		6261897
o-Terphenyl	%	96	96	97	6261077	95		6261077

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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GENERAL COMMENTS

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

Package 1	8.7°C
Package 2	8.3°C
Package 3	7.3°C
Package 4	8.0°C

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
6257601	MYI	Matrix Spike	2,4,6-Tribromophenol	2019/08/01		120	%	50 - 130
			2-Fluorophenol	2019/08/01		39 (1)	%	50 - 130
			D5-Phenol	2019/08/01		50	%	30 - 130
			2-Chlorophenol	2019/08/01		38 (2)	%	50 - 130
			2,3,4,6-Tetrachlorophenol	2019/08/01		92	%	10 - 130
			2,3,5-Trichlorophenol	2019/08/01		88	%	10 - 130
			2,4-Dichlorophenol	2019/08/01		66	%	50 - 130
			2,4-Dimethylphenol	2019/08/01		69	%	30 - 130
			2,4,6-Trichlorophenol	2019/08/01		73	%	10 - 130
			2,6-Dichlorophenol	2019/08/01		59	%	10 - 130
			4-Chloro-3-Methylphenol	2019/08/01		123	%	10 - 130
			4-Nitrophenol	2019/08/01		72	%	10 - 130
			m/p-Cresol	2019/08/01		61	%	10 - 130
			o-Cresol	2019/08/01		62	%	10 - 130
			Pentachlorophenol	2019/08/01		109	%	50 - 130
			Phenol	2019/08/01		113	%	30 - 130
			2,3,4,5-Tetrachlorophenol	2019/08/01		108	%	10 - 130
			2,3,5,6-Tetrachlorophenol	2019/08/01		113	%	10 - 130
			2,3,4-Trichlorophenol	2019/08/01		110	%	10 - 130
			2,3,6-Trichlorophenol	2019/08/01		84	%	30 - 130
			2,4,5-Trichlorophenol	2019/08/01		91	%	50 - 130
			3,4,5-Trichlorophenol	2019/08/01		94	%	10 - 130
			2,4-Dinitrophenol	2019/08/01		85	%	30 - 130
			2,3-Dichlorophenol	2019/08/01		70	%	10 - 130
			2,5-Dichlorophenol	2019/08/01		68	%	10 - 130
			3,4-Dichlorophenol	2019/08/01		54	%	10 - 130
			3,5-Dichlorophenol	2019/08/01		84	%	10 - 130
			4,6-Dinitro-2-methylphenol	2019/08/01		119	%	10 - 130
			3 & 4-Chlorophenol	2019/08/01		85	%	10 - 130
			2-Nitrophenol	2019/08/01		58	%	10 - 130
6257601	MYI	Spiked Blank	2,4,6-Tribromophenol	2019/08/01		122	%	50 - 130
			2-Fluorophenol	2019/08/01		70	%	50 - 130
			D5-Phenol	2019/08/01		88	%	30 - 130
			2-Chlorophenol	2019/08/01		71	%	50 - 130
			2,3,4,6-Tetrachlorophenol	2019/08/01		92	%	10 - 130
			2,3,5-Trichlorophenol	2019/08/01		97	%	10 - 130
			2,4-Dichlorophenol	2019/08/01		86	%	50 - 130
			2,4-Dimethylphenol	2019/08/01		97	%	30 - 130
			2,4,6-Trichlorophenol	2019/08/01		88	%	10 - 130
			2,6-Dichlorophenol	2019/08/01		92	%	10 - 130
			4-Chloro-3-Methylphenol	2019/08/01		127	%	10 - 130
			4-Nitrophenol	2019/08/01		97	%	10 - 130
			m/p-Cresol	2019/08/01		99	%	10 - 130
			o-Cresol	2019/08/01		85	%	10 - 130
			Pentachlorophenol	2019/08/01		105	%	50 - 130
			Phenol	2019/08/01		76	%	30 - 130
			2,3,4,5-Tetrachlorophenol	2019/08/01		112	%	10 - 130
			2,3,5,6-Tetrachlorophenol	2019/08/01		101	%	10 - 130
			2,3,4-Trichlorophenol	2019/08/01		105	%	10 - 130
			2,3,6-Trichlorophenol	2019/08/01		94	%	30 - 130
			2,4,5-Trichlorophenol	2019/08/01		93	%	50 - 130
			3,4,5-Trichlorophenol	2019/08/01		95	%	10 - 130
			2,4-Dinitrophenol	2019/08/01		104	%	30 - 130
			2,3-Dichlorophenol	2019/08/01		91	%	10 - 130

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			2,5-Dichlorophenol	2019/08/01		92	%	10 - 130
			3,4-Dichlorophenol	2019/08/01		64	%	10 - 130
			3,5-Dichlorophenol	2019/08/01		87	%	10 - 130
			4,6-Dinitro-2-methylphenol	2019/08/01		117	%	10 - 130
			3 & 4-Chlorophenol	2019/08/01		98	%	10 - 130
			2-Nitrophenol	2019/08/01		95	%	10 - 130
6257601	MYI	Method Blank	2,4,6-Tribromophenol	2019/08/01		121	%	50 - 130
			2-Fluorophenol	2019/08/01		65	%	50 - 130
			D5-Phenol	2019/08/01		91	%	30 - 130
			2-Chlorophenol	2019/08/01	<0.1		ug/L	
			2,3,4,6-Tetrachlorophenol	2019/08/01	<0.1		ug/L	
			2,3,5-Trichlorophenol	2019/08/01	<0.1		ug/L	
			2,4-Dichlorophenol	2019/08/01	<0.1		ug/L	
			2,4-Dimethylphenol	2019/08/01	<1		ug/L	
			2,4,6-Trichlorophenol	2019/08/01	<0.1		ug/L	
			2,6-Dichlorophenol	2019/08/01	<0.1		ug/L	
			4-Chloro-3-Methylphenol	2019/08/01	<0.1		ug/L	
			4-Nitrophenol	2019/08/01	<1		ug/L	
			m/p-Cresol	2019/08/01	<0.5		ug/L	
			o-Cresol	2019/08/01	<0.5		ug/L	
			Pentachlorophenol	2019/08/01	<0.1		ug/L	
			Phenol	2019/08/01	<0.5		ug/L	
			2,3,4,5-Tetrachlorophenol	2019/08/01	<0.1		ug/L	
			2,3,5,6-Tetrachlorophenol	2019/08/01	<0.1		ug/L	
			2,3,4-Trichlorophenol	2019/08/01	<0.1		ug/L	
			2,3,6-Trichlorophenol	2019/08/01	<0.1		ug/L	
			2,4,5-Trichlorophenol	2019/08/01	<0.1		ug/L	
			3,4,5-Trichlorophenol	2019/08/01	<0.1		ug/L	
			2,4-Dinitrophenol	2019/08/01	<1		ug/L	
			2,3-Dichlorophenol	2019/08/01	<0.1		ug/L	
			2,5-Dichlorophenol	2019/08/01	<0.1		ug/L	
			3,4-Dichlorophenol	2019/08/01	<0.1		ug/L	
			3,5-Dichlorophenol	2019/08/01	<0.1		ug/L	
			4,6-Dinitro-2-methylphenol	2019/08/01	<1		ug/L	
			3 & 4-Chlorophenol	2019/08/01	<0.1		ug/L	
			2-Nitrophenol	2019/08/01	<1		ug/L	
6257601	MYI	RPD	2-Chlorophenol	2019/08/01	NC		%	30
			2,3,4,6-Tetrachlorophenol	2019/08/01	NC		%	40
			2,3,5-Trichlorophenol	2019/08/01	NC		%	40
			2,4-Dichlorophenol	2019/08/01	NC		%	30
			2,4-Dimethylphenol	2019/08/01	NC		%	30
			2,4,6-Trichlorophenol	2019/08/01	NC		%	30
			2,6-Dichlorophenol	2019/08/01	NC		%	40
			4-Chloro-3-Methylphenol	2019/08/01	NC		%	40
			4-Nitrophenol	2019/08/01	NC		%	40
			m/p-Cresol	2019/08/01	NC		%	40
			o-Cresol	2019/08/01	NC		%	40
			Pentachlorophenol	2019/08/01	NC		%	30
			Phenol	2019/08/01	NC		%	30
			2,3,4,5-Tetrachlorophenol	2019/08/01	NC		%	40
			2,3,5,6-Tetrachlorophenol	2019/08/01	NC		%	40
			2,3,4-Trichlorophenol	2019/08/01	NC		%	40
			2,3,6-Trichlorophenol	2019/08/01	NC		%	40
			2,4,5-Trichlorophenol	2019/08/01	NC		%	30

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			3,4,5-Trichlorophenol	2019/08/01	NC		%	40
			2,4-Dinitrophenol	2019/08/01	NC		%	30
			2,3-Dichlorophenol	2019/08/01	NC		%	40
			2,5-Dichlorophenol	2019/08/01	NC		%	40
			3,4-Dichlorophenol	2019/08/01	NC		%	40
			3,5-Dichlorophenol	2019/08/01	NC		%	40
			4,6-Dinitro-2-methylphenol	2019/08/01	NC		%	40
			3 & 4-Chlorophenol	2019/08/01	NC		%	40
			2-Nitrophenol	2019/08/01	NC		%	40
6257833	C_N	Matrix Spike [KJW021-04]	Nitrite (N)	2019/08/01		105	%	80 - 120
			Nitrate (N)	2019/08/01		103	%	80 - 120
6257833	C_N	Spiked Blank	Nitrite (N)	2019/08/01		100	%	80 - 120
			Nitrate (N)	2019/08/01		100	%	80 - 120
6257833	C_N	Method Blank	Nitrite (N)	2019/08/01	<0.010		mg/L	
			Nitrate (N)	2019/08/01	<0.10		mg/L	
6257833	C_N	RPD [KJW021-04]	Nitrite (N)	2019/08/01	1.5		%	20
			Nitrate (N)	2019/08/01	NC		%	20
6257838	NYS	Spiked Blank	Alkalinity (Total as CaCO3)	2019/07/31		98	%	85 - 115
6257838	NYS	Method Blank	Alkalinity (Total as CaCO3)	2019/07/31	<1.0		mg/L	
6257838	NYS	RPD [KJW017-04]	Alkalinity (Total as CaCO3)	2019/07/31	0.80		%	20
6257839	NYS	Spiked Blank	Conductivity	2019/07/31		101	%	85 - 115
6257839	NYS	Method Blank	Conductivity	2019/07/31	<0.001		mS/cm	
6257839	NYS	RPD [KJW017-04]	Conductivity	2019/07/31	0.82		%	25
6257840	NYS	Spiked Blank	pH	2019/07/31		102	%	98 - 103
6257840	NYS	RPD [KJW017-04]	pH	2019/07/31	0.57		%	N/A
6257850	DRM	Matrix Spike	Dissolved Chloride (Cl-)	2019/08/01		NC	%	80 - 120
6257850	DRM	Spiked Blank	Dissolved Chloride (Cl-)	2019/08/01		102	%	80 - 120
6257850	DRM	Method Blank	Dissolved Chloride (Cl-)	2019/08/01	<1.0		mg/L	
6257850	DRM	RPD	Dissolved Chloride (Cl-)	2019/08/01	0.49		%	20
6257871	DRM	Matrix Spike	Dissolved Sulphate (SO4)	2019/08/01		98	%	75 - 125
6257871	DRM	Spiked Blank	Dissolved Sulphate (SO4)	2019/08/01		104	%	80 - 120
6257871	DRM	Method Blank	Dissolved Sulphate (SO4)	2019/08/01	<1.0		mg/L	
6257871	DRM	RPD	Dissolved Sulphate (SO4)	2019/08/01	0.36		%	20
6257874	C_N	Matrix Spike [KJW018-04]	Nitrite (N)	2019/08/01		103	%	80 - 120
			Nitrate (N)	2019/08/01		94	%	80 - 120
6257874	C_N	Spiked Blank	Nitrite (N)	2019/08/01		101	%	80 - 120
			Nitrate (N)	2019/08/01		98	%	80 - 120
6257874	C_N	Method Blank	Nitrite (N)	2019/08/01	<0.010		mg/L	
			Nitrate (N)	2019/08/01	<0.10		mg/L	
6257874	C_N	RPD [KJW018-04]	Nitrite (N)	2019/08/01	NC		%	20
			Nitrate (N)	2019/08/01	NC		%	20
6257962	NB3	QC Standard	Total Suspended Solids	2019/08/01		98	%	85 - 115
6257962	NB3	Method Blank	Total Suspended Solids	2019/08/01	<1		mg/L	
6257962	NB3	RPD [KJW023-03]	Total Suspended Solids	2019/08/01	NC		%	25
6258016	DRM	Matrix Spike	Dissolved Chloride (Cl-)	2019/08/01		NC	%	80 - 120
6258016	DRM	Spiked Blank	Dissolved Chloride (Cl-)	2019/08/01		102	%	80 - 120
6258016	DRM	Method Blank	Dissolved Chloride (Cl-)	2019/08/01	<1.0		mg/L	
6258016	DRM	RPD	Dissolved Chloride (Cl-)	2019/08/01	0.69		%	20
6258017	DRM	Matrix Spike	Dissolved Sulphate (SO4)	2019/08/01		NC	%	75 - 125
6258017	DRM	Spiked Blank	Dissolved Sulphate (SO4)	2019/08/01		102	%	80 - 120
6258017	DRM	Method Blank	Dissolved Sulphate (SO4)	2019/08/01	<1.0		mg/L	
6258017	DRM	RPD	Dissolved Sulphate (SO4)	2019/08/01	4.1		%	20
6258889	XH1	QC Standard	Total Suspended Solids	2019/08/01		95	%	85 - 115
6258889	XH1	Method Blank	Total Suspended Solids	2019/08/01	<1		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
6258889	XH1	RPD [KJW021-03]	Total Suspended Solids	2019/08/01	12		%	25
6259082	MKX	QC Standard	Total Suspended Solids	2019/08/02		100	%	85 - 115
6259082	MKX	Method Blank	Total Suspended Solids	2019/08/02	<1		mg/L	
6259082	MKX	RPD [KJW018-03]	Total Suspended Solids	2019/08/02	17		%	25
6259284	MT4	Matrix Spike	Total Ammonia-N	2019/08/01		95	%	75 - 125
6259284	MT4	Spiked Blank	Total Ammonia-N	2019/08/01		98	%	80 - 120
6259284	MT4	Method Blank	Total Ammonia-N	2019/08/01	<0.050		mg/L	
6259284	MT4	RPD	Total Ammonia-N	2019/08/01	5.9		%	20
6259301	MT4	Matrix Spike	Total Ammonia-N	2019/08/02		99	%	75 - 125
6259301	MT4	Spiked Blank	Total Ammonia-N	2019/08/02		103	%	80 - 120
6259301	MT4	Method Blank	Total Ammonia-N	2019/08/02	<0.050		mg/L	
6259301	MT4	RPD	Total Ammonia-N	2019/08/02	NC		%	20
6261077	GUL	Matrix Spike	o-Terphenyl	2019/08/02		104	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2019/08/02		113	%	50 - 130
6261077	GUL	Spiked Blank	o-Terphenyl	2019/08/02		103	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2019/08/02		108	%	60 - 130
6261077	GUL	Method Blank	o-Terphenyl	2019/08/02		99	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2019/08/02	<100		ug/L	
6261077	GUL	RPD	F2 (C10-C16 Hydrocarbons)	2019/08/02	NC		%	30
6261339	H_W	Matrix Spike [KJW017-09]	1,4-Difluorobenzene	2019/08/02		101	%	70 - 130
			4-Bromofluorobenzene	2019/08/02		99	%	70 - 130
			D10-Ethylbenzene	2019/08/02		101	%	70 - 130
			D4-1,2-Dichloroethane	2019/08/02		98	%	70 - 130
			Benzene	2019/08/02		100	%	70 - 130
			Toluene	2019/08/02		93	%	70 - 130
			Ethylbenzene	2019/08/02		98	%	70 - 130
			o-Xylene	2019/08/02		91	%	70 - 130
			p+m-Xylene	2019/08/02		92	%	70 - 130
			F1 (C6-C10)	2019/08/02		99	%	70 - 130
6261339	H_W	Spiked Blank	1,4-Difluorobenzene	2019/08/02		99	%	70 - 130
			4-Bromofluorobenzene	2019/08/02		97	%	70 - 130
			D10-Ethylbenzene	2019/08/02		98	%	70 - 130
			D4-1,2-Dichloroethane	2019/08/02		99	%	70 - 130
			Benzene	2019/08/02		99	%	70 - 130
			Toluene	2019/08/02		91	%	70 - 130
			Ethylbenzene	2019/08/02		90	%	70 - 130
			o-Xylene	2019/08/02		88	%	70 - 130
			p+m-Xylene	2019/08/02		91	%	70 - 130
			F1 (C6-C10)	2019/08/02		101	%	70 - 130
6261339	H_W	Method Blank	1,4-Difluorobenzene	2019/08/02		101	%	70 - 130
			4-Bromofluorobenzene	2019/08/02		98	%	70 - 130
			D10-Ethylbenzene	2019/08/02		101	%	70 - 130
			D4-1,2-Dichloroethane	2019/08/02		102	%	70 - 130
			Benzene	2019/08/02	<0.20		ug/L	
			Toluene	2019/08/02	<0.20		ug/L	
			Ethylbenzene	2019/08/02	<0.20		ug/L	
			o-Xylene	2019/08/02	<0.20		ug/L	
			p+m-Xylene	2019/08/02	<0.40		ug/L	
			Total Xylenes	2019/08/02	<0.40		ug/L	
			F1 (C6-C10)	2019/08/02	<25		ug/L	
			F1 (C6-C10) - BTEX	2019/08/02	<25		ug/L	
6261339	H_W	RPD [KJW017-09]	Benzene	2019/08/02	NC		%	30
			Toluene	2019/08/02	NC		%	30
			Ethylbenzene	2019/08/02	NC		%	30

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			o-Xylene	2019/08/02	2.7		%	30
			p+m-Xylene	2019/08/02	12		%	30
			Total Xylenes	2019/08/02	7.4		%	30
			F1 (C6-C10)	2019/08/02	14		%	30
			F1 (C6-C10) - BTEX	2019/08/02	14		%	30
6261897	AGA	Matrix Spike	1,4-Difluorobenzene	2019/08/02		104	%	70 - 130
			4-Bromofluorobenzene	2019/08/02		101	%	70 - 130
			D10-Ethylbenzene	2019/08/02		88	%	70 - 130
			D4-1,2-Dichloroethane	2019/08/02		104	%	70 - 130
			Benzene	2019/08/02		94	%	70 - 130
			Toluene	2019/08/02		91	%	70 - 130
			Ethylbenzene	2019/08/02		95	%	70 - 130
			o-Xylene	2019/08/02		92	%	70 - 130
			p+m-Xylene	2019/08/02		95	%	70 - 130
			F1 (C6-C10)	2019/08/02		103	%	70 - 130
6261897	AGA	Spiked Blank	1,4-Difluorobenzene	2019/08/02		104	%	70 - 130
			4-Bromofluorobenzene	2019/08/02		104	%	70 - 130
			D10-Ethylbenzene	2019/08/02		88	%	70 - 130
			D4-1,2-Dichloroethane	2019/08/02		105	%	70 - 130
			Benzene	2019/08/02		95	%	70 - 130
			Toluene	2019/08/02		92	%	70 - 130
			Ethylbenzene	2019/08/02		95	%	70 - 130
			o-Xylene	2019/08/02		92	%	70 - 130
			p+m-Xylene	2019/08/02		96	%	70 - 130
			F1 (C6-C10)	2019/08/02		116	%	70 - 130
6261897	AGA	Method Blank	1,4-Difluorobenzene	2019/08/02		103	%	70 - 130
			4-Bromofluorobenzene	2019/08/02		100	%	70 - 130
			D10-Ethylbenzene	2019/08/02		86	%	70 - 130
			D4-1,2-Dichloroethane	2019/08/02		104	%	70 - 130
			Benzene	2019/08/02	<0.20		ug/L	
			Toluene	2019/08/02	<0.20		ug/L	
			Ethylbenzene	2019/08/02	<0.20		ug/L	
			o-Xylene	2019/08/02	<0.20		ug/L	
			p+m-Xylene	2019/08/02	<0.40		ug/L	
			Total Xylenes	2019/08/02	<0.40		ug/L	
			F1 (C6-C10)	2019/08/02	<25		ug/L	
			F1 (C6-C10) - BTEX	2019/08/02	<25		ug/L	
6261897	AGA	RPD	Benzene	2019/08/02	NC		%	30
			Toluene	2019/08/02	NC		%	30
			Ethylbenzene	2019/08/02	NC		%	30
			o-Xylene	2019/08/02	NC		%	30
			p+m-Xylene	2019/08/02	NC		%	30
			Total Xylenes	2019/08/02	NC		%	30
			F1 (C6-C10)	2019/08/02	NC		%	30
			F1 (C6-C10) - BTEX	2019/08/02	NC		%	30
6262200	éCG	Matrix Spike	Total Aluminum (Al)	2019/08/02		101	%	80 - 120
			Total Arsenic (As)	2019/08/02		103	%	80 - 120
			Total Cadmium (Cd)	2019/08/02		99	%	80 - 120
			Total Cobalt (Co)	2019/08/02		98	%	80 - 120
			Total Copper (Cu)	2019/08/02		97	%	80 - 120
			Total Iron (Fe)	2019/08/02		101	%	80 - 120
			Total Lead (Pb)	2019/08/02		101	%	80 - 120
			Total Molybdenum (Mo)	2019/08/02		104	%	80 - 120
			Total Nickel (Ni)	2019/08/02		98	%	80 - 120

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Selenium (Se)	2019/08/02		100	%	80 - 120
			Total Silver (Ag)	2019/08/02		101	%	80 - 120
			Total Titanium (Ti)	2019/08/02		100	%	80 - 120
			Total Zinc (Zn)	2019/08/02		98	%	80 - 120
6262200	éCG	Spiked Blank	Total Aluminum (Al)	2019/08/02		103	%	80 - 120
			Total Arsenic (As)	2019/08/02		102	%	80 - 120
			Total Cadmium (Cd)	2019/08/02		101	%	80 - 120
			Total Cobalt (Co)	2019/08/02		100	%	80 - 120
			Total Copper (Cu)	2019/08/02		100	%	80 - 120
			Total Iron (Fe)	2019/08/02		102	%	80 - 120
			Total Lead (Pb)	2019/08/02		101	%	80 - 120
			Total Molybdenum (Mo)	2019/08/02		103	%	80 - 120
			Total Nickel (Ni)	2019/08/02		101	%	80 - 120
			Total Selenium (Se)	2019/08/02		100	%	80 - 120
			Total Silver (Ag)	2019/08/02		102	%	80 - 120
			Total Titanium (Ti)	2019/08/02		102	%	80 - 120
			Total Zinc (Zn)	2019/08/02		103	%	80 - 120
6262200	éCG	Method Blank	Total Aluminum (Al)	2019/08/02	<3.0		ug/L	
			Total Arsenic (As)	2019/08/02	<0.10		ug/L	
			Total Cadmium (Cd)	2019/08/02	<0.010		ug/L	
			Total Cobalt (Co)	2019/08/02	<0.20		ug/L	
			Total Copper (Cu)	2019/08/02	<0.50		ug/L	
			Total Iron (Fe)	2019/08/02	<10		ug/L	
			Total Lead (Pb)	2019/08/02	<0.20		ug/L	
			Total Molybdenum (Mo)	2019/08/02	<1.0		ug/L	
			Total Nickel (Ni)	2019/08/02	<1.0		ug/L	
			Total Selenium (Se)	2019/08/02	<0.10		ug/L	
			Total Silver (Ag)	2019/08/02	<0.020		ug/L	
			Total Titanium (Ti)	2019/08/02	<5.0		ug/L	
			Total Zinc (Zn)	2019/08/02	<5.0		ug/L	
6264305	FA	Matrix Spike	Total Oil & Grease	2019/08/06		95	%	75 - 125
6264305	FA	Spiked Blank	Total Oil & Grease	2019/08/06		95	%	85 - 115
6264305	FA	RPD	Total Oil & Grease	2019/08/06	2.6		%	25
			Total Oil & Grease	2019/08/06	0.45		%	25
6264305	FA	Method Blank	Total Oil & Grease	2019/08/06	<0.50		mg/L	
6264921	HG3	Matrix Spike	D10-Anthracene	2019/08/02		91	%	50 - 130
			D14-Terphenyl	2019/08/02		113	%	50 - 130
			D8-Acenaphthylene	2019/08/02		89	%	50 - 130
			D8-Naphthalene	2019/08/02		85	%	50 - 130
			Acenaphthene	2019/08/02		80	%	50 - 130
			Acenaphthylene	2019/08/02		84	%	50 - 130
			Acridine	2019/08/02		74	%	50 - 130
			Anthracene	2019/08/02		87	%	50 - 130
			Benzo(a)anthracene	2019/08/02		89	%	50 - 130
			Benzo(b/j)fluoranthene	2019/08/02		86	%	50 - 130
			Benzo(k)fluoranthene	2019/08/02		89	%	50 - 130
			Benzo(g,h,i)perylene	2019/08/02		74	%	50 - 130
			Benzo(c)phenanthrene	2019/08/02		96	%	50 - 130
			Benzo(a)pyrene	2019/08/02		83	%	50 - 130
			Benzo(e)pyrene	2019/08/02		95	%	50 - 130
			Chrysene	2019/08/02		90	%	50 - 130
			Dibenz(a,h)anthracene	2019/08/02		57	%	50 - 130
			Fluoranthene	2019/08/02		87	%	50 - 130
			Fluorene	2019/08/02		81	%	50 - 130

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Indeno(1,2,3-cd)pyrene	2019/08/02		67	%	50 - 130
			1-Methylnaphthalene	2019/08/02		89	%	50 - 130
			2-Methylnaphthalene	2019/08/02		86	%	50 - 130
			Naphthalene	2019/08/02		106	%	50 - 130
			Phenanthrene	2019/08/02		84	%	50 - 130
			Perylene	2019/08/02		90	%	50 - 130
			Pyrene	2019/08/02		85	%	50 - 130
			Quinoline	2019/08/02		114	%	50 - 130
6264921	HG3	Spiked Blank	D10-Anthracene	2019/08/02		85	%	50 - 130
			D14-Terphenyl	2019/08/02		100	%	50 - 130
			D8-Acenaphthylene	2019/08/02		87	%	50 - 130
			D8-Naphthalene	2019/08/02		83	%	50 - 130
			Acenaphthene	2019/08/02		78	%	50 - 130
			Acenaphthylene	2019/08/02		83	%	50 - 130
			Acridine	2019/08/02		72	%	50 - 130
			Anthracene	2019/08/02		86	%	50 - 130
			Benzo(a)anthracene	2019/08/02		87	%	50 - 130
			Benzo(b/j)fluoranthene	2019/08/02		86	%	50 - 130
			Benzo(k)fluoranthene	2019/08/02		82	%	50 - 130
			Benzo(g,h,i)perylene	2019/08/02		79	%	50 - 130
			Benzo(c)phenanthrene	2019/08/02		90	%	50 - 130
			Benzo(a)pyrene	2019/08/02		83	%	50 - 130
			Benzo(e)pyrene	2019/08/02		93	%	50 - 130
			Chrysene	2019/08/02		87	%	50 - 130
			Dibenz(a,h)anthracene	2019/08/02		63	%	50 - 130
			Fluoranthene	2019/08/02		85	%	50 - 130
			Fluorene	2019/08/02		79	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2019/08/02		74	%	50 - 130
			1-Methylnaphthalene	2019/08/02		84	%	50 - 130
			2-Methylnaphthalene	2019/08/02		84	%	50 - 130
			Naphthalene	2019/08/02		80	%	50 - 130
			Phenanthrene	2019/08/02		81	%	50 - 130
			Perylene	2019/08/02		93	%	50 - 130
			Pyrene	2019/08/02		83	%	50 - 130
			Quinoline	2019/08/02		113	%	50 - 130
6264921	HG3	Method Blank	D10-Anthracene	2019/08/02		99	%	50 - 130
			D14-Terphenyl	2019/08/02		126	%	50 - 130
			D8-Acenaphthylene	2019/08/02		103	%	50 - 130
			D8-Naphthalene	2019/08/02		97	%	50 - 130
			Acenaphthene	2019/08/02	<0.10		ug/L	
			Acenaphthylene	2019/08/02	<0.10		ug/L	
			Acridine	2019/08/02	<0.040		ug/L	
			Anthracene	2019/08/02	<0.010		ug/L	
			Benzo(a)anthracene	2019/08/02	<0.0085		ug/L	
			Benzo(b/j)fluoranthene	2019/08/02	<0.0085		ug/L	
			Benzo(k)fluoranthene	2019/08/02	<0.0085		ug/L	
			Benzo(g,h,i)perylene	2019/08/02	<0.0085		ug/L	
			Benzo(c)phenanthrene	2019/08/02	<0.050		ug/L	
			Benzo(a)pyrene	2019/08/02	<0.0075		ug/L	
			Benzo(e)pyrene	2019/08/02	<0.050		ug/L	
			Chrysene	2019/08/02	<0.0085		ug/L	
			Dibenz(a,h)anthracene	2019/08/02	<0.0075		ug/L	
			Fluoranthene	2019/08/02	<0.010		ug/L	
			Fluorene	2019/08/02	<0.050		ug/L	

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Indeno(1,2,3-cd)pyrene	2019/08/02	<0.0085		ug/L	
			1-Methylnaphthalene	2019/08/02	<0.10		ug/L	
			2-Methylnaphthalene	2019/08/02	<0.10		ug/L	
			Naphthalene	2019/08/02	<0.10		ug/L	
			Phenanthrene	2019/08/02	<0.050		ug/L	
			Perylene	2019/08/02	<0.050		ug/L	
			Pyrene	2019/08/02	<0.020		ug/L	
			Quinoline	2019/08/02	<0.20		ug/L	
6270821	éCG	Matrix Spike [KJW022-08]	Total Aluminum (Al)	2019/08/08		100	%	80 - 120
			Total Arsenic (As)	2019/08/08		103	%	80 - 120
			Total Cadmium (Cd)	2019/08/08		103	%	80 - 120
			Total Cobalt (Co)	2019/08/08		97	%	80 - 120
			Total Copper (Cu)	2019/08/08		99	%	80 - 120
			Total Iron (Fe)	2019/08/08		100	%	80 - 120
			Total Lead (Pb)	2019/08/08		98	%	80 - 120
			Total Molybdenum (Mo)	2019/08/08		94	%	80 - 120
			Total Nickel (Ni)	2019/08/08		98	%	80 - 120
			Total Selenium (Se)	2019/08/08		106	%	80 - 120
			Total Silver (Ag)	2019/08/08		77 (3)	%	80 - 120
			Total Titanium (Ti)	2019/08/08		99	%	80 - 120
			Total Zinc (Zn)	2019/08/08		111	%	80 - 120
6270821	éCG	Spiked Blank	Total Aluminum (Al)	2019/08/08		98	%	80 - 120
			Total Arsenic (As)	2019/08/08		97	%	80 - 120
			Total Cadmium (Cd)	2019/08/08		96	%	80 - 120
			Total Cobalt (Co)	2019/08/08		97	%	80 - 120
			Total Copper (Cu)	2019/08/08		98	%	80 - 120
			Total Iron (Fe)	2019/08/08		99	%	80 - 120
			Total Lead (Pb)	2019/08/08		97	%	80 - 120
			Total Molybdenum (Mo)	2019/08/08		98	%	80 - 120
			Total Nickel (Ni)	2019/08/08		98	%	80 - 120
			Total Selenium (Se)	2019/08/08		98	%	80 - 120
			Total Silver (Ag)	2019/08/08		97	%	80 - 120
			Total Titanium (Ti)	2019/08/08		100	%	80 - 120
			Total Zinc (Zn)	2019/08/08		99	%	80 - 120
6270821	éCG	Method Blank	Total Aluminum (Al)	2019/08/08	<3.0		ug/L	
			Total Arsenic (As)	2019/08/08	<0.10		ug/L	
			Total Cadmium (Cd)	2019/08/08	<0.010		ug/L	
			Total Cobalt (Co)	2019/08/08	<0.20		ug/L	
			Total Copper (Cu)	2019/08/08	<0.50		ug/L	
			Total Iron (Fe)	2019/08/08	<10		ug/L	
			Total Lead (Pb)	2019/08/08	<0.20		ug/L	
			Total Molybdenum (Mo)	2019/08/08	<1.0		ug/L	
			Total Nickel (Ni)	2019/08/08	<1.0		ug/L	
			Total Selenium (Se)	2019/08/08	<0.10		ug/L	
			Total Silver (Ag)	2019/08/08	<0.020		ug/L	
			Total Titanium (Ti)	2019/08/08	<5.0		ug/L	
			Total Zinc (Zn)	2019/08/08	<5.0		ug/L	
6270821	éCG	RPD [KJW022-08]	Total Aluminum (Al)	2019/08/08	NC		%	20
			Total Arsenic (As)	2019/08/08	NC		%	20
			Total Cadmium (Cd)	2019/08/08	NC		%	20
			Total Cobalt (Co)	2019/08/08	NC		%	20
			Total Copper (Cu)	2019/08/08	NC		%	20
			Total Iron (Fe)	2019/08/08	NC		%	20
			Total Lead (Pb)	2019/08/08	NC		%	20

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Molybdenum (Mo)	2019/08/08	NC		%	20
			Total Nickel (Ni)	2019/08/08	NC		%	20
			Total Selenium (Se)	2019/08/08	NC		%	20
			Total Silver (Ag)	2019/08/08	NC		%	20
			Total Titanium (Ti)	2019/08/08	NC		%	20
			Total Zinc (Zn)	2019/08/08	NC		%	20

N/A = Not Applicable

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

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

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

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

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

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) Surrogate recovery was below the lower control limit due to matrix interference. This may represent a lower bias in some results.

(2) The recovery was below the lower control limit. This may represent a low bias in some results for this specific analyte.

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

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VALIDATION SIGNATURE PAGE

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

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

Justin Geisel, B.Sc., Organics Supervisor

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

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

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IMMEDIATE TEST

STANTEC CHAIN OF CUSTODY RECORD

INVOICE INFORMATION:		REPORT INFORMATION(if differs from invoice):		PROJECT INFORMATION:		Laboratory Use Only:	
Company Name:	#24125 Stantec Consulting Ltd	Company Name:	Stantec	Quotation #:	B93364	BV Labs Job #:	Bottle Order #: 727759
Contact Name:	Accounts Payable	Contact Name:	Lindsay Van Noortwyk	Task #:			
Address:	PO Box 1680	Address:	10220 103 Ave NW	Project #:	110220370		
	Yellowknife NT X1A2P3		Edmonton AB T5J 0K4	Profit Centre:		COC #: C#727759-01-01	Project Manager: Augustyna Dobosz
Phone:	(867) 920-2216 Fax: (867) 920-2278	Phone:	780 232 1114 Fax:	Site #:			
Email:	SAPinvoices@Stantec.com	Email:	Lindsay.VanNoortwyk@Stantec.com	Sampled By:	LA		

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

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

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

Special Instructions

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

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

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

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

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): Metals / Hg / Cr VI	Low Level Total Suspended Solids	CCME PAHs	CCME PHCs, BTEX/F1-F4	Alkalinity/Chloride/Sulphate	pH/Nitrate+Nitrite/Conductivity	Total Oil and Grease	Acid Extractables by GC/MS	Total Ammonia-N	Diss. ICPMS Metals for Federal Int. GW/QG	Total ICPMS Metals for CCME CEQG for SW	# of Bottles	Comments
1		SW1	2019/07/26	1415	W	Y	X	X	X	X	X	X	X	X		X	14	30-Jul-19 11:50 Augustyna Dobosz B9K9571 WVL ENV-1182 RECEIVED IN OTTAWA
2		SW2		1428			X	X	X	X	X	X	X	X		X		
3		SW3		1450			X	X	X	X	X	X	X	X		X		
4		SW4		1520			X	X	X	X	X	X	X	X		X		
5		QC19-01		1452			X	X	X	X	X	X	X	X		X	14	
6		QC19-02		1455			X	X	X	X	X	X	X	X		X	13	
7		QC19-03	2019/07/26	1457	W	Y	X	X	X	X	X	X	X	X		X	14	
8		[illegible]																
9																		See additional cooler & temp form.
10																		

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Luke Anderson	19/07/26	1614	Ian Campbell	2019/07/29	11:50	
			Luke Gylmsthen Ichiz	2019/07/30	08:00	

Laboratory Use Only: Time Sensitive | Temperature (°C) on Recei: 8, 8, 9 | Custody Seal: Present ✓, Intact ✓

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BV LABS' STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVLABS.COM/TERMS-AND-CONDITIONS.

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

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

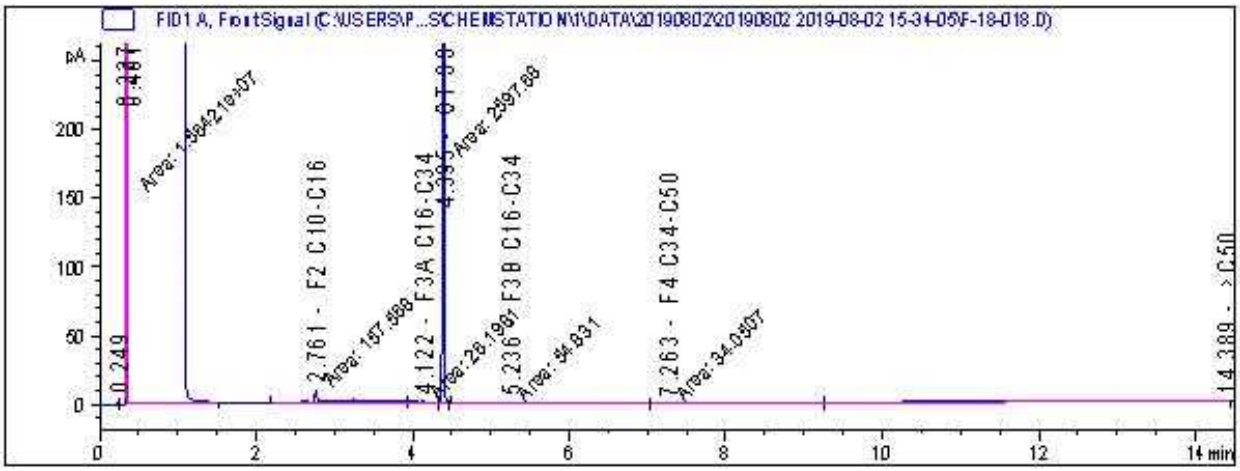
SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BV LABS

White: BV Labs Yellow: Client

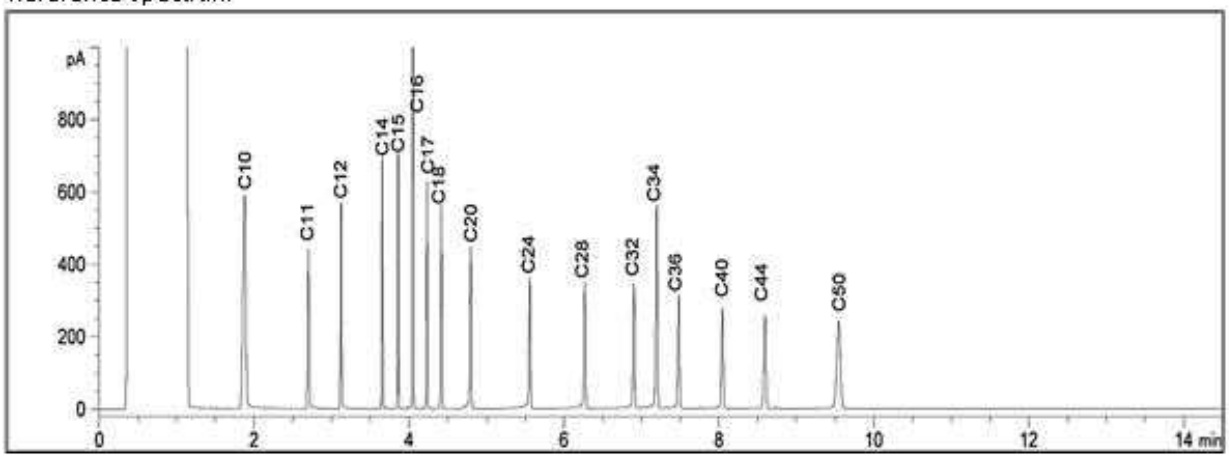
BV Labs Job #: B9K9571
Report Date: 2019/08/08
BV Labs Sample: KJW017

Stantec Consulting Ltd
Client Project #: 110220370
Client ID: SW1

Petroleum Hydrocarbons F2-F4 in Water Chromatogram



Reference Spectrum

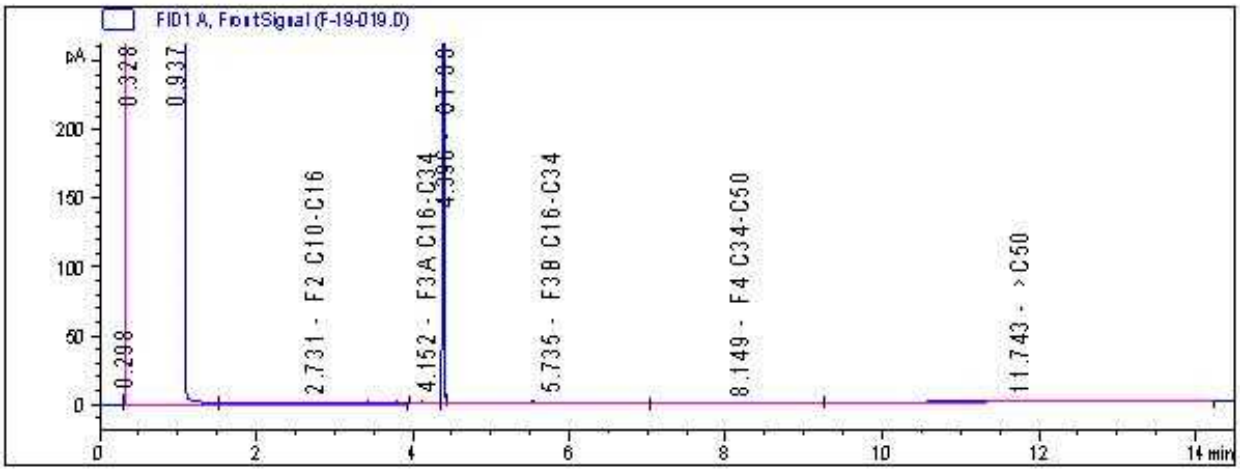


TYPICAL PRODUCT CARBON NUMBER RANGES

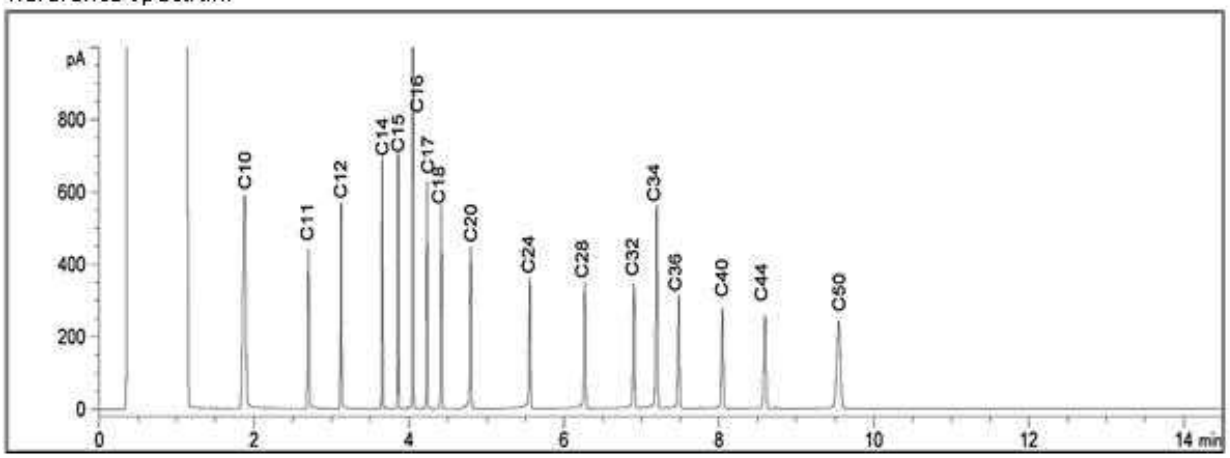
Gasoline: **C6 - C12**	Diesel: **C10 - C24**	Jet Fuels: **C6 - C16**
Varsol: **C8 - C12**	Fuel Oils: **C6 - C32**	Creosote: **C10 - C26**
Kerosene: **C8 - C16**	Motor Oils: **C16 - C50**	Asphalt: **C18 - C50+**

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

Petroleum Hydrocarbons F2-F4 in Water Chromatogram



Reference Spectrum



TYPICAL PRODUCT CARBON NUMBER RANGES

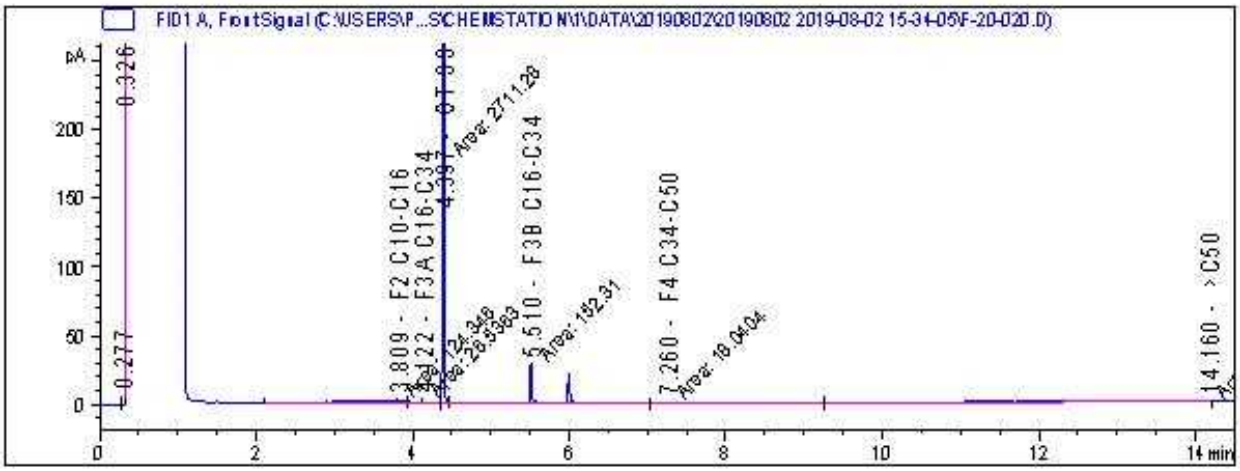
Gasoline: **C6 - C12**	Diesel: **C10 - C24**	Jet Fuels: **C6 - C16**
Varsol: **C8 - C12**	Fuel Oils: **C6 - C32**	Creosote: **C10 - C26**
Kerosene: **C8 - C16**	Motor Oils: **C16 - C50**	Asphalt: **C18 - C50+**

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

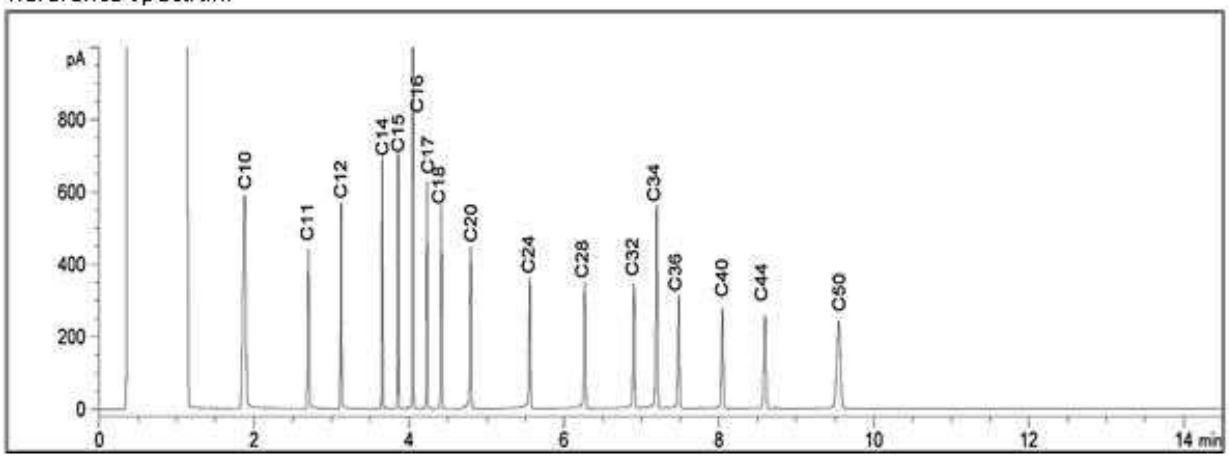
BV Labs Job #: B9K9571
Report Date: 2019/08/08
BV Labs Sample: KJW019

Stantec Consulting Ltd
Client Project #: 110220370
Client ID: SW3

Petroleum Hydrocarbons F2-F4 in Water Chromatogram



Reference Spectrum



TYPICAL PRODUCT CARBON NUMBER RANGES

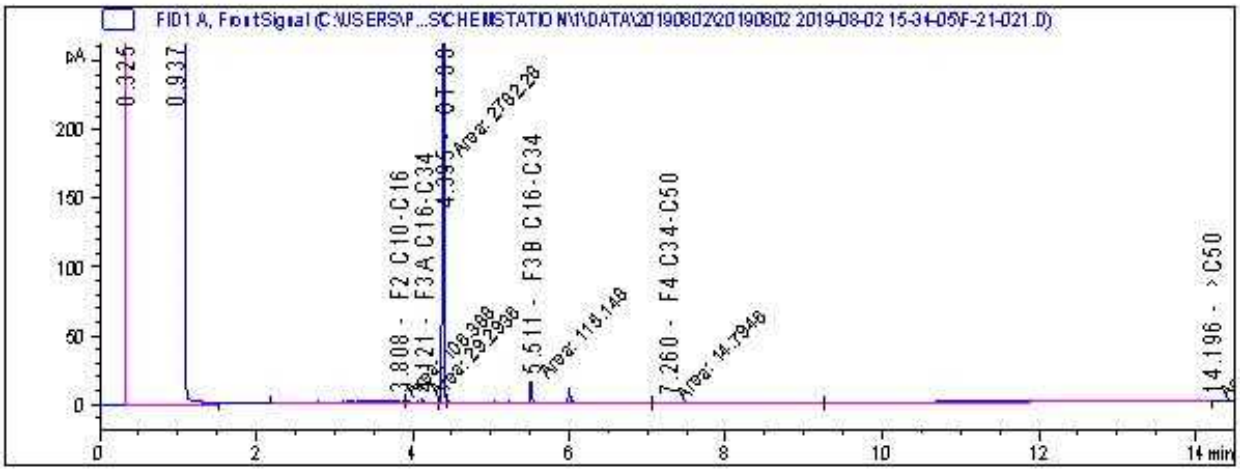
Gasoline: **C6 - C12**	Diesel: **C10 - C24**	Jet Fuels: **C6 - C16**
Varsol: **C8 - C12**	Fuel Oils: **C6 - C32**	Creosote: **C10 - C26**
Kerosene: **C8 - C16**	Motor Oils: **C16 - C50**	Asphalt: **C18 - C50+**

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

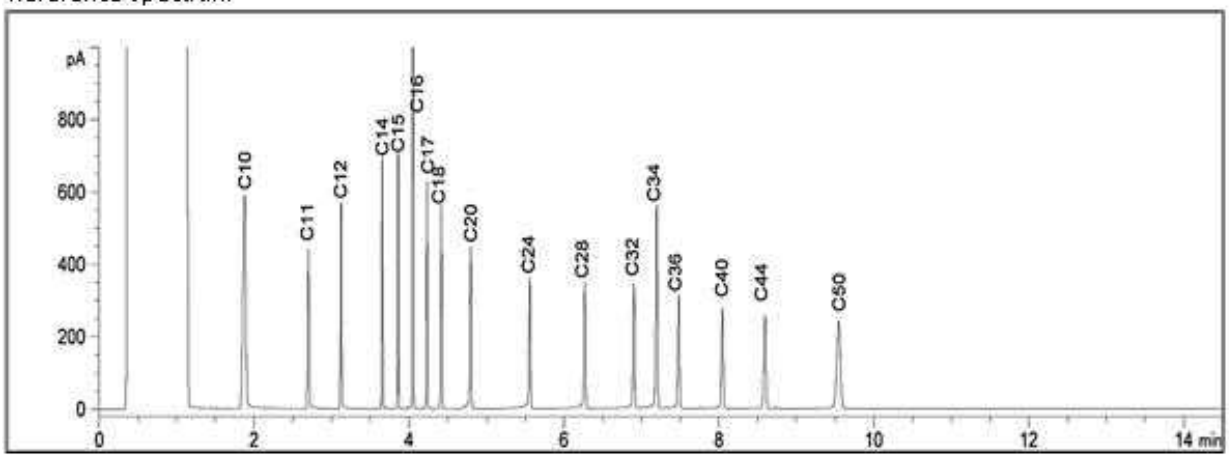
BV Labs Job #: B9K9571
Report Date: 2019/08/08
BV Labs Sample: KJW020

Stantec Consulting Ltd
Client Project #: 110220370
Client ID: SW4

Petroleum Hydrocarbons F2-F4 in Water Chromatogram



Reference Spectrum



TYPICAL PRODUCT CARBON NUMBER RANGES

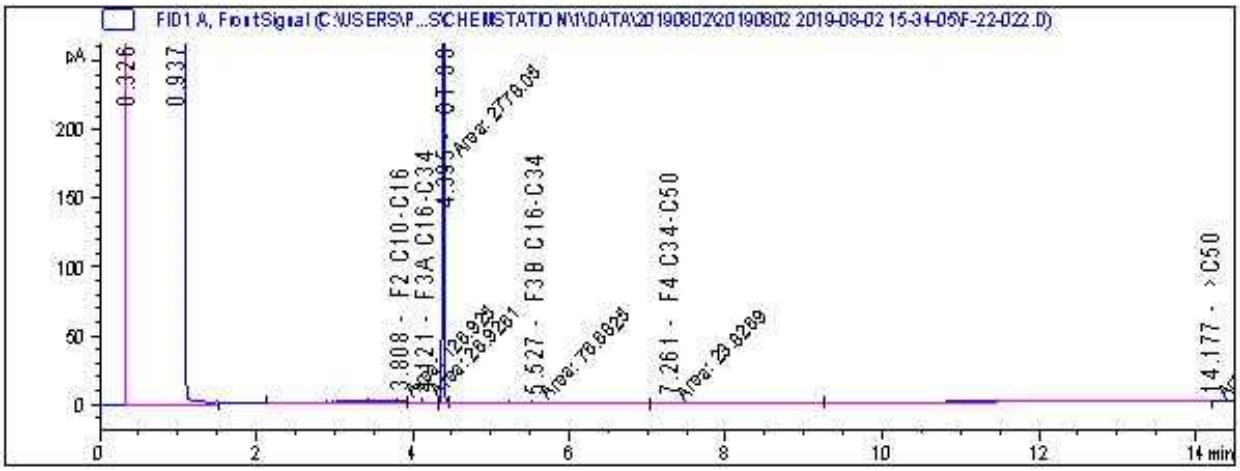
Gasoline: **C6 - C12**	Diesel: **C10 - C24**	Jet Fuels: **C6 - C16**
Varsol: **C8 - C12**	Fuel Oils: **C6 - C32**	Creosote: **C10 - C26**
Kerosene: **C8 - C16**	Motor Oils: **C16 - C50**	Asphalt: **C18 - C50+**

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

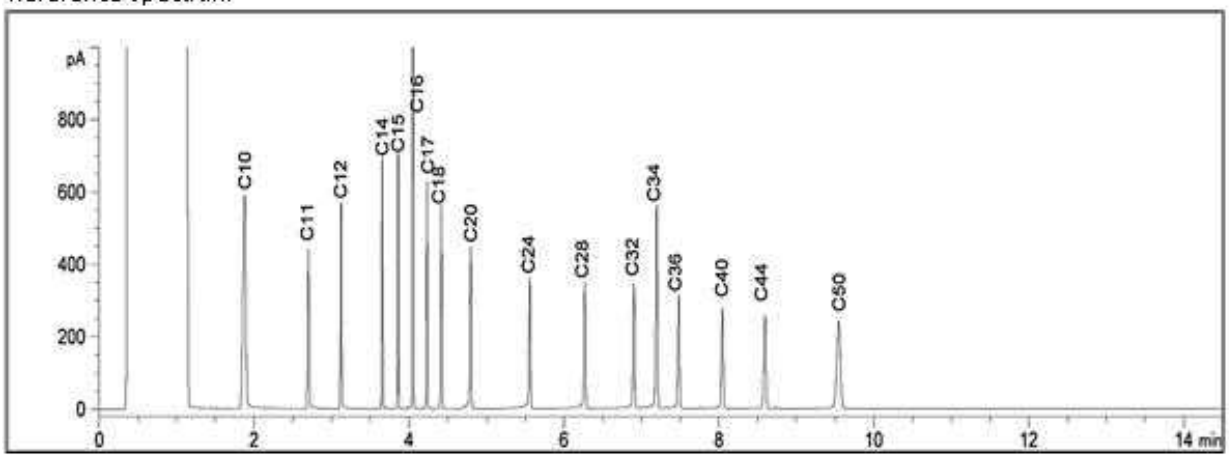
BV Labs Job #: B9K9571
Report Date: 2019/08/08
BV Labs Sample: KJW021

Stantec Consulting Ltd
Client Project #: 110220370
Client ID: QC19-01

Petroleum Hydrocarbons F2-F4 in Water Chromatogram



Reference Spectrum



TYPICAL PRODUCT CARBON NUMBER RANGES

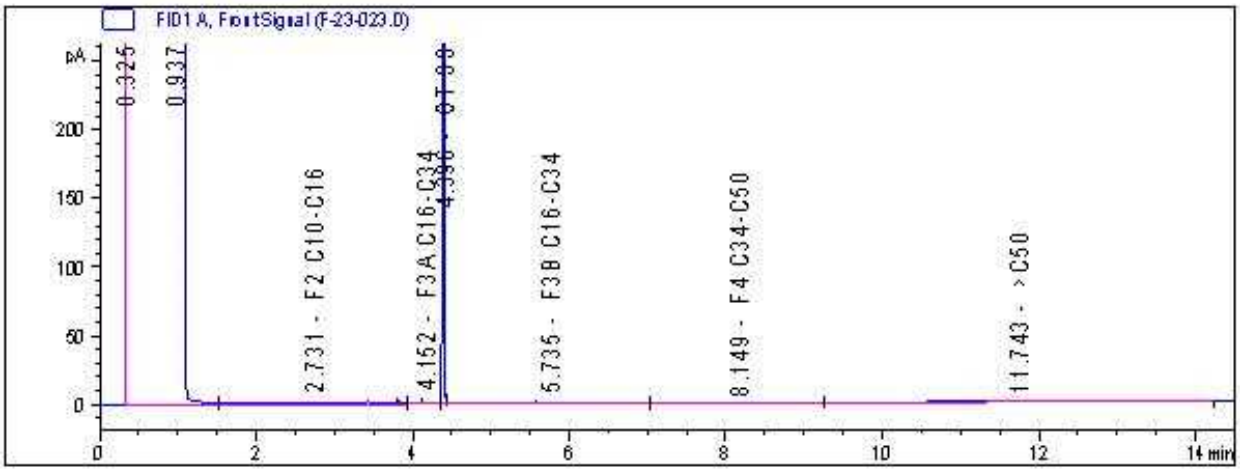
Gasoline: **C6 - C12**	Diesel: **C10 - C24**	Jet Fuels: **C6 - C16**
Varsol: **C8 - C12**	Fuel Oils: **C6 - C32**	Creosote: **C10 - C26**
Kerosene: **C8 - C16**	Motor Oils: **C16 - C50**	Asphalt: **C18 - C50+**

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

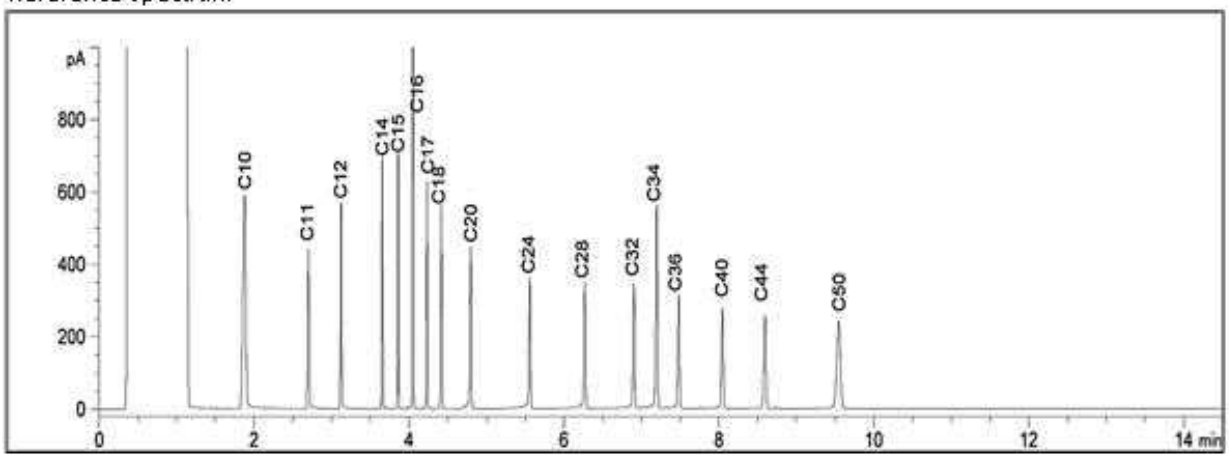
BV Labs Job #: B9K9571
Report Date: 2019/08/08
BV Labs Sample: KJW022

Stantec Consulting Ltd
Client Project #: 110220370
Client ID: QC19-02

Petroleum Hydrocarbons F2-F4 in Water Chromatogram



Reference Spectrum



TYPICAL PRODUCT CARBON NUMBER RANGES

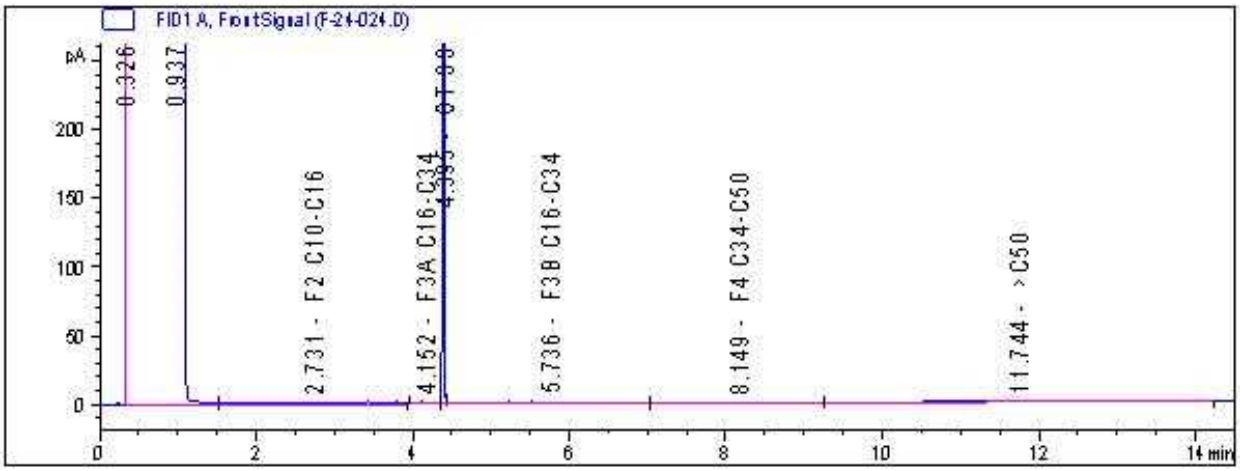
Gasoline: **C6 - C12**	Diesel: **C10 - C24**	Jet Fuels: **C6 - C16**
Varsol: **C8 - C12**	Fuel Oils: **C6 - C32**	Creosote: **C10 - C26**
Kerosene: **C8 - C16**	Motor Oils: **C16 - C50**	Asphalt: **C18 - C50+**

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

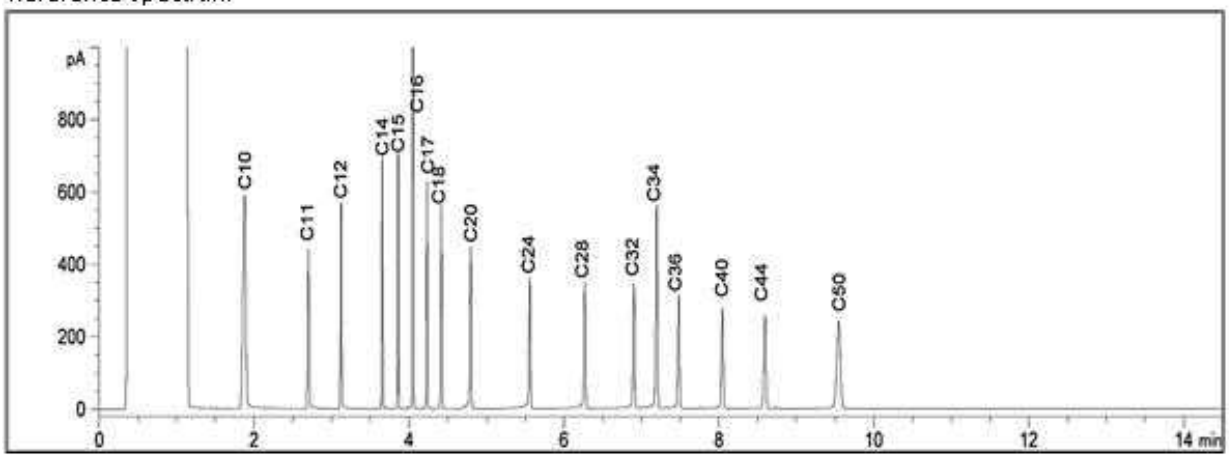
BV Labs Job #: B9K9571
Report Date: 2019/08/08
BV Labs Sample: KJW023

Stantec Consulting Ltd
Client Project #: 110220370
Client ID: QC19-03

Petroleum Hydrocarbons F2-F4 in Water Chromatogram



Reference Spectrum



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline: **C6 - C12**	Diesel: **C10 - C24**	Jet Fuels: **C6 - C16**
Varsol: **C8 - C12**	Fuel Oils: **C6 - C32**	Creosote: **C10 - C26**
Kerosene: **C8 - C16**	Motor Oils: **C16 - C50**	Asphalt: **C18 - C50+**

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