29 March 2018

SUPPLEMENTARY ENVIRONMENTAL INVESTIGATION AND POST-REMEDIAL MONITORING

K19 Trutch Former Townsite, Alaska Highway, Northern BC

Submitted to:
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REPORT

Golder Associates

Executive Summary

Golder Associates Ltd. (Golder) was retained by Public Services and Procurement Canada (PSPC) to conduct a Supplementary Environmental Investigation and Post-Remediation Monitoring program for K-19, Former Trutch Townsite (the Site) located at KM 320 (Franz 2010a) of the old alignment of the Alaska Highway at latitude 57º43.908 north and longitude 122º56.564 west. The Site is located approximately 247 kilometres (km) north of Fort St. John (Figures 1 and 2).

This report was prepared for Canada in accordance with terms and conditions of the Public Services and Procurement Canada (PSPC) in accordance with the terms and conditions of the Public Works and Government Services Canada (PWGSC) Remediation Consultants Contract with Task Authorizations (CTA) #EZ897-160027/002/PWY) dated 31 July 2015 and scope of work outlined in Golder's email to PSPC dated 20 December 2017 in regard to refinement of scope related to the original scope of work described in the document titled "*Implementation Work Plan and Cost Estimate: Tasks in Support of Remediation Implementation of Remediation Plan and Contractor Monitoring, at Site K19, Alaska Highway, Northern, BC*", dated 29 June 2017. Approval for the scope of work was provided under TA 700386476, dated 10 July 2017.

The Site is located within the former Townsite of Trutch, BC, which historically consisted of a highway construction and maintenance camp, refuelling area, dumpsite and residential area.

Since 2009, a number of environmental investigation and remediation programs have been undertaken at the Site; prior to the investigation reported herein, the most recent was conducted by Golder in October and November 2017. The results of the investigation and remediation work carried out so far have identified several areas of potential environmental concern (APECs) and areas of environmental concern (AECs), and associated potential contaminants of concern (PCOCs) or contaminants of concern (COCs). AECs were retained based on the results of intrusive investigation work (i.e., soil and groundwater sampling), while APECs were retained based on a review of historical information as well as observations made during the June 2016 site walkover. Additional APECs were identified from a 1951 Site plan provided to Golder by Ron Sedor on 16 September 2016 and summarized in the document entitled "*Updated Sampling and Analysis Plan for K-19 Trutch, Former Alaska Highway Alignment, BC*", dated 22 December 2016.

Following the 27 July 2017 investigation program, an updated list of the APECs/AECs at the Site was developed as shown on Figure 2. Based on the results of site investigation works conducted to July 2017, nine areas were identified to have petroleum hydrocarbon related contamination in soils and were carried forward for remedial excavation work.

Remedial excavation of AEC 1B (EX17-01) and AEC 1C (EX17-02) was undertaken between 27 September and 15 November 2017. After completion of the remedial excavations, residual hydrocarbon contaminated material was identified in situ in localized areas within both AEC 1B and AEC 1C. As such, additional lateral delineation and remediation work was warranted at AEC 1B, in order to remove the residual contaminated material that underlies the former Alaska Highway alignment as well as along a portion of the eastern wall of the EX 17-01 at AEC 1B. Similarly, for EX 17-02 at AEC 1C, it was anticipated that the residual contaminated material remaining along localized sections of the excavation walls would be delineated laterally and remediated as part of the future remediation program at the Site. In addition, a post-remediation monitoring program to assess groundwater and

soil vapour quality in AEC 1B was recommended, including the installation of several nested groundwater monitoring wells and soil vapour probes. The nested groundwater monitoring wells (screened within the shallow soils and within bedrock) would allow post-remediation groundwater concentrations to be monitored relative to former groundwater monitoring wells that exhibited groundwater contamination within AEC 1B. The soil vapour probes would allow for assessment of post remediation vapour concentrations associated with residual contamination remaining at depth. A summary of the remedial activities carried out on AECs 1B and 1C, is provided in the table below.

Summary of Remedial Activities on AECs 1B and 1C

AEC	Approximate Volume of Contaminated Material Removed (m^3)	Disposal Location	Residual Soil Contaminants of Concern (in situ)	Status
AEC 1B	16,316	Northern Rockies Landfill (37,290 tonnes)	Benzene, toluene, xylene, naphthalene, LEPH, HEPH, VPH	Further delineation and remedial excavation work required to address residual soil contamination in excavation sidewalls in the vicinity of the former alignment
AEC 1C	5,549	Northern Rockies Landfill (5,793 tonnes) Temporary On-Site Stockpile (6,889 tonnes)	Benzene, toluene, xylene, LEPH	Further delineation and remedial excavation work required to address residual soil contamination in excavation sidewalls

The present report summarizes the supplementary environmental investigation and post-remedial monitoring activities carried out at the Site from 11 to 27 January 2018, where the primary objectives of the field investigation were as follows:

- to further delineate the residual hydrocarbon contaminated material identified during 2017 remedial excavations within AECs 1B and 1C for the purposes of supporting future remediation planning for the Site
- to support risk-management planning for the Site, through post-remediation monitoring of groundwater and soil vapour quality and through targeted collection of backfill soil samples for arsenic analysis within the area of the remedial excavation at AEC 1B.

In order to meet the objectives of the investigation program, Golder implemented the following scope of work:

- Snow removal of trails and clear trees to provide access for the supplementary environmental investigation.
- Completion of utility locates in the areas targeted for excavation of test pits and borehole drilling.
- Installation of nine monitoring wells, including three nested locations (with a shallow and deep monitoring well installed within the same borehole), and four vapour probes, for off-site migration west of AEC 1B and for future remedial planning.

- Installation of two monitoring wells and four vapour probes, for post-remedial monitoring of soil and groundwater on AEC 1B.
- Excavation of six test pits for delineation of residual contamination identified on the eastern wall of AEC 1B, to support future remedial planning.
- Excavation of seven test pits for delineation of residual contamination identified on the eastern wall of AEC 1C, to support future remedial planning.
- Drilling four boreholes with installation of three monitoring wells and 1 soil vapour probe for further characterization of previously identified hydrocarbon contamination on AEC 19B.
- Installation of two soil vapour probes to assess validity of the previously calculated exceedances obtained from partitioning calculations made from soil and groundwater analysis results, directly east of wetland C and south-east of AEC 19B.
- Development of the 14 newly-installed monitoring wells, as well as 17 existing monitoring wells.
- Sampling 29 existing and newly-installed monitoring wells.
- Sampling the 11 newly-installed soil vapour probes.
- Collecting additional soil samples from the remaining backfill material on-site, as well as the source material at Adsette Pit, near Prophet River, for assessing previous arsenic concentrations above the applicable CSR standards.
- Surveying of the newly-installed monitoring wells, soil vapour probes and test pit locations across the Site.
- Creation of analytical chemistry tables and figures, including the assessment against the applicable CSR standards.
- Report preparation (this report).

The overall objectives of the January 2018 investigation program were substantially met. The key findings of the investigation program indicate that:

- Test pits and boreholes excavated and drilled respectively for assessing the lateral extent of soil exceedances found along the north-west wall of AEC 1B remedial excavation and eastern walls of both, 1B and 1C remedial excavations fully delineated those exceedances. However, residual hot spots of soil contamination were found west of remedial excavation AEC 1B, across the former Alaska Highway alignment (K19-MW18-10) and east of remedial excavation AEC 1C (K19-TP18-12). Benzene exceedances were found at these two locations. Additional step-out investigation locations are warranted around these two locations, in order to assess lateral extent of contamination.
- A first round of post-remedial groundwater samples was collected from previously and newly installed monitoring wells, showing in general exceedances for dissolved metals (barium, cobalt and lithium) with one historical monitoring well (K19-MW17-35D) showing exceedances for benzene, toluene, and

1,2-dichloroethane. The 2018 monitoring wells installed down gradient of K19-MW17-35D have delineated these exceedances. The parameters with exceedances and the range of concentrations are generally consistent with previous investigation results at the respective monitoring well locations. Additional rounds of post-remediation monitoring are warranted in order to monitor seasonal and temporal changes in groundwater quality and to document improvements in groundwater quality following the remediation work.

- Several soil vapour samples were collected from across the Site, for assessing the soil quality after the completion of the remediation activities carried out during late 2017. The soil samples collected did not show exceedances above the applicable CSR RL standards; however, additional monitoring is warranted in the future in order to assess possible seasonal and temporal changes in soil vapour quality and to confirm that residual hydrocarbon-contaminated soil does not affect soil vapour quality at the Site.
- Additional soil samples were collected from the backfill material used for backfilling remedial excavations of AECs 1B and 1C. The backfill material was sourced from a local quarry that had exhibited metal concentrations below the CSR standards at the time of sampling of the source backfill. Subsequent to the Stage 10 changes to the CSR standards (which occurred during backfilling that included a lowering of background concentrations for arsenic) arsenic concentration at the source backfill site were found to be slightly above the CSR background concentrations. 10 soil samples were collected and analyzed for arsenic from the two existing stockpiles left at the Adsette Pit, while six soil samples collected and analyzed for arsenic from two monitoring wells and two vapour probes installed within the limits of remedial excavation AEC 1B. From the 16 samples analyzed for assessing the backfill environmental quality, seven (7) were found to have exceedances slightly above the applicable CSR Protocol 4 standards for arsenic.

The results of the supplementary investigation and post-remediation monitoring program will be used to update the Remediation Action Plan/Risk Management Plan for the Site.

Notice to Readers

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The inferences concerning Site conditions contained in this report are based on information obtained during the assessment conducted by Golder personnel, and are based solely on the condition of the properties at the time of the Site reconnaissance, supplemented by historical and interview information obtained by Golder, as described in this report.

This report was prepared, based in part, on information obtained from historic information sources. In evaluating the subject Site, Golder has relied in good faith on information provided. We accept no responsibility for any deficiency or inaccuracy contained in this report as a result of our reliance on the aforementioned information.

The findings and conclusions documented in this report have been prepared for the specific application to this project and have been developed in a manner consistent with that level of care normally exercised by environmental professionals currently practicing under similar conditions in the jurisdiction.

With respect to regulatory compliance issues, regulatory statutes are subject to change and interpretation. These statutes and interpretations may change over time, and should be reviewed.

If new information is discovered during future work, the conclusions of this report should be re-evaluated and the report amended, as required, prior to any reliance upon the information presented herein.

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1.0 INTRODUCTION

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The field investigation was completed between 11 and 27 January 2018.

1.1 Site Description and Background

The Site is located within the former Townsite of Trutch, BC, which historically consisted of a highway construction and maintenance camp, refuelling area, dumpsite and residential area.

Since 2009, a number of environmental investigation and remediation programs have been undertaken at the Site; prior to the investigation reported herein, the most recent was conducted by Golder in October and November 2017 (Golder 2018a). The results of the investigation and remediation work carried out so far have identified several areas of potential environmental concern (APECs) and areas of environmental concern (AECs), and associated potential contaminants of concern (PCOCs) or contaminants of concern (COCs). AECs were retained based on the results of intrusive investigation work (*i.e.*, soil and groundwater sampling), while APECs were retained based on a review of historical information as well as observations made during the June 2016 site walkover. Additional APECs were identified from a 1951 Site plan provided to Golder by Ron Sedor on 16 September 2016 and summarized in the document entitled "*Updated Sampling and Analysis Plan for K-19 Trutch, Former Alaska Highway Alignment, BC*", dated 22 December 2016.

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Remedial excavation of AEC 1B (EX17-01) and AEC 1C (EX17-02) was undertaken between 27 September and 15 November 2017. After completion of the remedial excavations, residual hydrocarbon contaminated material was identified in situ in localized areas within both AEC 1B and AEC 1C. As such, additional lateral delineation and remediation work was warranted at AEC 1B, in order to remove the residual contaminated material that underlies the former Alaska Highway alignment as well as along a portion of the eastern wall of the EX 17-01 at

AEC 1B. Similarly, for EX 17-02 at AEC 1C, it was anticipated that the residual contaminated material remaining along localized sections of the excavation walls would be delineated laterally and remediated as part of the future remediation program at the Site. In addition, a post-remediation monitoring program to assess groundwater and soil vapour quality in AEC 1B was recommended, including the installation of several nested groundwater monitoring wells and soil vapour probes. The nested groundwater monitoring wells (screened within the shallow soils and within bedrock) would allow post-remediation groundwater concentrations to be monitored relative to former groundwater monitoring wells that exhibited groundwater contamination within AEC 1B. The soil vapour probes would allow for assessment of post remediation vapour concentrations associated with residual contamination remaining at depth.

Table 1 below, summarizes the remedial activities carried out on AECs 1B and 1C.

Table 1: Summary of Remedial Activities on AECs 1B and 1C

AEC	Approximate Volume of Contaminated Material Removed (m^3)	Disposal Location	Residual Soil Contaminants of Concern (in situ)	Status
AEC 1B	16,316	Northern Rockies Landfill (37,290 tonnes)	Benzene, toluene, xylene, naphthalene, LEPH, HEPH, VPH	Further delineation and remedial excavation work required to address residual soil contamination in excavation sidewalls in the vicinity of the former alignment
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The present report summarizes the supplementary environmental investigation and post-remedial monitoring activities carried out at the Site from 11 to 27 January 2018.

2.0 OBJECTIVES AND SCOPE OF WORK

2.1 Objectives of Investigation

The primary objectives of the January 2018 field investigation were as follows:

- To further delineate the residual hydrocarbon contaminated material identified during 2017 remedial excavations within AECs 1B and 1C for the purposes of supporting future remediation planning for the Site.
- To support risk-management planning for the Site, through post-remediation monitoring of groundwater and soil vapour quality and through targeted collection of backfill soil samples for arsenic analysis within the area of the remedial excavation at AEC 1B.

The scope of work that was developed in order to meet these objectives in further detail in Section 2.2, below.

2.2 Scope of Work

In order to meet the objectives of the investigation program, Golder implemented the following scope of work:

- Snow removal of trails and clear trees to provide access for the supplementary environmental investigation.
- Completion of utility locates in the areas targeted for excavation of test pits and borehole drilling.
- Installation of nine monitoring wells, including three nested locations (with a shallow and deep monitoring well installed within the same borehole), and four vapour probes, for off-site migration west of AEC 1B and for future remedial planning.
- Installation of two monitoring wells and four vapour probes, for post-remedial monitoring of soil and groundwater on AEC 1B.
- Excavation of six test pits for delineation of residual contamination identified on the eastern wall of AEC 1B, to support future remedial planning.
- Excavation of seven test pits for delineation of residual contamination identified on the eastern wall of AEC 1C, to support future remedial planning.
- Drilling four boreholes with installation of three monitoring wells and 1 soil vapour probe for further characterization of previously identified hydrocarbon contamination on AEC 19B
- Installation of two soil vapour probes to assess validity of the previously calculated exceedances obtained from partitioning calculations made from soil and groundwater analysis results, directly east of wetland C and south-east of AEC 19B.
- Development of the 14 newly-installed monitoring wells, as well as 17 existing monitoring wells.
- Sampling 29 existing and newly-installed monitoring wells.
- Sampling the 11 newly-installed soil vapour probes.

- Collecting additional soil samples from the remaining backfill material on-site, as well as the source material at Adsette Pit, near Prophet River, for assessing previous arsenic concentrations above the applicable CSR standards.
- Surveying of the newly-installed monitoring wells, soil vapour probes and test pit locations across the Site
- Creation of analytical chemistry tables and figures, including the assessment against the applicable CSR standards.
- Report preparation (this report).

2.3 Constraints of Work

The constraints to the January 2018 field investigation program was primarily associated with winter conditions, including cold temperatures and snowfall events and which contributed to challenges during the drilling and test-pitting program, including the collection of groundwater and soil vapour samples.

3.0 APPLICABLE REGULATORY CRITERIA

Golder understands that the Site is owned by the province of British Columbia and leased from the Province by PSPC. The former Site use was industrial but also included accommodation as part of the maintenance camp. Currently there are no buildings on-site. Based on this ownership structure, and taking into consideration the objectives of the remediation works, and considering that Provincial regulations are to be applied in the event that the Site is transferred back to the Province, only the Provincial environmental legislation was applied to the Site to assess soil quality during the remedial activities at the Site.

Generally, provincial and municipal laws, regulations and requirements do not apply on federal lands, activities or undertakings. Soil and other materials that are removed from federal lands may become subject to provincial or municipal laws and regulations. Provincial or municipal standards may be used in relation to federal lands only as guidelines for the purpose of establishing remediation goals and objectives. The term "standards" is used in this part in order to maintain consistency in terminology throughout this document, and does not imply that standards contained in provincial or municipal laws and regulations apply on federal lands, activities or undertakings.

In British Columbia, environmental matters pertaining to contaminated sites generally fall under the jurisdiction of the Ministry of Environment and Climate Change Strategy, pursuant to the Environmental Management Act (EMA, SBC 2003, Chapter 53 assented to 23 October 2003, updated to 30 October 2017). The key regulation under the EMA that relates to the assessment and remediation of contaminated sites is the Contaminated Sites Regulation (CSR; BC Reg. 375/96, O.C. 1480/96 and M271/2004, as updated [includes amendments up to BC Reg. 253/2016 and BC Reg. 196/2017, updated to 1 November 2017]). BC Reg. 253/2016 is also known as the Stage 10 or Omnibus amendment; BC Reg. 196/2017 is also known as the Stage 11 or Housekeeping amendment. These two amendments, effective as of 1 November 2017, include significant changes to the text and numerical standards of the CSR, and are accompanied by new technical guidance documents and administrative procedures.

A related regulation under the EMA is the Hazardous Waste Regulation (HWR; BC Reg. 63/88, O.C. 268/88, as updated [includes amendments up to BC Reg. 243/2016, updated to 1 November 2017]). Previous amendments to the CSR and the HWR (in effect 19 July 2016) decoupled the CSR and HWR for the management of contaminated sites, such that the role of the HWR in contaminated sites is limited to cases of off-site transport and disposal of material meeting the criteria of hazardous waste, and cases involving materials that do not meet the definition of on-site media (e.g., drums of hazardous waste, dumped hazardous waste, mine tailings and waste rock).

A third regulation in effect in BC that applies to environmental investigations is the BC Ground Water Protection Regulation (GPWR; BC Reg 39/2016, O.C. 113/2016, including amendments up to BC Reg 152/2016, 10 June 2016). This regulation establishes standards to protect groundwater supplies by requiring wells in BC, including environmental boreholes, test pits and monitoring wells, to be properly constructed, maintained, and, at the end of their service and properly deactivated.

3.1 Provincial CSR Soil Standards

The CSR identifies soil standards based on six land use categories and two sub-categories: Agricultural (AL); Urban Park (PL); Wildlands (WL) (subdivided into natural and reverted); Residential (RL) (subdivided into low density and high density); Commercial (CL); and Industrial (IL). The CSR also includes standards for the protection of human health (including intake of contaminated soil) and environmental protection in consideration of environmental receptors. The standards are further divided into site-specific standards, based on the nature of the land and groundwater use at or in the area of a subject site, including standards for groundwater used for drinking water (DW), groundwater flow to aquatic life in surface water (AW), groundwater used for livestock watering (LW), and groundwater used for irrigation (IW). The CSR also includes provision for the development of site-specific risk-based standards.

Current and future land use of the Site is considered to be Wildlands Reverted (WL_R). For the purposes of remediation, WL_R soil standards were considered applicable for the top three metres of soil, while CSR IL soil standards were considered applicable for soil samples collected deeper than 3 metres below ground surface (m bgs).

The following CSR matrix and generic numerical soil standards (Schedule 3.1, Parts 1 and 2) were considered applicable to the Site:

- Human health protection—intake of contaminated soil
- Human health protection—protection of groundwater used as drinking water
- Environmental protection—toxicity to soil invertebrates and plants
- Environmental protection—groundwater flow to freshwater used by aquatic life

3.2 Provincial CSR Groundwater Standards

The CSR identifies groundwater standards for the protection of drinking water (DW), irrigation (IW), livestock watering (LW), fresh water (FW) and marine water (MW) surface water bodies (AW). The CSR groundwater standards (Schedule 3.2) for the protection of aquatic life (AW) in freshwater (FW) bodies and for protection of groundwater used as drinking water (DW) were considered applicable to the Site. Provincial drinking water standards for dissolved iron and manganese were not considered applicable to the Site as the industrial and commercial activities executed on-site did not fall under applicable purposes or activities outlined in Schedule 2 of the CSR.

3.3 Provincial CSR Soil Vapour Standards

The CSR provides Generic Numerical Vapour Standards (Schedule 3.3, under the Stage 10 Amendments) for use in the assessment of soil vapour quality at sites subject to investigation. The vapour standards are divided into three categories based on land use and include standards for residential (RL), agricultural (AL) and urban park (PL) (as one category), commercial (CL) and industrial (IL) land uses.

The BC MoE document titled *"Technical Guidance 4 – Vapour Investigation and Remediation"* allows for the application of vapour attenuation factors (indoor or outdoor air concentration divided by the soil vapour concentration) to predict indoor and outdoor vapour concentrations from soil vapour concentrations, as follows:

$$C_{air} = C_{vapour} * \alpha$$

Where α is the vapour attenuation factor, C_{air} is the estimated air concentration of the substance, and C_{vapour} is the measured or predicted soil vapour concentration of the substance. For indoor air, the vapour attenuation factor takes into account the attenuation of soil vapours that occur through migration in the vadose zone and the building foundation, and mixing of vapours in indoor air. Vapour attenuation factors for indoor air are based on the land use of the site, soil vapour sample location, and the distance between the soil vapour sample and receptor (building or outdoor air). The soil vapour concentration may be measured or estimated from measured soil and/or groundwater concentrations, subject to the criteria listed in BC MoE TG4.

The CSR PL vapour standards (Schedule 3.3) are considered applicable to the Site. Given the current and anticipated future open use of the Site, the outdoor scenario was considered as the most appropriate end use regarding partitioning factors and soil vapour standards. In cases where nearby properties within 30 m of areas with detectable volatile concentrations were identified, the indoor standards were also adopted.

4.0 FIELD METHODS

This section of the report outlines the methods used in order to complete the scope of work described in Section 2.2, above, including the overall approach and rationale of the investigation.

A photographic summary of the field program is presented in Appendix A.

4.1 Approach and Rationale

The overall approach of the soil, groundwater and soil vapour characterization program was developed by considering the data gaps that had been identified through the course of both previous environmental investigations and remediation work at the Site. Data gaps that were identified in the planning process of this investigation program included:

- Delineation of off-site migration of soil and groundwater contamination to the west of AEC 1B.
- Delineation of residual soil contamination identified on the eastern walls of AECs 1B and 1C.
- Post remedial soil vapour and groundwater monitoring at AEC 1B.
- Validation of two modelled soil vapour exceedances calculated as part of the 2017 summer field environmental program, directly east of wetland C and south-east of AEC 19B.
- Attempt to identify the source of the localized deep hydrocarbon soil exceedance associated with toluene in K19-MW17-26 at AEC 19B.
- Increased sampling density of backfill material that was imported to the Site during the 2017 remediation program to assess arsenic concentrations.

The January 2018 soil, groundwater and soil vapour characterization program focused on AECs 1B, 1C and 19B. A summary of sampling locations completed within each AEC and the rationale is shown in Table 2, below. Sampling locations are shown on Figures 3A and 3B, at the end of this report.

Table 2: Summary of Borehole, Monitoring Well, Vapour Probes and Test Pit Locations

APEC/AEC	Borehole, Monitoring Well, Vapour Probes and Test Pit Locations	
	Proposed Locations	**Rationale**
AEC 1B	MW18-06 MW18-07S & D / SV18-07 MW18-08S & D / SV18-08 MW18-09 / SV18-09 MW18-10S & D / SV18-10 MW18-11	Delineation of off-site migration of soil and groundwater contamination west of AEC 1B, to support future remedial planning as well as assessing the soil vapour concentrations off-site. The Monitoring wells and soil vapour probes can also be utilized for future post remediation monitoring (assuming they are not removed as part of future remediation)
	MW18-01 / SV18-01 MW18-02 / SV18-02 SV18-03 SV18-04	Post remedial soil vapour and groundwater monitoring at AEC 1B to assess concentrations associated with residual hydrocarbon contamination within the bedrock at depth. Increased sampling density for arsenic of imported backfill material, to support risk management planning
	TP18-01 TP18-02 TP18-05 TP18-09 TP18-10 TP18-13 TP18-14	Delineation of residual contamination identified on the eastern wall of AEC 1B for future remedial planning.
AEC 1C	TP18-03 TP18-04 TP18-06 TP18-07 TP18-08 TP18-11 TP18-12	Delineation of residual contamination identified on the eastern wall of AEC 1C, to support future remedial planning.
AEC 19B	MW18-12 BH18-13 MW18-15 MW18-16 SV18-17	Further characterization and delineation of previously identified hydrocarbon contamination of the AEC.
Soil Vapour Modelling Validation	SV18-05 SV18-14	Installation of two soil vapour probes to validate the two exceedances obtained as part of the partitioning calculations made from soil and groundwater results obtained during past environmental investigations.

Notes:

BH= borehole, MW = monitoring well, TP = test pit, SV = soil vapour probe.

Because the soil investigation program was conducted in order to support future remediation and risk management planning activities for the Site, soil samples were generally submitted for CSR-regulated parameters which were used for developing remedial objectives for the Site (e.g., LEPH/HEPH, BTEX/VPH) as opposed to hydrocarbon-based parameters listed in Federal guidance documents (e.g., CWS PHC F1-F4).

4.2 Health and Safety

Prior to undertaking the field investigation program, the existing health and safety plan for the Site was updated to reflect current site conditions. The plan addressed potential health and safety issues that had been identified on the Site, and provided mitigation measures to address those potential risks. The plan also included a detailed check-in and check-out procedure, due to the remote location of the Site.

4.3 Site Clearances

A BC One Call was completed prior to advancing the test pits and borehole locations. No utility services were reported in the BC One Call database and the Site has no existing services. Underworld Line Locating Ltd. (Underworld) was also contracted to complete utility locates in along the former alignment in the area around proposed borehole locations in the vicinity of AEC1b.

Tree clearing and mulching directly west of the AEC 1B and the former Alaska Highway Alignment was subcontracted to Eh Cho Dene Enterprises GP Ltd. (ECD) of Fort Nelson. In addition, ECD conducted plowing and snow clearing from the work areas, during and before the field program started.

4.4 Test Pitting Investigation

The test pit investigation comprised excavating 14 test pits between 12 and 28 January 2018. A John Deere 350D LC excavator, supplied and operated by ECD was used to excavate the test pits.

Test pits were advanced to a minimum pre-determined depth, based on the data gap that each location was intended to address. In general, test pits were excavated to a depth of 2.5 metres below ground surface (m bgs) or to refusal. The refusal depth was determined by the presence of competent bedrock that varied in depth across the Site. Aside from the depth to bedrock, field screening was used to assist with final determination of test pit depths.

The soil conditions encountered during test pitting, and the results of field testing, were recorded and logged in the field by Golder staff, and were reported on the test pit logs. Soil samples were collected for environmental testing as described in the subsections below

The test pit spoils were stockpiled for soil sampling purposes and subsequently backfilled in each test pit. The material was backfilled in the test pit in the same order that it was excavated and was nominally compacted during backfilling using the excavator bucket and tracks. Where available, mulched wood was placed on top of the backfilled test pits. Following completion, test pit locations were surveyed by Vector Geomatics Land Surveying Ltd. (Vector) of Fort St. John, BC (refer to Section 4.8).

Copies of the test pit logs are included in Appendix B.

4.5 Borehole, Soil Vapour Probe, and Monitoring Well Investigation

The borehole investigation and soil vapour and monitoring well installations were carried out between 16 and 25 January 2018. The work consisted of advancing 17 boreholes, with three locations consisting of a shallow and deep well pair (K19-MW18-07 S and D, K19-MW18-08 S and D, and K19-MW18-010 S and D); 8 locations consisting of a single monitoring well installation (K19-MW18-01, -02, -03, -04, -05, -06, -09, -11, -12, -15, and -16); and five locations where a vapour probe was installed (K19-SV18-03, -04, -05, -14, and -17). In one borehole location (K19-BH18-13) no monitoring well and/or vapour probe was installed. In addition, nested vapour probes were installed in six locations (K19-MW18-01, -02, -07, -08, -09 and -10). These vapour probes were numbered using the same monitoring well coding (e.g., at location K19-MW18-01, the nested vapour probe K19-SV18-01 was installed).

The boreholes were advanced through the overburden soils into bedrock to depths ranging from 9.0 to 13.7 m bgs. The final depths of the boreholes were decided in the field based on field screening and depths to bedrock and the water table.

The boreholes were advanced using a CME 750 track-mounted drill rig supplied and operated by Tundra Environmental Drilling Services Ltd. of Stettler, AB (Tundra). The boreholes were advanced using the solid stem drilling method, using water as the drilling fluid.

The investigation was carried out under the full-time supervision of Golder's staff who provided technical direction to the drillers, collected samples and logged the subsurface conditions encountered. Soil samples were collected for environmental testing as described in the subsections below.

The drill cuttings were assessed by Golder in the field. Borehole cuttings with indications of contamination (e.g., hydrocarbon-like odour, staining or sheen) were placed in labelled woven plastic 'super sacks' and left on-site for future disposal, adjacent to investigation location K19-TP18-13. Approximately three full filled sacks were generated during the field investigation (i.e., equal to approximately 1.5 m^3). Cuttings without indications of contamination were disposed of on the ground surface adjacent to the borehole.

4.5.1 Monitoring Well Installation, Development and Sampling

Groundwater monitoring wells were installed in 16 of the 17 boreholes that were drilled. The monitoring wells were assembled without the use of glues or solvents. The well risers were constructed of 51-millimetre (mm) diameter, Schedule 40, threaded PVC pipe. The well screens were constructed of 1.5 metre length sections of No. 10 size slotted PVC pipe. A clean filter sand pack was placed around the screened portion of the wells to minimize the entry of fines into the well and allow the flow of water into the well. A sand pack was installed from the base of the borehole to approximately 0.3 metres above the top of the screen. A bentonite or grout seal was placed above the sand pack, and was used to fill the annular space between the well and the borehole wall to ground surface. Each monitoring well was completed at surface with a locked steel protective monument casing or a steel roadbox and secured with concrete. Monitoring well construction details are included in the borehole logs attached in Appendix D and are summarized in Table 3, below.

Table 3: Well Completion Details

Location	Surveyed easting and northing		Surveyed elevation of ground surface	Surveyed elevation of top of well casing	Groundwater Monitoring Well				Depth of end-of-borehole, measured at time of drilling
					Depth of sand pack interval, measured at time of installation		Depth of well screen interval, measured at time of installation		
	(m; NAD83 UTM Z10N)		(m asl)	(m asl)	(m bgs)		(m bgs)		(m bgs)
	Easting	Northing			Top	Bottom	Top	Bottom	
K19-MW18-01	503232.799	6399044.293	855.054	855.906	6.70	8.50	7.00	8.50	9.00
K19-MW18-02	503245.766	6399057.324	855.025	855.887	9.20	11.00	9.50	11.00	12.00
K19-MW18-06	503191.683	6399057.242	851.418	852.206	7.90	10.00	8.20	9.70	10.60
K19-MW18-07S	503210.906	6399080.366	851.147	851.94	4.10	6.00	4.40	5.90	6.00
K19-MW18-07D	503209.842	6399080.395	851.018	851.895	8.00	9.80	8.30	9.80	10.30
K19-MW18-08S	503228.162	6399091.731	851.629	852.433	5.20	7.10	5.50	7.00	7.10
K19-MW18-08D	503228.98	6399092.539	851.601	852.529	8.10	11.00	8.40	9.90	11.10
K19-MW18-09	503242.805	6399108.225	851.547	852.352	8.60	10.40	8.90	10.40	10.50
K19-MW18-10S	503178.498	6399043.657	851.392	852.325	4.20	6.10	4.50	6.00	6.10
K19-MW18-10D	503179.307	6399044.464	851.428	852.330	8.10	10.30	8.50	10.00	10.60
K19-MW18-11	503166.566	6399030.89	850.999	851.879	8.20	10.20	8.50	10.00	10.60
K19-MW18-12	503119.804	6398731.9	863.012	863.867	11.40	13.20	11.70	13.20	13.70
K19-MW18-15	503133.673	6398743.815	863.308	864.116	8.90	12.00	9.20	11.70	12.20
K19-MW18-16	503106.442	6398756.425	861.291	862.076	8.40	10.50	8.70	10.20	10.60

m asl = metres above sea level

m bgs = metres below ground surface

Eleven newly-installed monitoring wells, as well as 15 monitoring wells installed during previous environmental investigations, were developed between 14 and 25 January 2018. Three previously-installed monitoring wells (K19-MW16-01S, K19-MW16-10, K19-MW17-35S) and one of the newly installed monitoring wells (K19-MW18-08S) were found to be dry and were therefore not developed and/or sampled during present environmental investigation.

The water level in the wells were measured prior to development using a water level tape and well volumes were calculated based on these values. Where possible, at least six (6) well volumes were removed from the wells using high-density polyethylene (HDPE) tubing, Waterra™ inertial foot valves and a hydrolift pump or using a peristaltic pump. While purging the wells (target of six volumes), measurements of pH, temperature, dissolved oxygen, redox, and conductivity were recorded. The wells were purged until physical parameters (conductivity, pH, dissolved oxygen, redox, and temperature) stabilized. If well recharge rates were insufficient to remove six well volumes, the well was purged dry a minimum of three times.

Monitoring well development and sampling field sheets are provided in Appendix D.

4.5.2 Soil Vapour Probe Installation

Soil vapour probes were installed in boreholes either as dedicated soil vapour locations in drilled boreholes, or as nested soil vapour probe(s) secured to 2" PVC pipe using zip ties and installed concurrent with a monitoring well location. In general, soil vapour probes were installed half way between the possible contamination source, usually located within the bedrock, and the soil surface.

The depth of the installed soil vapour probes, as defined by the top of sand pack above the probe, ranged from 1.0 m bgs to 3.8 m bgs. The sub-surface probes were completed by drilling a 15 cm (6 inch) diameter borehole and subsequently installing a 15 cm long stainless-steel mesh AMS probe attached to 6 mm diameter Teflon® tubing with either a Swagelok or three-barbed fitting. Where installed as nested locations, the probe was secured to the monitoring well PVC pipe using zip ties at regular (approximately 1.5 m) intervals.

A clean filter sand pack was placed around the probe from 0.3 m beneath the base of the probe screen to approximately 0.15 m above the top of the screen. A bentonite seal, constructed of granular bentonite that was hydrated in lifts using water from a municipal source, was placed above the sand pack and was used to fill the annular space between the well and the borehole wall to ground surface. The tubing at surface was connected to a valve, which was shut except when sampling occurred.

Soil vapour probe construction details are included in the borehole logs attached in Appendix D and are summarized in Table 4, below.

Table 4: Soil Vapour Probe Details

Location	Surveyed easting and northing		Surveyed elevation of ground surface	Surveyed elevation of top of well casing	Soil Vapour Probe			
					Depth of sand pack interval, measured at time of installation		Depth of well screen interval, measured at time of installation	
	(m; NAD83 UTM Z10N)		(m asl)	(m asl)	(m bgs)		(m bgs)	
	Easting	Northing			Top	Bottom	Top	Bottom
K19-SV18-01	503232.799	6399044.293	855.054	855.906	3.35	3.80	3.50	3.65
K19-SV18-02	503245.766	6399057.324	855.025	855.887	3.33	3.80	3.50	3.65
K19-SV18-03	503244.089	6399050.382	855.272	855.272	3.35	3.80	3.50	3.65
K19-SV18-04	503279.325	6399060.052	855.927	855.927	2.00	2.45	2.15	2.30
K19-SV18-05	503364.088	6399069.187	857.025	857.025	1.00	1.45	1.15	1.30
K19-SV18-07	503209.842	6399080.395	851.018	851.895	2.55	3.00	2.70	2.85
K19-SV18-08	503228.98	6399092.539	851.601	852.529	2.05	2.50	2.20	2.35
K19-SV18-09	503242.805	6399108.225	851.547	852.352	2.55	3.00	2.60	2.85
K19-SV18-10	503178.498	6399043.657	851.392	852.325	2.35	2.80	2.50	2.65
K19-SV18-14	503226.897	6398683.236	867.271	867.271	1.05	1.50	1.20	1.35
K19-SV18-17	503133.153	6398712.141	863.987	863.987	3.05	3.50	3.20	3.35

m asl = metres above sea level

m bgs = metres below ground surface

4.6 Environmental Sampling

4.6.1 Soil

Representative soil samples were collected during the test pit and borehole investigations. Where field headspace screening on recovered soils was feasible, a portion of the discrete soil sample was placed in a headspace bag which was then sealed. After a period of approximately 5 to 10 minutes, the probe of a MiniRAE 3000 photo-ionisation detector (PID) was inserted into a corner of the headspace bag to obtain a measurement of the total organic vapour concentration in the headspace. The PID was calibrated to 100 parts per million (ppm) isobutylene gas, as per operating instructions, and was re-checked for calibration on a daily basis throughout the investigation program. Results of the vapour headspace screening were used to support the selection of samples for laboratory analysis along with the sample depth, field observations of stratigraphy and/or visual evidence of contamination.

Representative soil samples were collected and submitted for potential laboratory analysis. Each sample jar was labelled, registered on a chain-of-custody (CoC) form, packed in cardboard boxes and placed in a cooler with ice for transport to the laboratory. Appropriate preservatives, prepared by the laboratory, were used to preserve samples where appropriate. Soil samples were selected for analysis were chosen based on visual observation, the stratigraphy encountered, the depth, the location, the specific AECs, and the PCOCs to be investigated at that particular location, and the results of field headspace screening. Analysis included soil metals, benzene, toluene, and xylene (BTEX) parameters; volatile petroleum hydrocarbons (VPH); volatile organic compounds (VOCs); light and heavy extractable hydrocarbons (LEPH/ HEPH); and polycyclic aromatic hydrocarbons (PAHs).

4.6.2 Groundwater

Groundwater samples were collected from 11 of the 12 newly-installed wells (one was found to be dry) and from 15 existing wells. The monitoring wells were sampled from 13 to 27 January 2018. The wells sampled included K19-MW09-04, K19-MW10-03, K19-MW16-01D, -10S & D; K19-MW17-04, -06, -10, 18, -22, -26, -29D, -31, -32, -35D; K19-MW18-01, -02, -06, -07, -08D, -09, -10D, -11, -12, -15, and -16; the locations are shown on Figures 3A and 3B at the end of this report. Monitoring well sampling field forms are provided in Appendix D.

Prior to sampling, an interface probe meter was used to measure the depth to groundwater in each monitoring well, in addition to the thickness of any non-aqueous phase liquid (NAPL) hydrocarbons, if present. Where possible, groundwater sampling was conducted using dedicated high-density polyethylene (HDPE) tubing and a low flow peristaltic pump to minimize agitation during sampling. Seven locations (K19-MW17-06, -10, -26; K19-MW18-08D, -09, -12, -15), were sampled with a Teflon® bailer as the depth to water was beyond the capacity of the peristaltic pump. The sampling method for each well is indicated in Table 6, within Section 5.1.2.

While purging the wells, measurements of pH, temperature, dissolved oxygen, redox, and conductivity were recorded. Once these parameters had stabilized (i.e., changes between three successive measurements were less than ten percent), or three well volumes had been purged, groundwater samples were collected.

Groundwater samples were collected using standard Golder sampling techniques for laboratory analysis of the COCs. Field duplicates were analysed at an approximate frequency of 10 percent for quality control purposes. Purge water with no indications of sheen, petroleum odour or NAPL was poured slowly on to the ground surface approximately 5 m from the well that it was collected from. Groundwater with indications of petroleum hydrocarbon

contamination were stored in covered buckets and left on-site for future disposal. Low yield wells were purged dry and allowed to recharge prior to sampling. Four monitoring wells (K19-MW16-01S & D, K19-MW17-35S, and K19-MW18-08S) were found to be dry and therefore, were not sampled.

Water samples were collected in laboratory prepared and supplied containers with appropriate preservatives. Samples were labelled, registered on chain-of-custody forms, stored on ice in coolers and delivered by Golder personnel to AGAT Laboratories (AGAT) located in Fort St. John, BC or Fort Nelson, BC. Groundwater samples were analyzed for dissolved metals, BTEX, VPH, VOCs, LEPH/HEPH, PAHs, pesticides and chloride.

4.6.3 Soil Vapour

Prior to sample collection, soil vapour probes were purged using an SKC® pump set to a flow rate of approximately 200 mL/minute in most locations. Soil vapour samples for field screening were collected indirectly using a SKC® Vac-U-Chamber™ and 1 litre SKC Tedlar® bags to eliminate cross-contamination from soil vapour passing through a pump. A minimum of three probe volumes of air were purged from probes. During the purging process, measurements of oxygen, carbon dioxide, and methane were recorded using a Landtec GEM 2000 Plus. A charcoal filter was not used and therefore the methane specific measurement may include other gases. Organic vapours were measured using a Mini-RAE 3000 PID equipped with a 10.6 eV lamp calibrated with 100 ppmv isobutylene.

Soil vapour probes were sampled between 19 and 24 January 2018. The soil vapour samples were collected using evacuated 1.4 L Summa canisters with the flow regulator set to collect a 20-minute sample (i.e., flow rate of 70 ml/min). A hand pump with an integrated vacuum gauge was used to purge ambient air from the sample tubing prior to sample collection, as well as to verify the integrity of the Summa canister tubing and regulator connections. The Summa canister samples were labelled, registered on chain-of-custody forms, and delivered by Golder personnel to AGAT Laboratories (AGAT) located in Fort St. John, BC or Fort Nelson, BC. Soil vapour samples were analyzed for naphthalene, VPHs, BTEX, and VOCs.

The soil vapour sampling sheets and leak tracer test results are included in Appendix E.

4.7 Stockpile Sampling

During previous environmental investigations, several soil samples collected from the materials used for backfilling remedial excavations at AECs 1B and 1C, showed concentrations above the applicable MoE Protocol 4 standards for arsenic. The backfill material was sourced from a local quarry that had exhibited metal concentrations below the CSR standards at the time of sampling of the source backfill. Subsequent to the Stage 10 changes to the CSR standards (which occurred during backfilling that included a lowering of background concentrations for arsenic) arsenic concentration at the source backfill site were found to be slightly above the CSR background concentrations. During the present environmental investigation, Golder personnel collected additional soil samples from the two existing stockpiles (SP18-01 and SP18-02) left at the source of the backfill material, the Adsette Pit, near Prophet River. In addition, a number of soil samples were obtained from within the backfilled AEC 1B excavation for arsenic analysis.

From each stockpile, five discrete samples were taken; each representing one-fifth of the stockpile volume, along with a composite sample generated from the five discrete samples.

The five discrete samples collected from stockpile SP18-01 were analyzed for soil metals, including arsenic, while the five discrete samples collected from stockpile SP18-02 were analyzed only for arsenic.

4.8 Survey

The newly established test pit, borehole, monitoring well, and soil vapour locations and elevations, were surveyed by Vector at the end of the field program. Monitoring wells were surveyed at ground surface and top of casing.

Surveying was conducted using a real-time kinetic (RTK) GPS. A RTK base station was established at a local monument and corrections were transmitted via laser level loops (Leica Sprinter 250M). The ground station was located using the Canadian Spatial Reference System with Precise Point Positioning (CSRS-PPP). Position accuracy varied depending upon the distance from the reference station and the number of stations used in the position calculation. RTK positioning was set to an industry standard of one centimetre (cm) or less.

4.9 Laboratory Analysis

AGAT was contracted by PWGSC to analyse the soil, groundwater and soil vapour samples collected as part of the investigation. AGAT is certified by the Canadian Association for Laboratory Accreditation (CALA) for the analyses undertaken.

The quality of the generated laboratory data was assessed using the appropriate laboratory quality control samples and laboratory quality replicate samples. Quality control samples consisted of analytical method blanks, analysis of reference material, laboratory replicate samples and laboratory spikes.

Laboratory certificates of analysis (COAs) and corresponding chain-of-custody forms are included in Appendix F.

4.10 Quality Assurance/Quality Control

4.10.1 Field Procedures

To assess and document that the sampling and analytical data are interpretable, meaningful, and reproducible, conformance to a Golder quality assurance/quality control (QA/QC) program was followed. Standard industry field procedures were used throughout the field investigation to ensure that reproducibility would be achieved. This involved using QA/QC measures in both the collection (field program) and analysis (laboratory) of samples.

A detailed description of the QA/QC procedures and a discussion of the results of the QA/QC program are presented in Appendix G.

4.10.2 Data Transfer

Standard Golder data quality checks were completed to verify that electronic and manual data transfers (e.g., compilation of data into tables) were complete and that potential for errors was minimized.

4.10.3 Laboratory Analysis

AGAT Laboratories (AGAT) was contracted by PWGSC to analyse the soil, groundwater and soil vapour samples collected as part of the investigation. AGAT is certified by the Canadian Association for Laboratory Accreditation (CALA) for the analyses undertaken.

The quality of the generated laboratory data was assessed using the appropriate laboratory quality control samples and laboratory quality replicate samples. Quality control samples consisted of analytical method blanks, analysis of reference material, laboratory replicate samples and laboratory spikes.

5.0 RESULTS OF THE INVESTIGATION PROGRAM

This section of the report presents the results of the January 2018 investigation program, including a summary of field observations, analytical soil, groundwater, and soil vapour laboratory results, and the results of QA/QC analyses.

5.1 Field Observations

5.1.1 Soil and Weathered Bedrock

The soil encountered (outside the backfilled area within AEC 1B) during the drilling and test pit investigations generally consisted of overburden soil overlying weathered bedrock, as follows:

- A layer of clayey silt and clay. The layer contained some gravel and wood debris at selected locations and was observed from ground surface to depths ranging from 0.9 metre (m) below ground surface (bgs) to 1.8 m bgs.
- Weathered siltstone (bedrock), also referred to as residual soil. The weathering of the bedrock generally decreased with increasing depth. Weathered bedrock was observed from approximately 0.9 m bgs (at K19-TP18-11) to the maximum depth of completion of the boreholes and test pits (13.7 m bgs, at K19-MW18-12) ranging from highly/completely weathered (residual soils) along the top of its profile (1.0 m bgs at K19-MW18-10, to 6.20 m bgs at K19-MW18-01) to slightly/moderately weathered near its base. The depth of competent bedrock varied across the Site but generally occurred between 3 and 7 m bgs.

Visual and olfactory indicators of potential soil contamination (i.e., staining, odours, and/or debris) were assessed and recorded during soil sample collection and noted on the borehole and test pit logs. Field measurements were collected using a PID, and ranged from 0.0 ppm to 206.5 ppm. The maximum PID reading was observed at a depth of 5.5 to 6.0 m bgs at K19-MW18-10, west of AEC 1B, across the former Alaska Highway alignment. Observations of petroleum hydrocarbon-like odours and sheen/staining for each location are summarized in Table 5, below.

Table 5: Borehole, Monitoring Well and Test Pit Field Observations

Location	Depth (m)	Sheen/ Staining	Petroleum Hydrocarbon-like Odour	Highest PID (ppm)	Depth of Highest PID (m bgs)	Comments
K19-TP18-01	2.8	No	No	0.8	0.5	-
K19-TP18-02	2.6	No	No	0.8	2.6	-
K19-TP18-03	2.6	Iron staining	No	0.1	0.5	-
K19-TP18-04	2.6	No	No	0.8	0.5	-
K19-TP18-05	2.5	No	Slight	21.7	0.5	-
K19-TP18-06	2.6	Iron staining	No	1.3	2.6	-
K19-TP18-07	3.4	Iron staining	Yes	41.8	3.4	-
K19-TP18-08	2.5	No	No	7.2	2.5	-
K19-TP18-09	2.5	No	No	1.2	2.5	-
K19-TP18-10	3.3	No	Yes	13.2	2.5	-
K19-TP18-11	2.5	No	No	1.7	2.5	-
K19-TP18-12	3.0	Iron staining	No	5.8	3.0	2" metal pipe, orientated north to south, observed at 2.5 m bgs
K19-TP18-13	3.2	No	No	6.2	0.5	Wood debris observed from 1.5-2.0 m bgs. Metal pipe observed at 2.8 m bgs.
K19-TP18-14	3.0	No	Slight	6.0	2.5	Wooden culvert strike at 3 m bgs.
K19-MW18-01	9.0	No	No	5.1	6.5 - 7.0	-
K19-MW18-02	12.0	No	No	5.8	8.5 - 9.0	-
K19-SV18-03	6.1	No	No	1.1	2.5 - 3.0	-
K19-SV18-04	4.6	No	No	1.5	2.0 - 2.3	-
K19-SV18-05	2.5	No	No	1.1	0.3 - 0.5	-
K19-MW18-06	10.6	No	No	58.9	3.0 - 3.5	-
K19-MW18-07	10.3	No	Yes	30.4	5.0 - 5.5	-
K19-MW18-08	11.1	No	No	8.6	7.0 - 7.6	-
K19-MW18-09	10.5	No	No	6.1	5.0 - 5.5	-
K19-MW18-10	10.6	No	Strong	206.5	5.5 - 6.0	-
K19-MW18-11	10.6	No	No	6.5	5.5 - 6.0	-
K19-MW18-12	13.7	No	No	37.1	11.5 - 12.0	-
K19-BH18-13	13.7	No	No	21.2	11.5 - 12.0	-
K19-SV18-14	2.0	No	No	2.4	0.3 - 0.5	-
K19-MW18-15	12.2	No	Slight	38.2	11.5 - 12.0	-
K19-MW18-16	10.6	No	No	27.0	8.5 - 9.0	-
K19-BH18-17	13.7	No	No	50.3	13.0 - 13.7	-

Test pit logs are presented in Appendix B, while borehole logs details are presented in Appendix B, both at the end of this report.

5.1.2 Groundwater

Depth to groundwater was measured prior to sampling each well between 13 and 26 January 2018. The groundwater measurements, are presented in Appendix D.

Stabilized field parameters were measured in the groundwater at the conclusion of purging and prior to sampling, and no petroleum hydrocarbon-like odours and/or sheen was identified in the purged groundwater during the field program. The field parameters data are provided in Table 6, below.

Table 6: Summary of Field Parameters Measured in Groundwater

Monitoring Well	Temperature (ºC)	pH	Specific Conductance (µS/cm)	Redox (mV)	Dissolved Oxygen (mg/L)	Sampling Method	Comments
K19-MW09-04	2.9	6.96	593.1	-241.7	0.46	Peristaltic	Clear
K19-MW10-03	3.4	6.48	886	-101.6	7.05	Peristaltic	Clear
K19-MW16-01D	2.5	6.48	513.3	-57.2	0.84	Peristaltic	Clear
K19-MW16-01S	-	-	-	-	-	-	Dry
K19-MW16-10	-	-	-	-	-	-	Dry
K19-MW16-10D	2.8	6.95	550.7	-136.1	0.42	Peristaltic	Clear
K19-MW16-10S	3.3	6.5	495.2	-103.6	0.71	Peristaltic	Clear
K19-MW17-04	3.1	6.33	649.2	-120.8	1.28	Peristaltic	Clear
K19-MW17-06	3.7	7.13	1251	-23.8	2.30	Bailer	Clear
K19-MW17-10	3.3	6.20	2990.0	109.6	7.75	Bailer	Clear
K19-MW17-18	2.8	6.72	450.6	47.8	8.26	Peristaltic	Clear
K19-MW17-22	3.4	6.78	533.4	-8.4	0.72	Peristaltic	Clear
K19-MW17-26	3.3	6.94	762.2	37.9	4.64	Bailer	Clear
K19-MW17-29D	4.2	6.47	789.2	-111.8	0.64	Peristaltic	Clear
K19-MW17-31	2.7	6.78	418.2	48.2	3.53	Peristaltic	Clear
K19-MW17-32	2.4	7.09	574.4	-33	0.75	Peristaltic	Clear
K19-MW17-35D	3.8	6.39	838.1	-137.5	1.50	Peristaltic	Clear
K19-MW17-35S	-	-	-	-	-	-	Dry
K19-MW18-01	0.6	6.48	856.9	-33.6	1.56	Peristaltic	Clear
K19-MW18-02	1.2	6.45	838.4	-23.1	1.07	Peristaltic	Clear
K19-MW18-06	2.6	6.53	710.1	-41.7	0.93	Peristaltic	Clear
K19-MW18-07	2.1	6.72	731.2	-8	2.73	Peristaltic	Clear
K19-MW18-08D	3.2	7.93	986	-55.7	2.33	Bailer	Clear
K19-MW18-08S	-	-	-	-	-	-	Dry
K19-MW18-09	3.2	7.23	989	-23.2	4.95	Bailer	Clear
K19-MW18-10D	2.5	6.73	630.5	99.9	0.89	Peristaltic	Clear
K19-MW18-11	2.5	6.68	551.7	-20.4	0.72	Peristaltic	Clear
K19-MW18-12	2.7	7.79	698.0	26.0	3.31	Bailer	Clear
K19-MW18-15	3.2	7.48	768.3	7.8	6.01	Bailer	Clear
K19-MW18-16	2.0	7.51	720.6	-45.0	5.72	Peristaltic	Clear

5.1.3 Soil Vapour

Soil vapour field parameters were monitored during the purging of the vapour probes during the post remediation investigation program, and the following was noted:

- Organic vapour concentrations measured with a PID ranged from below the instrument detection limit (<0.1 ppm), to 15.7 ppm in K19-SV18-10.
- Methane concentrations measured ranged from below the instrument detection limit (<0.1%) to 0.6% in K19-SV18-05.
- Carbon dioxide concentrations measured ranged from below the instrument detection limit (<0.1%) to 5.2% in K19-SV18-05.
- Oxygen concentrations measured ranged from 2.8% in K19-SV18-05 to 21.4% in K19-SV18-17.
- Hydrogen sulphide concentrations measured in all the locations, were found to be below the instrument detection limit (<0.1 ppm).

5.2 Chemical Analytical Results

Chemical laboratory certificates-of-analysis, with CoC forms, are provided in Appendix I. A brief interpretation of the chemical analytical data, including implications for remediation and risk-management planning is provided in Section 6.0, below.

5.2.1 Soil Analytical Results

This section of the report presents the analytical soil results that were assessed during the January 2018 investigation. Analytical results were screened against the applicable CSR WL Reverted (WL_R) and IL soil standards. MoE's Protocol 4 for Contaminated Sites applicable regional background soil quality estimates were applied when these values were higher (less conservative) then the applicable WL_R for specified inorganic substances (BC MOE 2017). Analytical results are presented on the following tables, at the end of this report:

- Table 7 – Results of Soil Analyses – Metals and Inorganics
- Table 8 – Results of Soil Analyses – Polycyclic Aromatic Hydrocarbons (PAHs) and BTEX
- Table 9 – Results of Soil Analyses – Volatile Organic Compounds

A visual display of sampling locations and analytical results (screened against the CSR standards) is shown on Figure 4.

Soil samples analytical reports are included in Appendix F, at the end of this report.

5.2.1.1 Metals and Inorganics

Two (2) soil samples were analyzed for total metals and sodium in the most recent investigation, from locations K19-MW18-06 and 08, located west of AEC 1B, across the former Alaska Highway alignment. No exceedances of the applicable CSR WL_R and/or IL standards were found in these two samples.

Six (6) soil samples were analyzed for arsenic from four different locations and depths, within the limits of remedial excavation AEC 1B (K19MW18-01 and -02, and K19-SV18-03 and -04), for assessing the environmental quality of the backfill material used for this remedial excavation. Of the six samples collected and analyzed, three showed exceedances for arsenic slightly above the applicable CSR Protocol 4 regional background soil standards.

In addition, ten (10) discrete soil samples collected from two different stockpiles (SP18-01 and SP18-02) located at the Adsette Pit, containing materials used for backfilling remedial excavations at AECs 1B and 1C, were analyzed for total metals and sodium. From the ten samples collected, four showed exceedances for arsenic above the applicable CSR Protocol 4 regional background standards, with one discrete soil sample, collected from SP18-01, showing a concentration of arsenic of two times the applicable CSR Protocol 4 regional background soil standards; and three discrete soil samples collected from SP18-02, showing exceedances slightly above the CSR Protocol 4 regional background soil standards.

5.2.1.2 Petroleum Hydrocarbon Parameters

As part of the January 2018 investigation, 43 soil samples were analyzed for petroleum hydrocarbons and PAHs, and 34 soil samples were analyzed for BTEX and VPHs.

No exceedances for PAHs were found from the soil samples collected during the present environmental investigation; whereas two (2) soil samples, collected from locations K19-MW18-10 (west of AEC 1B, across the former Alaska Highway alignment, with a depth of 5.5 to 6.0 m bgs) and K19-TP18-12 (between AEC 1B and AEC 1C, with a depth of 3.0 m bgs), showed concentrations above the applicable CSR WLR and/or IL standards for benzene.

5.2.1.3 Volatile Organic Compounds

One (1) soil sample collected from location K19-MW18-10 (west of AEC 1B, across the former Alaska Highway alignment) was analyzed for VOCs. This sample did not exceed the applicable CSR WL_R and/or IL standards.

5.2.2 Groundwater Analytical Results

Twenty-nine (29) groundwater samples, including three (3) field duplicates, were collected and submitted for laboratory analyses as part of the January 2018 investigation. Analytical data is presented in the following tables, at the end of this report:

- Table 10 – Results of Groundwater Analyses – Dissolved Metals and Anions
- Table 11 – Results of Groundwater Analyses – Polycyclic Aromatic Hydrocarbons (PAHs) and BTEX
- Table 12 – Results of Groundwater Analyses – Volatile Organic Compounds (VOCs) and Pesticides

Analytical results were screened against the applicable CSR DW and AW-F groundwater standards, and a visual display of sampling locations are shown on Figures 5A, 5B and 5C.

Groundwater analytical reports are included in Appendix F, at the end of this report.

5.2.2.1 Dissolved Metals

Of the twenty-nine (29) groundwater samples collected and analyzed for dissolved metals, the following exceedances were found for both, historical and newly-installed monitoring wells:

- Fourteen (14) groundwater samples showed concentrations above the applicable CSR DW and/or AW-F for barium, from both, historical and newly-installed monitoring wells.
- Seven (7) groundwater samples were found to have concentrations for cobalt above the applicable CSR DW standards.
- All the groundwater samples collected during January 2018, showed concentrations above the applicable CSR DW standard for lithium.

5.2.2.2 Chloride Ion and Dissolved Sodium

Of the twenty-nine (29) groundwater samples collected and analyzed for sodium and chloride, one exceedance of dissolved chloride relative to the applicable CSR DW and/or AW-F was identified in location K19-MW17-10.

5.2.2.3 Petroleum Hydrocarbons, PAHs, BTEX and VPH

Of the seventeen (17) groundwater samples collected and analyzed for petroleum hydrocarbons, PAHs, BTEX and VPHs compounds, two groundwater samples (including the duplicate) collected from location KMW17-35D, showed exceedances above the applicable CSR DW and/or AW-F for benzene.

5.2.2.4 Volatile Organic Compounds

Of the twenty-one (21) groundwater samples collected and analyzed for VOCs compounds, two groundwater samples (including the duplicate) collected from location KMW17-35D, showed exceedances above the applicable CSR DW for 1,2-dichloroethane.

5.2.2.5 Pesticides

No exceedances were found for pesticides from the two (2) groundwater samples (including one field duplicate) collected and analyzed from location K19-MW17-35D.

5.2.3 Soil Vapour Results

Eleven (11) soil vapour samples, including one field duplicate, were collected and submitted for laboratory analyses of naphthalene, VPHs, BTEX and VOCs compounds, as part of the January 2018 investigation. Analytical data is presented in Table 13, at the end of this report.

The soil vapour results indicated that the samples analyzed were less than the CSR RL standards for the outdoor (and indoor in the case of location K19-SV18-14) air breathing zone scenario, after application of the appropriate attenuation factors.

A visual display of sampling locations and analytical results (screened against the CSR standards) is shown on Figure 6. Soil vapour analytical analysis reports are included in Appendix F, at the end of this report.

5.3 Results of QA/QC Analyses

The methods and results of QA/QC analyses are included in Appendix G. QA/QC analyses included a review of field duplicate results and a review of laboratory QA/QC tests from the most recent investigation. The key findings of the QA/QC review are summarized below.

5.3.1 Duplicate Frequency

Duplicate frequencies are provided for soil, groundwater, and soil vapour samples collected. The target duplicate frequency is 10% or greater.

- Duplicate frequency analysis was less than the target rate of 10% for certain parameters that were analyzed as part the soil/residual soil investigation, as shown below. However, the reduced sampling frequency is not considered to affect the results of the supplementary environmental investigation:
  - Metals – 25 %
  - LEPH/ HEPH/PAHs – 7.0 %
  - BTEX/VPH – 8.9 %
- Duplicate frequency analysis target rate of 10% was met for the parameters that were analyzed as part the groundwater sampling, as shown below:
  - Dissolved Metals – 10.3 %
  - LEPH/ HEPH/PAHs – 10.3 %
  - BTEX/VPHs – 10.3 %
  - VOCs – 10.3 %
- Duplicate frequency analysis target rate of 10% was not met for the parameters analyzed as part of the soil vapour investigation (9% for the parameters that were analyzed).

5.3.2 Relative Percent Difference and Difference Factor

Relative percent difference (RPD) and difference factor (DF) are provided for soil, groundwater, surface water and sediment. The target RPD and DFs are as follows:

- For parameters in soil except PAHs, a RPD of less than 35%.
- For PAH parameters in soil, a RPD of less than 50%.
- For parameters in groundwater a RPD of less than 20%.
- For parameters in soil vapour a RPD of less than 50%.
- For parameters with concentrations less than five times the MRL, the difference factor should be less than two (2).

The findings of the RPD and DF calculations are summarized as follows:

- RPD and DF values for all the soil samples duplicate pairs met the applicable DQOs.
- RPD and DF values for all the groundwater samples duplicate pairs met the applicable DQOs.
- Soil vapour sample pair 04316-03 and 04316-04, had a RPD value greater than 50% for VPHs (C6-C10). This does not have a material effect on the quality of the data as both samples had concentrations for VPHs (C6-C10) below the most conservative CSR standard.

5.3.3 Helium Leak Tracer Test

In the case of the collection of the soil vapour samples, a helium leak tracer test was conducted at each vapour probe to directly assess the integrity of the vapour probe installations and to determine if short circuiting of ambient air was occurring. The leak tracer test involved placing a shroud over the vapour probe and sampling valves, and flooding the shroud with helium gas. A Dielectric MGD-2002 Helium detector was used to measure the concentration of helium under the shroud and in the air purged from the vapour probe. In general, the concentration of helium in the screening sample should not exceed 2 percent of the concentration under the shroud. Higher levels of helium in the screening sample could indicate short circuiting or leakage and could necessitate measures to appropriately seal the vapour probe.

The results of the helium leak tracer tests conducted during the investigation were less than Golder's objective of 2%.

5.3.4 Laboratory QC

No exceedances of laboratory QC tests were identified.

6.0 DISCUSSION

The sections below provide an updated understanding of the conceptual side model for the AECs that were investigated as part of the January 2018 supplementary environmental field program. It is understood that the conditions in APECs and/or AECs that were not investigated in January 2018 have not changed since site activities conducted in previous environmental investigations.

6.1 AEC 1B

The main objectives of the investigation work carried out in AEC 1B were to:

- Delineate the off-site migration of soil and groundwater contamination to the west of the remedial excavation boundary (in order to support future remedial planning).
- Delineate residual contamination identified on the eastern wall of AEC 1B (in order to support future remedial planning).
- Conduct a post-remedial soil vapour and groundwater monitoring program, following the remedial excavation which took place during late 2017, to support risk-management activities for the Site.
- Increase the sampling density of backfill material that was imported to the Site as part of the remediation program in 2017.

Delineation of Off-Site Contamination

The findings of the remedial excavation program conducted in 2017 indicated that residual soil contamination remained along the northwest wall of AEC 1B (i.e., along the former Alaska Highway alignment). The contaminated soil was generally confined between 2 m bgs and at least 6 m bgs (into the competent bedrock) along an approximately 30 m length of the wall. Beyond this length, residual contamination continued for another 35 m but tended to be confined generally between 2.5 m bgs and 5.5 m bgs and did not extend into the competent bedrock. Lateral delineation off-site to the northwest of the former alignment was not achieved during the remedial excavation works in late 2017. The available data indicated residual soil contamination containing concentrations of LEPH/HEPHs, VPHs, benzene, toluene, xylene, and naphthalene above applicable CSR standards.

Two (2) monitoring wells (K19-MW18-06 and 11), and four (4) nested monitoring wells and vapour probes (K19-MW18-07S & D / K19-SV18-07, K19-MW18-08S & D / K19-SV18-08, K19-MW18-09 / K19-SV18-09, and K19-MW18-10S & D / K19-SV18-10) were completed by stepping-out approximately 20 m from the original northwestern remedial excavation wall.

Soil samples collected from these locations were found to be less than applicable CSR standards, with the exception of the soil sample collected from location K19-MW18-10, which showed exceedances of almost five times the applicable CSR standard for benzene from 5.5 to 6.0 m bgs. Based on the available soil data for the Site and proximity of other “clean” sampling locations, the benzene exceedance is possibly a localized ‘hot-spot’; additional borehole locations would help refine the extent of the benzene exceedances in the vicinity of this monitoring well location. The residual soil contamination along the northwest wall of the excavation is, however, considered to be delineated for the purposes of remediation planning.

Groundwater samples collected from the monitoring wells installed for delineation of off-site migration showed exceedances above the applicable CSR DW standards for dissolved metals, including barium, cobalt and lithium. The observed concentrations are consistent with groundwater quality observed as part of previous monitoring work at the Site. No exceedances were found at the recently installed monitoring wells for PAHs, BTEX or VOCs compounds, which also indicates that the hydrocarbon groundwater plume is considered delineated.

Soil vapour samples collected were found to be below the applicable CSR standards, which indicates that in situ hydrocarbon soil contamination does not pose a risk to soil vapour receptors in this area of the Site.

Delineation of On-Site Residual Contamination

Residual contamination was identified along the northeast wall of the remedial excavation conducted within AEC 1B. Exceedances of LEPH/HEPH and naphthalene were observed in confirmatory samples collected as part of the remediation program. The exceedances were vertically delineated to a depth of 1.5 m bgs and extended along approximately three 10 m long segments along length of the excavation wall.

Six (6) test pits (TP18-01, 02, 05, 09, 10, and 13) were completed along the eastern wall of the remedial excavation in order to delineate the confirmatory sampling exceedances. Step-out test pit locations were advanced approximately 5 m east of the limit of the remedial excavation boundary.

Sample results from these test pits were found to be less than applicable CSR standards. The results provide confirmation of lateral delineation for the previously identified residual pockets of contamination for LEPH/HEPH and naphthalene, along the north-eastern wall of the remedial excavation at this AEC.

Post-Remedial Soil Vapour and Groundwater Monitoring

During the remedial activities carried out at AEC 1B in late 2017, several confirmatory soil samples collected from the base of the remedial excavation in the area where the hazardous waste quality (HWQ) soils were excavated, showed exceedances above the applicable CSR standards. Residual contaminated soils were not excavated in this area due to the presence of competent bedrock underlying the affected soils at the base of the excavation.

Further excavation work was not considered necessary, as it was anticipated that residual soil contamination at the base of AEC 1B would be addressed as part of the risk management strategy for the Site, including a combination of post remediation soil vapour and groundwater monitoring and risk assessment.

As part of the January 2018 supplementary environmental investigation, two (2) monitoring wells (MW18-01 and 02) and four (4) soil vapour probes (SV18-01, 02, 03 and 04) were installed in the area where the confirmatory soil samples collected from the base of the remedial excavation, exceeded the applicable CSR standards.

Soil vapour samples collected and analyzed did not exceed the applicable CSR standards; however, the two groundwater samples collected from the installed monitoring wells K19-MW18-01 and 02, exceeded the applicable CSR DW standards for barium, cobalt and lithium. This is consistent with the previous findings regarding the site wide presence of these contaminants that will be undergoing risk assessment as part of overall site risk management. In addition, data from the January 2018 monitoring at the previously installed MW17-35D, near the edge of the remedial excavation, continues to show benzene, toluene, and 1,2-dichloroethane exceedances.

However, two of the monitoring wells installed for purposes of off-site delineation (MW18-07D and MW18-08D), that are downgradient to MW17-35D, did not identify benzene, toluene, and 1,2-dichloroethane exceedances, which indicate that the exceedances at MW17-35D have been delineated. Future monitoring at MW17-35D is anticipated to show improvements in groundwater quality due to the remedial work conducted.

The remedial implications of the post-remedial soil and groundwater monitoring results in AEC 1B are further discussed in Section 7.0, below.

Backfill Sampling

Additional samples of the backfill material imported to AEC 1B during the remediation program were collected during the investigation program. The purpose of collecting the samples was to increase the overall sampling density of the backfill material, and to corroborate the findings of the remediation report for the Site, which identified exceedances of CSR WL_R standard for arsenic in the backfill material. Samples of the backfill material were also collected at the Adsette Pit. The analytical results for arsenic were consistent with the results of the remediation program, in that concentrations of arsenic in three of the six soil samples analyzed during the backfilling activities, exceeded the applicable CSR Protocol 4 standards. Four of 10 samples analyzed from stockpiles at the Adsette Pit also exceeded the applicable CSR WL_R standards. Based on this data set, slightly less than 50% of samples analyzed were found to exceed CSR WL_R standards and Protocol 4 background concentrations. The magnitude of arsenic exceedances was generally within two times the applicable soil standard of 10 mg/kg, with the exception of one sample collected at K19-SP18-01, which was slightly more than two times the standard. As part of the Human Health and Ecological Problem Formulation (Golder 2018b) carried out for the Site, a statistical evaluation of arsenic concentrations for the backfill material was conducted (as shown on Table 7, below).

Table 7: Summary of Backfill Arsenic Statistics

Parameter	N [a]	Min (mg/kg)	Mean (mg/kg)	90th Percentile (mg/kg)	Max [b] (mg/kg)	Most Conservative Standard (MCS) (mg/kg)	Background Soil Concentration in the Omineca-Peace Region (mg/kg)	Number of Exceedances above MCS (above Regional Background)
Arsenic	24	6.4	9.8	11.9	**21.4**	10 (DW/F)	10 (17 [b])	11 (1)

Notes:

mg/kg = milligrams per kilogram; N = number of samples

a. Includes 14 samples collected from backfill material during or following placement on-site, and 10 additional samples collected from stockpiled material at the source quarry. The stockpiled material is considered representative of material that has been brought to the Site, and may itself be brought to the Site in the future.

b. Maximum concentration in the regional background dataset.

Bold = exceeds the LSC and regional background concentration

The maximum concentration of arsenic in samples collected on-site (14.6 mg/kg) falls within the range of data outlined in BC ENV *Technical Guidance 17 – Background Concentrations in Soil Database* (November 2017). The data provided in Technical Guidance 17 is used to develop the background soil concentrations outlined in Protocol 4; the maximum arsenic concentration reported in the regional background dataset is 17 mg/kg. However, higher concentrations of arsenic were measured in the locally sourced imported backfill material, which has been brought to the Site.

The BC Contaminated Sites Regulations *Technical Guidance #2 - Statistical Criteria for Characterizing a Volume of Contaminated Soil* (November 2009) provides guidance on the use of statistical methods to assess the class of contamination at a site. One key requirement is that it can be shown that the data set is from one representative population. The samples obtained for assessing the arsenic concentrations can therefore be shown to be from a single population given the source is the Adsette Pit. In order to be able to reclassify for the arsenic concentration and demonstrate that it meets the CSR WL_R standard, Technical Guidance #2 requires all the following conditions to be met:

- Condition #1: The upper 90th percentile of the sample population is less than the criterion concentration.
- Condition #2: The upper 95 percent upper confidence limit of the average concentration of the sample is less than the criterion concentration.
- Condition #3: No sample within the data set has a concentration exceeding two times the criterion standard.

Given that Conditions #2 and #3 were not met, the statistical methods outlined in Technical Guidance 2 are not considered appropriate to reclassify the backfill material as meeting the CSR WL_R.

The maximum soil concentration of arsenic (21.4 mg/kg) was identified in a sample collected from the backfill material stockpiled at the Adsette Pit, and may be representative of concentrations of material that was used to backfill excavations at AEC 1B and a portion of AEC 1C during the remediation works carried out during October and November of 2017. Although selected results of backfill samples collected from the Adsette Pit material exceeded applicable CSR WL_R standards, the observed concentrations are considered representative of background concentrations, because:

- The data set that was used by ENV to determine the arsenic background concentration for the region contained individual arsenic results that exceeded the CSR WL_R standard of 10 mg/kg. Naturally-occurring arsenic in soil is therefore considered present in the region.
- Adsette Pit is considered a native source and unaffected by anthropogenic activities that could have given rise to elevated arsenic concentrations. The maximum arsenic concentration from samples collected at the pit (21.4 mg/kg) is within 20% of the highest concentration used to develop the Protocol 4 background concentration for the region.
- Concentrations of arsenic in the backfill from the Adsette Pit are lower than those observed in non-contaminated areas at other Alaska Highway sites that were assessed by Golder as part of the PSPC Alaska Highway program.

The findings of the Problem Formulation for the Site (Golder 2018b) indicate that, although arsenic will be carried forward as part of the risk assessment, the arsenic concentrations for the backfill material are unlikely to pose an unacceptable risk. This is consistent with the findings of the Detailed Quantitative Risk Assessments (DQRA) that were conducted for nearby Alaska Highway sites K-12 (Golder 2018c) and K-21 (Golder 2018d). Arsenic concentrations at the K-12 and K-21 sites were compared to the K-19 results, and the maximum concentration at K-19 (21.4 mg/kg) was lower than the maximum concentration observed at K-12 and K-21. As such, it is anticipated that the findings of the Human Health and Ecological Risk Assessment (to be completed in Fiscal Year 2018-2019), will also indicate that arsenic concentrations do not pose a risk at the Site.

6.2 AEC 1C

The objectives of the investigation work in AEC 1C were to delineate, both laterally and vertically, the residual contamination identified on the eastern wall of the remedial excavation carried out at AEC 1C during late 2017, in order to support future remedial planning.

Seven (7) test pits (TP18-03, 04, 06, 07, 08, 11, and 12) were completed along the eastern wall of the remedial excavation, stepping-out approximately 5 to 10 m towards the east of the limit of the remedial excavation boundary.

Sample results from these test pits were found to be less than applicable CSR standards, with the exception of the soil sample collected and analyzed from location TP18-12, which showed an exceedance slightly above the applicable CSR standard for benzene at a depth of 3 m bgs. The results provide confirmation of lateral and vertical delineation for the previously identified residual pockets of contamination for benzene and LEPH/HEPHs, along the eastern wall of the remedial excavation at this AEC, with the exception of the area where TP18-12 were excavated. Given that the nearest sampling locations with no exceedances (TP18-08 and TP18-07) were located between TP18-12 and the residual wall contamination at AEC 1c, it is possible that the benzene exceedance at this location may represent a localized ‘hot-spot’. Additional, step-out boreholes, would provide a more accurate interpretation of soil quality in this area of the Site and whether or not the exceedance at TP18-12 is localized.

6.3 AEC 19B

During the July 2017 environmental field program, contamination at AEC 19a was identified based on a concentration of LEPH that exceeded the applicable CSR WL_R and IL standards in the top 1.4 m of soil at one location (K19-MW17-04). Based on the relatively shallow nature of the contamination identified at K19MW17-04, the contamination was associated with historical activities conducted near the inferred industrial buildings. Based on field observations and a review of the test pit log, contamination in this location was suspected to reflect a relatively small localized area of contamination, and was considered as having been delineated for remedial design purposes.

Based on the results of the January 2017 investigation work, one monitoring well (K19-MW17-26) was installed in the inferred down-gradient portion of AEC 19a in order to determine whether the identified soil contamination may have affected groundwater quality. Although the results of the July 2017 investigation did not identify groundwater contamination, toluene soil contamination was identified at a depth of approximately 8.0 m bgs to 11.0 m bgs. For ease of reference this area is now referred to AEC 19b. Given that the test pits in this area did not extend beyond 4 m bgs, it was not possible to determine whether or not another source of hydrocarbon contamination is present at AEC 19b that is contributing to the deeper contamination at MW17-26. As part of the January 2018, investigation program, additional borehole investigations were recommended to allow a better determination of lateral and vertical extent be made.

One (1) borehole (K19-BH18-13), three (3) monitoring wells (K19-MW18-12, 15, and 16), and one (1) soil vapour probe (K19- SV18-17) were completed in order to assess the soil, groundwater and soil vapour quality in this area.

Soil samples collected showed results below the applicable CSR standards for metals, LEPH/HEPH/PAHs and BTEX/VOCs analysis. Groundwater samples collected from the three monitoring wells installed, showed concentrations above the applicable CSR DW standards for dissolved lithium; however, no exceedances were found for PAHs, BTEX or VOCs parameters. This is consistent with the previous findings regarding the site wide presence of these contaminants that will be undergoing risk assessment as part of overall site risk management. In addition, the soil vapour sample collected from the installed vapour probe met the applicable CSR RL standards.

Based on the most up to date data, the source of deeper contamination at monitoring well K19-MW17-26 is still not known, however the deeper contamination is inferred to be limited within a localized area as shown on Figure 4. Currently, sufficient data is available for the purposes for risk management planning at this AEC.

6.4 Soil Vapour Modelling Validation

Soil vapour quality was predicted as part of the July 2017 environmental investigation using partitioning calculations of soil and groundwater results at the Site. The modeled soil vapour results were less than applicable CSR RL vapour standards, with the two following exceptions:

- Soil vapour results modeled based on groundwater partitioning exceeded applicable CSR standards for indoor air exposure for a dwelling located within 30 m of monitoring well location K19-MW16-07S/D. K19-MW16-07S/D is located along the eastern boundary of the Site and is within 30 m of an off-site building to the east. The vapour results were considered conservative, as groundwater results used as part of the modeling were less than laboratory detection limits.
- The predicted soil vapour concentration of benzene at monitoring well location K19A-09MW-05 exceeded the applicable CSR standards for outdoor air exposure. K19A-09MW-05 is located south of AEC 1a. The predicted based concentration was based on soil partitioning. The predicted benzene concentration was considered to be conservative, as soil concentrations used as part of the model were less than the laboratory detection limits (0.04 mg/kg for benzene) which was higher than the current CSR standard of 0.035 mg/kg.

To evaluate the above findings more rigorously for management decisions, and to confirm or refute the modelled soil vapour exceedances, two vapour probes were installed during the January 2018 supplementary environmental investigation in the vicinity of both K19-MW16-07S/D (K19-SV18-14) and K19A-09MW-05 (K19-SV18-05).

Soil vapour samples collected from the two newly-installed vapour probes analyzed for naphthalene, VPHs, BTEX and VOCs compounds, were found to be below the applicable CSR RL standards for the outdoor and/or indoor air breathing scenario, after application of the appropriate attenuation factors. Additional soil vapour sampling is warranted in the two investigated areas, in order to assess seasonal variations in soil vapour quality.

6.5 Additional Groundwater Monitoring

As part of the 2018 supplementary environmental investigation, nineteen (19) pre-existing monitoring wells were planned to be sampled for assessing possible seasonal variations in groundwater quality, including K19-MW09-04, K19-MW10-03, K19-MW16-01S & D, K19-MW16-10S & D; K19-MW17-04, K19-MW17-04-06, K19-MW17-04-10, K19-MW17-04-18, K19-MW17-04-22, K19-MW17-04-26, K19-MW17-04-29D, K19-MW17-04-31, K19-MW17-04-32, and K19-MW17-04-35S & D. During the groundwater sampling event three shallow monitoring wells were found to be dry and furthermore were not sampled: K19-MW16-01S, K19-MW16-10S, and K19-MW17-35S.

Groundwater samples collected were analyzed for at least one of the following parameters: dissolved metals, petroleum hydrocarbons, PAHs, BTEX, volatile organic compounds and pesticides.

The groundwater samples collected across the Site as part of this field program showed exceedances for dissolved lithium above the applicable CSR DW standards. In addition, 10 of the groundwater samples, including two field duplicates were found to be above the applicable CSR DW and/or AW-F for barium; three of the groundwater samples showed exceedances above the CSR DW standards for cobalt; and only one sample showed an exceedance for chloride above the applicable CSR DW standard. The results were generally consistent with previous investigation results at the Site and may be associated with background conditions. Further assessment of groundwater quality will be conducted as part of the risk management plan for the Site.

An additional round of groundwater samples monitoring is warranted during future post-remediation works at the Site, as part of overall risk-management planning for the Site.

7.0 CONCLUSIONS

Golder Associates Ltd. (Golder) was retained by PSPC to conduct a Supplementary Environmental Investigation and Post-Remedial Monitoring for K-19, Former Trutch Townsite (the Site). The overall objectives of the investigation were:

- to further delineate the residual hydrocarbon contaminated material identified during the 2017 remedial excavations within AECs 1B and 1C for the purposes of supporting future remediation planning for the Site
- to support risk-management planning for the Site, through post-remediation monitoring of groundwater and soil vapour quality and through targeted collection of backfill soil samples within the area of the remedial excavation at AEC 1B and the backfill source site.

The overall objectives of the January 2018 investigation program were substantially met. The key findings of the investigation program indicate that:

- Test pits and boreholes excavated and drilled respectively for assessing the lateral extent of soil exceedances found along the north-west wall of AEC 1B remedial excavation and eastern walls of both, 1B and 1C remedial excavations fully delineated those exceedances. However, residual hot spots of soil contamination were found west of remedial excavation AEC 1B, across the former Alaska Highway alignment (K19-MW18-10) and east of remedial excavation AEC 1C (K19-TP18-12). Benzene exceedances were found at these two locations. Additional step-out investigation locations are warranted around these two locations, in order to assess lateral extent of contamination.

- A first round of post-remedial groundwater samples was collected from previously and newly installed monitoring wells, showing in general exceedances for dissolved metals (barium, cobalt and lithium) with one historical monitoring well (K19-MW17-35D) showing exceedances for benzene, toluene, and 1,2-dichloroethane. The 2018 monitoring wells installed down gradient of K19-MW17-35D have delineated these exceedances. The parameters with exceedances and the range of concentrations are generally consistent with previous investigation results at the respective monitoring well locations. Additional rounds of post-remediation monitoring are warranted in order to monitor seasonal and temporal changes in groundwater quality and to document improvements in groundwater quality following the remediation work.
- Several soil vapour samples were collected from across the Site, for assessing the soil quality after the completion of the remediation activities carried out during late 2017. The soil samples collected did not show exceedances above the applicable CSR RL standards; however, additional monitoring is warranted in the future in order to assess possible seasonal and temporal changes in soil vapour quality and to confirm that residual hydrocarbon-contaminated soil does not affect soil vapour quality at the Site.
- Additional soil samples were collected from the backfill material used for backfilling remedial excavations of AEC 1B and a portion of AEC 1C. The backfill material was sourced from the Adsette pit that had exhibited metal concentrations below the CSR standards at the time of sampling of the source backfill. Subsequent to the Stage 10 changes to the CSR standards (which occurred during backfilling of remedial excavations and included a reduction of the background concentration for arsenic), arsenic concentrations at the source backfill site were found to be slightly above the CSR background concentrations. Although it is anticipated that the observed exceedances from the backfill source at the Adsette pit are associated with background soil conditions for the region, additional evaluation is required in order to formally demonstrate background quality in accordance with the Provincial background determination process.
- While the upcoming risk assessment for the K-19 site is expected to indicate that the backfill material does not pose an unacceptable risk, and in the absence of a formal background determination from BC ENV, the use of a different backfill source in the future is warranted, in order to meet the current applicable CSR Protocol 4 standards for arsenic.
- The results of the supplementary investigation and post-remediation monitoring program will be used to update the Remediation Action Plan / Risk Management Plan for the Site.

8.0 CLOSURE

We trust this information is sufficient for your needs at this time. Should you have any questions or concerns, please do not hesitate to contact the undersigned at 604-296-4200.

GOLDER ASSOCIATES LTD.

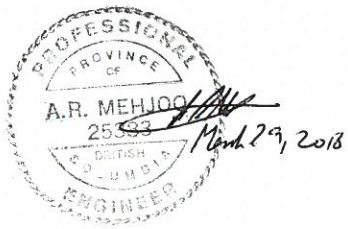

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Table 8
Results of January 2018 Supplementary Investigation
Soil Analyses - Metals
K19 - Trutch Former Townsite
Alaska Highway, BC

Location					K19-MW18-01	K19-MW18-01	K19-MW18-02	K19-MW18-02	K19-SV18-03	K19-SV18-04	K19-MW18-06	K19-MW18-08	K19-SP18-01 D1	K19-SP18-01 D2	K19-SP18-01 D3	K19-SP18-01 D4	K19-SP18-01 D5	K19-SP18-02 D1	K19-SP18-02 D2	K19-SP18-02 D3	K19-SP18-02 D4	K19-SP18-02 D5
Sample Control Number	**BC CSR Standards for WLR (< 3m)**	**Notes**	**BC CSR Standards for IL (> 3m)**	**Notes**	04301-07	04301-09	04302-01	04302-03	04302-10	04302-12	04303-04	04304-09	04313-01	04313-02	04313-03	04313-04	04313-05	04313-06	04313-07	04313-08	04313-09	04313-10
Sample Date					2018-01-17	2018-01-17	2018-01-17	2018-01-17	2018-01-17	2018-01-17	2018-01-18	2018-01-19	2018-01-15	2018-01-15	2018-01-15	2018-01-15	2018-01-15	2018-01-15	2018-01-15	2018-01-15	2018-01-15	2018-01-15
Depth of Sample (m bgs)					0.3-0.5	5.5-5.8	0.3-0.5 m	4.8-5.1 m	5.8-6.1 m	3.8-4.1	0.3-0.5 m	0.3-0.5 m	0.1-0.1 m	0.1-0.1 m	0.1-0.1 m	0.1-0.1 m	0.1-0.1 m	0.1-0.1 m	0.1-0.1 m	0.1-0.1 m	0.1-0.1 m	0.1-0.1 m
Laboratory Report					18N303338	18N303338	18V304890	18V304890	18V304890	18V304890	18V304890	18N304491	18N303359	18N303359	18N303359	18N303359	18N303359	18N303359	18N303359	18N303359	18N303359	18N303359
QA/QC																						
Field Parameters																						
PID (ppm)					-	-	-	-	-	-	0.9	0.6	-	-	-	-	-	-	-	-	-	-
Physical Tests																						
pH					8.49	8.45	8.48	8.47	8.54	8.46	5.95	7.68	8.30	8.53	8.37	8.46	8.63	7.58	7.52	7.50	7.50	7.48
Metals																						
Aluminum	**40000**	HH	250000	DW	-	-	-	-	-	-	8800	9800	4890	5200	5200	5210	4760	-	-	-	-	-
Antimony	**20**	EH	40	T	-	-	-	-	-	-	0.3	0.6	0.8	0.5	0.5	0.5	0.4	-	-	-	-	-
Arsenic	**10**	P4	10	P4	**10.9**	**12.1**	8.8	8.3	9.2	**11.7**	5.3	8.4	**21.4**	6.4	7.0	6.5	8.4	9.7	9.6	**11.7**	**10.7**	**10.4**
Barium	**500**	P4	500	P4	-	-	-	-	-	-	185	168	177	131	148	176	144	-	-	-	-	-
Beryllium	**1-500**	AWF	1-500	AWF	-	-	-	-	-	-	0.4	0.5	0.4	0.3	0.4	0.3	0.3	-	-	-	-	-
Bismuth					-	-	-	-	-	-	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	-	-	-	-	-
Cadmium	**1 - 50**	AWF	1 - 50	AWF	-	-	-	-	-	-	0.11	0.34	0.90	0.48	0.46	0.46	0.61	-	-	-	-	-
Calcium					-	-	-	-	-	-	2030	9540	75300	76000	82300	85000	80000	-	-	-	-	-
Chromium	**60**	P4	60	P4	-	-	-	-	-	-	14	17	11	14	12	12	12	-	-	-	-	-
Cobalt	**25**	P4	25	P4	-	-	-	-	-	-	3.4	6.3	9.3	6.1	6.7	6.5	6.2	-	-	-	-	-
Copper	**100-7500**	AWF	100-7500	AWF	-	-	-	-	-	-	9.1	13.2	12.3	11.9	22.4	14.4	13.4	-	-	-	-	-
Iron	**35000**	HH	150000	HH	-	-	-	-	-	-	11600	17300	18800	15600	21200	21800	21900	-	-	-	-	-
Lead	**120**	INT	150-8500	DW	-	-	-	-	-	-	12.4	25.7	8.8	5.2	6.7	5.7	5.9	-	-	-	-	-
Lithium	**65**	HH	450	HH	-	-	-	-	-	-	5.5	8.4	9.0	10.2	11.1	9.0	8.9	-	-	-	-	-
Magnesium					-	-	-	-	-	-	1350	2840	8090	11500	13000	14300	11300	-	-	-	-	-
Manganese	**2000**	T	2000	T	-	-	-	-	-	-	83	171	463	335	557	445	437	-	-	-	-	-
Mercury	**25**	INT	75	INT	-	-	-	-	-	-	0.02	0.04	0.06	0.03	0.02	0.03	0.03	-	-	-	-	-
Molybdenum	**15**	DW	15	DW	-	-	-	-	-	-	1.2	1.8	2.6	2.0	2.7	2.4	3.2	-	-	-	-	-
Nickel	**70-300**	DW	70-300	DW	-	-	-	-	-	-	9.4	13.4	26.5	15.7	19.3	17.2	18.6	-	-	-	-	-
Phosphorus					-	-	-	-	-	-	343	511	1320	355	430	398	399	-	-	-	-	-
Potassium					-	-	-	-	-	-	1470	1380	1020	1130	1050	1180	1090	-	-	-	-	-
Selenium	**4**	P4	4	P4	-	-	-	-	-	-	0.2	0.6	0.8	0.7	0.5	0.6	0.7	-	-	-	-	-
Silver	**20**	EH	40	EH	-	-	-	-	-	-	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	-	-	-	-	-
Sodium	**200**	TOX	1000	TOX	-	-	-	-	-	-	60	54	115	80	79	89	77	-	-	-	-	-
Strontium	**20000**	HH	150000	HH	-	-	-	-	-	-	22	30	95	56	84	80	73	-	-	-	-	-
Thallium	**9**	EH	25	EH	-	-	-	-	-	-	0.2	0.2	0.2	0.2	0.2	0.2	0.3	-	-	-	-	-
Tin	**50**	EH	300	EH	-	-	-	-	-	-	0.4	0.8	0.3	0.3	0.3	0.3	0.3	-	-	-	-	-
Titanium					-	-	-	-	-	-	63	35	136	166	145	189	202	-	-	-	-	-
Uranium	**30**	DW	30	DW	-	-	-	-	-	-	0.5	1.0	1.6	1.1	1.2	1.2	1.5	-	-	-	-	-
Vanadium	**100**	DW	100	DW	-	-	-	-	-	-	37	37	30	18	20	22	19	-	-	-	-	-
Zinc	**150-3000**	AWF	150-3000	AWF	-	-	-	-	-	-	41	58	83	64	72	65	84	-	-	-	-	-
Zirconium					-	-	-	-	-	-	0.6	0.4	5.1	3.0	3.2	3.8	3.3	-	-	-	-	-

Notes:

All parameter units in milligrams per kilogram (mg/kg), unless otherwise noted; m bgs= metres below ground surface

Standards shown are from the Contaminated Sites Regulation (CSR), B.C. Reg. 253/96 with amendments up to November 1, 2017 (B.C. Reg 253/2016). Stage 10 CSR standards applied and updated as of February 13, 2018.

Current Site Land Use is Wildlands (WL); under the CSR Wildlands (reverted) Land Use (WLR) standards are applied soil above 3 m, and Industrial Land Use (IL) standards are applied to soil below 3 m.

Most conservative CSR standard applied of generic (G), intake of contaminated soil (IND), toxicity to soil invertebrates and plants (TOX), freshwater aquatic life (AWF), drinking water (DW), protection of human health (HH) and protection of ecological health (EH).

P4 = BC MoE Protocol 4 For Contaminated Sites

pH = Standard is pH dependant

QA/QC = Quality Assurance, Quality Control

FDA = Field Duplicate Available; FD = Field Duplicate.

Italics = indicates that the detection limit exceeds one or more criteria.

< = Less than the laboratory method detection limit; (-) = Parameter not analyzed

Table 9
Results of January 2018 Supplementary Investigation
Soil Analyses - Polycyclic Aromatic Hydrocarbons (PAHs) and BTEX
K19 - Trutch Former Townsite
Alaska Highway, BC

Location Sample Control Number Sample Date Depth of Sample (m bgs) Laboratory Report QA/QC	BC CSR Standards for WLR (< 3m)	Notes	BC CSR Standards for IL (> 3m)	Notes	K19-MW18-01 04301-10 2018-01-16 6.5-7 m 18N303338	K19-MW18-02 04302-04 2018-01-17 6.5-7 m 18V304890	K19-MW18-06 04303-06 2018-01-18 3-3.5 m 18V304890	K19-MW18-06 04303-07 2018-01-18 5-5.5 m 18V304890	K19-MW18-06 04303-08 2018-01-18 7-7.5 m 18V304890	K19-MW18-07 04304-01 2018-01-18 3.5-4 m 18N304491	K19-MW18-08 04305-01 2018-01-19 7-7.6 m 18N304491	K19-MW18-09 04305-07 2018-01-20 5-5.5 m 18N304491	K19-MW18-10 04306-04 2018-01-20 5.5-6 m 18N304491	K19-MW18-10 04306-05 2018-01-20 7-7.5 m 18N304491	K19-MW18-10 04306-06 2018-01-20 8.5-9 m 18N304491	K19-MW18-11 04307-04 2018-01-23 5.5-6 m 18N306694	K19-MW18-11 04307-05 2018-01-23 7-7.5 m 18N306694	K19-MW18-12 04317-03 2018-01-23 11.5-12 m 18N306694	K19-MW18-13 04318-01 2018-01-24 11.5-12 m 18N306694
Polycyclic Aromatic Hydrocarbon (PAHs)																				
Acenaphthene	**2000**	HH	15000	HH	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.05	< 0.05
Acenaphthylene					< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.05	< 0.05
Anthracene	**2.5**	TOX	30	TOX	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
Benzo(a)anthracene	**1**	EH	10	EH	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene	**10**	INT	50	INT	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(b)fluoranthene					0.03	0.04	0.03	0.04	0.04	< 0.02	0.06	0.07	0.06	0.04	0.04	0.06	0.04	0.04	0.04
Benzo(g,h,i)perylene					0.07	0.07	< 0.05	0.09	0.14	< 0.05	0.07	0.07	0.11	0.13	0.14	0.09	0.12	0.17	0.17
Benzo[j]fluoranthene					< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Benzo(k)fluoranthene	**1**	EH	10	EH	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Chrysene	**400**	HH	4500	HH	< 0.05	0.07	< 0.05	0.07	0.08	< 0.05	0.10	0.11	0.13	0.08	0.09	0.10	0.08	0.09	0.10
Dibenzo(a,h)anthracene	**1**	EH	10	EH	0.005	< 0.005	< 0.005	< 0.005	0.005	< 0.005	< 0.005	< 0.005	0.005	< 0.005	0.005	0.006	< 0.005	0.005	0.006
Fluoranthene	**50**	TOX	200	TOX	0.01	0.02	< 0.01	0.01	0.03	< 0.01	0.04	0.03	0.03	0.02	0.03	0.02	0.02	0.03	0.03
Benzo(a)pyrene Total Potency Equivalence (TPE)					< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(b,j) fluoranthene	**1**	EH	10	EH	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.06	0.07	0.06	< 0.05	< 0.05	0.06	< 0.05	< 0.05	< 0.05
Fluorene	**1000**	HH	9500	HH	0.09	0.11	< 0.02	< 0.02	0.04	< 0.02	< 0.02	< 0.02	0.13	0.07	0.11	< 0.02	0.08	0.18	0.18
Indeno(1,2,3-c,d)pyrene	**1**	EH	10	EH	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Index of Additive Cancer Risk (IACR)					< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	0.6	0.7	0.6	< 0.6	< 0.6	0.6	< 0.6	< 0.6	< 0.6
Naphthalene	**0.6**	TOX	20	TOX	0.101	0.196	< 0.005	0.017	0.021	< 0.005	0.024	0.051	0.678	0.132	0.328	0.021	0.149	1.25	1.08
Phenanthrene	**5**	EH	50	EH	0.23	0.30	0.05	0.15	0.21	0.02	0.33	0.39	0.53	0.30	0.34	0.25	0.27	0.46	0.47
Pyrene	**10**	EH	100	EH	0.03	0.04	< 0.01	0.04	0.05	< 0.01	0.08	0.06	0.03	0.05	0.05	0.03	0.05	0.06	0.06
Quinoline	**4.5**	HH	10	HH	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.5	< 0.5
1-methylnaphthalene	**500**	HH	1000	HH	0.298	0.437	0.069	0.043	0.075	< 0.005	0.152	0.198	1.22	0.34	0.51	0.066	0.321	1.39	1.14
2-methylnaphthalene	**100**	HH	950	HH	0.493	0.47	0.072	0.044	0.094	< 0.005	0.119	0.187	1.10	0.44	0.76	0.071	0.484	1.99	1.56
EPH (C10-C19)					101	61	82	38	58	< 20	62	56	299	59	58	43	60	85	114
EPH (C19-C32)					112	72	59	55	84	< 20	84	78	84	66	70	66	81	78	101
VPHs	**200**	EH	200	EH	14	16	< 10	-	-	< 10	< 10	< 10	18	-	-	< 10	-	52	62
BTEX																			
Benzene	**0.035**	DW	0.035	DW	< 0.02	< 0.02	< 0.02	-	-	< 0.02	< 0.02	< 0.02	**0.17**	-	-	< 0.02	-	< 0.02	< 0.02
Toluene	**0.5**	AWF	0.5	AWF	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	0.12	-	-	< 0.05	-	0.13	0.31
Ethylbenzene	**15**	DW	15	DW	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	0.09	-	-	< 0.05	-	0.36	0.58
o-Xylene					< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	0.10	-	-	< 0.05	-	0.51	0.80
m,p-Xylenes					< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	0.39	-	-	< 0.05	-	1.07	1.66
Xylenes, Total	**6.5**	DW	6.5	DW	< 0.1	< 0.1	< 0.1	-	-	< 0.1	< 0.1	< 0.1	0.5	-	-	< 0.1	-	1.6	2.5
Styrene	**5**	EH	50	EH	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	-	< 0.05	< 0.05
Methyl tert-Butyl Ether (MTBE)	**8000**	EH	20000	HH	< 0.1	< 0.1	< 0.1	-	-	< 0.1	< 0.1	< 0.1	< 0.1	-	-	< 0.1	-	< 0.1	< 0.1

Notes:

All parameter units in milligrams per kilogram (mg/kg), unless otherwise noted; m bgs= metres below ground surface

Standards shown are from the Contaminated Sites Regulation (CSR), B.C. Reg. 253/96 with amendments up to 1 November 2017 (B.C. Reg 253/2016). Stage 10 CSR standards applied and updated as of 13 February 2018.

Current Site Land Use is Wildlands (WL); under the CSR Wildlands (reverted) Land Use (WLR) standards are applied soil above 3 m, and Industrial Land Use (IL) standards are applied to soil below 3 m.

Most conservative CSR standard applied of generic (G), intake of contaminated soil (IND), toxicity to soil invertebrates and plants (TOX), freshwater aquatic life (AWF), drinking water (DW), protection of human health (HH) and protection of ecological health (EH).

pH = Standard is pH dependant

QA/QC = Quality Assurance, Quality Control

FDA = Field Duplicate Available; FD = Field Duplicate.

Italics = indicates that the detection limit exceeds one or more criteria.

< = Less than the laboratory method detection limit; (-) = Parameter not analyzed

Table 9
Results of January 2018 Supplementary Investigation
Soil Analyses - Polycyclic Aromatic Hydrocarbons (PAHs) and BTEX
K19 - Trutch Former Townsite
Alaska Highway, BC

Location Sample Control Number Sample Date Depth of Sample (m bgs) Laboratory Report QA/QC	BC CSR Standards for WLR (< 3m)	Notes	BC CSR Standards for IL (> 3m)	Notes	K19-MW18-15 04318-12 2018-01-24 11.5-12 m 18N306694	K19-MW18-16 04321-07 2018-01-25 8.5-9 m 18N306694	K19-SP18-01 D1 04313-01 2018-01-15 0.1-0.1 m 18N303359	K19-SP18-01 D2 04313-02 2018-01-15 0.1-0.1 m 18N303359	K19-SP18-01 D3 04313-03 2018-01-15 0.1-0.1 m 18N303359	K19-SP18-01 D4 04313-04 2018-01-15 0.1-0.1 m 18N303359	K19-SP18-01 D5 04313-05 2018-01-15 0.1-0.1 m 18N303359	K19-SV18-17 04322-05 2018-01-25 13-13.7 m 18N306694	K19-TP18-01 04308-02 2018-01-12 1.5-1.5 m 18N303338	K19-TP18-02 04308-05 2018-01-12 1.5-1.5 m 18N303338	K19-TP18-03 04308-07 2018-01-13 0.5-0.5 m 18N303338 FDA	K19-TP18-03 04308-08 2018-01-13 0.5-0.5 m 18N303338 FD	K19-TP18-04 04308-11 2018-01-13 0.5-0.5 m 18N303338	K19-TP18-05 04299-03 2018-01-13 1.5-1.5 m 18N303338	K19-TP18-06 04299-05 2018-01-13 0.5-0.5 m 18N303338	K19-TP18-07 04299-10 2018-01-14 2.5-2.5 m 18N303338
Polycyclic Aromatic Hydrocarbon (PAHs)																				
Acenaphthene	**2000**	HH	15000	HH	< 0.05	< 0.05	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.05	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Acenaphthylene					< 0.05	< 0.05	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.05	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Anthracene	**2.5**	TOX	30	TOX	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
Benzo(a)anthracene	**1**	EH	10	EH	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene	**10**	INT	50	INT	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(b)fluoranthene					0.04	0.03	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.04	0.02	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.06
Benzo(g,h,i)perylene					0.18	0.10	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.15	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.10
Benzo[j]fluoranthene					< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Benzo(k)fluoranthene	**1**	EH	10	EH	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Chrysene	**400**	HH	4500	HH	0.10	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.08	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.09
Dibenzo(a,h)anthracene	**1**	EH	10	EH	0.006	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Fluoranthene	**50**	TOX	200	TOX	0.03	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.03	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.02
Benzo(a)pyrene Total Potency Equivalence (TPE)					< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(b,j) fluoranthene	**1**	EH	10	EH	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.06
Fluorene	**1000**	HH	9500	HH	0.20	0.12	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Indeno(1,2,3-c,d)pyrene	**1**	EH	10	EH	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Index of Additive Cancer Risk (IACR)					< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	0.6
Naphthalene	**0.6**	TOX	20	TOX	1.12	0.74	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	1.18	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.005	< 0.005	< 0.005
Phenanthrene	**5**	EH	50	EH	0.53	0.30	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.50	0.03	< 0.02	< 0.02	< 0.02	< 0.02	0.03	< 0.02	0.12
Pyrene	**10**	EH	100	EH	0.06	0.04	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.06	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.03
Quinoline	**4.5**	HH	10	HH	< 0.5	< 0.5	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.5	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
1-methylnaphthalene	**500**	HH	1000	HH	1.29	0.77	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	1.51	0.009	< 0.005	< 0.005	< 0.005	< 0.005	0.007	< 0.005	0.032
2-methylnaphthalene	**100**	HH	950	HH	1.84	1.08	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	2.18	0.009	< 0.005	< 0.005	< 0.005	< 0.005	0.008	0.009	0.022
EPH (C10-C19)					102	67	< 20	< 20	< 20	< 20	< 20	130	33	< 20	< 20	< 20	< 20	38	33	54
EPH (C19-C32)					95	65	< 20	< 20	< 20	< 20	< 20	104	51	29	< 20	28	31	51	228	86
VPHs	**200**	EH	200	EH	55	37	-	-	-	-	-	70	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
BTEX																				
Benzene	**0.035**	DW	0.035	DW	< 0.02	< 0.02	-	-	-	-	-	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Toluene	**0.5**	AWF	0.5	AWF	0.36	0.41	-	-	-	-	-	0.16	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Ethylbenzene	**15**	DW	15	DW	0.49	0.40	-	-	-	-	-	0.51	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
o-Xylene					0.68	0.55	-	-	-	-	-	0.69	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
m,p-Xylenes					1.37	1.09	-	-	-	-	-	1.51	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Xylenes, Total	**6.5**	DW	6.5	DW	2.1	1.6	-	-	-	-	-	2.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Styrene	**5**	EH	50	EH	< 0.05	< 0.05	-	-	-	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Methyl tert-Butyl Ether (MTBE)	**8000**	EH	20000	HH	< 0.1	< 0.1	-	-	-	-	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1

Notes:

All parameter units in milligrams per kilogram (mg/kg), unless otherwise noted; m bgs= metres below ground surface

Standards shown are from the Contaminated Sites Regulation (CSR), B.C. Reg. 253/96 with amendments up to 1 November 2017 (B.C. Reg 253/2016). Stage 10 CSR standards applied and updated as of 13 February 2018.

Current Site Land Use is Wildlands (WL); under the CSR Wildlands (reverted) Land Use (WLR) standards are applied soil above 3 m, and Industrial Land Use (IL) standards are applied to soil below 3 m.

Most conservative CSR standard applied of generic (G), intake of contaminated soil (IND), toxicity to soil invertebrates and plants (TOX), freshwater aquatic life (AWF), drinking water (DW), protection of human health (HH) and protection of ecological health (EH).

pH = Standard is pH dependant

QA/QC = Quality Assurance, Quality Control

FDA = Field Duplicate Available; FD = Field Duplicate.

Italics = indicates that the detection limit exceeds one or more criteria.

< = Less than the laboratory method detection limit; (-) = Parameter not analyzed

Table 9
Results of January 2018 Supplementary Investigation
Soil Analyses - Polycyclic Aromatic Hydrocarbons (PAHs) and BTEX
K19 - Trutch Former Townsite
Alaska Highway, BC

Location					K19-TP18-07	K19-TP18-07	K19-TP18-08	K19-TP18-09	K19-TP18-10	K19-TP18-11	K19-TP18-12	K19-TP18-12	K19-TP18-13	K19-TP18-13	K19-TP18-13	K19-TP18-14	K19-TP18-14
Sample Control Number					04299-11	04299-12	04300-03	04300-05	04300-10	04301-01	04301-05	04301-06	04315-01	04315-02	04315-03	04315-07	04315-08
Sample Date					2018-01-14	2018-01-14	2018-01-14	2018-01-14	2018-01-15	2018-01-15	2018-01-15	2018-01-15	2018-01-18	2018-01-18	2018-01-18	2018-01-18	2018-01-18
Depth of Sample (m bgs)					3.4-3.4 m	3.4-3.4 m	2.5-2.5 m	1.5-1.5 m	2.5-2.5 m	1.5-1.5 m	2.5-2.5 m	3-3 m	0.5-0.5 m	1.5-1.5 m	1.5-1.5 m	1.5-1.5 m	2.5-2.5 m
Laboratory Report					18N303338	18N303338	18N303338	18N303338	18N303338	18N303338	18N303338	18N303338	18V304890	18V304890	18V304890	18V304890	18V304890
QA/QC					FDA	FD								FDA	FD		
Polycyclic Aromatic Hydrocarbon (PAHs)																	
Acenaphthene	**2000**	HH	15000	HH	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	-	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Acenaphthylene					< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	-	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Anthracene	**2.5**	TOX	30	TOX	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	-	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
Benzo(a)anthracene	**1**	EH	10	EH	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene	**10**	INT	50	INT	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(b)fluoranthene					0.04	0.04	0.03	0.02	< 0.02	0.03	-	0.03	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Benzo(g,h,i)perylene					0.10	0.08	0.08	< 0.05	< 0.05	< 0.05	-	0.06	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo[j]fluoranthene					< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	-	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Benzo(k)fluoranthene	**1**	EH	10	EH	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	-	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Chrysene	**400**	HH	4500	HH	0.08	0.07	0.06	< 0.05	< 0.05	< 0.05	-	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dibenzo(a,h)anthracene	**1**	EH	10	EH	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	-	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Fluoranthene	**50**	TOX	200	TOX	0.02	0.02	0.01	< 0.01	< 0.01	< 0.01	-	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene Total Potency Equivalence (TPE)					< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(b,j) fluoranthene	**1**	EH	10	EH	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	**1000**	HH	9500	HH	0.06	0.04	0.02	< 0.02	0.03	< 0.02	-	< 0.02	0.02	< 0.02	< 0.02	< 0.02	< 0.02
Indeno(1,2,3-c,d)pyrene	**1**	EH	10	EH	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	-	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Index of Additive Cancer Risk (IACR)					< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	-	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6
Naphthalene	**0.6**	TOX	20	TOX	0.57	0.367	< 0.005	0.005	0.025	< 0.005	-	< 0.005	0.075	< 0.005	< 0.005	0.008	0.006
Phenanthrene	**5**	EH	50	EH	0.18	0.15	0.16	0.03	0.03	0.02	-	0.11	0.07	< 0.02	< 0.02	< 0.02	< 0.02
Pyrene	**10**	EH	100	EH	0.05	0.04	0.03	< 0.01	< 0.01	< 0.01	-	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Quinoline	**4.5**	HH	10	HH	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
1-methylnaphthalene	**500**	HH	1000	HH	0.79	0.573	0.020	0.007	0.154	0.008	-	0.013	0.169	< 0.005	< 0.005	0.014	0.006
2-methylnaphthalene	**100**	HH	950	HH	1.33	0.72	0.020	0.007	0.070	0.006	-	< 0.005	0.114	0.006	< 0.005	0.022	0.006
EPH (C10-C19)					383	324	103	28	134	< 20	-	133	129	< 20	< 20	48	59
EPH (C19-C32)					232	180	91	47	70	30	-	184	93	55	56	260	197
VPHs	**200**	EH	200	EH	< 10	< 10	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
BTEX																	
Benzene	**0.035**	DW	0.035	DW	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	**0.04**	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Toluene	**0.5**	AWF	0.5	AWF	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Ethylbenzene	**15**	DW	15	DW	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
o-Xylene					< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
m,p-Xylenes					0.16	0.15	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.06	< 0.05	< 0.05	< 0.05
Xylenes, Total	**6.5**	DW	6.5	DW	0.2	0.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Styrene	**5**	EH	50	EH	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Methyl tert-Butyl Ether (MTBE)	**8000**	EH	20000	HH	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1

Notes:

All parameter units in milligrams per kilogram (mg/kg), unless otherwise noted; m bgs= metres below ground surface

Standards shown are from the Contaminated Sites Regulation (CSR), B.C. Reg. 253/96 with amendments up to 1 November 2017 (B.C. Reg 253/2016). Stage 10 CSR standards applied and updated as of 13 February 2018.

Current Site Land Use is Wildlands (WL); under the CSR Wildlands (reverted) Land Use (WLR) standards are applied soil above 3 m, and Industrial Land Use (IL) standards are applied to soil below 3 m.

Most conservative CSR standard applied of generic (G), intake of contaminated soil (IND), toxicity to soil invertebrates and plants (TOX), freshwater aquatic life (AWF), drinking water (DW), protection of human health (HH) and protection of ecological health (EH).

pH = Standard is pH dependant

QA/QC = Quality Assurance, Quality Control

FDA = Field Duplicate Available; FD = Field Duplicate.

Italics = indicates that the detection limit exceeds one or more criteria.

< = Less than the laboratory method detection limit; (-) = Parameter not analyzed

Table 10
Results of January 2018 Supplementary Investigation
Soil Analyses - Volatile Organic Compounds (VOCs)
K19 - Trutch Former Townsite
Alaska Highway, BC

Location Sample Control Number Sample Date Depth of Sample (m bgs) Laboratory Report QA/QC	BC CSR Standards for WLR (< 3m)	Notes	BC CSR Standards for IL (> 3m)	Notes	K19-MW18-10 04306-04 2018-01-20 5.5-6 m 18N304491
Volatile Organic Compounds (VOCs)					
Acetone	**30000**	HH			< 0.5
Bromodichloromethane (BDCM)	**200**	HH	550	HH	< 0.05
Bromomethane (Methyl bromide)	**45**	HH	300	HH	< 0.05
Bromoform (Tribromomethane)	**650**	HH	4000	HH	< 0.05
2-Butanone	**20000**	HH			< 0.5
Carbon Tetrachloride	**5**	EH	50	EH	< 0.02
Chlorobenzene	**1**	EH	10	EH	< 0.05
Chloroethane					< 0.05
Chloroform	**5**	EH	50	EH	< 0.05
Chloromethane					< 0.05
Dichloromethane (DCM) (Methylene Chloride)	**5**	EH	50	EH	< 0.05
Dibromochloromethane (DBCM)	**150**	HH			< 0.05
1,2-dibromoethane (Ethylene Dibromide) (EDB)	**7**	HH			< 0.05
1,2-dichlorobenzene	**1**	EH	10	EH	< 0.05
1,3-dichlorobenzene	**1**	EH	10	EH	< 0.05
1,4-dichlorobenzene	**1**	EH	10	EH	< 0.05
1,1-dichloroethane	**5**	EH	50	EH	< 0.05
1,2-dichloroethane	**5**	EH	50	EH	< 0.05
1,1-dichloroethene	**5**	EH	50	EH	< 0.05
1,2-dichloroethylene (Cis) (1,2-dichloroethene)	**5**	EH	50	EH	< 0.05
1,2-dichloroethylene (Trans) (1,2-dichloroethene)	**5**	EH	50	EH	< 0.05
1,2-dichloropropane (Propylene Dichloride)	**5**	EH	50	EH	< 0.05
1,3-dichloropropene (Cis)	**5**	EH	50	EH	< 0.05
1,3-dichloropropene (Trans)	**5**	EH	50	EH	< 0.05
1,3-dichloropropene, Total	**5**	EH	50	EH	< 0.05
4-Methyl-2-pentanone					< 0.5
1,1,1,2-tetrachloroethane	**550**	HH			< 0.05
1,1,2,2-tetrachloroethane	**70**	HH			< 0.05
Tetrachloroethylene (PCE/PERC)			2.5	AWF	< 0.05
1,1,1-trichloroethane	**5**	EH	50	EH	< 0.05
1,1,2-trichloroethane	**5**	EH	50	EH	< 0.05
Trichloroethylene (TCE)			0.3	AWF	< 0.01
Trichlorofluoromethane (Freon 11)	**9000**	HH			< 0.05
Vinyl Chloride (Chloroethene)	**2**	HH			< 0.05
1,2,4-Trichlorobenzene	**2**	EH	10	EH	< 0.05

Notes:

All parameter units in milligrams per kilogram (mg/kg), unless otherwise noted; m bgs= metres below ground surface

Standards shown are from the Contaminated Sites Regulation (CSR), B.C. Reg. 253/96 with amendments up to 1 November 2017 (B.C. Reg 253/2016). Stage 10 CSR standards applied and updated as of 13 February 2018.

Current Site Land Use is Wildlands (WL); under the CSR Wildlands (reverted) Land Use (WLR) standards are applied soil above 3 m, and Indu Land Use (IL) standards are applied to soil below 3 m.

Most conservative CSR standard applied of generic (G), intake of contaminated soil (IND), toxicity to soil invertebrates and plants (TOX), freshw aquatic life (AWF), drinking water (DW), protection of human health (HH) and protection of ecological health (EH).

pH = Standard is pH dependant

QA/QC = Quality Assurance, Quality Control

FDA = Field Duplicate Available; FD = Field Duplicate.

Italics = indicates that the detection limit exceeds one or more criteria.

< = Less than the laboratory method detection limit; (-) = Parameter not analyzed

Table 11
Results of January 2018 Supplementary Investigation
Groundwater Analyses - Dissolved Metals Anions
K19 - Trutch Former Townsite
Alaska Highway, BC

Location Sample Control Number Laboratory Report Number Date Sampled QA/QC	BC CSR Standards for Drinking Water (DW)	Notes	BC CSR Standards for Aquatic Life (AWF)	Notes	K19-MW09-04 04309-01 18N303317 13-Jan-18	K19-MW10-03 04309-07 18N303317 14-Jan-18	K19-MW16-01D 04309-11 18N303317 14-Jan-18 FDA	K19-MW16-01D 04309-12 18N303317 14-Jan-18 FD	K19-MW16-10D 04309-06 18N303317 14-Jan-18	K19-MW16-10S 04310-02 18N303317 16-Jan-18	K19-MW17-04 04309-02 18N303317 13-Jan-18	K19-MW17-06 04309-03 18N303317 13-Jan-18	K19-MW17-10 04309-04 18N303317 14-Jan-18	K19-MW17-18 04309-10 18N303317 14-Jan-18	K19-MW17-22 04309-05 18N303317 14-Jan-18	K19-MW17-26 04309-09 18N303317 14-Jan-18	K19-MW17-29D 04310-03 18N303317 16-Jan-18	K19-MW17-31 04309-08 18N303317 14-Jan-18
Field Parameters																		
Dissolved Oxygen					0.46	7.05	0.84	0.84	0.42	-	1.28	2.3	7.75	8.26	0.72	-	0.64	3.53
Conductivity (µS/cm)					593.1	886	513.3	513.3	550.7	-	649.2	1251	2990	450.6	533.4	-	789.2	418.2
Oxidation Reduction Potential (mV)					-241.7	-141.6	-57.2	-57.2	-136.1	-	-120.8	-23.8	109.6	47.8	-8.4	-	-111.8	48.2
pH (pH units)					6.96	6.48	6.48	6.48	6.95	-	6.33	7.13	6.09	6.72	6.78	-	6.47	6.78
Temperature (°C)					2.9	3.4	2.5	2.5	2.8	-	3.1	3.7	3.3	2.8	3.4	-	4.2	2.7
Physical Tests																		
Hardness (mg/L)					309	411	249	244	243	127	123	489	1190	240	250	346	338	193
Anions and Nutrients																		
Sodium	200000				16200	14800	6830	6810	18500	16000	78900	36200	31300	12000	12600	25900	26200	23300
Chloride	250000		1500000		-	106000	-	-	22500	35800	320	217000	873000	-	-	-	58900	-
Dissolved Metals																		
Aluminum	9500				36	< 2	3	3	< 2	5	4	< 2	25	2	< 2	< 2	5	2
Antimony	6		90		0.3	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Arsenic	10		50		0.4	< 0.1	1.8	1.8	0.5	0.4	0.2	0.4	0.4	< 0.1	0.2	0.2	1.0	0.2
Barium	1000		10000		67.0	10400	2000	1990	**11300**	104	1060	**11300**	4190	147	76.7	40.8	7470	573
Beryllium	8		1.5		0.19	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.01	0.01	0.20	0.01	< 0.01	< 0.01	< 0.01	0.02
Bismuth					< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Boron	5000		12000		314	148	101	93	295	90	203	278	173	137	315	260	228	164
Cadmium	5		0.5	H	0.03	< 0.01	< 0.01	< 0.01	< 0.01	0.11	< 0.01	< 0.01	0.08	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Calcium					76900	110000	60600	59500	51600	31500	30600	124000	332000	62900	57800	92600	82800	47900
Chromium	50		10	V	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Cobalt	1		40		7.56	< 0.05	0.31	0.30	0.12	1.90	< 0.05	0.06	5.10	0.15	0.49	0.50	0.18	0.43
Copper	1500		20	H	< 0.2	< 0.2	< 0.2	< 0.2	1.2	0.2	< 0.2	< 0.2	1.8	< 0.2	< 0.2	< 0.2	< 0.2	0.2
Iron					16	6000	18200	17400	834	6700	1040	1670	5850	918	772	580	9330	311
Lead	10		40	H	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Lithium	8				173	80.2	63.1	60.8	239	75.2	113	153	219	80.2	130	121	98.2	112
Magnesium					28400	33100	23600	23100	27700	11800	11400	43600	87100	20100	25700	27900	31900	17900
Manganese					1140	543	71	71	701	1060	288	1550	13100	736	833	773	600	439
Mercury	1		0.25		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Molybdenum	250		10000		0.65	< 0.05	1.45	1.55	0.07	0.34	< 0.05	0.09	0.72	0.37	0.29	0.57	0.12	0.24
Nickel	80		250	H	14.7	< 0.2	1.2	1.2	0.4	3.8	< 0.2	0.2	8.4	0.3	0.5	1.3	0.5	0.6
Potassium					3240	2000	1910	1840	1870	1240	1530	2890	5550	1720	2380	3440	2040	1910
Selenium	10		20		5.3	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Silicon					6250	5580	5870	5850	2660	5340	3760	5070	8330	5820	6170	6030	5860	4040
Silver	20		0.5	H	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Strontium	2500				482	850	290	300	1260	129	377	1320	2060	257	632	679	746	545
Sulphur (Colloidal)					24200	3410	2140	2110	582	3340	< 500	1910	4150	3420	8510	23200	1950	1110
Thallium			3		0.04	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.01	0.03	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Tin	2500				0.15	< 0.05	0.09	0.07	< 0.05	0.06	< 0.05	0.10	0.12	0.11	< 0.05	0.14	0.05	0.15
Titanium			1000		1.6	1.5	2.3	2.3	0.6	1.1	1.1	1.3	1.9	1.2	1.3	1.2	2.0	0.8
Uranium	20		85		3.38	< 0.01	0.04	0.04	0.02	0.30	< 0.01	0.32	0.55	0.11	0.46	0.10	0.13	0.43
Vanadium	20				0.9	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Zinc	3000		75	H	4	5	4	3	5	6	< 2	8	14	< 2	< 2	< 2	5	2
Zirconium					0.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1

Notes:
All parameter units in micrograms per litre (ug/L), unless otherwise noted.
B.C. Contaminated Sites Regulation standards shown are from the 1 November 2017 (B.C. Reg 253/2016 and B.C. Reg 196/2017). Stage 10 CSR standards are for drinking water (DW) and freshwater aquatic life (AW-F)
H = Hardness-dependant; V= Standard is valence dependent. VI refers to chromium [VI] and III refers to chromium [III]
Site falls under Schedule 2 G2 activity; CSR iron and manganese standards do not apply.
QA/QC = Quality Assurance/Quality Control
FDA = Field Duplicate Available; FD = Field Duplicate.
< = Less than the laboratory method detection limit; (-) = Parameter not analyzed
Italics - indicates that the detection limit exceeds one or more criteria.

2.5	Exceeds CSR DW standard
1	Exceeds CSR AW-F standard

Table 11
Results of January 2018 Supplementary Investigation
Groundwater Analyses - Dissolved Metals Anions
K19 - Trutch Former Townsite
Alaska Highway, BC

Location Sample Control Number Laboratory Report Number Date Sampled QA/QC	BC CSR Standards for Drinking Water (DW)	Notes	BC CSR Standards for Aquatic Life (AWF)	Notes	K19-MW17-32 04310-01 18N303317 14-Jan-18	K19-MW17-35D 04310-04 18N303317 16-Jan-18 FDA	K19-MW17-35D 04310-05 18N303317 16-Jan-18 FD	K19-MW18-01 04319-04 18N304491 21-Jan-18	K19-MW18-02 04319-02 18N304491 21-Jan-18	K19-MW18-07D 04319-03 18N304491 21-Jan-18	K19-MW18-08D 04255-03 18N306717 22-Jan-18	K19-MW18-09 04255-02 18N306717 22-Jan-18	K19-MW18-10D 04255-01 18N306717 22-Jan-18	K19-MW18-11 04255-05 18N306717 22-Jan-18	K19-MW18-12 04254-01 18N306660 26-Jan-18 FDA	K19-MW18-12 04254-02 18N306660 26-Jan-18 FD	K19-MW18-15 04254-04 18N306660 26-Jan-18	K19-MW18-16 04254-03 18N306660 27-Jan-18
Field Parameters																		
Dissolved Oxygen					0.75	1.5	1.5	1.56	1.19	2.73	-	4.95	0.89	-	3.31	3.31	6.01	5.72
Conductivity (µS/cm)					574.4	838.1	838.1	856.9	870.4	731.2	1004	989	630.5	-	698.0	698.0	768.3	720.6
Oxidation Reduction Potential (mV)					-33	-137.5	-137.5	-33.6	-56.5	-8.0	-	-23.2	99.9	-	26.0	26.0	4.8	-45
pH (pH units)					7.09	6.39	6.39	6.48	8.75	6.72	7.22	7.23	6.73	-	7.79	7.79	7.48	7.51
Temperature (°C)					2.4	3.8	3.8	0.6	1.8	2.1	3.3	3.2	2.5	-	2.7	2.7	3.2	2
Physical Tests																		
Hardness (mg/L)					318	381	375	-	-	-	394	391	263	235	314	303	327	282
Anions and Nutrients																		
Sodium	200000				7420	11600	11800	10100	11200	11500	19200	26600	11900	11800	36300	34700	18800	18500
Chloride	250000		1500000		-	6520	6600	-	-	81300	150000	130000	-	-	-	-	-	-
Dissolved Metals																		
Aluminum	9500				4	4	4	3	5	2	< 2	10	3	4	3	3	< 2	2
Antimony	6		90		< 0.2	< 0.2	< 0.2	0.7	< 0.2	< 0.2	< 0.2	0.3	0.3	0.3	< 0.2	< 0.2	< 0.2	< 0.2
Arsenic	10		50		1.0	0.8	0.8	0.4	0.3	9.5	3.6	0.6	0.8	0.6	0.2	0.2	0.3	0.3
Barium	1000		10000		62.6	1820	1780	4720	1280	579	6110	4990	435	558	91.0	86.1	36.4	47.7
Beryllium	8		1.5		< 0.01	< 0.01	0.01	< 0.01	0.02	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.01	0.01	< 0.01	< 0.01
Bismuth					< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Boron	5000		12000		105	73	68	92	138	110	222	217	128	138	326	325	313	246
Cadmium	5		0.5	H	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.03	< 0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.02
Calcium					82400	99100	97700	106000	75400	84900	96800	98200	66300	58500	75200	72700	86600	71300
Chromium	50		10	V	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Cobalt	1		40		0.55	0.15	0.16	2.16	1.28	0.84	0.98	0.86	2.27	1.93	0.13	0.14	0.21	0.37
Copper	1500		20	H	< 0.2	< 0.2	< 0.2	0.2	0.3	0.4	< 0.2	0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Iron					2470	39900	39700	6640	3920	5060	10300	1480	1180	1520	531	535	834	852
Lead	10		40	H	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Lithium	8				59.7	57.6	57.5	69.3	81.9	80.0	103	113	135	149	140	134	146	108
Magnesium					27300	32400	31800	32200	29400	28800	37100	35400	23600	21700	30600	29500	26900	25300
Manganese					163	357	356	575	651	742	800	654	899	772	275	281	436	747
Mercury	1		0.25		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Molybdenum	250		10000		0.74	0.44	0.45	0.80	0.49	0.61	0.51	0.50	0.57	0.40	0.13	0.09	0.08	0.14
Nickel	80		250	H	0.8	0.6	0.6	4.6	1.7	1.6	1.3	1.7	3.4	3.6	0.4	0.3	0.3	0.5
Potassium					2400	1460	1540	5270	2840	2610	3250	4630	4260	3620	2500	2380	2380	2410
Selenium	10		20		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Silicon					5540	5260	5140	6440	5610	5900	5260	5330	4930	4210	5200	4950	5520	5840
Silver	20		0.5	H	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Strontium	2500				252	405	428	397	605	610	1000	870	455	486	954	903	786	584
Sulphur (Colloidal)					10800	2290	2230	2690	1210	1840	1340	1490	1770	1440	9340	9240	21500	15600
Thallium			3		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	0.02
Tin	2500				0.08	< 0.05	< 0.05	0.44	0.19	0.27	0.37	0.45	0.14	0.07	0.15	0.12	0.10	0.31
Titanium			1000		1.2	3.2	2.8	2.1	1.7	1.8	1.3	1.2	1.2	1.3	1.3	1.4	1.4	1.4
Uranium	20		85		0.78	0.14	0.14	0.77	0.26	0.86	0.55	1.16	0.57	0.37	0.07	0.06	0.12	0.22
Vanadium	20				< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Zinc	3000		75	H	< 2	< 2	< 2	4	2	3	5	4	< 2	2	3	3	< 2	< 2
Zirconium					< 0.1	0.1	0.1	0.3	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1

Notes:
All parameter units in micrograms per litre (ug/L), unless otherwise noted.
B.C. Contaminated Sites Regulation standards shown are from the 1 November 2017 (B.C. Reg 253/2016 and B.C. Reg 196/2017). Stage 10 CSR standards are for drinking water (DW) and freshwater aquatic life (AW-F)
H = Hardness-dependant; V= Standard is valence dependent. VI refers to chromium [VI] and III refers to chromium [III]
Site falls under Schedule 2 G2 activity; CSR iron and manganese standards do not apply.
QA/QC = Quality Assurance/Quality Control
FDA = Field Duplicate Available; FD = Field Duplicate.
< = Less than the laboratory method detection limit; (-) = Parameter not analyzed
Italics - indicates that the detection limit exceeds one or more criteria.

2.5	Exceeds CSR DW standard
1	Exceeds CSR AW-F standard

Table 12
Results of January 2018 Supplementary Investigation
Groundwater Analyses - PAHs BTEX
K19 - Trutch Former Townsite
Alaska Highway, BC

Location	BC CSR Standards for Drinking Water	Notes	BC CSR Standards for Aquatic Life (Fresh Water)	Notes	K19-MW09-04	K19-MW10-03	K19-MW16-01D	K19-MW16-01D	K19-MW16-10D	K19-MW16-10S	K19-MW17-04	K19-MW17-06	K19-MW17-10	K19-MW17-18	K19-MW17-22	K19-MW17-26	K19-MW17-29D	K19-MW17-31	K19-MW17-32
Sample Control Number					04309-01	04309-07	04309-11	04309-12	04309-06	04310-02	04309-02	04309-03	04309-04	04309-10	04309-05	04309-09	04310-03	04309-08	04310-01
Laboratory ID					18N303317	18N303317	18N303317	18N303317	18N303317	18N303317	18N303317	18N303317	18N303317	18N303317	18N303317	18N303317	18N303317	18N303317	18N303317
Date Sampled					13-Jan-18	14-Jan-18	14-Jan-18	14-Jan-18	14-Jan-18	16-Jan-18	13-Jan-18	13-Jan-18	14-Jan-18	14-Jan-18	14-Jan-18	14-Jan-18	16-Jan-18	14-Jan-18	14-Jan-18
QA/QC							FDA	FD											
Polycyclic Aromatic Hydrocarbons (PAHs)																			
Acenaphthene	250		0.06		< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Acenaphthylene					< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Acridine			0.0005		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Anthracene	1000		0.001		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)anthracene	0.07		0.001		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	0.01		0.0001		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene					< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(g,h,i)perylene					< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo[j]fluoranthene					< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene					< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Chrysene	7		0.001		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dibenzo(a,h)anthracene	0.01				< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluoranthene	150		0.002		< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Benzo(b,j) fluoranthene	0.07				< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluorene	150		0.12		< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Indeno(1,2,3-c,d)pyrene					< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Naphthalene	180		0.01		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05	< 0.05	< 0.05	< 0.05
Phenanthrene			0.003		< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
Pyrene	100		0.0002		< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Quinoline	0.05		0.034		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2-methylnaphthalene	15				< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
1-Methylnaphthalene	5.5				< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Extractable Petroleum Hydrocarbons (C10-C19)	5000		5000		< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
Extractable Petroleum Hydrocarbons (C19-C32)					< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
Volatile Petroleum Hydrocarbons: BTEX, VPH, LEPH & HEPH; PAH Corrected			1500		< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
Volatile Hydrocarbon Fraction					< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
Petroleum Hydrocarbons - F1 (C6-C10)-BTEX					-	-	-	-	-	-	-	-	-	-	-	-	< 100	-	-
Petroleum Hydrocarbons - F1 (C6-C10)					-	-	-	-	-	-	-	-	-	-	-	-	< 100	-	-
Petroleum Hydrocarbons - F2 (C10-C16)					-	-	-	-	-	-	-	-	-	-	-	-	< 100	-	-
Petroleum Hydrocarbons - F3 (C16-C34)					-	-	-	-	-	-	-	-	-	-	-	-	< 100	-	-
Petroleum Hydrocarbons - F4 (C34-C50)					-	-	-	-	-	-	-	-	-	-	-	-	< 100	-	-
BTEX Compounds																			
Benzene	5		400		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Ethylbenzene	140		2000		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Toluene	60		5		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Styrene	800		720		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
o-Xylene					< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
m,p-Xylenes					< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Xylenes, Total	90		300		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Methyl tert-Butyl Ether (MTBE)	95		34000		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1

Notes:
All parameter units in micrograms per litre (ug/L), unless otherwise noted.
B.C. Contaminated Sites Regulation standards shown are from the 1 November 2017 (B.C. Reg 253/2016 and B.C. Reg 196/2017). Stage 10 CSR standards are for drinking water (DW) and freshwater aquatic life (AW-F)
QA/QC = Quality Assurance/Quality Control
FDA = Field Duplicate Available; FD = Field Duplicate
< = Less than the laboratory method detection limit; (-) = Parameter not analyzed
Italics - indicates that the detection limit exceeds one or more criteria.
PAHs = polycyclic aromatic hydrocarbons
EPH (C10-C19) = extractable petroleum hydrocarbons, carbon range 10-19; LEPH = light extractable petroleum hydrocarbons
EPH (C19-C32) = extractable petroleum hydrocarbons, carbon range 19-32; HEPH = heavy extractable petroleum hydrocarbons
VH (C6-C10) = volatile hydrocarbons, carbon range 6-10; VPH = volatile petroleum hydrocarbons

2.5	Exceeds CSR DW standar
1	Exceeds CSR AW-F standard

Table 12
Results of January 2018 Supplementary Investigation
Groundwater Analyses - PAHs BTEX
K19 - Trutch Former Townsite
Alaska Highway, BC

Location Sample Control Number Laboratory ID Date Sampled QA/QC	BC CSR Standards for Drinking Water	Notes	BC CSR Standards for Aquatic Life (Fresh Water)	Notes	K19-MW17-35D 04310-04 18N303317 16-Jan-18 FDA	K19-MW17-35D 04310-05 18N303317 16-Jan-18 FD	K19-MW18-01 04319-04 18N304491 21-Jan-18	K19-MW18-02 04319-02 18N304491 21-Jan-18	K19-MW18-06 04319-01 18N304491 21-Jan-18	K19-MW18-07D 04319-03 18N304491 21-Jan-18	K19-MW18-08D 04255-03 18N306717 22-Jan-18	K19-MW18-09 04255-02 18N306717 22-Jan-18	K19-MW18-10D 04255-01 18N306717 22-Jan-18	K19-MW18-11 04255-05 18N306717 22-Jan-18	K19-MW18-12 04254-01 18N306660 26-Jan-18 FDA	K19-MW18-12 04254-02 18N306660 26-Jan-18 FD	K19-MW18-15 04254-04 18N306660 26-Jan-18	K19-MW18-16 04254-03 18N306660 27-Jan-18
Polycyclic Aromatic Hydrocarbons (PAHs)																		
Acenaphthene	250		0.06		< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Acenaphthylene					< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Acridine			0.0005		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Anthracene	1000		0.001		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)anthracene	0.07		0.001		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	0.01		0.0001		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene					< 0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(g,h,i)perylene					< 0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.02	0.05	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo[j]fluoranthene					< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	-	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene					< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Chrysene	7		0.001		< 0.01	< 0.01	0.03	< 0.01	< 0.01	< 0.01	< 0.01	0.05	0.11	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dibenzo(a,h)anthracene	0.01				< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluoranthene	150		0.002		< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.02	0.04	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Benzo(b,j) fluoranthene	0.07				< 0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluorene	150		0.12		< 0.02	< 0.02	0.04	< 0.02	< 0.02	< 0.02	< 0.02	0.07	0.19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Indeno(1,2,3-c,d)pyrene					< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Naphthalene	180		0.01		< 0.05	< 0.05	0.14	< 0.05	< 0.05	< 0.05	< 0.05	0.09	0.74	< 0.05	< 0.05	< 0.05	0.05	< 0.05
Phenanthrene			0.003		< 0.04	< 0.04	0.11	< 0.04	< 0.04	< 0.04	< 0.04	0.26	0.67	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
Pyrene	100		0.0002		< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.03	0.07	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Quinoline	0.05		0.034		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2-methylnaphthalene	15				< 0.05	< 0.05	0.29	< 0.05	< 0.05	< 0.05	< 0.05	0.33	1.58	0.05	< 0.05	< 0.05	< 0.05	< 0.05
1-Methylnaphthalene	5.5				< 0.05	< 0.05	0.22	< 0.05	< 0.05	< 0.05	< 0.05	0.25	1.14	0.05	< 0.05	< 0.05	< 0.05	< 0.05
Extractable Petroleum Hydrocarbons (C10-C19)	5000		5000		< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	120	< 100	< 100	< 100	< 100	< 100
Extractable Petroleum Hydrocarbons (C19-C32)					< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	100	< 100	< 100	< 100	< 100	< 100
Volatile Petroleum Hydrocarbons: BTEX, VPH, LEPH & HEPH; PAH Corrected			1500		100	160	< 100	< 100	< 100	< 100	-	-	-	-	-	-	-	-
Volatile Hydrocarbon Fraction					380	410	< 100	< 100	< 100	< 100	-	-	-	-	-	-	-	-
Petroleum Hydrocarbons - F1 (C6-C10)-BTEX					560	630	250	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
Petroleum Hydrocarbons - F1 (C6-C10)					840	880	250	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
Petroleum Hydrocarbons - F2 (C10-C16)					< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	-	< 100	< 100	< 100	< 100	< 100
Petroleum Hydrocarbons - F3 (C16-C34)					110	< 100	< 100	< 100	< 100	< 100	< 100	< 100	-	< 100	< 100	< 100	< 100	< 100
Petroleum Hydrocarbons - F4 (C34-C50)					< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	-	< 100	< 100	< 100	< 100	< 100
BTEX Compounds																		
Benzene	5		400		271	237	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Ethylbenzene	140		2000		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Toluene	60		5		8.1	7.7	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Styrene	800		720		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
o-Xylene					< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
m,p-Xylenes					< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Xylenes, Total	90		300		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Methyl tert-Butyl Ether (MTBE)	95		34000		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1

Notes:
All parameter units in micrograms per litre (ug/L), unless otherwise noted.
B.C. Contaminated Sites Regulation standards shown are from the 1 November 2017 (B.C. Reg 253/2016 and B.C. Reg 196/2017). Stage 10 CSR standards are for drinking water (DW) and freshwater aquatic life (AW-F)
QA/QC = Quality Assurance/Quality Control
FDA = Field Duplicate Available; FD = Field Duplicate
< = Less than the laboratory method detection limit; (-) = Parameter not analyzed
Italics - indicates that the detection limit exceeds one or more criteria.
PAHs = polycyclic aromatic hydrocarbons
EPH (C10-C19) = extractable petroleum hydrocarbons, carbon range 10-19; LEPH = light extractable petroleum hydrocarbons
EPH (C19-C32) = extractable petroleum hydrocarbons, carbon range 19-32; HEPH = heavy extractable petroleum hydrocarbons
VH (C6-C10) = volatile hydrocarbons, carbon range 6-10; VPH = volatile petroleum hydrocarbons

2.5	Exceeds CSR DW standar
1	Exceeds CSR AW-F standard

Table 13
Results of January 2018 Supplementary Investigation
Groundwater Analysis - VOCs Pesticides
K19 - Trutch Former Townsite
Alaska Highway, BC

Location	BC CSR Standards for Drinking Water	Notes	BC CSR Standards for Aquatic Life (Fresh Water)	Notes	K19-MW09-04	K19-MW10-03	K19-MW16-01D	K19-MW16-01D	K19-MW17-06	K19-MW17-10	K19-MW17-29D	K19-MW17-35D	K19-MW17-35D	K19-MW18-01
Sample Control Number					04309-01	04309-07	04309-11	04309-12	04309-03	04309-04	04310-03	04310-04	04310-05	04319-04
Laboratory ID					18N303317	18N303317	18N303317	18N303317	18N303317	18N303317	18N303317	18N303317	18N303317	18N304491
Date Sampled					13-Jan-18	14-Jan-18	14-Jan-18	14-Jan-18	13-Jan-18	14-Jan-18	16-Jan-18	16-Jan-18	16-Jan-18	21-Jan-18
QA/QC							FDA	FD				FDA	FD	
Volatile Organic Compounds (VOCs)														
Bromodichloromethane (BDCM)	100				< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Bromomethane (Methyl Bromide)	5.5				< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Bromoform (Tribromomethane)	100				< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Carbon Tetrachloride	2		130		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chlorobenzene	80		13		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Chloroethane					< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Chloroform	100		20		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Chloromethane					< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Dichloromethane (DCM) (Methylene Chloride)	50		980		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Dibromochloromethane (DBCM)	100				< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,2-dibromoethane (Ethylene Dibromide) (EDB)	0.5				< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
1,2-dichlorobenzene	200		7		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,3-dichlorobenzene			1500		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,4-dichlorobenzene	5		260		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,1-dichloroethane	30				< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,2-dichloroethane	5		1000		< 1	< 1	< 1	< 1	< 1	< 1	< 1	52	49	< 1
1,1-dichloroethene	14				< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,2-dichloroethylene (cis) (1,2-dichloroethene)	8				< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,2-dichloroethylene (trans) (1,2-dichloroethene)	80				< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,2-dichloropropane (Propylene Dichloride)	4.5				< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,3-dichloropropene (cis)	1.5				< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,3-dichloropropene (trans)	1.5				< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,3-dichloropropene, total	1.5				< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,2,4-Trichlorobenzene	5.5		240		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,1,1,2-tetrachloroethane	6				< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,1,2,2-tetrachloroethane	0.8				< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8
Tetrachloroethylene (PCE/PERC)	30		1100		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,1,1-trichloroethane	8000				< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,1,2-trichloroethane	3				< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Trichloroethylene (TCE)	5		200		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Trichlorofluoromethane (Freon 11)	1000				< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Trihalomethanes (Total)					< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Vinyl Chloride (Chloroethene)	2				< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
2-Butanone	2500				< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
4-Methyl-2-pentanone					< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Acetone	3500				< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Groundwater Pesticides														
4,4-DDT			1920		-	-	< 0.04	< 0.04	-	-	-	-	-	-

Notes:
All parameter units in micrograms per litre (ug/L), unless otherwise noted.
B.C. Contaminated Sites Regulation standards shown are from the 1 November 2017 (B.C. Reg 253/2016 and B.C. Reg 196/2017). Stage 10 CSR standards are for drinking water (DW) and freshwater aquatic life (AW-F)
QA/QC = Quality Assurance/Quality Control
FDA = Field Duplicate Available; FD = Field Duplicate
< = Less than the laboratory method detection limit; (-) = Parameter not analyzed
Italics - indicates that the detection limit exceeds one or more criteria.

2.5	Exceeds CSR DW standard
1	Exceeds CSR AW-F standard

Table 13
Results of January 2018 Supplementary Investigation
Groundwater Analysis - VOCs Pesticides
K19 - Trutch Former Townsite
Alaska Highway, BC

Location Sample Control Number Laboratory ID Date Sampled QA/QC	BC CSR Standards for Drinking Water	Notes	BC CSR Standards for Aquatic Life (Fresh Water)	Notes	K19-MW18-02 04319-02 18N304491 21-Jan-18	K19-MW18-06 04319-01 18N304491 21-Jan-18	K19-MW18-07D 04319-03 18N304491 21-Jan-18	K19-MW18-08D 04255-03 18N306717 22-Jan-18	K19-MW18-09 04255-02 18N306717 22-Jan-18	K19-MW18-10D 04255-01 18N306717 22-Jan-18	K19-MW18-11 04255-05 18N306717 22-Jan-18	K19-MW18-12 04254-01 18N306660 26-Jan-18 FDA	K19-MW18-12 04254-02 18N306660 26-Jan-18 FD	K19-MW18-15 04254-04 18N306660 26-Jan-18	K19-MW18-16 04254-03 18N306660 27-Jan-18
Volatile Organic Compounds (VOCs)															
Bromodichloromethane (BDCM)	100				< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Bromomethane (Methyl Bromide)	5.5				< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Bromoform (Tribromomethane)	100				< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Carbon Tetrachloride	2		130		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chlorobenzene	80		13		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Chloroethane					< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Chloroform	100		20		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Chloromethane					< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Dichloromethane (DCM) (Methylene Chloride)	50		980		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Dibromochloromethane (DBCM)	100				< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,2-dibromoethane (Ethylene Dibromide) (EDB)	0.5				< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
1,2-dichlorobenzene	200		7		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,3-dichlorobenzene			1500		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,4-dichlorobenzene	5		260		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,1-dichloroethane	30				< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,2-dichloroethane	5		1000		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,1-dichloroethene	14				< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,2-dichloroethylene (cis) (1,2-dichloroethene)	8				< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,2-dichloroethylene (trans) (1,2-dichloroethene)	80				< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,2-dichloropropane (Propylene Dichloride)	4.5				< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,3-dichloropropene (cis)	1.5				< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,3-dichloropropene (trans)	1.5				< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,3-dichloropropene, total	1.5				< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,2,4-Trichlorobenzene	5.5		240		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,1,1,2-tetrachloroethane	6				< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,1,2,2-tetrachloroethane	0.8				< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8
Tetrachloroethylene (PCE/PERC)	30		1100		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,1,1-trichloroethane	8000				< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,1,2-trichloroethane	3				< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Trichloroethylene (TCE)	5		200		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Trichlorofluoromethane (Freon 11)	1000				< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Trihalomethanes (Total)					< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Vinyl Chloride (Chloroethene)	2				< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
2-Butanone	2500				< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
4-Methyl-2-pentanone					< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Acetone	3500				< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Groundwater Pesticides															
4,4-DDT			1920		-	-	-	-	-	-	-	-	-	-	-

Notes:
All parameter units in micrograms per litre (ug/L), unless otherwise noted.
B.C. Contaminated Sites Regulation standards shown are from the 1 November 2017 (B.C. Reg 253/2016 and B.C. Reg 196/2017). Stage 10 CSR standards are for drinking water (DW) and freshwater aquatic life (AW-F)
QA/QC = Quality Assurance/Quality Control
FDA = Field Duplicate Available; FD = Field Duplicate
< = Less than the laboratory method detection limit; (-) = Parameter not analyzed
Italics - indicates that the detection limit exceeds one or more criteria.

2.5	Exceeds CSR DW standard
1	Exceeds CSR AW-F standard

Table 14
Results of January 2018 Supplementary Investigation
Soil Vapour Analysis
K19 - Trutch Former Townsite
Alaska Highway, BC

Location		K19-MW18-02		K19-SV18-03		K19-SV18-03		K19-SV18-04	
Sample Control Number	CSR[1]	04316-02		04316-03		04316-04		04316-01	
Sampling Method	Standards	Summa canister		Summa canister		Summa canister		Summa canister	
Sample Depth (m bgs)	for	3.5-3.65		3.5-3.65		3.5-3.65		2.15-2.30	
Date Sampled	RL	19-Jan-18		19-Jan-18		19-Jan-18		19-Jan-18	
QA/QC				FDA		FD			
Field Screening									
Organic Vapour (ppm)		0.3		0.8		0.8		0.5	
Methane (%)		0		0		0		0	
Carbon Dioxide (%)		15.3		0.5		0.5		14.6	
Oxygen (%)		0.1		14.8		14.8		0.15	
Helium breakthrough (%)		0.7		-		-		-	
		Outdoor Air Result *	***Raw laboratory data*****	***Outdoor Air Result ****	***Raw laboratory data*****	***Outdoor Air Result ****	***Raw laboratory data*****	***Outdoor Air Result ****	***Raw laboratory data*****
Attenuation Factor Applied (α)		6.1E-07		6.1E-07		6.1E-07		9.2E-07	
Polycyclic Aromatic Hydrocarbons (PAHs)									
Naphthalene	3	4.9E-06	< 8.0	1.2E-06	<2.0	1.2E-06	<2.0	7.4E-06	< 8.0
VPH (C6-C10)	1000	1.8E-03	3000	3.5E-03	5700	1.6E-03	2700	2.8E-03	3000
BTEX									
Benzene	1.5	2.0E-06	3.2	9.8E-07	1.6	8.5E-07	1.4	2.5E-06	2.7
Toluene	5000	3.7E-06	6.0	7.9E-07	1.3	1.7E-06	2.8	7.7E-06	8.4
Ethylbenzene	1000	2.2E-06	< 3.6	7.3E-07	1.2	6.7E-07	1.1	3.3E-06	< 3.6
Styrene	1000	2.4E-06	< 4.0	6.1E-07	<1.0	6.1E-07	<1.0	3.7E-06	< 4.0
o-Xylene		2.2E-06	< 3.6	1.5E-06	2.4	9.8E-07	1.6	3.3E-06	< 3.6
m,p-Xylenes		4.0E-06	6.6	2.3E-06	3.7	2.4E-06	4.0	7.5E-06	8.1
Xylenes, Total	100	4.9E-06	< 8.0	3.7E-06	6.1	3.4E-06	5.6	7.5E-06	8.1
Volatile Organic Compounds (VOCs)									
Bromodichloromethane (BDCM)	40	3.2E-06	< 5.2	7.9E-07	<1.3	7.9E-07	<1.3	4.8E-06	< 5.2
Bromomethane (Methyl bromide)	5	4.6E-06	< 7.6	1.2E-06	<1.9	1.2E-06	<1.9	7.0E-06	< 7.6
Bromoform (Tribromomethane)	9	4.9E-06	< 8.0	1.2E-06	<2.0	1.2E-06	<2.0	7.4E-06	< 8.0
1,3-Butadiene	2	2.4E-06	< 4.0	6.1E-07	<1.0	6.1E-07	<1.0	3.7E-06	< 4.0
Carbon Tetrachloride	1.5	4.9E-06	< 8.0	1.2E-06	<2.0	1.2E-06	<2.0	7.4E-06	< 8.0
Chlorobenzene	10	2.4E-06	< 4.0	6.1E-07	<1.0	6.1E-07	<1.0	3.7E-06	< 4.0
Chloroethane	10000	2.4E-06	< 4.0	2.0E-06	3.3	6.1E-07	<1.0	3.7E-06	< 4.0
Chloroform	100	4.6E-06	7.5	6.1E-07	<1.0	1.1E-06	1.8	3.7E-06	< 4.0
Chloromethane	90	1.5E-06	< 2.40	3.7E-07	<0.60	3.7E-07	<0.60	2.2E-06	< 2.40
Dichloromethane (DCM) (Methylene Chloride)	600	2.4E-06	< 4.0	6.1E-07	<1.0	6.1E-07	<1.0	3.7E-06	< 4.0
Dibromochloromethane (DBCM)	40	4.9E-06	< 8.0	1.2E-06	<2.0	1.2E-06	<2.0	7.4E-06	< 8.0
1,2-dibromoethane (Ethylene Dibromide) (EDB)	0.5	3.7E-06	< 6.0	9.2E-07	<1.5	9.2E-07	<1.5	5.5E-06	< 6.0
1,2-dichlorobenzene	200	6.1E-06	< 10.0	1.5E-06	<2.5	1.5E-06	<2.5	9.2E-06	< 10.0
1,3-dichlorobenzene	60	6.1E-06	< 10.0	1.5E-06	<2.5	1.5E-06	<2.5	9.2E-06	< 10.0
1,4-dichlorobenzene	800	6.1E-06	< 10.0	1.5E-06	<2.5	1.5E-06	<2.5	9.2E-06	< 10.0
Dichlorodifluoromethane (Freon 12)	100	2.4E-06	< 4.0	1.3E-06	2.2	1.3E-06	2.1	3.7E-06	< 4.0
1,1-dichloroethane	500	2.9E-06	< 4.8	7.3E-07	<1.2	7.3E-07	<1.2	4.4E-06	< 4.8
1,2-dichloroethane	7	7.3E-07	< 1.20	4.9E-07	<0.80	4.9E-07	<0.80	1.1E-06	< 1.20
1,1-dichloroethene	200	2.4E-06	< 4.0	4.9E-07	<0.80	4.9E-07	<0.80	3.7E-06	< 4.0
1,2-dichloroethylene (Cis) (1,2-dichloroethene)	60	2.0E-06	< 3.20	4.9E-07	<0.80	4.9E-07	<0.80	2.9E-06	< 3.20
1,2-dichloroethylene (Trans) (1,2-dichloroethene)	60	2.0E-06	< 3.20	4.9E-07	<0.80	4.9E-07	<0.80	2.9E-06	< 3.20
1,2-dichloropropane (Propylene Dichloride)	4	4.9E-06	< 8.0	1.2E-06	<2.0	1.2E-06	<2.0	7.4E-06	< 8.0
2,2-Dichloropropane		4.9E-06	< 8.0	1.2E-06	<2.0	1.2E-06	<2.0	7.4E-06	< 8.0
1,3-dichloropropene (Cis)		2.4E-06	< 4.0	6.1E-07	<1.0	6.1E-07	<1.0	3.7E-06	< 4.0
1,3-dichloropropene (Trans)		2.4E-06	< 4.0	6.1E-07	<1.0	6.1E-07	<1.0	3.7E-06	< 4.0
1,2-Dichlorotetrafluoroethane		3.4E-06	< 5.6	8.5E-07	<1.4	8.5E-07	<1.4	5.2E-06	< 5.6
1,1,2,2-tetrachloroethane	40	3.7E-06	< 6.0	9.2E-07	<1.5	9.2E-07	<1.5	5.5E-06	< 6.0
Freon 113	30000	3.7E-06	< 6.0	9.2E-07	<1.5	9.2E-07	<1.5	5.5E-06	< 6.0
2-Hexanone		4.9E-06	< 8.0	1.2E-06	<2.0	1.2E-06	<2.0	7.4E-06	< 8.0
Isopropylbenzene	400	2.0E-06	< 3.20	4.9E-07	<0.80	4.9E-07	<0.80	2.9E-06	< 3.20
Methyl Cyclohexane	1500	1.3E-05	21	5.2E-06	8.6	7.9E-06	13	4.7E-05	51
Methyl tert-Butyl Ether (MTBE)	3000	2.0E-06	< 3.20	4.9E-07	<0.80	4.9E-07	<0.80	2.9E-06	< 3.20
n-Decane	2500	3.2E-06	< 5.2	4.5E-06	7.4	2.4E-05	40	1.4E-05	15
n-Hexane	700	3.1E-05	50	1.7E-06	2.8	1.0E-06	1.7	4.3E-06	4.7
4-Methyl-2-pentanone	3000	4.9E-06	< 8.0	1.2E-06	<2.0	1.2E-06	<2.0	7.4E-06	< 8.0
Tetrachloroethylene (PCE/PERC)	40	1.2E-05	20	1.3E-06	2.1	6.7E-06	11	1.6E-05	17
1,2,4-Trimethylbenzene	7	3.7E-06	< 6.0	9.2E-07	<1.5	9.2E-07	<1.5	5.5E-06	< 6.0
1,3,5-Trimethylbenzene	3.5	3.7E-06	< 6.0	9.2E-07	<1.5	9.2E-07	<1.5	5.5E-06	< 6.0
1,1,1-trichloroethane	5000	3.9E-06	< 6.4	9.8E-07	<1.6	9.8E-07	<1.6	5.9E-06	< 6.4
1,1,2-trichloroethane	0.5	3.9E-06	< 6.4	9.8E-07	<1.6	9.8E-07	<1.6	5.9E-06	< 6.4
Trichloroethylene (TCE)	2	2.4E-06	< 4.0	6.1E-07	<1.0	6.1E-07	<1.0	3.7E-06	< 4.0
Trichlorofluoromethane (Freon 11)	700	5.6E-06	< 9.2	1.4E-06	<2.3	1.4E-06	<2.3	8.5E-06	< 9.2
Vinyl Bromide	1	2.0E-06	< 3.20	4.9E-07	<0.80	4.9E-07	<0.80	2.9E-06	< 3.20
Vinyl Chloride (Chloroethene)	1	9.8E-07	< 1.60	2.4E-07	<0.40	2.4E-07	<0.40	1.5E-06	< 1.60

Notes

All values are in µg/m^3 unless otherwise noted.

Standards shown are from the Contaminated Sites Regulation (CSR), B.C. Reg. 253/96 with amendments up to 1 November 2017 (B.C. Reg 253/2016). Stage 10 CSR standards applied and updated as of 13 February 2018.

Land Use abbreviations: RL (Agricultural, Urban Park, Residential)

Applied attenuation factors (α) obtained from Table 1 of BC Ministry of Environment Protocol #22 - Application of Vapour Attenuation Factors to Characterize Vapour Contamination (Effective 1 November 2017).

* Compared to vapour standards.

** Raw laboratory data (without attenuation) are shown for reference only and are not compared to the vapour standards.

ppm - parts per million

QA/QC = Quality Assurance / Quality Control; FDA = Field Duplicate Available; FD = Field Duplicate

VPHv = Volatile petroleum hydrocarbons, carbon range 6-13

Table 14
Results of January 2018 Supplementary Investigation
Soil Vapour Analysis
K19 - Trutch Former Townsite
Alaska Highway, BC

Location		K19-MW18-07		K19-MW18-10		K19-SV18-05		K19-MW18-01	
Sample Control Number	CSR[1]	04316-08		04316-07		04316-06		04320-03	
Sampling Method	Standards	Summa canister		Summa canister		Summa canister		Summa canister	
Sample Depth (m bgs)	for	2.7-2.85		2.5-2.65		1.15-1.3		3.5-3.65	
Date Sampled	RL	21-Jan-18		21-Jan-18		21-Jan-18		22-Jan-18	
QA/QC									
Field Screening									
Organic Vapour (ppm)		1.6		1.8		5.2		0.1	
Methane (%)		0		0		0.6		0.1	
Carbon Dioxide (%)		19		18.9		2.8		19.5	
Oxygen (%)		-0.6		1.3		3.8		0	
Helium breakthrough (%)		13.9		15.7		5.5		0	
		Outdoor Air Result *	***Raw laboratory data*****	***Outdoor Air Result ****	***Raw laboratory data*****	***Outdoor Air Result ****	***Raw laboratory data*****	***Outdoor Air Result ****	***Raw laboratory data*****
Attenuation Factor Applied (α)		9.2E-07		9.2E-07		1.5E-06		6.1E-07	
Polycyclic Aromatic Hydrocarbons (PAHs)									
Naphthalene	3	1.8E-05	< 20.0	1.8E-05	< 20.0	3.0E-05	< 20.0	1.2E-06	< 2.0
VPH (C6-C10)	1000	2.3E-02	25000	2.5E-02	27000	3.8E-02	25000	3.1E-04	510
BTEX									
Benzene	1.5	6.5E-05	71	4.0E-05	44	7.5E-06	< 5.00	1.6E-06	2.6
Toluene	5000	7.4E-06	< 8.00	8.5E-06	9.2	1.2E-05	< 8.00	9.8E-07	1.6
Ethylbenzene	1000	8.3E-06	< 9.0	8.3E-06	< 9.0	1.4E-05	< 9.0	5.5E-07	< 0.9
Styrene	1000	9.2E-06	< 10.0	9.2E-06	< 10.0	1.5E-05	< 10.0	6.1E-07	< 1.0
o-Xylene		8.3E-06	< 9.0	8.3E-06	< 9.0	2.4E-05	16	5.5E-07	< 0.9
m,p-Xylenes		1.4E-05	< 15.0	1.4E-05	< 15.0	5.3E-05	35	9.2E-07	< 1.5
Xylenes, Total	100	1.8E-05	< 20.0	1.8E-05	< 20.0	6.2E-05	41	1.2E-06	< 2.0
Volatile Organic Compounds (VOCs)									
Bromodichloromethane (BDCM)	40	1.2E-05	< 13.0	1.2E-05	< 13.0	2.0E-05	< 13.0	7.9E-07	< 1.3
Bromomethane (Methyl bromide)	5	1.7E-05	< 19.0	1.7E-05	< 19.0	2.9E-05	< 19.0	1.2E-06	< 1.9
Bromoform (Tribromomethane)	9	1.8E-05	< 20.0	1.8E-05	< 20.0	3.0E-05	< 20.0	1.2E-06	< 2.0
1,3-Butadiene	2	9.2E-06	< 10.0	9.2E-06	< 10.0	1.5E-05	< 10.0	6.1E-07	< 1.0
Carbon Tetrachloride	1.5	1.8E-05	< 20.0	1.8E-05	< 20.0	3.0E-05	< 20.0	1.2E-06	< 2.0
Chlorobenzene	10	9.2E-06	< 10.0	9.2E-06	< 10.0	1.5E-05	< 10.0	6.1E-07	< 1.0
Chloroethane	10000	9.2E-06	< 10.0	9.2E-06	< 10.0	1.5E-05	< 10.0	6.1E-07	< 1.0
Chloroform	100	9.2E-06	< 10.0	9.2E-06	< 10.0	1.5E-05	< 10.0	6.1E-07	< 1.0
Chloromethane	90	5.5E-06	< 6.00	5.5E-06	< 6.00	9.0E-06	< 6.00	1.4E-06	2.3
Dichloromethane (DCM) (Methylene Chloride)	600	9.2E-06	< 10.0	9.2E-06	< 10.0	1.5E-05	< 10.0	6.1E-07	< 1.0
Dibromochloromethane (DBCM)	40	1.8E-05	< 20.0	1.8E-05	< 20.0	3.0E-05	< 20.0	1.2E-06	< 2.0
1,2-dibromoethane (Ethylene Dibromide) (EDB)	0.5	1.4E-05	< 15.0	1.4E-05	< 15.0	2.3E-05	< 15.0	9.2E-07	< 1.5
1,2-dichlorobenzene	200	2.3E-05	< 25.0	2.3E-05	< 25.0	3.8E-05	< 25.0	1.5E-06	< 2.5
1,3-dichlorobenzene	60	2.3E-05	< 25.0	2.3E-05	< 25.0	3.8E-05	< 25.0	1.5E-06	< 2.5
1,4-dichlorobenzene	800	2.3E-05	< 25.0	2.3E-05	< 25.0	3.8E-05	< 25.0	1.5E-06	< 2.5
Dichlorodifluoromethane (Freon 12)	100	9.2E-06	< 10.0	9.2E-06	< 10.0	1.5E-05	< 10.0	1.8E-06	2.9
1,1-dichloroethane	500	1.1E-05	< 12.0	1.1E-05	< 12.0	1.8E-05	< 12.0	7.3E-07	< 1.2
1,2-dichloroethane	7	2.8E-06	< 3.00	2.8E-06	< 3.00	4.5E-06	< 3.00	1.8E-07	< 0.30
1,1-dichloroethene	200	9.2E-06	< 10.0	9.2E-06	< 10.0	1.5E-05	< 10.0	6.1E-07	< 1.0
1,2-dichloroethylene (Cis) (1,2-dichloroethene)	60	7.4E-06	< 8.00	7.4E-06	< 8.00	1.2E-05	< 8.00	4.9E-07	< 0.80
1,2-dichloroethylene (Trans) (1,2-dichloroethene)	60	7.4E-06	< 8.00	7.4E-06	< 8.00	1.2E-05	< 8.00	4.9E-07	< 0.80
1,2-dichloropropane (Propylene Dichloride)	4	1.8E-05	< 20.0	1.8E-05	< 20.0	3.0E-05	< 20.0	1.2E-06	< 2.0
2,2-Dichloropropane		1.8E-05	< 20.0	1.8E-05	< 20.0	3.0E-05	< 20.0	1.2E-06	< 2.0
1,3-dichloropropene (Cis)		9.2E-06	< 10.0	9.2E-06	< 10.0	1.5E-05	< 10.0	6.1E-07	< 1.0
1,3-dichloropropene (Trans)		9.2E-06	< 10.0	9.2E-06	< 10.0	1.5E-05	< 10.0	6.1E-07	< 1.0
1,2-Dichlorotetrafluoroethane		1.3E-05	< 14.0	1.3E-05	< 14.0	2.1E-05	< 14.0	8.5E-07	< 1.4
1,1,2,2-tetrachloroethane	40	1.4E-05	< 15.0	1.4E-05	< 15.0	2.3E-05	< 15.0	9.2E-07	< 1.5
Freon 113	30000	1.4E-05	< 15.0	1.4E-05	< 15.0	2.3E-05	< 15.0	9.2E-07	< 1.5
2-Hexanone		1.8E-05	< 20.0	1.8E-05	< 20.0	3.0E-05	< 20.0	1.2E-06	< 2.0
Isopropylbenzene	400	7.4E-06	< 8.00	7.4E-06	< 8.00	1.2E-05	< 8.00	4.9E-07	< 0.80
Methyl Cyclohexane	1500	7.1E-05	77	5.2E-05	57	1.1E-05	< 7.00	9.8E-06	16
Methyl tert-Butyl Ether (MTBE)	3000	7.4E-06	< 8.00	7.4E-06	< 8.00	1.2E-05	< 8.00	4.9E-07	< 0.80
n-Decane	2500	1.5E-04	160	1.9E-04	210	2.0E-05	< 13.0	7.9E-07	< 1.3
n-Hexane	700	1.0E-04	110	2.9E-04	310	3.2E-05	21	2.8E-06	4.6
4-Methyl-2-pentanone	3000	1.8E-05	< 20.0	1.8E-05	< 20.0	3.0E-05	< 20.0	1.2E-06	< 2.0
Tetrachloroethylene (PCE/PERC)	40	9.2E-06	< 10.0	9.2E-06	< 10.0	1.5E-05	< 10.0	6.1E-07	< 1.0
1,2,4-Trimethylbenzene	7	1.4E-05	< 15.0	1.4E-05	< 15.0	2.3E-05	< 15.0	9.2E-07	< 1.5
1,3,5-Trimethylbenzene	3.5	1.4E-05	< 15.0	1.4E-05	< 15.0	2.3E-05	< 15.0	9.2E-07	< 1.5
1,1,1-trichloroethane	5000	1.5E-05	< 16.0	1.5E-05	< 16.0	2.4E-05	< 16.0	9.8E-07	< 1.6
1,1,2-trichloroethane	0.5	1.5E-05	< 16.0	1.5E-05	< 16.0	2.4E-05	< 16.0	9.8E-07	< 1.6
Trichloroethylene (TCE)	2	9.2E-06	< 10.0	9.2E-06	< 10.0	1.5E-05	< 10.0	6.1E-07	< 1.0
Trichlorofluoromethane (Freon 11)	700	2.1E-05	< 23.0	2.1E-05	< 23.0	3.5E-05	< 23.0	1.4E-06	< 2.3
Vinyl Bromide	1	7.4E-06	< 8.00	7.4E-06	< 8.00	1.2E-05	< 8.00	4.9E-07	< 0.80
Vinyl Chloride (Chloroethene)	1	3.7E-06	< 4.00	3.7E-06	< 4.00	6.0E-06	< 4.00	2.4E-07	< 0.40

Notes

All values are in µg/m^3 unless otherwise noted.

Standards shown are from the Contaminated Sites Regulation (CSR), B.C. Reg. 253/96 with amendments up to 1 November 2017 (B.C. Reg 253/2016). Stage 10 CSR standards applied and updated as of 13 February 2018.

Land Use abbreviations: RL (Agricultural, Urban Park, Residential)

Applied attenuation factors (α) obtained from Table 1 of BC Ministry of Environment Protocol #22 - Application of Vapour Attenuation Factors to Characterize Vapour Contamination (Effective 1 November 2017).

* Compared to vapour standards.

** Raw laboratory data (without attenuation) are shown for reference only and are not compared to the vapour standards.

ppm - parts per million

QA/QC = Quality Assurance / Quality Control; FDA = Field Duplicate Available; FD = Field Duplicate

VPHv = Volatile petroleum hydrocarbons, carbon range 6-13

Table 14
Results of January 2018 Supplementary Investigation
Soil Vapour Analysis
K19 - Trutch Former Townsite
Alaska Highway, BC

Location		K19MW18-08		K19-MW18-09		K19-SV18-14			K19-SV18-17	
Sample Control Number	CSR[1]	04320-01		04320-02		04320-04			04323-01	
Sampling Method	Standards	Summa canister		Summa canister		Summa canister			Summa canister	
Sample Depth (m bgs)	for	2.2-2.35		2.6-2.85		1.2-1.35			3.2-3.35	
Date Sampled	RL	22-Jan-18		22-Jan-18		24-Jan-18			27-Jan-18	
QA/QC										
Field Screening										
Organic Vapour (ppm)		1.1		0.2		0.3			0.1	
Methane (%)		0		0.1		0			0	
Carbon Dioxide (%)		20.8		19.9		21			21.4	
Oxygen (%)		0.8		0		0.7			0.7	
Helium breakthrough (%)		0.6		0.4		0.9			0	
		Outdoor Air Result *	***Raw laboratory data*****	***Outdoor Air Result ****	***Raw laboratory data*****	***Indoor Air Result ****	***Outdoor Air Result ****	***Raw laboratory data*****	***Outdoor Air Result ****	***Raw laboratory data*****
Attenuation Factor Applied (α)		9.2E-07		9.2E-07		2.8E-03	1.50E-06		6.1E-07	
Polycyclic Aromatic Hydrocarbons (PAHs)										
Naphthalene	3	1.8E-06	< 2.0	1.8E-06	< 2.0	5.6E-03	0.0000	< 2.0	1.2E-06	< 2.0
VPH (C6-C10)	1000	4.7E-03	5100	1.1E-03	1200	6.4E+00	0.0035	2300	3.5E-05	57
BTEX										
Benzene	1.5	2.9E-06	3.1	7.5E-07	0.82	1.5E-02	0.0000	5.5	3.1E-07	< 0.50
Toluene	5000	2.4E-06	2.6	7.4E-07	< 0.80	3.9E-02	0.0000	14	4.9E-07	< 0.80
Ethylbenzene	1000	8.3E-07	< 0.9	8.3E-07	< 0.9	7.0E-03	0.0000	2.5	5.5E-07	< 0.9
Styrene	1000	9.2E-07	< 1.0	9.2E-07	< 1.0	2.8E-03	0.0000	< 1.0	6.1E-07	< 1.0
o-Xylene		1.1E-06	1.2	8.3E-07	< 0.9	1.7E-02	0.0000	6.2	5.5E-07	< 0.9
m,p-Xylenes		1.7E-06	1.9	1.4E-06	< 1.5	2.8E-02	0.0000	10	9.2E-07	< 1.5
Xylenes, Total	100	2.9E-06	3.1	1.8E-06	< 2.0	4.5E-02	0.0000	16	1.2E-06	< 2.0
Volatile Organic Compounds (VOCs)										
Bromodichloromethane (BDCM)	40	1.2E-06	< 1.3	1.2E-06	< 1.3	3.6E-03	0.0000	< 1.3	7.9E-07	< 1.3
Bromomethane (Methyl bromide)	5	1.7E-06	< 1.9	1.7E-06	< 1.9	5.3E-03	0.0000	< 1.9	1.2E-06	< 1.9
Bromoform (Tribromomethane)	9	1.8E-06	< 2.0	1.8E-06	< 2.0	5.6E-03	0.0000	< 2.0	1.2E-06	< 2.0
1,3-Butadiene	2	9.2E-07	< 1.0	9.2E-07	< 1.0	2.8E-03	0.0000	< 1.0	6.1E-07	< 1.0
Carbon Tetrachloride	1.5	1.8E-06	< 2.0	1.8E-06	< 2.0	5.6E-03	0.0000	< 2.0	1.2E-06	< 2.0
Chlorobenzene	10	9.2E-07	< 1.0	9.2E-07	< 1.0	2.8E-03	0.0000	< 1.0	6.1E-07	< 1.0
Chloroethane	10000	9.2E-07	< 1.0	9.2E-07	< 1.0	2.8E-03	0.0000	< 1.0	6.1E-07	< 1.0
Chloroform	100	1.3E-05	14	9.2E-07	< 1.0	2.5E-01	0.0001	89	6.1E-07	< 1.0
Chloromethane	90	5.5E-07	< 0.60	5.5E-07	< 0.60	6.7E-03	0.0000	2.4	1.4E-06	2.3
Dichloromethane (DCM) (Methylene Chloride)	600	9.2E-07	< 1.0	9.2E-07	< 1.0	3.1E-03	0.0000	1.1	6.1E-07	< 1.0
Dibromochloromethane (DBCM)	40	1.8E-06	< 2.0	1.8E-06	< 2.0	5.6E-03	0.0000	< 2.0	1.2E-06	< 2.0
1,2-dibromoethane (Ethylene Dibromide) (EDB)	0.5	1.4E-06	< 1.5	1.4E-06	< 1.5	4.2E-03	0.0000	< 1.5	9.2E-07	< 1.5
1,2-dichlorobenzene	200	2.3E-06	< 2.5	2.3E-06	< 2.5	7.0E-03	0.0000	< 2.5	1.5E-06	< 2.5
1,3-dichlorobenzene	60	3.8E-06	4.1	2.4E-06	2.6	7.0E-03	0.0000	< 2.5	1.5E-06	< 2.5
1,4-dichlorobenzene	800	2.3E-06	< 2.5	2.3E-06	< 2.5	7.0E-03	0.0000	< 2.5	1.5E-06	< 2.5
Dichlorodifluoromethane (Freon 12)	100	2.7E-06	2.9	2.7E-06	2.9	1.1E-02	0.0000	4.0	1.9E-06	3.1
1,1-dichloroethane	500	1.1E-06	< 1.2	1.1E-06	< 1.2	3.4E-03	0.0000	< 1.2	7.3E-07	< 1.2
1,2-dichloroethane	7	2.8E-07	< 0.30	2.8E-07	< 0.30	8.4E-04	0.0000	< 0.30	1.8E-07	< 0.30
1,1-dichloroethene	200	9.2E-07	< 1.0	9.2E-07	< 1.0	2.8E-03	0.0000	< 1.0	6.1E-07	< 1.0
1,2-dichloroethylene (Cis) (1,2-dichloroethene)	60	7.4E-07	< 0.80	7.4E-07	< 0.80	2.2E-03	0.0000	< 0.80	4.9E-07	< 0.80
1,2-dichloroethylene (Trans) (1,2-dichloroethene)	60	7.4E-07	< 0.80	7.4E-07	< 0.80	2.2E-03	0.0000	< 0.80	4.9E-07	< 0.80
1,2-dichloropropane (Propylene Dichloride)	4	1.8E-06	< 2.0	1.8E-06	< 2.0	5.6E-03	0.0000	< 2.0	1.2E-06	< 2.0
2,2-Dichloropropane		1.8E-06	< 2.0	1.8E-06	< 2.0	5.6E-03	0.0000	< 2.0	1.2E-06	< 2.0
1,3-dichloropropene (Cis)		9.2E-07	< 1.0	9.2E-07	< 1.0	2.8E-03	0.0000	< 1.0	6.1E-07	< 1.0
1,3-dichloropropene (Trans)		9.2E-07	< 1.0	9.2E-07	< 1.0	2.8E-03	0.0000	< 1.0	6.1E-07	< 1.0
1,2-Dichlorotetrafluoroethane		1.3E-06	< 1.4	1.3E-06	< 1.4	3.9E-03	0.0000	< 1.4	8.5E-07	< 1.4
1,1,2,2-tetrachloroethane	40	1.4E-06	< 1.5	1.4E-06	< 1.5	4.2E-03	0.0000	< 1.5	9.2E-07	< 1.5
Freon 113	30000	1.4E-06	< 1.5	1.4E-06	< 1.5	4.2E-03	0.0000	< 1.5	9.2E-07	< 1.5
2-Hexanone		1.8E-06	< 2.0	1.8E-06	< 2.0	5.6E-03	0.0000	< 2.0	1.2E-06	< 2.0
Isopropylbenzene	400	7.4E-07	< 0.80	7.4E-07	< 0.80	2.2E-03	0.0000	< 0.80	4.9E-07	< 0.80
Methyl Cyclohexane	1500	6.3E-06	6.8	8.3E-06	9.0	5.6E-02	0.0000	20	3.7E-06	6.0
Methyl tert-Butyl Ether (MTBE)	3000	7.4E-07	< 0.80	7.4E-07	< 0.80	2.2E-03	0.0000	< 0.80	4.9E-07	< 0.80
n-Decane	2500	2.9E-05	32	1.4E-06	1.5	9.5E-02	0.0001	34	7.9E-07	< 1.3
n-Hexane	700	4.1E-05	45	2.9E-06	3.1	3.4E-02	0.0000	12	3.1E-06	5.1
4-Methyl-2-pentanone	3000	1.8E-06	< 2.0	1.8E-06	< 2.0	5.6E-03	0.0000	< 2.0	1.2E-06	< 2.0
Tetrachloroethylene (PCE/PERC)	40	1.6E-06	1.7	9.2E-07	< 1.0	2.8E-03	0.0000	< 1.0	6.1E-07	< 1.0
1,2,4-Trimethylbenzene	7	1.5E-06	1.6	1.4E-06	< 1.5	1.3E-02	0.0000	4.5	9.2E-07	< 1.5
1,3,5-Trimethylbenzene	3.5	1.4E-06	< 1.5	1.4E-06	< 1.5	5.3E-03	0.0000	1.9	9.2E-07	< 1.5
1,1,1-trichloroethane	5000	1.5E-06	< 1.6	1.5E-06	< 1.6	4.5E-03	0.0000	< 1.6	9.8E-07	< 1.6
1,1,2-trichloroethane	0.5	1.5E-06	< 1.6	1.5E-06	< 1.6	4.5E-03	0.0000	< 1.6	9.8E-07	< 1.6
Trichloroethylene (TCE)	2	9.2E-07	< 1.0	9.2E-07	< 1.0	2.8E-03	0.0000	< 1.0	6.1E-07	< 1.0
Trichlorofluoromethane (Freon 11)	700	2.1E-06	< 2.3	2.1E-06	< 2.3	6.4E-03	0.0000	< 2.3	1.4E-06	< 2.3
Vinyl Bromide	1	7.4E-07	< 0.80	7.4E-07	< 0.80	2.2E-03	0.0000	< 0.80	4.9E-07	< 0.80
Vinyl Chloride (Chloroethene)	1	3.7E-07	< 0.40	3.7E-07	< 0.40	1.1E-03	0.0000	< 0.40	2.4E-07	< 0.40

Notes

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Land Use abbreviations: RL (Agricultural, Urban Park, Residential)

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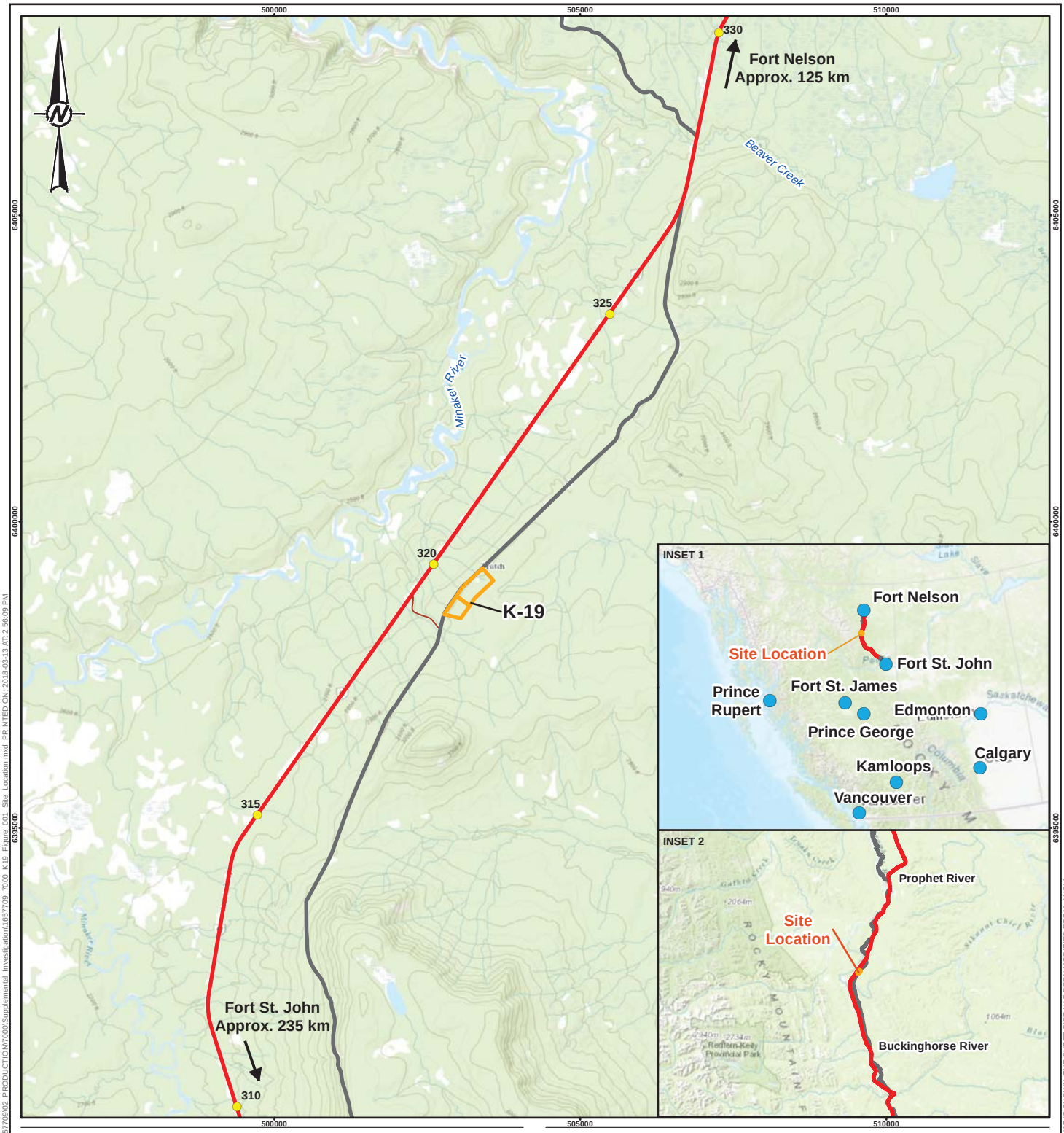
* Compared to vapour standards.

** Raw laboratory data (without attenuation) are shown for reference only and are not compared to the vapour standards.

ppm - parts per million

QA/QC = Quality Assurance / Quality Control; FDA = Field Duplicate Available; FD = Field Duplicate

VPHv = Volatile petroleum hydrocarbons, carbon range 6-13



LEGEND

- COMMUNITY / TOWN / CITY
- KILOMETRE POST
- ALASKA HIGHWAY 2007 SURVEYED ALIGNMENT
- ALASKA HIGHWAY FORMER ALIGNMENT
- SECONDARY ROAD
- SITE LOCATION

0 1.5 3

1:90,000 KILOMETRES

NOTE

KILOMETRE POSTS ARE COUNTED FROM KILOMETRE 0 OF THE ALASKA HIGHWAY IN DAWSON CREEK, BC, APPROXIMATELY 75 KILOMETRES SOUTH OF FORT ST. JOHN.

REFERENCE(S)

1. TOPO MAP OBTAINED FROM ESRI, HERE, DELORME, INTERMAP, GEBCO, USGS, FAO, NPS, NRCAN AND THE GIS USER COMMUNITY.
2. COMMUNITY, TOWN AND CITY LOCATIONS AND NAMES OBTAINED FROM CANVEC AND GEOGRATIS © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
3. KILOMETRE POSTS AND ALASKA HIGHWAY ALIGNMENTS OBTAINED FROM ARCADIS.
4. PROJECTION: UTM ZONE 10N DATUM: WGS84

CLIENT
PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

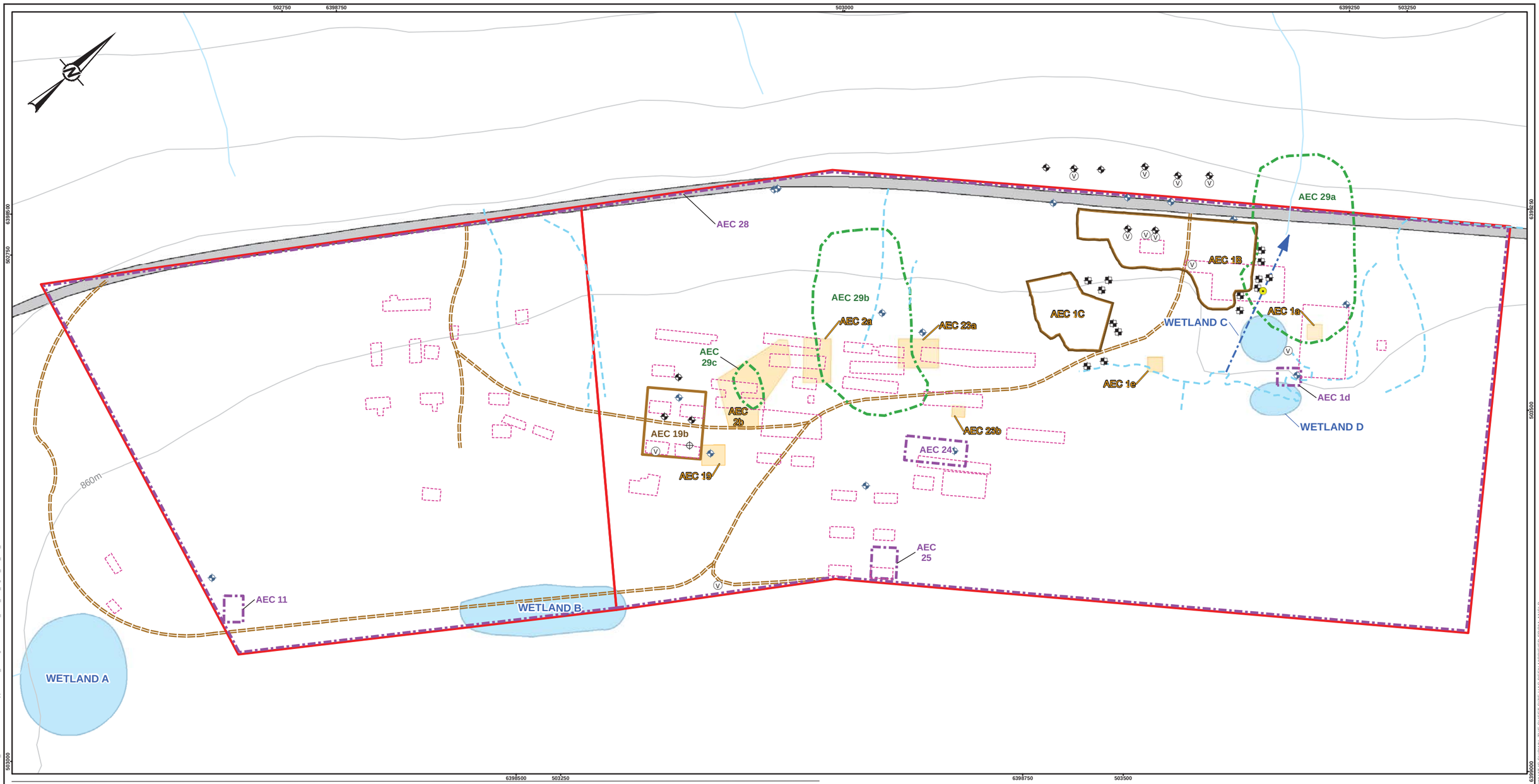
PROJECT
K-19 TRUTCH FORMER TOWNSITE
ALASKA HIGHWAY, B.C.

TITLE
SITE LOCATION

CONSULTANT
Golder Associates

YYYY-MM-DD	2018-03-13
DESIGNED	AGH
PREPARED	RC
REVIEWED	AB
APPROVED	AM

PROJECT NO.	PHASE	REV.	FIGURE
1657709	7000	0	1



LEGEND

2018 SAMPLE LOCATIONS

- 2018 BOREHOLE
- 2018 MONITORING WELL
- 2018 TEST PIT
- 2018 SOIL VAPOUR PROBE
- 2018 CULVERT

PRE-2018 SAMPLE LOCATIONS

- PRE-2018 MONITORING WELL

- CONTOUR (10m)
- SECONDARY ROAD
- INFERRED UNDERGROUND WATERCOURSE
- APPROXIMATE SEASONAL SWALE / DRAINAGE DITCH
- WATERCOURSE
- APPROXIMATE WETLAND
- ALASKA HIGHWAY FORMER ALIGNMENT
- APPROXIMATE LOCATION OF HISTORICAL BUILDINGS
- SITE LOCATION

- AEC BOUNDARY BASED ON METALS CONTAMINATION
- AEC BOUNDARY BASED ON SODIUM AND/OR CHLORIDE CONTAMINATION
- PRELIMINARY AEC BOUNDARY BASED ON ESTIMATED PETROLEUM HYDROCARBON CONTAMINATION (DELINEATION REQUIRED)
- AEC BOUNDARY BASED ON ESTIMATED EXTENT OF PETROLEUM HYDROCARBON CONTAMINATION
- AREA OF REMEDIAL EXCAVATION (2017)

REFERENCE(S)

1. CONTOURS OBTAINED FROM ARCADIS.
2. APPROXIMATE WETLAND AND APPROXIMATE SWALE/DRAINAGE DITCH OBTAINED FROM GOLDER ASSOCIATES LTD..
3. ALASKA HIGHWAY FORMER ALIGNMENT AND SECONDARY ROADS OBTAINED BY ARCADIS, PORTIONS DERIVED BY VECTOR GEOMATICS, FEBRUARY 7TH AND 8TH, 2017.
4. WATERCOURSES OBTAINED BY B.C. MINISTRY OF FORESTS, LAND AND NATURAL RESOURCE OPERATIONS.
5. PROJECTION: UTM ZONE 10N DATUM: WGS84

0 50 100

1:2,500 METRES

CLIENT
PUBLIC SERVICES AND PROCUREMENT CANADA

CONSULTANT
Golder Associates

YYYY-MM-DD	2018-03-26
DESIGNED	AGH
PREPARED	RC
REVIEWED	AB
APPROVED	AM

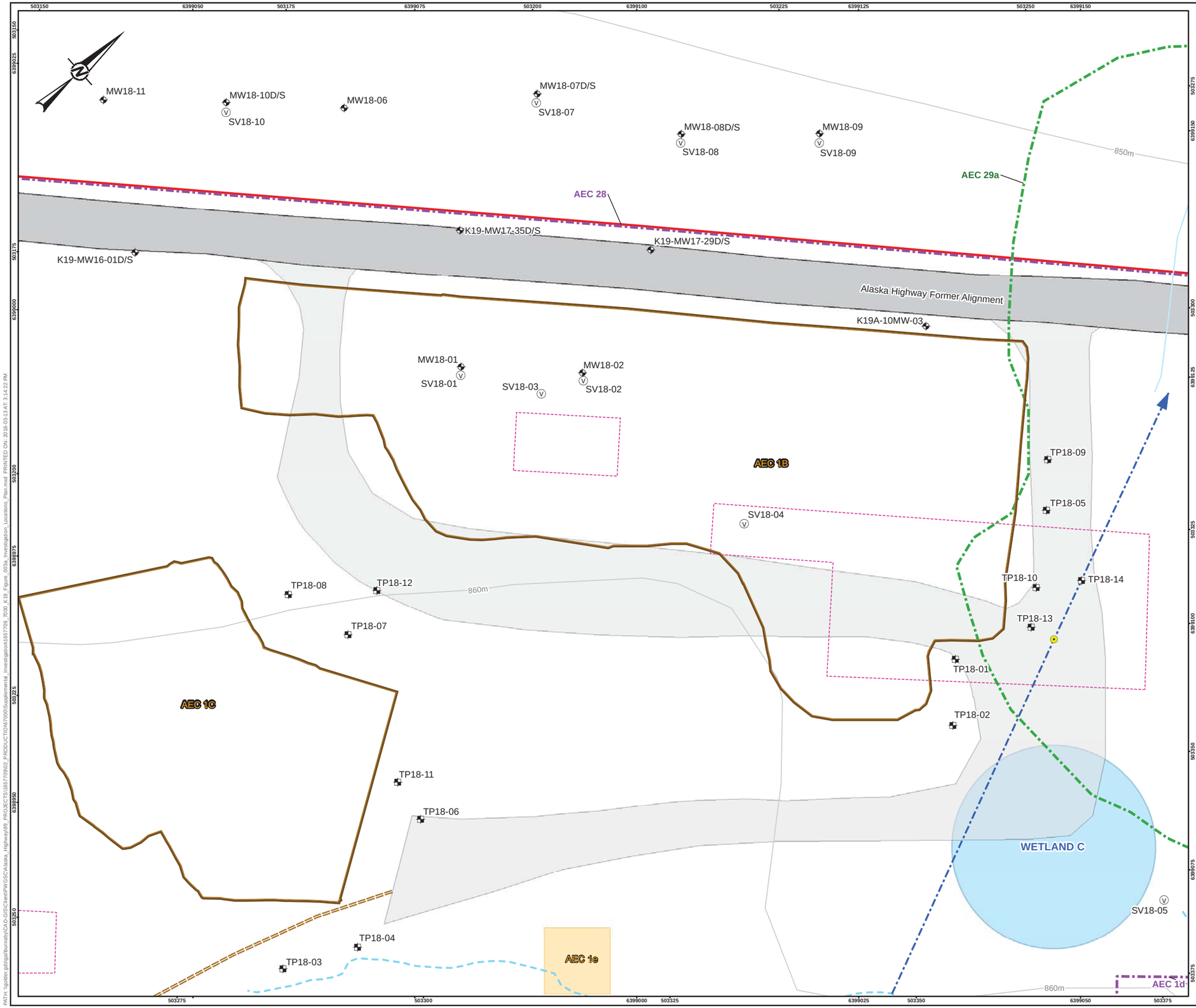
PROJECT
K-19 TRUTCH FORMER TOWNSITE
ALASKA HIGHWAY, B.C.

TITLE
SITE PLAN

PROJECT NO.	PHASE	REV.	FIGURE
1657709	7000	0	2

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

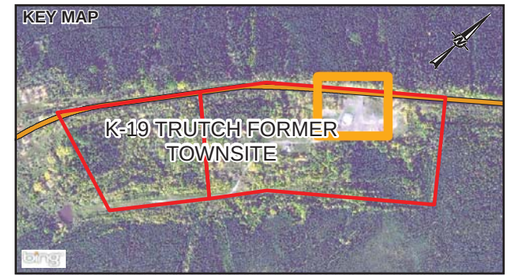
PATH: \\golder.gds\gal\burnaby\CAD-GIS\Client\PWGSC\Alaska_Highway\99_PROJECTS\1657709\02_PRODUCTION\7000\Supplemental_Investigation\1657709_7000_K19_Figure_002_Site_Plan.mxd PRINTED ON: 2018-03-26 AT 10:53:27 AM



LEGEND

2018 SAMPLE LOCATIONS

- MONITORING WELL
- TEST PIT
- SOIL VAPOUR PROBE
- CULVERT
- CONTOUR (10M)
- SECONDARY ROAD
- INFERRED UNDERGROUND WATERCOURSE
- APPROXIMATE SEASONAL SWALE / DRAINAGE DITCH
- WATERCOURSE
- APPROXIMATE WETLAND
- ALASKA HIGHWAY FORMER ALIGNMENT
- APPROXIMATE LOCATION OF HISTORICAL BUILDINGS
- AEC BOUNDARY BASED ON METALS CONTAMINATION
- AEC BOUNDARY BASED ON SODIUM AND/OR CHLORIDE CONTAMINATION
- SITE LOCATION
- AEC BOUNDARY BASED ON ESTIMATED EXTENT OF PETROLEUM HYDROCARBON CONTAMINATION
- HAUL ROAD
- AREA OF REMEDIAL EXCAVATION (2017)



0 10 20

1:575 METRES

NOTES

ONLY 2018 INVESTIGATION LOCATIONS SHOWN.

REFERENCES

1. CONTOURS OBTAINED FROM ARCADIS.
2. SURFACE SAMPLES OBTAINED FROM ARCADIS AND GOLDER ASSOCIATES LTD.
3. DW WELL, CULVERT, APPROXIMATE WETLAND AND APPROXIMATE SWALE/DRAINAGE DITCH OBTAINED FROM GOLDER ASSOCIATES LTD.
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5. TEST PITS AND MONITORING WELLS OBTAINED FROM ARCADIS, VECTOR GEOMATICS, AND GOLDER ASSOCIATES LTD.
6. ALASKA HIGHWAY FORMER ALIGNMENT AND SECONDARY ROADS OBTAINED BY ARCADIS, PORTIONS DERIVED BY VECTOR GEOMATICS, FEBRUARY 7TH AND 8TH, 2017.
7. WATERCOURSES OBTAINED BY B.C. MINISTRY OF FORESTS, LAND AND NATURAL RESOURCE OPERATIONS.
8. PROJECTION: UTM ZONE 10N DATUM: WGS84

CLIENT

PUBLIC SERVICES AND PROCUREMENT CANADA

PROJECT

K-19 TRUTCH FORMER TOWNSITE
ALASKA HIGHWAY, B.C.

TITLE

2018 SAMPLING LOCATION PLAN - AEC 1B AND AEC 1C

CONSULTANT

Golder Associates

YYYY-MM-DD	2018-03-13
DESIGNED	AGH
PREPARED	RC
REVIEWED	AB
APPROVED	AM

PROJECT NO.	PHASE	REV.	FIGURE
1657709	7000	0	3A

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

0 25mm

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MW18-11
MW18-10D/S
SV18-10
MW18-06
MW18-07D/S
SV18-07
MW18-08D/S
SV18-08
MW18-09
SV18-09
850m
AEC 29a
AEC 28
K19-MW17-35D/S
K19-MW17-29D/S
K19-MW16-01D/S
Alaska Highway Former Alignment
K19A-10MW-03
MW18-01
SV18-01
SV18-03
MW18-02
SV18-02
AEC 1B
TP18-09
TP18-05
SV18-04
TP18-08
TP18-12
860m
TP18-10
TP18-14
TP18-07
TP18-13
TP18-01
TP18-02
AEC 1C
TP18-11
TP18-06
WETLAND C
SV18-05
TP18-04
TP18-03
AEC 1e
860m
AEC 1d

LEGEND

2018 SAMPLE LOCATIONS

- MONITORING WELL
- TEST PIT
- SOIL VAPOUR PROBE
- CULVERT
- CONTOUR (10M)
- SECONDARY ROAD
- INFERRED UNDERGROUND WATERCOURSE
- APPROXIMATE SEASONAL SWALE / DRAINAGE DITCH
- WATERCOURSE
- APPROXIMATE WETLAND
- ALASKA HIGHWAY FORMER ALIGNMENT
- APPROXIMATE LOCATION OF HISTORICAL BUILDINGS
- AEC BOUNDARY BASED ON METALS CONTAMINATION
- AEC BOUNDARY BASED ON SODIUM AND/OR CHLORIDE CONTAMINATION
- SITE LOCATION
- AEC BOUNDARY BASED ON ESTIMATED EXTENT OF PETROLEUM HYDROCARBON CONTAMINATION
- HAUL ROAD
- AREA OF REMEDIAL EXCAVATION (2017)

KEY MAP

0 10 20

1:575 METRES

DRAFT

NOTES

ONLY 2018 INVESTIGATION LOCATIONS SHOWN.

REFERENCES

1. CONTOURS OBTAINED FROM ARCADIS.
2. SURFACE SAMPLES OBTAINED FROM ARCADIS AND GOLDER ASSOCIATES LTD.
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7. WATERCOURSES OBTAINED BY B.C. MINISTRY OF FORESTS, LAND AND NATURAL RESOURCE OPERATIONS.
8. PROJECTION: UTM ZONE 10N DATUM: WGS84

CLIENT

PUBLIC SERVICES AND PROCUREMENT CANADA

PROJECT

K-19 TRUTCH FORMER TOWNSITE
ALASKA HIGHWAY, B.C.

TITLE

2018 SAMPLING LOCATION PLAN - AEC 1B AND AEC 1C

CONSULTANT

Golder Associates

YYYY-MM-DD	2018-03-05
DESIGNED	AGH
PREPARED	RC
REVIEWED	
APPROVED	

PROJECT NO.	PHASE	REV.	FIGURE
1657709	7000	A	3A

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

0 25mm

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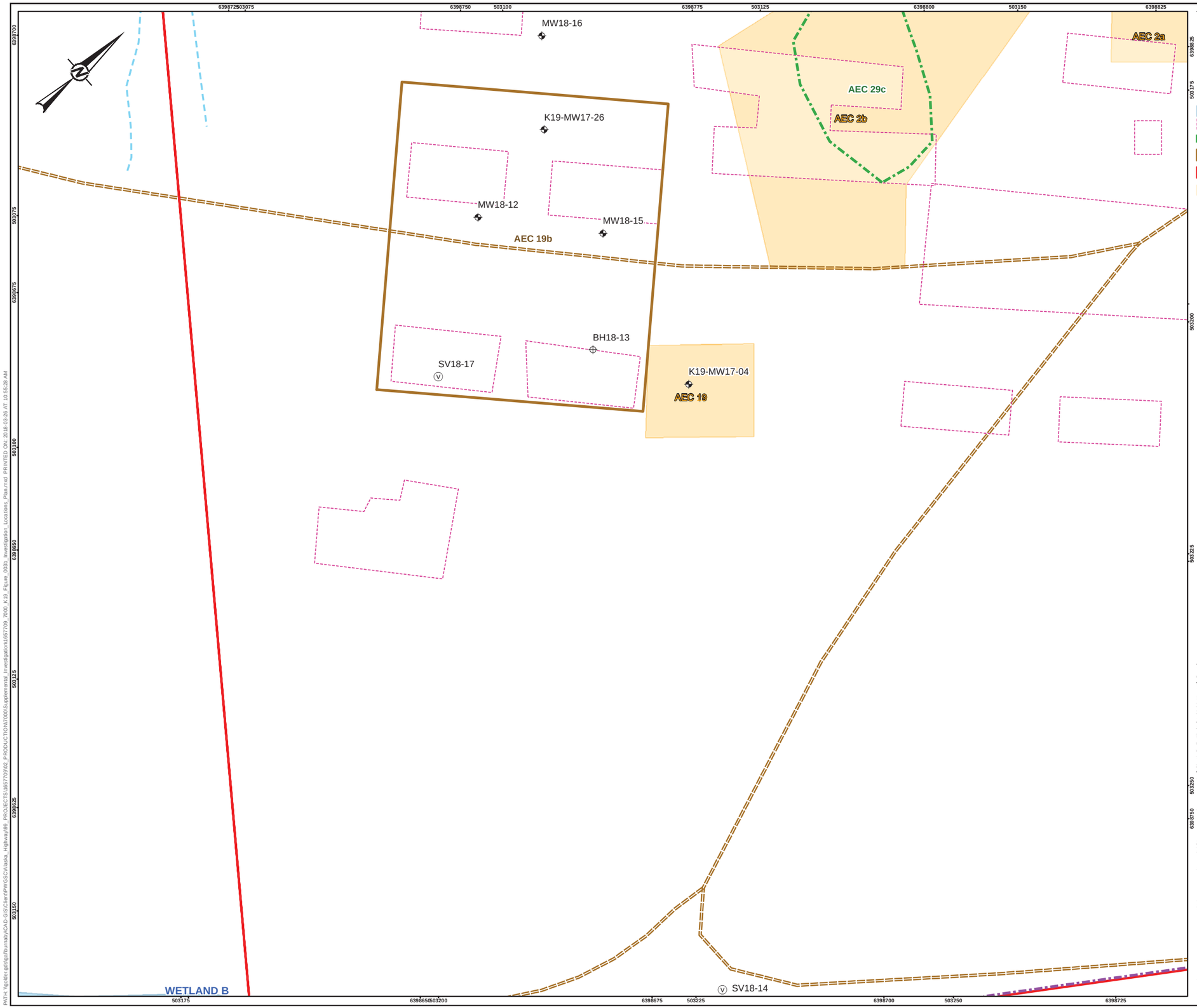
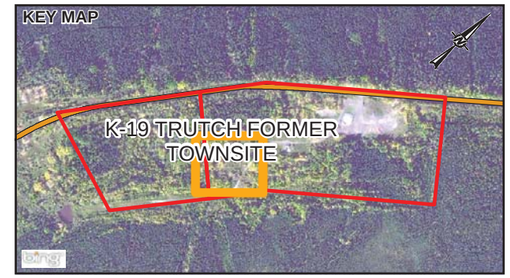


LEGEND

2018 SAMPLE LOCATIONS

- BOREHOLE
- MONITORING WELL
- SOIL VAPOUR PROBE
- SECONDARY ROAD
- APPROXIMATE SEASONAL SWALE / DRAINAGE DITCH
- APPROXIMATE WETLAND
- APPROXIMATE LOCATION OF HISTORICAL BUILDINGS
- AEC BOUNDARY BASED ON SODIUM AND/OR CHLORIDE CONTAMINATION
- Preliminary AEC boundary based on estimated petroleum hydrocarbon contamination (delineation required)
- SITE LOCATION
- AEC BOUNDARY BASED ON ESTIMATED EXTENT OF PETROLEUM HYDROCARBON CONTAMINATION



0 10 20

1:550 METRES

NOTES

ONLY 2018 INVESTIGATION LOCATIONS SHOWN.

REFERENCES

1. CONTOURS OBTAINED FROM ARCADIS.
2. SURFACE SAMPLES OBTAINED FROM ARCADIS AND GOLDER ASSOCIATES LTD.
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7. WATERCOURSES OBTAINED BY B.C. MINISTRY OF FORESTS, LAND AND NATURAL RESOURCE OPERATIONS.
8. PROJECTION: UTM ZONE 10N DATUM: WGS84

CLIENT

PUBLIC SERVICES AND PROCUREMENT CANADA

PROJECT

K-19 TRUTCH FORMER TOWNSITE
ALASKA HIGHWAY, B.C.

TITLE

2018 SAMPLING LOCATION PLAN - AEC 19B

CONSULTANT

Golder Associates

YYYY-MM-DD	2018-03-26
DESIGNED	AGH
PREPARED	RC
REVIEWED	AB
APPROVED	AM

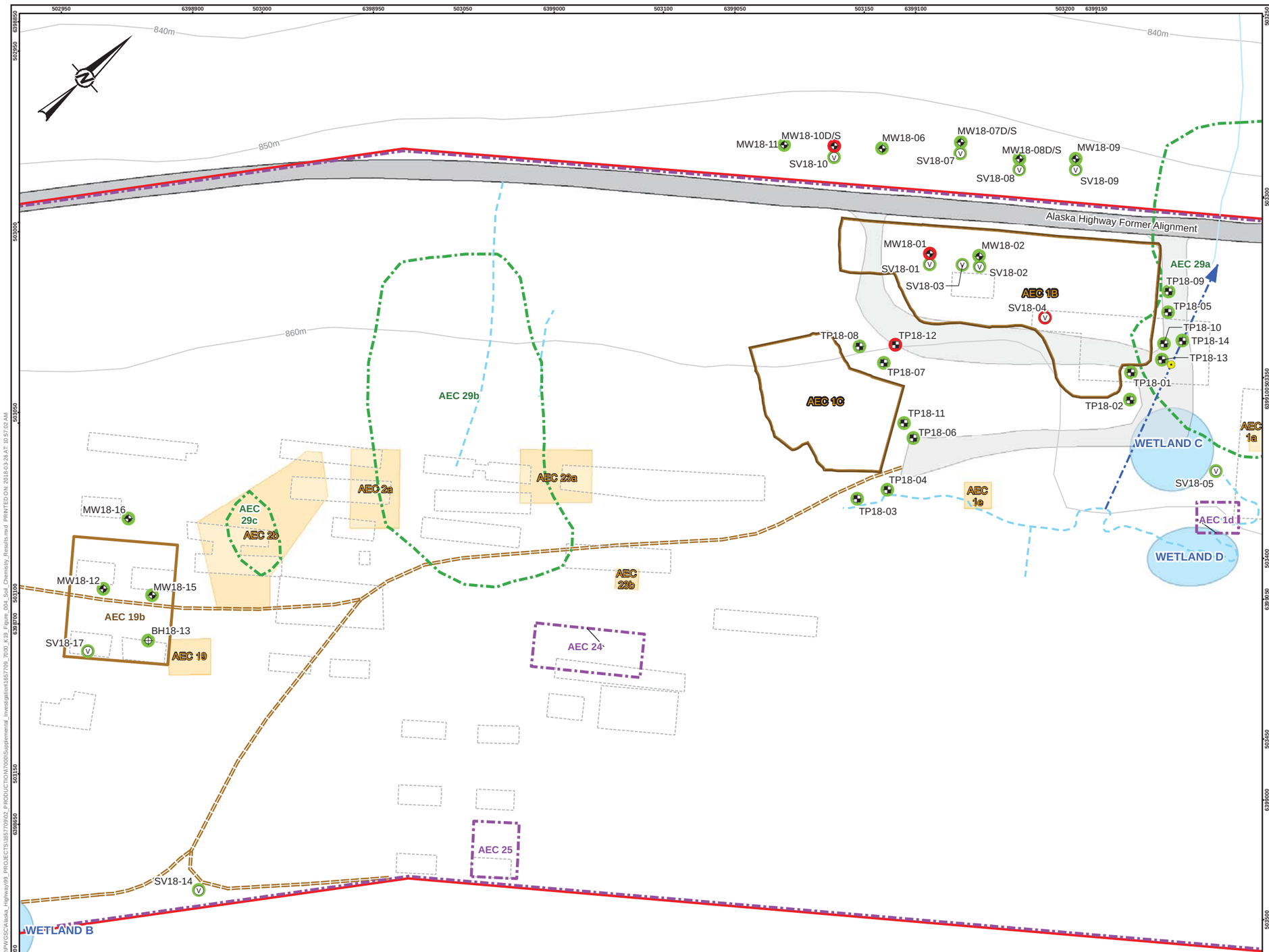
PROJECT NO.	PHASE	REV.	FIGURE
1657709	7000	0	3B

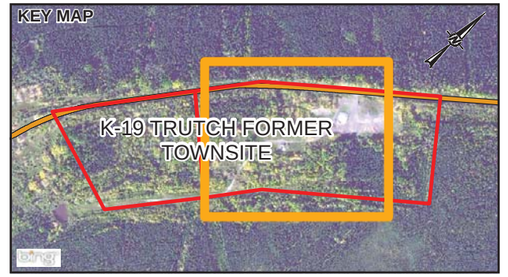
IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

25mm

0

PATH: \\golder.gds\gal\burnaby\CAD-GIS\Client\PWGSC\Alaska_Highway\99_PROJECTS\1657709\02_PRODUCTION\7000\Supplemental_Investigation\1657709_7000_K19_Figure_003b_Investigation_Locations_Plan.mxd PRINTED ON: 2018-03-26 AT: 10:55:28 AM





0 25 50
1:1,500 METRES

LEGEND

- BOREHOLE
- MONITORING WELL
- TEST PIT
- SOIL VAPOUR PROBE
- CULVERT
- CONTOUR (10M)
- SECONDARY ROAD
- INFERRED UNDERGROUND WATERCOURSE
- APPROXIMATE SEASONAL SWALE / DRAINAGE DITCH
- WATERCOURSE
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- SITE LOCATION
- AEC BOUNDARY BASED ON ESTIMATED EXTENT OF PETROLEUM HYDROCARBON CONTAMINATION
- HAUL ROAD
- AREA OF REMEDIAL EXCAVATION 2017

SOIL CHEMISTRY RESULTS

- ONE OR MORE SAMPLES IN THIS LOCATION CONTAIN CONCENTRATIONS EXCEEDING THE APPLICABLE CSR STANDARDS
- ONE OR MORE SAMPLES IN THIS LOCATION CONTAIN CONCENTRATIONS BELOW THE APPLICABLE CSR STANDARDS

Parameter	CSR WL_R Standard*	CSR IL Standard*
Benzene	**0.035**	0.035
Arsenic	**10**	10

K19-MW18-01	
Depth/Analyte	Arsenic
0.3 - 0.5	**10.9**
5.5 - 5.8	**12.1**

K19-MW18-10	
Depth/Analyte	Benzene
5.5 - 6.0	**0.17**

K19-SV18-04	
Depth/Analyte	Arsenic
3.8 - 4.1	**11.7**

K19-TP18-12	
Depth/Analyte	Benzene
3.0 - 3.0	**0.04**

NOTES
ONLY 2018 INVESTIGATION LOCATIONS SHOWN.
*CONCENTRATIONS IN MG/KG

REFERENCES

1. CONTOURS OBTAINED FROM ARCADIS.
2. SURFACE SAMPLES OBTAINED FROM ARCADIS AND GOLDER ASSOCIATES LTD.
3. DW WELL, CULVERT, APPROXIMATE WETLAND AND APPROXIMATE SWALE/DRAINAGE DITCH OBTAINED FROM GOLDER ASSOCIATES LTD.
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7. WATERCOURSES OBTAINED BY B.C. MINISTRY OF FORESTS, LAND AND NATURAL RESOURCE OPERATIONS.
8. PROJECTION: UTM ZONE 10N DATUM: WGS84

CLIENT
PUBLIC SERVICES AND PROCUREMENT CANADA

PROJECT
K-19 TRUTCH FORMER TOWNSITE
ALASKA HIGHWAY, B.C.

TITLE
SOIL CHEMISTRY RESULTS

CONSULTANT
Golder Associates

YYYY-MM-DD	2018-03-26
DESIGNED	AGH
PREPARED	RC
REVIEWED	AB
APPROVED	AM

PROJECT NO.	PHASE	REV.	FIGURE
1657709	7000	0	4

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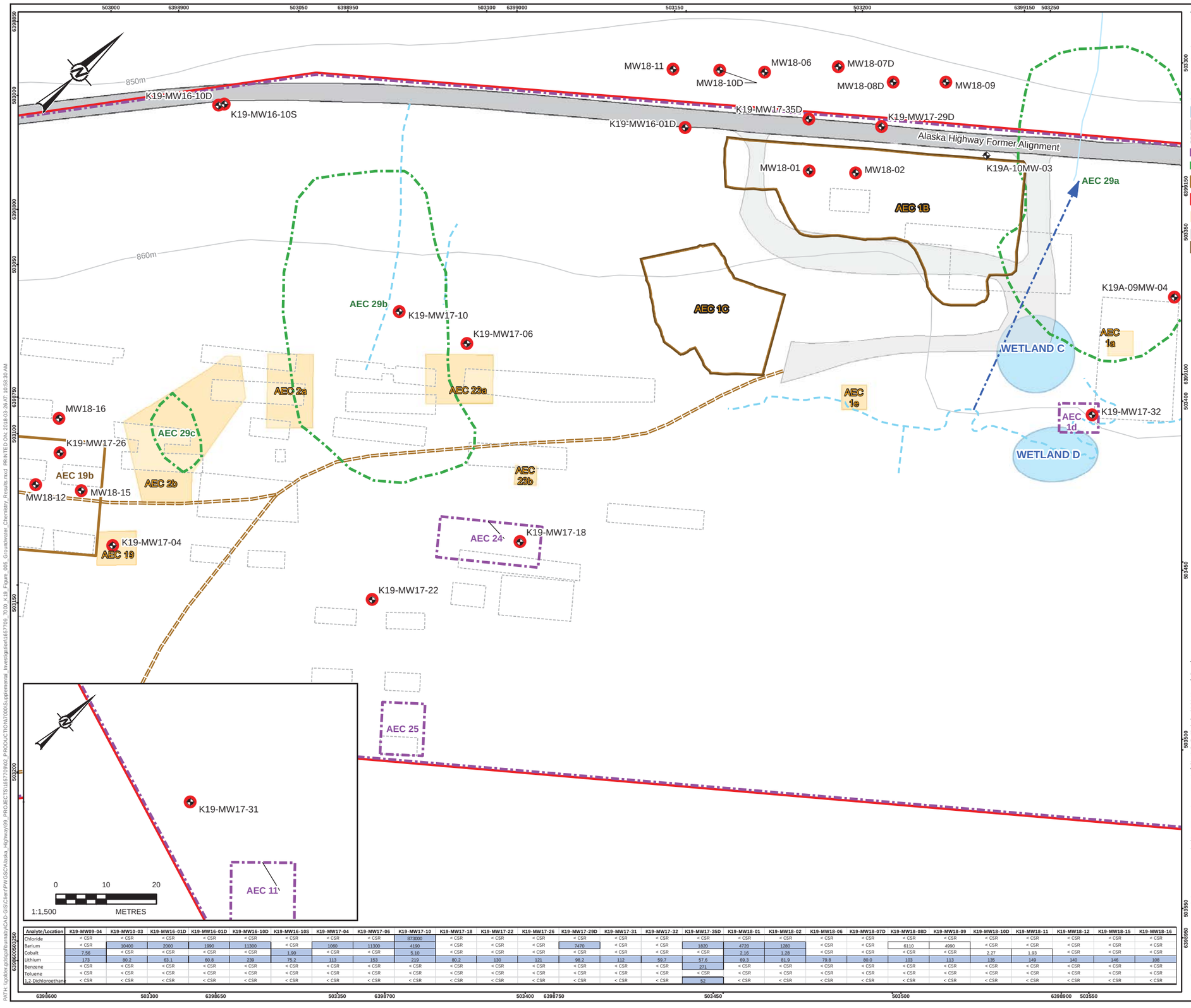

LEGEND

- MONITORING WELL
- CONTOUR (10M)
- SECONDARY ROAD
- INFERRED UNDERGROUND WATERCOURSE
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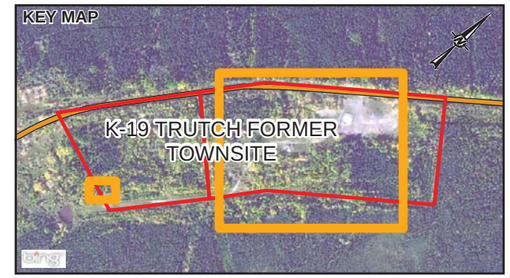
- HAUL ROAD
- AREA OF REMEDIAL EXCAVATION

GROUNDWATER CHEMISTRY RESULTS

- ONE OR MORE SAMPLES IN THIS LOCATION CONTAIN CONCENTRATIONS EXCEEDING THE APPLICABLE CSR STANDARDS

KEY MAP



Analyte/Location	K19-MW09-04	K19-MW10-03	K19-MW16-01D	K19-MW16-01D	K19-MW16-10D	K19-MW16-10S	K19-MW17-04	K19-MW17-06	K19-MW17-10	K19-MW17-18	K19-MW17-22	K19-MW17-26	K19-MW17-29D	K19-MW17-31	K19-MW17-32	K19-MW17-35D	K19-MW18-01	K19-MW18-02	K19-MW18-06	K19-MW18-07D	K19-MW18-08D	K19-MW18-09	K19-MW18-10D	K19-MW18-11	K19-MW18-12	K19-MW18-15	K19-MW18-16
Chloride	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	873000	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR		< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR
Barium	< CSR	10400	2000	1990	11300	< CSR	1060	11300	4100	< CSR	< CSR	< CSR	7470	< CSR	< CSR	1820	4720	1280	< CSR	< CSR	6110	4990	< CSR	< CSR	< CSR	< CSR	< CSR
Cobalt	7.56	< CSR	< CSR	< CSR	< CSR	1.90	< CSR	< CSR	5.10	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	2.16	1.28	< CSR	< CSR	< CSR	< CSR	2.27	1.93	< CSR	< CSR	< CSR
Lithium	173	80.2	63.1	60.8	239	75.2	113	153	219	80.2	130	121	98.2	112	59.7	57.6	69.3	81.9	79.8	80.0	103	113	135	149	140	146	108
Benzene	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	271	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR
Toluene	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR
1,2-Dichloroethane	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	52	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR

NOTES

ONLY MONITORING WELLS SAMPLED IN JANUARY 2018 ARE SHOWN.

REFERENCES

1. CONTOURS OBTAINED FROM ARCADIS.
2. SURFACE SAMPLES OBTAINED FROM ARCADIS AND GOLDER ASSOCIATES LTD.
3. DW WELL, CULVERT, APPROXIMATE WETLAND AND APPROXIMATE SWALE/DRAINAGE DITCH OBTAINED FROM GOLDER ASSOCIATES LTD.
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8. PROJECTION: UTM ZONE 10N DATUM: WGS84

CLIENT

PUBLIC SERVICES AND PROCUREMENT CANADA

PROJECT

K-19 TRUTCH FORMER TOWNSITE
ALASKA HIGHWAY, B.C.

TITLE

GROUNDWATER CHEMISTRY RESULTS

CONSULTANT

Golder Associates

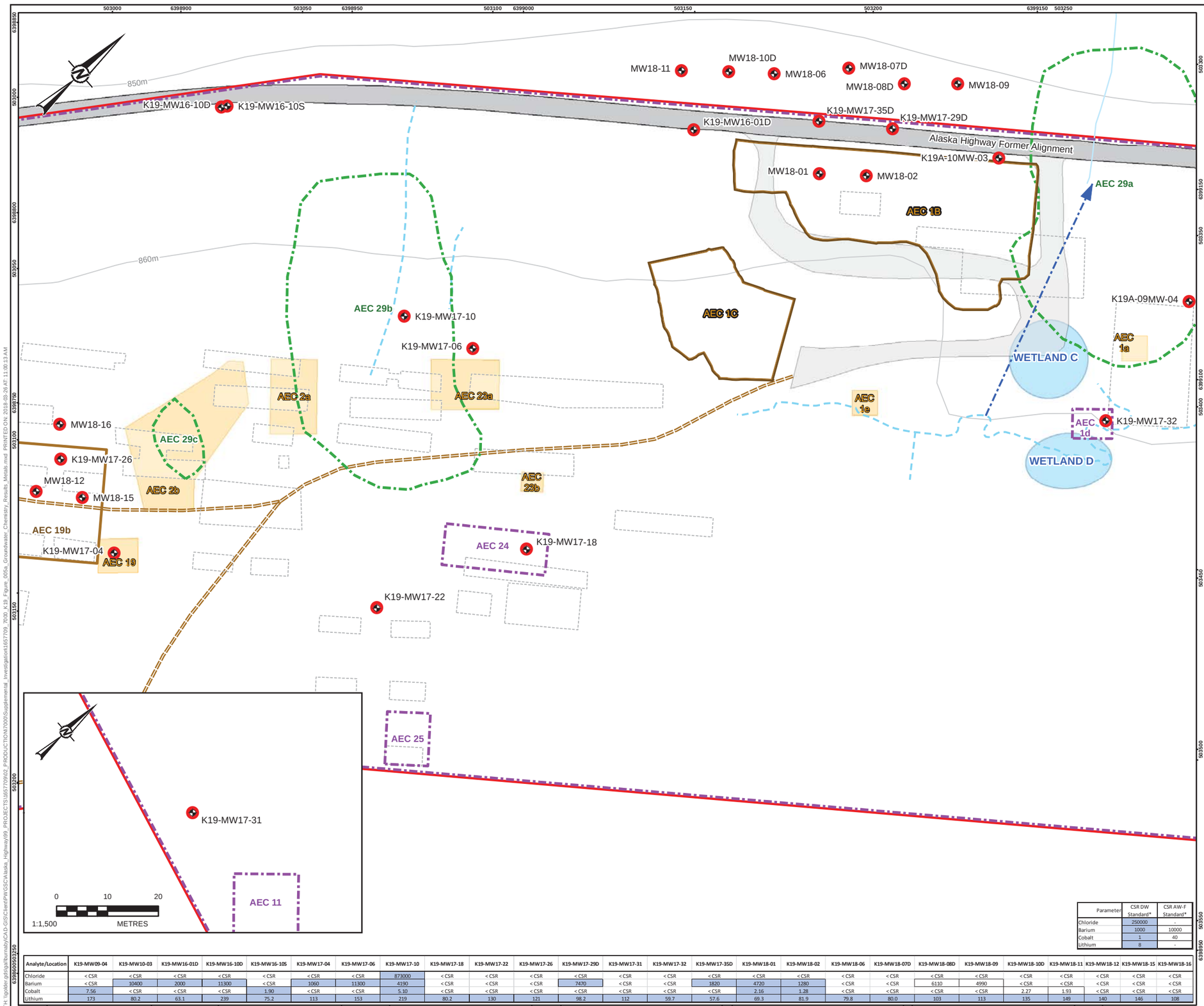
YYYY-MM-DD	2018-03-26
DESIGNED	AGH
PREPARED	RC
REVIEWED	AB
APPROVED	AM

PROJECT NO.	PHASE	REV.	FIGURE
1657709	7000	0	5

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

0 25mm

PATH: \\golder.gds\gal\burnaby\CAD-GIS\Client\PWGSC\Alaska_Highway\99_PROJECTS\1657709\02_PRODUCTION\7000\Supplemental_Investigation\1657709_7000_K19_Figure_005_Groundwater_Chemistry_Results.mxd PRINTED ON: 2018-03-26 AT 10:58:30 AM



LEGEND

- MONITORING WELL
- CONTOUR (10M)
- SECONDARY ROAD
- INFERRED UNDERGROUND WATERCOURSE
- APPROXIMATE SEASONAL SWALE / DRAINAGE DITCH
- WATERCOURSE
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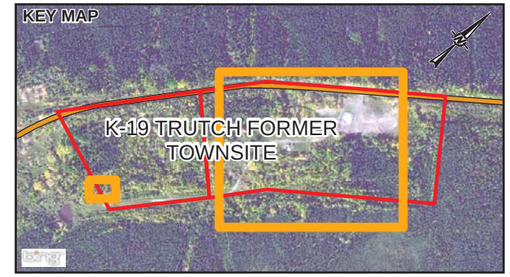
- SITE LOCATION
- AEC BOUNDARY BASED ON ESTIMATED EXTENT OF PETROLEUM HYDROCARBON CONTAMINATION
- HAUL ROAD
- AREA OF REMEDIAL EXCAVATION (2017)

GROUNDWATER Chemistry Results - ANIONS AND DISSOLVED METALS

- ONE OR MORE SAMPLES IN THIS LOCATION CONTAIN CONCENTRATIONS EXCEEDING THE APPLICABLE CSR STANDARDS
- ONE OR MORE SAMPLES IN THIS LOCATION CONTAIN CONCENTRATIONS BELOW THE APPLICABLE CSR STANDARDS

KEY MAP



Parameter	CSR DW Standard*	CSR AW-F Standard*
Chloride	250000	-
Barium	1000	10000
Cobalt	1	40
Lithium	8	-

Analyte/Location	K19-MW09-04	K19-MW10-03	K19-MW16-01D	K19-MW16-10D	K19-MW16-10S	K19-MW17-04	K19-MW17-06	K19-MW17-10	K19-MW17-18	K19-MW17-22	K19-MW17-26	K19-MW17-29D	K19-MW17-31	K19-MW17-32	K19-MW17-35D	K19-MW18-01	K19-MW18-02	K19-MW18-06	K19-MW18-07D	K19-MW18-08D	K19-MW18-09	K19-MW18-10D	K19-MW18-11	K19-MW18-12	K19-MW18-15	K19-MW18-16
Chloride	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	873000	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR
Barium	< CSR	10400	2000	11300	< CSR	1060	11300	4190	< CSR	< CSR	< CSR	7470	< CSR	< CSR	1820	4720	1280	< CSR	< CSR	6110	4990	< CSR	< CSR	< CSR	< CSR	< CSR
Cobalt	7.56	< CSR	< CSR	< CSR	1.90	< CSR	< CSR	5.10	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	< CSR	2.16	1.28	< CSR	< CSR	< CSR	< CSR	2.27	1.93	< CSR	< CSR	< CSR
Lithium	173	80.2	63.1	239	75.2	113	153	219	80.2	130	121	98.2	112	59.7	57.6	69.3	81.9	79.8	80.0	103	113	135	149	140	146	108

NOTES

ONLY MONITORING WELLS SAMPLED IN JANUARY 2018 ARE SHOWN.
*CONCENTRATIONS IN UG/L

REFERENCES

1. CONTOURS OBTAINED FROM ARCADIS.
2. SURFACE SAMPLES OBTAINED FROM ARCADIS AND GOLDER ASSOCIATES LTD.
3. DW WELL, CULVERT, APPROXIMATE WETLAND AND APPROXIMATE SWALE/DRAINAGE DITCH OBTAINED FROM GOLDER ASSOCIATES LTD.
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7. WATERCOURSES OBTAINED BY B.C. MINISTRY OF FORESTS, LAND AND NATURAL RESOURCE OPERATIONS.
8. PROJECTION: UTM ZONE 10N DATUM: WGS84

CLIENT

PUBLIC SERVICES AND PROCUREMENT CANADA

PROJECT

K-19 TRUTCH FORMER TOWNSITE
ALASKA HIGHWAY, B.C.

TITLE

GROUNDWATER CHEMISTRY RESULTS - ANIONS AND DISSOLVED METALS

CONSULTANT

Golder Associates

YYYY-MM-DD	2018-03-26
DESIGNED	AGH
PREPARED	RC
REVIEWED	AB
APPROVED	AM

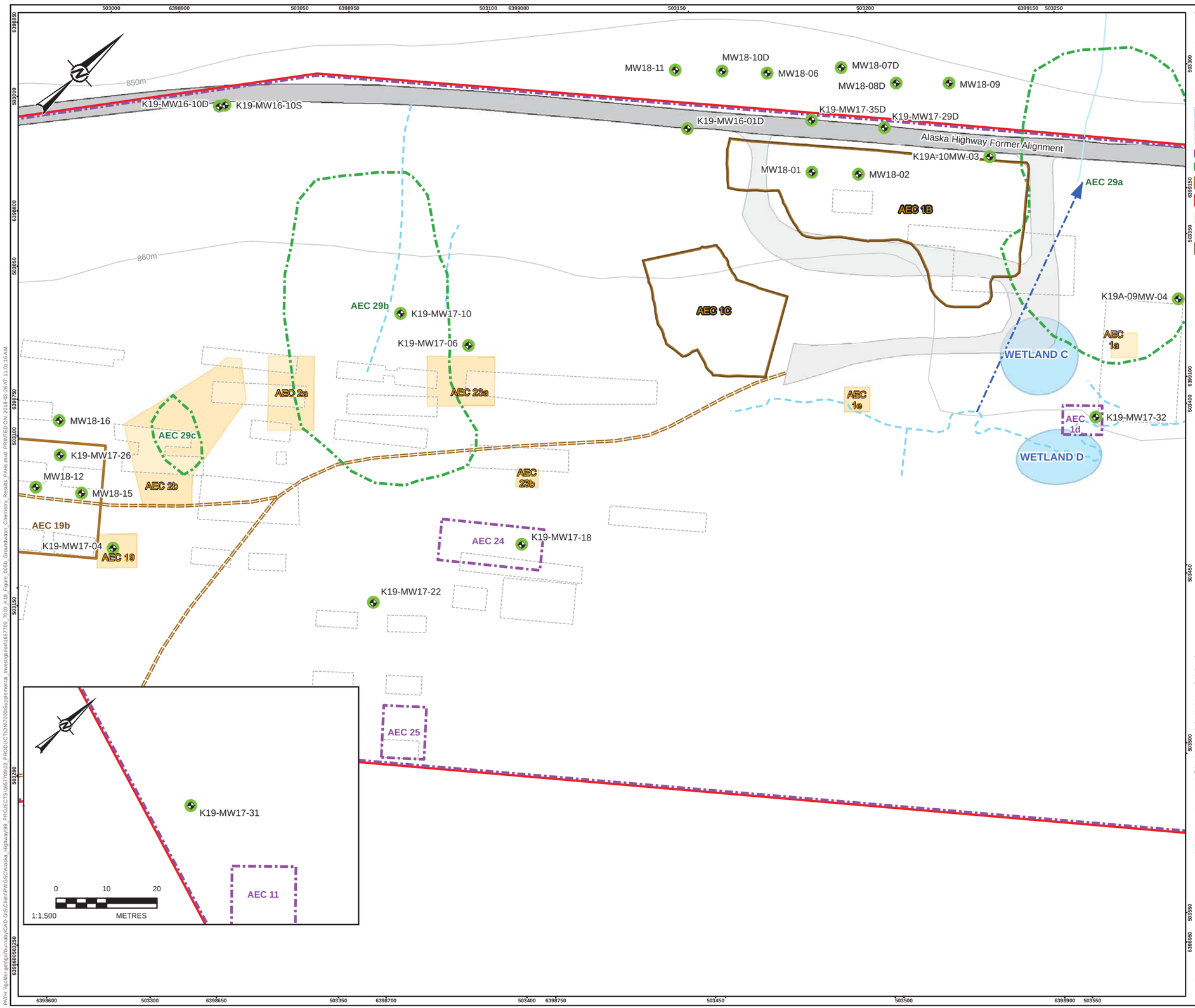
PROJECT NO.	PHASE	REV.	FIGURE
1657709	7000	0	5A

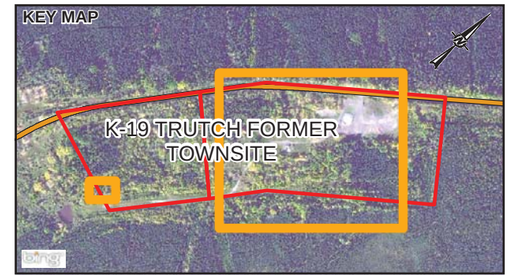
IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

25mm

0

PATH: \\golder.gds\gal\burnaby\CAD-GIS\Client\PWGSC\Alaska_Highway\99_PROJECTS\1657709\02_PRODUCTION\7000\Supplemental_Investigation\1657709_7000_K19_Figure_005a_Groundwater_Chemistry_Results_Metals.mxd PRINTED ON: 2018-03-26 AT: 11:00:13 AM





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NOTES
ONLY MONITORING WELLS SAMPLED IN JANUARY 2018 ARE SHOWN.
*CONCENTRATIONS IN UG/L

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7. WATERCOURSES OBTAINED BY B.C. MINISTRY OF FORESTS, LAND AND NATURAL RESOURCE OPERATIONS.
8. PROJECTION: UTM ZONE 10N DATUM: WGS84

CLIENT
PUBLIC SERVICES AND PROCUREMENT CANADA

PROJECT
K-19 TRUTCH FORMER TOWNSITE
ALASKA HIGHWAY, B.C.

TITLE
GROUNDWATER CHEMISTRY RESULTS - PAHS

CONSULTANT
Golder Associates

YYYY-MM-DD	2018-03-26
DESIGNED	AGH
PREPARED	RC
REVIEWED	AB
APPROVED	AM

PROJECT NO.	PHASE	REV.	FIGURE
1657709	7000	0	5B

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

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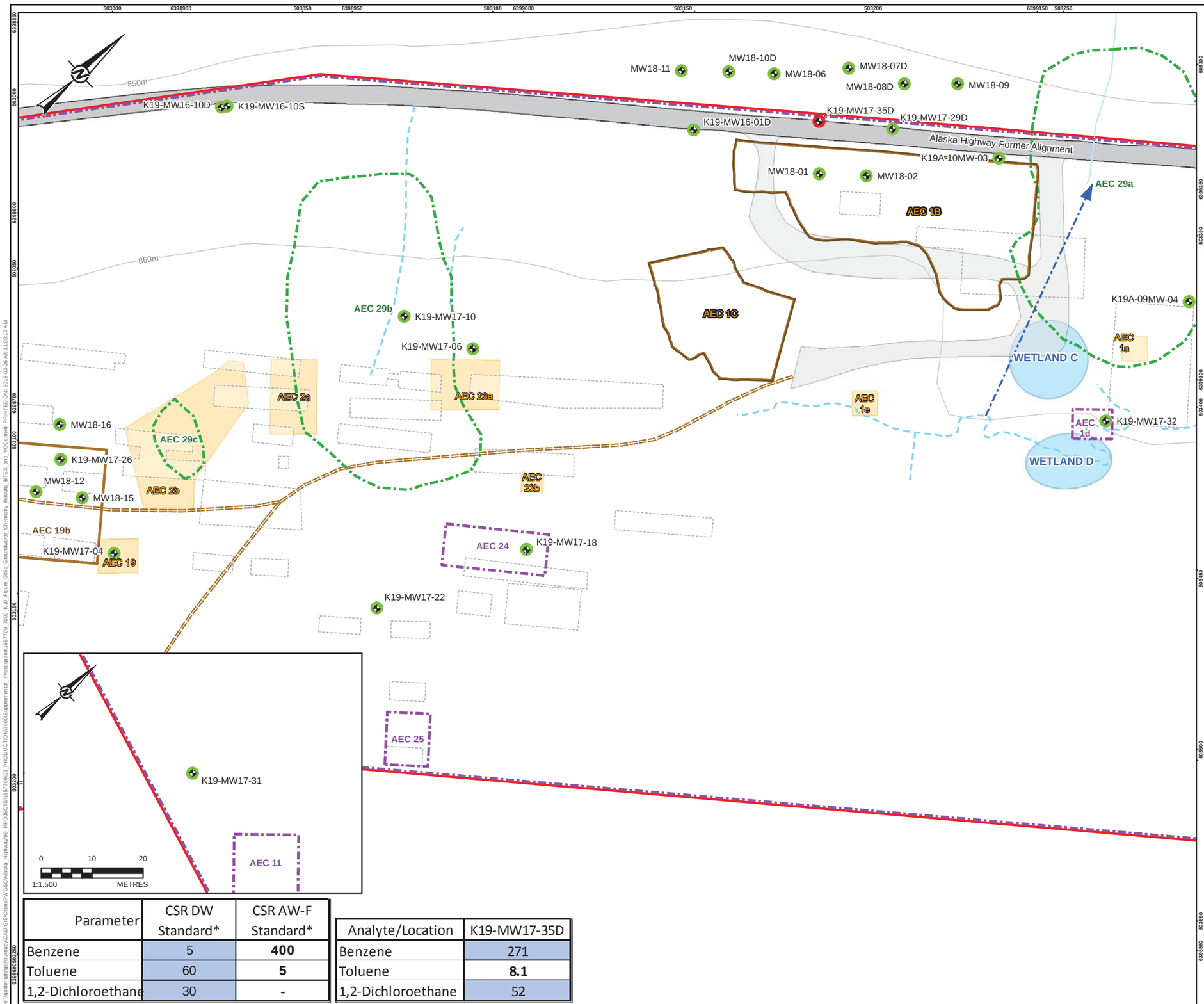

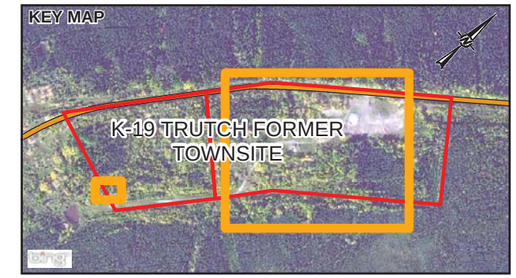

0 25 50
1:1,500 METRES

Parameter	CSR DW Standard*	CSR AW-F Standard*
Benzene	5	**400**
Toluene	60	**5**
1,2-Dichloroethane	30	-

Analyte/Location	K19-MW17-35D
Benzene	271
Toluene	**8.1**
1,2-Dichloroethane	52

LEGEND

- MONITORING WELL
- CONTOUR (10M)
- SECONDARY ROAD
- INFERRED UNDERGROUND WATERCOURSE
- APPROXIMATE SEASONAL SWALE / DRAINAGE DITCH
- WATERCOURSE
- APPROXIMATE WETLAND
- ALASKA HIGHWAY FORMER ALIGNMENT
- APPROXIMATE LOCATION OF HISTORICAL BUILDINGS
- AEC BOUNDARY BASED ON METALS CONTAMINATION
- AEC BOUNDARY BASED ON SODIUM AND/OR CHLORIDE CONTAMINATION
- Preliminary AEC boundary based on estimated petroleum hydrocarbon contamination (delineation required)
- SITE LOCATION
- AEC BOUNDARY BASED ON ESTIMATED EXTENT OF PETROLEUM HYDROCARBON CONTAMINATION
- HAUL ROAD
- AREA OF REMEDIAL EXCAVATION (2017)

GROUNDWATER Chemistry Results - BTEX AND VOCS

- ONE OR MORE SAMPLES IN THIS LOCATION CONTAIN CONCENTRATIONS EXCEEDING THE APPLICABLE CSR STANDARDS
- ONE OR MORE SAMPLES IN THIS LOCATION CONTAIN CONCENTRATIONS BELOW THE APPLICABLE CSR STANDARDS

NOTES

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*CONCENTRATIONS IN UG/L

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8. PROJECTION: UTM ZONE 10N DATUM: WGS84

CLIENT
PUBLIC SERVICES AND PROCUREMENT CANADA

PROJECT
K-19 TRUTCH FORMER TOWNSITE
ALASKA HIGHWAY, B.C.

TITLE
GROUNDWATER CHEMISTRY RESULTS - BTEX AND VOCS

CONSULTANT
Golder Associates

YYYY-MM-DD	2018-03-26
DESIGNED	AGH
PREPARED	RC
REVIEWED	AB
APPROVED	AM

PROJECT NO.	PHASE	REV.	FIGURE
1657709	7000	0	5C

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

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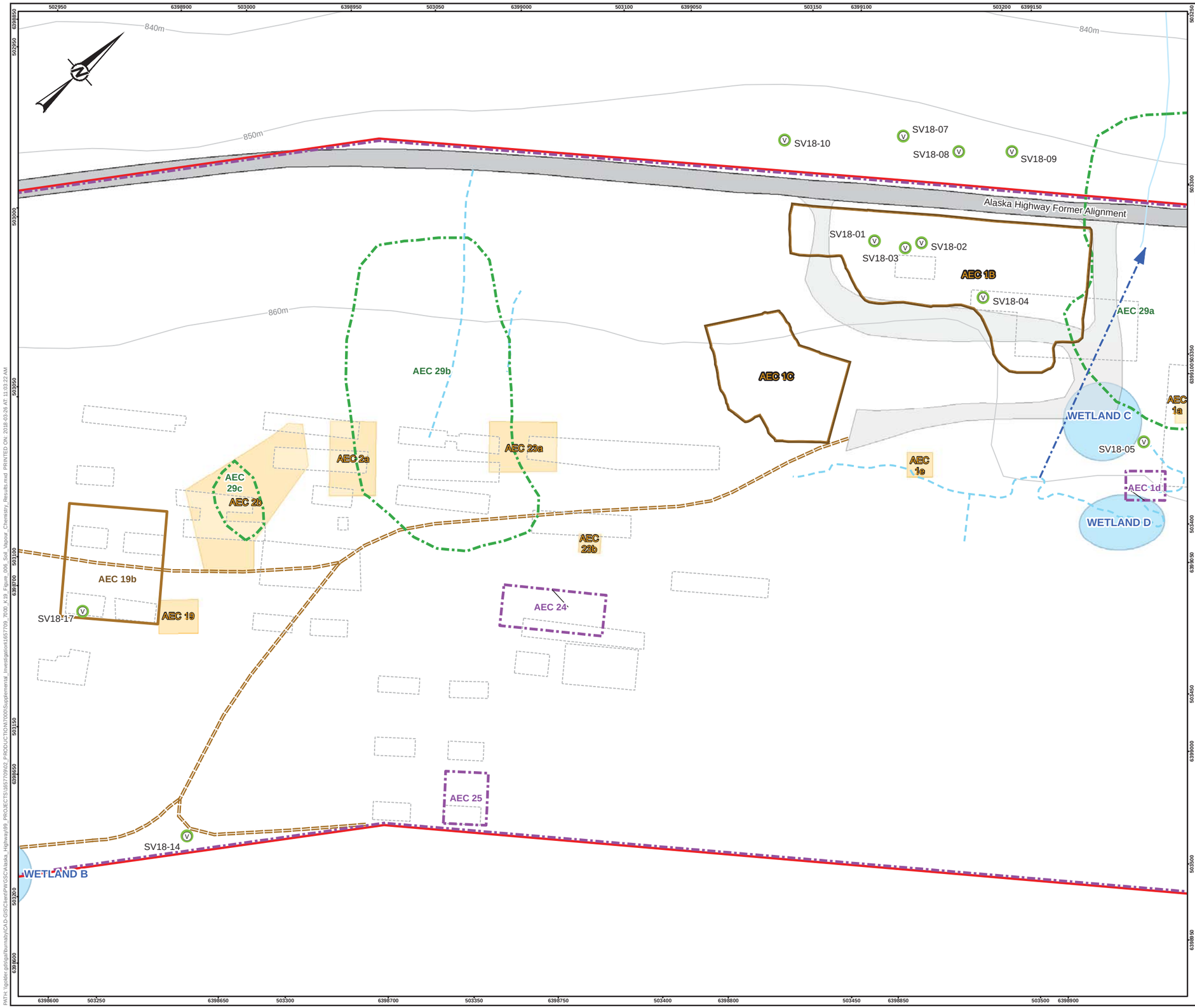
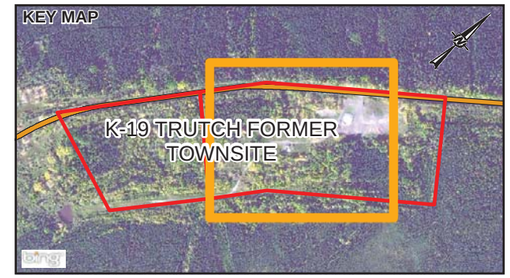


LEGEND

- SOIL VAPOUR PROBE
- CONTOUR (10M)
- SECONDARY ROAD
- INFERRED UNDERGROUND WATERCOURSE
- APPROXIMATE SEASONAL SWALE / DRAINAGE DITCH
- WATERCOURSE
- APPROXIMATE WETLAND
- ALASKA HIGHWAY FORMER ALIGNMENT
- APPROXIMATE LOCATION OF HISTORICAL BUILDINGS
- AEC BOUNDARY BASED ON METALS CONTAMINATION
- AEC BOUNDARY BASED ON SODIUM AND/OR CHLORIDE CONTAMINATION
- Preliminary AEC boundary based on estimated petroleum hydrocarbon contamination (delineation required)
- SITE LOCATION
- AEC BOUNDARY BASED ON ESTIMATED EXTENT OF PETROLEUM HYDROCARBON CONTAMINATION
- HAUL ROAD
- AREA OF REMEDIAL EXCAVATION (2017)

SOIL VAPOUR CHEMISTRY RESULTS

- ONE OR MORE SAMPLES IN THIS LOCATION CONTAIN CONCENTRATIONS EXCEEDING THE APPLICABLE CSR STANDARDS
- ONE OR MORE SAMPLES IN THIS LOCATION CONTAIN CONCENTRATIONS BELOW THE APPLICABLE CSR STANDARDS



0 25 50

1:1,500 METRES

NOTES

ONLY 2018 INVESTIGATION LOCATIONS SHOWN.

REFERENCES

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7. WATERCOURSES OBTAINED BY B.C. MINISTRY OF FORESTS, LAND AND NATURAL RESOURCE OPERATIONS.
8. PROJECTION: UTM ZONE 10N DATUM: WGS84

CLIENT

PUBLIC SERVICES AND PROCUREMENT CANADA

PROJECT

K-19 TRUTCH FORMER TOWNSITE
ALASKA HIGHWAY, B.C.

TITLE

SOIL VAPOUR CHEMISTRY RESULTS

CONSULTANT

Golder Associates

YYYY-MM-DD	2018-03-26
DESIGNED	AGH
PREPARED	RC
REVIEWED	AB
APPROVED	AM

PROJECT NO.	PHASE	REV.	FIGURE
1657709	7000	0	6

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

25mm

0

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APPENDIX A

Photographic Summary

TREE CLEARING AND ROAD BUILDING

Photograph 1: Tree clearing west of the former alignment in AEC 1b, looking north. 11 January 2018.

Photograph 2: Tree clearing west of the former alignment in AEC 1b, looking west. 11 January 2018.

Photograph 3: Completed access road to the area west of the former alignment in AEC 1b, looking west. 12 January 2018.

Photograph 4: Cleared area west of the former alignment in AEC 1b, looking north. 12 January 2018

TEST PITTING

Photograph 5: Excavation of test pit K19-TP18-05 (TP-2), looking northwest. 13 January 2018.

Photograph 6: Excavation of test pit K19-TP18-09 (TP-1), looking southeast. 14 January 2018.

SAMPLING

Photograph 7: Groundwater sampling at monitoring well K19-MW16-10S, looking southwest. 14 January 2018.

Photograph 8: Stockpile sampling at the quarry, looking northwest. 15 January 2018.

Photograph 9: Use of impact hammer to assess monitoring wells K19-MW17-29S/D along the former alignment. Looking north. 16 January 2018.

Photograph 10: Soil vapour sampling at K19-SV18-03. 19 January 2018.

Photograph 11: Soil vapour sampling at K19-SV18-06. 22 January 2018.

DRILLING

Photograph 12: Drilling of K19-MW18-01 (MW/SVP-11), looking east. 16 January 2018.

Photograph 13: Installed monitoring well K19-MW18-02, looking northeast. 17 January 2018.

Photograph 14: Drilling groundwater monitoring well K19-MW18-07, looking north. 18 January 2018.

Photograph 15: Drilling groundwater monitoring well K19-MW18-09, looking southwest. 20 January 2018.

Photograph 16: Drilling K19-SV18-17, looking south. 25 January 2018.

APPENDIX B

Test Pit Logs

PROJECT No.: 1657709 / 7000

CLIENT: Public Services and Procurement Canada
PROJECT: Alaska Highway
LOCATION: K19
N: 6399070.43 E: 503310.81

RECORD OF TEST PIT: K19-TP18-01

SHEET 1 OF 1

DATUM: NAD 83

EXCAVATION DATE: January 12, 2018
EXCAVATION CONTRACTOR: Eh Cho Dene Enterprises GP Ltd.

INCLINATION: -90°

TEST PIT DIMENSIONS:

6.5 m Length x 2.2 m Width

DEPTH SCALE METRES	EXCAVATION METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	GEOTECH SAMPLES: NUMBER	TYPE	RECOVERY %	PID ppm (2 4 6 8) / PID ppm (20 40 60 80)	CHEMISTRY ANALYSIS: NUMBER	SCN	ANALYSED	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE, THERMISTOR INSTALLATION OR SEEPAGE OBSERVATION
0		Ground Surface		856.89									
	Deere 325D Excavator Bucket	**(ML)** SILT, trace to some gravel; brown, no odour, no staining; cohesive, w<PL.		0.00				⊕	1	04308-01			
1				855.69									
		Highly to completely weathered (W4-W5), brown, no odour, no staining, very weak, SILTSTONE.	× × ×	1.20				⊕	2	04308-02			
2				854.59									
		Moderately weathered (W3), brown, no odour, no staining, weak, SILTSTONE.	× × ×	2.30				⊕	3	04308-03			
				854.19									
		End of Test Pit.Reached Target Depth		2.70									
3													

DEPTH SCALE

1 : 30

LOGGED: SS/KDB

CHECKED: AGH

PROJECT No.: 1657709 / 7000

RECORD OF TEST PIT: K19-TP18-02

SHEET 1 OF 1

CLIENT: Public Services and Procurement Canada
PROJECT: Alaska Highway
LOCATION: K19
N: 6399062.69 E: 503318.71

DATUM: NAD 83

EXCAVATION DATE: January 12, 2018
EXCAVATION CONTRACTOR: Eh Cho Dene Enterprises GP Ltd.
INCLINATION: -90°

TEST PIT DIMENSIONS:
6.2 m Length x 1.3 m Width

DEPTH SCALE METRES	EXCAVATION METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	GEOTECH SAMPLES NUMBER	TYPE	RECOVERY %	PID ppm (⊕ 2 4 6 8; □ 20 40 60 80)	CHEMISTRY ANALYSIS NUMBER	SCN	ANALYSED	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE, THERMISTOR INSTALLATION OR SEEPAGE OBSERVATION
		Ground Surface		857.26									
0	Deere 325D Excavator Bucket	**(ML)** SILT, some gravel; brown, no odour, no staining; cohesive, w<PL.		0.00				⊕	1	04308-04			
1		Highly to completely weathered (W4-W5), brown, no odour, no staining, very weak, SILTSTONE.		856.16 / 1.10				⊕	2	04308-05			
2		Moderately weathered (W3), brown, no odour, no staining, weak, SILTSTONE.		855.06 / 2.20									
		End of Test Pit.Reached Target Depth		854.66 / 2.60				⊕	3	04308-06			
3													

DEPTH SCALE
1 : 30

LOGGED: KDB
CHECKED: AGH

PROJECT No.: 1657709 / 7000

CLIENT: Public Services and Procurement Canada
PROJECT: Alaska Highway
LOCATION: K19
N: 6398962.94 E: 503282.69

RECORD OF TEST PIT: K19-TP18-03

SHEET 1 OF 1

DATUM: NAD 83

EXCAVATION DATE: January 13, 2018
EXCAVATION CONTRACTOR: Eh Cho Dene Enterprises GP Ltd.

INCLINATION: -90°

TEST PIT DIMENSIONS:

5.1 m Length x 1.4 m Width

DEPTH SCALE METRES	EXCAVATION METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	GEOTECH SAMPLES: NUMBER	TYPE	RECOVERY %	PID ppm (2 4 6 8) / PID ppm (20 40 60 80)	CHEMISTRY ANALYSIS: NUMBER	SCN	ANALYSED	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE, THERMISTOR INSTALLATION OR SEEPAGE OBSERVATION
0		Ground Surface		858.84									
	Deere 325D Excavator Bucket	**(ML)** CLAYEY SILT, some gravel, contains rootlets; brown to dark brown, no odour, no staining; cohesive, w<PL.		0.00				⊕	1	04308-07/08			
1				857.64									
		Completely weathered (W5), brown, no odour, no staining, extremely weak, SILTSTONE.	× ×	1.20				⊕	2	04308-09			
2				856.54									
		Highly weathered (W4), dark brown-black, no odour, iron staining, very weak, SILTSTONE.	× ×	2.30				⊕	3	04308-10			
				856.24									
		End of Test Pit.Reached Target Depth		2.60									
3													

DEPTH SCALE

1 : 30

LOGGED: KDB

CHECKED: AGH

PROJECT No.: 1657709 / 7000

CLIENT: Public Services and Procurement Canada
PROJECT: Alaska Highway
LOCATION: K19
N: 6398973.55 E: 503287.77

RECORD OF TEST PIT: K19-TP18-04

SHEET 1 OF 1

DATUM: NAD 83

EXCAVATION DATE: January 13, 2018
EXCAVATION CONTRACTOR: Eh Cho Dene Enterprises GP Ltd.

INCLINATION: -90°

TEST PIT DIMENSIONS:

4.8 m Length x 1.3 m Width

DEPTH SCALE METRES	EXCAVATION METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	GEOTECH SAMPLES: NUMBER	TYPE	RECOVERY %	PID ppm (2 4 6 8) / PID ppm (20 40 60 80)	CHEMISTRY ANALYSIS: NUMBER	SCN	ANALYSED	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE, THERMISTOR INSTALLATION OR SEEPAGE OBSERVATION
0		Ground Surface		858.48									
	Deere 325D Excavator Bucket	**(ML)** CLAYEY SILT, some gravel, contains rootlets; dark brown, no odour, no staining; cohesive, w<PL.		0.00				⊕	1	04308-11			
1				857.48									
		Completely to highly weathered (W5-W4), brown, no odour, no staining, extremely weak, SILTSTONE.		1.00				⊕	2	04308-12			
2				856.18									
		Highly weathered (W4), brown, no odour, no staining, very weak, SILTSTONE.		2.30				⊕	3	04399-01			
				855.98									
		End of Test Pit.Reached Target Depth		2.50									
3													

DEPTH SCALE

1 : 30

LOGGED: KDB

CHECKED: AGH

PROJECT No.: 1657709 / 7000

RECORD OF TEST PIT: K19-TP18-05

SHEET 1 OF 1

CLIENT: Public Services and Procurement Canada
PROJECT: Alaska Highway
LOCATION: K19
N: 6399095.48 E: 503308.44

DATUM: NAD 83

EXCAVATION DATE: January 13, 2018
EXCAVATION CONTRACTOR: Eh Cho Dene Enterprises GP Ltd.

INCLINATION: -90°

TEST PIT DIMENSIONS:
4.5 m Length x 1.6 m Width

DEPTH SCALE METRES	EXCAVATION METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	GEOTECH SAMPLES: NUMBER	TYPE	RECOVERY %	PID ppm (⊕ 2, 4, 6, 8 / □ 20, 40, 60, 80)	CHEMISTRY ANALYSIS: NUMBER	SCN	ANALYSED	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE, THERMISTOR INSTALLATION OR SEEPAGE OBSERVATION
		Ground Surface		855.01									
0	Deere 325D Excavator Bucket	**(ML)** SILT, some gravel, contains wood debris; brown, no odur, no staining; non-cohesive, dry.		0.00									
		- slight petroleum hydrocarbon-like odour from 0.4 to 1.1m depth						□	1	04299-02			
1								⊕	2	04299-03			
		Highly to completely weathered (W4-W5), dark brown, no odour, no staining, extremely weak, SILTSTONE.		853.21 / 1.80									
2				852.51 / 2.50				⊕	3	04299-04			
		End of Test Pit.Reached Target Depth											
3													

DEPTH SCALE
1 : 30

LOGGED: KDB
CHECKED: AGH

PROJECT No.: 1657709 / 7000

CLIENT: Public Services and Procurement Canada
PROJECT: Alaska Highway
LOCATION: K19
N: 6398993.65 E: 503279.79

RECORD OF TEST PIT: K19-TP18-06

SHEET 1 OF 1

DATUM: NAD 83

EXCAVATION DATE: January 13, 2018
EXCAVATION CONTRACTOR: Eh Cho Dene Enterprises GP Ltd.

INCLINATION: -90°

TEST PIT DIMENSIONS:

5.4 m Length x 1.2 m Width

DEPTH SCALE METRES	EXCAVATION METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	GEOTECH SAMPLES: NUMBER	TYPE	RECOVERY %	PID ppm (2 4 6 8 / 20 40 60 80)	CHEMISTRY ANALYSIS: NUMBER	SCN	ANALYSED	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE, THERMISTOR INSTALLATION OR SEEPAGE OBSERVATION
0		Ground Surface		857.99									
	Deere 325D Excavator Bucket	**(ML)** CLAYEY SILT, some gravel, contains wood debris; brown, no odour, no staining; cohesive, w<PL.		0.00				⊕	1	04299-05			
1				856.99									
		Highly to completely weathered (W4-W5), dark brown, no dour, no staining, extremely weak, SILTSTONE.		1.00				⊕	2	04299-06			
2				855.89									
		Highly weathered (W4), dark brown-black, no odour, iron staining, extremely weak, SILTSTONE.		2.10									
				855.39									
		End of Test Pit.Reached Target Depth		2.60				⊕	3	04299-07			
3													

DEPTH SCALE

1 : 30

LOGGED: KDB

CHECKED: AGH

PROJECT No.: 1657709 / 7000

CLIENT: Public Services and Procurement Canada
PROJECT: Alaska Highway
LOCATION: K19
N: 6399004.18 E: 503251.63

RECORD OF TEST PIT: K19-TP18-07

SHEET 1 OF 1

DATUM: NAD 83

EXCAVATION DATE: January 14, 2018
EXCAVATION CONTRACTOR: Eh Cho Dene Enterprises GP Ltd.

INCLINATION: -90°

TEST PIT DIMENSIONS:

4.6 m Length x 1.7 m Width

DEPTH SCALE METRES	EXCAVATION METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	GEOTECH SAMPLES: NUMBER	TYPE	RECOVERY %	PID ppm (2 4 6 8) / PID ppm (20 40 60 80)	CHEMISTRY ANALYSIS: NUMBER	SCN	ANALYSED	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE, THERMISTOR INSTALLATION OR SEEPAGE OBSERVATION
0		Ground Surface		857.10									
	Deere 325D Excavator Bucket	**(ML)** CLAYEY SILT, some gravel; brown, no odour, no staining; cohesive, w~PL.		0.00				⊕	1	04299-08			
1				855.90									
		Highly to completely weathered (W4-W5), brown, no odour, no staining, extremely weak, SILTSTONE.	× ×	1.20				⊕	2	04299-09			
2			× ×	855.00									
		Highly weathered (W4), dark brown-black, petroleum hydrocarbon-like odour, iron staining, very weak, SILTSTONE.	× ×	2.10				⊕	3	04299-10			
3			× ×	854.00									
		Moderately weathered (W3), dark brown-black, petroleum hydrocarbon-like odour, no staining, weak, SILTSTONE.	× ×	3.10				□	4	04299-11/12			
		End of Test Pit. (Refusal)		853.70 3.40									

DEPTH SCALE

1 : 30

LOGGED: KDB

CHECKED: AGH

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_TESTPIT WITH PHOTO (ENVIRO) RY:James 28/3/18

RECORD OF TEST PIT: K19-TP18-08

PROJECT No.: 1657709 / 7000

SHEET 1 OF 1

CLIENT: Public Services and Procurement Canada

DATUM: NAD 83

PROJECT: Alaska Highway

LOCATION: K19

N: 6399001.54 E: 503241.05

EXCAVATION DATE: January 14, 2018

EXCAVATION CONTRACTOR: Eh Cho Dene Enterprises GP Ltd.

INCLINATION: -90°

TEST PIT DIMENSIONS: 5.1 m Length x 1.8 m Width

DEPTH SCALE METRES	EXCAVATION METHOD	SOIL PROFILE – DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	GEOTECH SAMPLES – NUMBER	TYPE	RECOVERY %	PID ppm ⊕ (2, 4, 6, 8) / PID ppm □ (20, 40, 60, 80)	CHEMISTRY ANALYSIS – NUMBER	SCN	ANALYSED	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE, THERMISTOR INSTALLATION OR SEEPAGE OBSERVATION
		Ground Surface		856.93									
0	Deere 350D Excavator Bucket	**(ML)** CLAYEY SILT; brown, no odour, no staining; cohesive, w~PL.		0.00				⊕	1	04300-01			
1		Highly to compeltely weathered (W5-W4), dark brown, no odour, no staining, extremely weak, SILTSTONE.		855.73 / 1.20				⊕	2	04300-02			
2		Moderately weathered (W3), dark brown-black, no odour, no staining, weak, SILTSTONE.		854.73 / 2.20				⊕	3	04300-03			
		End of Test Pit. (Refusal)		854.43 / 2.50									
3													

DEPTH SCALE

1 : 30

LOGGED: KDB

CHECKED: AGH

RECORD OF TEST PIT: K19-TP18-09

PROJECT No.: 1657709 / 7000
CLIENT: Public Services and Procurement Canada
PROJECT: Alaska Highway
LOCATION: K19
N: 6399100.78 E: 503302.84

EXCAVATION DATE: January 14, 2018
EXCAVATION CONTRACTOR: Eh Cho Dene Enterprises GP Ltd.
INCLINATION: -90°

SHEET 1 OF 1
DATUM: NAD 83
TEST PIT DIMENSIONS:
3.9 m Length x 1.8 m Width

DEPTH SCALE METRES	EXCAVATION METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	GEOTECH SAMPLES: NUMBER	TYPE	RECOVERY %	PID ppm ⊕ (2, 4, 6, 8) / PID ppm □ (20, 40, 60, 80)	CHEMISTRY ANALYSIS: NUMBER	SCN	ANALYSED	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE, THERMISTOR INSTALLATION OR SEEPAGE OBSERVATION
		Ground Surface		854.58									
0	Deere 350D Excavator Bucket	**(ML)** CLAYEY SILT; brown, no odour, no staining; cohesive, w<PL.		0.00				⊕	1	04300-04			
1		Highly weathered (W4), brown, no odour, no staining, extremely weak, SILTSTONE.		853.38 / 1.20				⊕	2	04300-05			
2													
		End of Test Pit.		852.08 / 2.50				⊕	3	04300-06			
3													

DEPTH SCALE
1 : 30

LOGGED: KDB
CHECKED: AGH

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_TESTPIT WITH PHOTO (ENVIRO) RYJames 28/3/18

PROJECT No.: 1657709 / 7000

CLIENT: Public Services and Procurement Canada
PROJECT: Alaska Highway
LOCATION: K19
N: 6399086.49 E: 503316.10

RECORD OF TEST PIT: K19-TP18-10

SHEET 1 OF 1

DATUM: NAD 83

EXCAVATION DATE: January 15, 2018
EXCAVATION CONTRACTOR: Eh Cho Dene Enterprises GP Ltd.

INCLINATION: -90°

TEST PIT DIMENSIONS:

4.6 m Length x 1.7 m Width

DEPTH SCALE METRES	EXCAVATION METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	GEOTECH SAMPLES: NUMBER	TYPE	RECOVERY %	PID ppm (2 4 6 8) / PID ppm (20 40 60 80)	CHEMISTRY ANALYSIS: NUMBER	SCN	ANALYSED	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE, THERMISTOR INSTALLATION OR SEEPAGE OBSERVATION
0		Ground Surface		855.82									
	Deere 350D Excavator Bucket	**(ML)** CLAYEY SILT, some gravel; brown, no odour, no staining; cohesive, w<PL.		0.00				⊕	1	04300-07			
1													
								⊕	2	04300-08/09			
				854.02									
		Highly weathered (W4), dark brown, petroleum hydrocarbon-like odour, no staining, very weak, SILTSTONE.		1.80									
2								□	3	04300-10			
				852.82									
3		Moderately weathered (W3), dark brown-black, no dour, no staining, weak, SILTSTONE.		3.00									
				852.52				⊕	4	04300-11			
		End of Test Pit.Reached Target Depth		3.30									

DEPTH SCALE

1 : 30

LOGGED: KDB

CHECKED: AGH

PROJECT No.: 1657709 / 7000

CLIENT: Public Services and Procurement Canada
PROJECT: Alaska Highway
LOCATION: K19
N: 6398994.80 E: 503273.31

RECORD OF TEST PIT: K19-TP18-11

SHEET 1 OF 1

DATUM: NAD 83

EXCAVATION DATE: January 15, 2018
EXCAVATION CONTRACTOR: Eh Cho Dene Enterprises GP Ltd.

INCLINATION: -90°

TEST PIT DIMENSIONS:

4.2 m Length x 1.6 m Width

DEPTH SCALE METRES	EXCAVATION METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	GEOTECH SAMPLES: NUMBER	TYPE	RECOVERY %	PID ppm (2 4 6 8 / 20 40 60 80)	CHEMISTRY ANALYSIS: NUMBER	SCN	ANALYSED	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE, THERMISTOR INSTALLATION OR SEEPAGE OBSERVATION
0		Ground Surface		857.67									
	Deere 350D Excavator Bucket	**(ML)** CLAYEY SILT; brown, no odour, no staining; cohesive, w~PL.		0.00				⊕	1	04300-12			
				856.77									
1		Highly to completely weathered (W4-W5), dark brown, no odour, no staining, extremely weak, SILTSTONE.	× ×	0.90				⊕	2	04301-01			
2			× ×	855.57									
		Highly weathered (W4), dark brown-black, no odour, no staining, very weak, SILTSTONE.	× ×	2.10									
				855.17				⊕	3	04301-02			
		End of Test Pit.		2.50									
3													

DEPTH SCALE

1 : 30

LOGGED: KDB

CHECKED: AGH

PROJECT No.: 1657709 / 7000

CLIENT: Public Services and Procurement Canada
PROJECT: Alaska Highway
LOCATION: K19
N: 6399011.92 E: 503249.54

RECORD OF TEST PIT: K19-TP18-12

SHEET 1 OF 1

DATUM: NAD 83

EXCAVATION DATE: January 15, 2018
EXCAVATION CONTRACTOR: Eh Cho Dene Enterprises GP Ltd.

INCLINATION: -90°

TEST PIT DIMENSIONS:

4.4 m Length x 1.8 m Width

DEPTH SCALE METRES	EXCAVATION METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	GEOTECH SAMPLES: NUMBER	TYPE	RECOVERY %	PID ppm (2 4 6 8) / PID ppm (20 40 60 80)	CHEMISTRY ANALYSIS: NUMBER	SCN	ANALYSED	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE, THERMISTOR INSTALLATION OR SEEPAGE OBSERVATION
		Ground Surface		856.78									
0	Deere 350D Excavator Bucket	**(ML)** CLAYEY SILT; brown, no odour, no staining; cohesive, w<PL.		0.00				⊕	1	04301-03			
1				855.68									
		Highly weathered (W4), dark brown, no odour, no staining, extremely weak, SILTSTONE.	× × ×	1.10				⊕	2	04301-04			
2		- iron staining from 2.0 to 2.6m depth.	× × ×										
		- 2" metal pipe at 2.5m depth	× × ×					⊕	3	04301-05			
			× × ×	853.98									
		Moderately weathered (W3), dark brown-black, no odour, no staining, weak, SILTSTONE.	× × ×	2.80									
3				853.78				⊕	4	04301-06			
		End of Test Pit. (Refusal)		3.00									

DEPTH SCALE

1 : 30

LOGGED: KDB

CHECKED: AGH

PROJECT No.: 1657709 / 7000

CLIENT: Public Services and Procurement Canada
PROJECT: Alaska Highway
LOCATION: K19
N: 6399081.91 E: 503320.06

RECORD OF TEST PIT: K19-TP18-13

SHEET 1 OF 1

DATUM: NAD 83

EXCAVATION DATE: January 18, 2018
EXCAVATION CONTRACTOR: Eh Cho Dene Enterprises GP Ltd.

INCLINATION: -90°

TEST PIT DIMENSIONS:

1.7 m Length x 5.9 m Width

DEPTH SCALE METRES	EXCAVATION METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	GEOTECH SAMPLES: NUMBER	TYPE	RECOVERY %	PID ppm (2 4 6 8) / PID ppm (20 40 60 80)	CHEMISTRY ANALYSIS: NUMBER	SCN	ANALYSED	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE, THERMISTOR INSTALLATION OR SEEPAGE OBSERVATION
		Ground Surface		856.48									
0	Deere 350D Excavator Bucket	**(ML)** CLAYEY SILT, some gravel; brown, no odour, no staining; cohesive, w<PL.		0.00					1	04315-01			
1				854.98					2	04315-02/03			
		Highly weathered (W4), dark brown, no odour, no staining, very weak, SILTSTONE. - small pieces of wood debris present from 1.5 to 2.8m		1.50									
2									3	04315-04			
		- metal pipe at 2.8m depth											
3				853.48									
		Moderately weathered (W3), dark brown.		3.00									
				853.28					4	04315-05			
		End of Test Pit.Reached Target Depth		3.20									

DEPTH SCALE

1 : 30

LOGGED: SS

CHECKED: AGH

PROJECT No.: 1657709 / 7000

CLIENT: Public Services and Procurement Canada
PROJECT: Alaska Highway
LOCATION: K19

RECORD OF TEST PIT: K19-TP18-14

SHEET 1 OF 1

DATUM: NAD 83

EXCAVATION DATE: January 18, 2018
EXCAVATION CONTRACTOR: Eh Cho Dene Enterprises GP Ltd.

INCLINATION: -90°

TEST PIT DIMENSIONS:

2.8 m Length x 1.8 m Width

DEPTH SCALE METRES	EXCAVATION METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	GEOTECH SAMPLES: NUMBER	TYPE	RECOVERY %	PID ppm (2 4 6 8) / PID ppm (20 40 60 80)	CHEMISTRY ANALYSIS: NUMBER	SCN	ANALYSED	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE, THERMISTOR INSTALLATION OR SEEPAGE OBSERVATION
		Ground Surface											
0	Deere 350D Excavator Bucket	**(ML)** CLAYEY SILT, some gravel; brown, no odour, no staining; cohesive, w<PL.		0.00					1	04315-06			
1		Highly weathered (W4), dark brown, no odour, no staining, very weak, SILTSTONE.		1.50					2	04315-07			
2		- weak petroleum hydrocarbon-like odour from 2.0 to 2.5m depth.							3	04315-08			
3		Moderately weathered (W3), dark brown-black, faint petroleum hydrocarbon-like odour, no staining, weak, SILTSTONE.		2.80					4	04315-09			
		End of Test Pit.Hit Culvert		3.00									

DEPTH SCALE

1 : 30

LOGGED: SS

CHECKED: AGH

APPENDIX C

Borehole Logs

PROJECT No.: 1657709 / 7000

CLIENT: Public Services and Procurement Canada

PROJECT: Alaska Highway

LOCATION: K19

N: 6398731.46 E: 503145.25

RECORD OF BOREHOLE: K19-BH18-13

SHEET 1 OF 1

DATUM: NAD 83

DRILLING DATE: January 23, 2018

DRILLING CONTRACTOR: Tundra Drilling

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	GEOTECH SAMPLES: NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	CHEMISTRY SAMPLES: NUMBER	SCN	ANALYSED	PID ppm (2 4 6 8) / PID ppm (20 40 60 80)	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / WATER CONTENT % Wp W Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
		Ground Surface		863.89												
0	CME750 Solid Stem Auger (Casing:152 mm;)	**(ML)** CLAYEY SILT, contains rootlets; brown, no odour; cohesive, w<PL.		0.00						1	04317-06		⊕			
1				862.69												
		Completely weathered to residual soil (W5-W6), brown, no odour, no staining, moist, SILTSTONE.	× ×	1.20												
2			× ×	861.64												
		Highly weathered (W4), brown, no odour, no staining, dry, SILTSTONE.	× ×	2.25						2	04317-07		⊕			
3			× ×	860.39												
		Moderately weathered (W3), grey-brown, no odour, no staining, dry, SILTSTONE.	× ×	3.50												
4										3	04317-08		⊕			
		- moist from approximately 4.5 to 6.0m depth														
5																
										4	04317-09		□			
6																
7										5	04317-10		□			
8																
										6	04317-11		□			
9				854.79												
		Moderately to slightly weathered (W3-W2), grey-brown, no odour, no stining, dry, SILTSTONE. - wet from 9.1 to 10.0m depth	× ×	9.10												
10			× ×							7	04317-12			⊕		
		- very hard layer from 10.7 to 10.8m depth (W1)	× ×	853.09 10.80												
11		Slightly weathered (W2), grey-brown, no odour, no staining, SILTSTONE.	× ×													
										8	04318-01		□			
12																
		- soft layer from 12.8 to 13.0m depth (W4)														
13																
		- very hard from 13.3 to 13.4m depth (W1)	× ×							9	04318-02		□			
			× ×	850.19												
		End of Borehole.		13.70												
14																
15																

DEPTH SCALE

1 : 75

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS

LOGGED: KDB

CHECKED: AGH

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE (GEOENVIRO) RY:James 28/3/18

PROJECT No.: 1657709 / 7000

CLIENT: Public Services and Procurement Canada
PROJECT: Alaska Highway
LOCATION: K19
N: 6399050.23 E: 503195.63

RECORD OF BOREHOLE: K19-BH18-17

SHEET 1 OF 1
DATUM: NAD 83

DRILLING DATE: March 10, 2018
DRILLING CONTRACTOR: Tundra Drilling

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG	DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	GEOTECH SAMPLES: NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	CHEMISTRY SAMPLES: NUMBER	SCN	ANALYSED	PID ppm (⊕) 2 4 6 8	PID ppm (□) 20 40 60 80	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m 20 40 60 80	WATER CONTENT % Wp W Wl 10 20 30 40	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
			Ground Surface																
0	CME750	Solid Stem Auger (Casing:152 mm.)	**(ML)** SILT, some fine to medium sand, some fine gravel; light brown; no odour, no staining; non-cohesive, dry.		0.00						1	11144-01							
1			Highly weathered (W4), brown, no odour, no staining, dry, SILTSTONE. (Bedrock inferred from drill reaction)		0.91						2	11144-02							
2																			
3											3	11144-03							
4											4	11144-04							
5			Moderately weathered (W3), grey brown, no odour, no staining, dry, SILTSTONE. (Bedrock inferred from drill reaction)		4.42						5	11144-05/06							
6			- slightly moist at 6.55m depth								6	11144-07							
7											7	11144-08							
8			End of Borehole.		7.62														
9																			
10																			
11																			
12																			
13																			
14																			
15																			

DEPTH SCALE
1 : 75

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: SS
CHECKED: ARM

Golder Associates

PROJECT No.: 1657709 / 7000

RECORD OF SOIL VAPOUR PROBE: K19-BH18-17/SV18-17

SHEET 1 OF 1

CLIENT: Public Services and Procurement Canada
PROJECT: Alaska Highway
LOCATION: K19
N: 6398712.14 E: 503133.15

DATUM: NAD 83

DRILLING DATE: January 25, 2018
DRILLING CONTRACTOR: Tundra Drilling

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	GEOTECH SAMPLES: NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	CHEMISTRY SAMPLES: NUMBER	SCN	ANALYSED	PID ppm (2 4 6 8) / PID ppm (20 40 60 80)	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / WATER CONTENT % Wp W Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
0		Ground Surface		863.99												
0	CME750 Solid Stem Auger (Casing:152 mm.)	**(ML)** CLAYEY SILT, contains rootlets; brown, no odour; cohesive, w~PL.		0.00						1	04321-09		⊕			Sand
1				862.59												
1		Highly to completely weathered (W4-W5), brown, no odour, no staining, moist, SILTSTONE.	×	1.40												Bentonite Chips
2			×							2	04321-10		⊕			
3			×	860.49												Granular Bentonite
3		Highly weathered (W4), brown-grey, no odour, no staining, dry, SILTSTONE.	×	3.50												Vapour Probe with Pointed Weight
4			×							3	04321-11		⊕			Granular Bentonite
5		- slightly moist at 5.3m depth	×	858.29												
5		Moderately weathered (W3), grey-brown, no odour, no staining, dry, SILTSTONE.	×	5.70						4	04321-12		□			
6			×													
7			×							5	04322-01		□			
8			×	855.29												
8		Slightly weathered (W2), grey-brown, no odour, no staining, dry, SILTSTONE.	×	8.70						6	04322-02		□			Bentonite Chips
9			×													
10			×							7	04322-03		□			
11		- hard layer from 11.1 to 11.3m depth	×													
11			×							8	04322-04		□			
12			×													
13			×							9	04322-05		□			
13			×	850.29												
14		End of Soil Vapour Probe.		13.70												
15																

DEPTH SCALE
1 : 75

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: KDB
CHECKED: AGH

Golder Associates

PROJECT No.: 1657709 / 7000

CLIENT: Public Services and Procurement Canada
PROJECT: Alaska Highway
LOCATION: K19
N: 6399037.21 E: 503182.79

RECORD OF BOREHOLE: K19-BH18-18

SHEET 1 OF 1
DATUM: NAD 83

DRILLING DATE: March 10. 2018
DRILLING CONTRACTOR: Tundra Drilling

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG	DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	GEOTECH SAMPLES: NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	CHEMISTRY SAMPLES: NUMBER	SCN	ANALYSED	PID ppm (⊕) 2 4 6 8	PID ppm (□) 20 40 60 80	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m 20 40 60 80	WATER CONTENT % Wp W Wl 10 20 30 40	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
			Ground Surface																
0	CME750	Solid Stem Auger (Casing:152 mm.)	**(ML)** SILT, some fine to medium sand, some fine gravel; brown, no odour, no staining; non-cohesive, dry. - hard up to 0.45m depth		0.00						1	11144-09	⊕						
1			Highly weathered (W4), brown, no odour, no staining, dry, SILTSTONE.	×	0.91														
2											2	11144-10	⊕						
3			Moderately weathered (W3), brown, no odour, no staining, dry, SILTSTONE. - soft layer from 3.5m to 3.8m depth		2.44														
4			- very hard layer from 4.0m to 4.6m depth								3	11144-11	⊕						
5											4	11144-12	⊕						
6											5	11145-01	⊕						
7			Slightly weathered (W2), grey, no odour, no staining, dry, SILTSTONE.		6.10						6	11145-02							
8			End of Borehole.		7.62														
9																			
10																			
11																			
12																			
13																			
14																			
15																			

DEPTH SCALE
1 : 75

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: SS
CHECKED: ARM

Golder Associates

PROJECT No.: 1657709 / 7000

CLIENT: Public Services and Procurement Canada
PROJECT: Alaska Highway
LOCATION: K19
N: 6399063.40 E: 503208.61

RECORD OF BOREHOLE: K19-BH18-19

SHEET 1 OF 1
DATUM: NAD 83

DRILLING DATE: March 10, 2018
DRILLING CONTRACTOR: Tundra Drilling

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG	DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	GEOTECH SAMPLES: NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	CHEMISTRY SAMPLES: NUMBER	SCN	ANALYSED	PID ppm (2 4 6 8) / PID ppm (20 40 60 80)	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / WATER CONTENT % Wp W Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
			Ground Surface														
0	CME750	Solid Stem Auger (Casing:152 mm.)	**(ML)** SILT, some fine to medium sand, contains rootlets; light brown; no odour, no staining; non-cohesive, dry.		0.00						1	11145-03		⊕			
1																	
											2	11145-04		⊕			
2			Highly weathered (W4), brown, no odour, no staining, dry, SILTSTONE.		1.83												
3											3	11145-05		⊕			
4			- harder rock from 3.9 to 4.6m depth								4	11145-06		□			
											5	11145-07		⊕	11		
5			Moderately weathered (W3), grey brown, no odour, no staining, dry, SILTSTONE.		4.88												
											6	11145-08/09		⊕			
6			Slightly weathered (W2), grey brown, no odour, no staining, moist, SILTSTONE.		6.10												
7			- moist from 6.1 to 7.6m depth - water in borehole from 6.4 to 7.6m depth								7	11145-10		⊕			
8			End of Borehole.		7.62												
9																	
10																	
11																	
12																	
13																	
14																	
15																	

DEPTH SCALE
1 : 75

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: SS
CHECKED: ARM

Golder Associates

PROJECT No.: 1657709 / 7000

CLIENT: Public Services and Procurement Canada
PROJECT: Alaska Highway
LOCATION: K19
N: 6399018.06 E: 503254.94

RECORD OF BOREHOLE: K19-BH18-20

SHEET 1 OF 1
DATUM: NAD 83

DRILLING DATE: March 11, 2018
DRILLING CONTRACTOR: Tundra Drilling

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	GEOTECH SAMPLES: NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	CHEMISTRY SAMPLES: NUMBER	SCN	ANALYSED	PID ppm (⊕) 2 4 6 8	PID ppm (□) 20 40 60 80	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m 20 40 60 80	WATER CONTENT % Wp W Wl 10 20 30 40	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
		Ground Surface																
0	CME750 Solid Stem Auger (Casing:152 mm.)	**(ML)** CLAYEY SILT; brown, no odour, no staining; cohesive, w<PL.		0.00						1	11145-11		⊕					
1																		
2		Highly weathered (W4), dark brown, no odour, no staining, extremely weak, SILTSTONE.	× × × × × × × × × ×	1.52						2	11145-12		⊕					
3		Moderately weathered (W3), dark brown black, hydrocarbon-like odour, possible dark staining, SILTSTONE. - Abrupt colour transition to lighter grey-brown at 3.4m depth	× × × × × × × × × ×	2.74						3	11146-01				⊕19.5			
4										4	11146-02				⊕12			
5		End of Borehole.		4.57														
6																		
7																		
8																		
9																		
10																		
11																		
12																		
13																		
14																		
15																		

DEPTH SCALE
1 : 75

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: SS
CHECKED: ARM

Golder Associates

PROJECT No.: 1657709 / 7000

CLIENT: Public Services and Procurement Canada
PROJECT: Alaska Highway
LOCATION: K19
N: 6399041.10 E: 503198.02

RECORD OF BOREHOLE: K19-BH18-21

SHEET 1 OF 1
DATUM: NAD 83

DRILLING DATE: March 11, 2018
DRILLING CONTRACTOR: Tundra Drilling

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	GEOTECH SAMPLES: NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	CHEMISTRY SAMPLES: NUMBER	SCN	ANALYSED	PID ppm (⊕) 2 4 6 8	PID ppm (□) 20 40 60 80	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m 20 40 60 80	WATER CONTENT % Wp W Wl 10 20 30 40	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
		Ground Surface																
0	CME750 Solid Stem Auger (Casing:152 mm.)	**(SM)** Gravelly SILTY SAND, fine sand, fine to medium gravel SR-SA; light brown; no odour, no staining; non-cohesive, dry. FILL		0.00						1	11146-03		⊕					
1																		
2		**(ML)** SILT, some fine sand, some fine gravel; grey-brown, no odour, no staining, dry, SILTSTONE.		1.52						2	11146-04		⊕					
3		Highly weathered (W4), grey-brown, no odour, no staining, dry, SILTSTONE.		2.44						3	11146-05		⊕					
4										4	11146-06		⊕					
5		Moderately weathered (W3), grey-brown, no odour, no staining, dry, SILTSTONE. - moist from 5.18 to 6.09m depth		4.27						5	11146-07		⊕					
6		Slightly weathered (W2), grey, no odour, no staining, dry, SILTSTONE. - slight hydro-carbon like odour from 6.09 to 7.01m depth		6.10						6	11146-08/09		⊕					
7										7	11146-10		⊕					
8		- water in borehole from 7.62 to 9.14m depth								8	11146-11		⊕					
9		- wet from 9.14 to 10.66m depth																
10										9	11146-12		⊕					
11		End of Borehole.		10.67														
12																		
13																		
14																		
15																		

DEPTH SCALE
1 : 75

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: SS
CHECKED: ARM

Golder Associates

PROJECT No.: 1657709 / 7000

CLIENT: Public Services and Procurement Canada
PROJECT: Alaska Highway
LOCATION: K19
N: 6399018.57 E: 503247.86

RECORD OF BOREHOLE: K19-BH18-22

SHEET 1 OF 1
DATUM: NAD 83

DRILLING DATE: March 11, 2018
DRILLING CONTRACTOR: Tundra Drilling

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	GEOTECH SAMPLES: NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	CHEMISTRY SAMPLES: NUMBER	SCN	ANALYSED	PID ppm (⊕) 2 4 6 8	PID ppm (□) 20 40 60 80	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m 20 40 60 80	WATER CONTENT % Wp W Wl 10 20 30 40	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
		Ground Surface																
0	CME750 Solid Stem Auger (Casing:152 mm.)	**(ML)** CLAYEY SILT, some gravel; brown, no odour, no staining; cohesive, w<PL.		0.00						1	11147-01		⊕					
1																		
2		**(SM)** SILTY SAND; dark grey, strong hydrocarbon-like odour, slight black staining; non-cohesive, dry.		1.52						2	11147-02			⊕				
3		Highly weathered (W4), grey, strong hydrocarbon-like odour, dry, SILTSTONE.	× ×	3.05						3	11147-03				□308.9			
4										4	11147-04							
5		End of Borehole.		4.57														
6																		
7																		
8																		
9																		
10																		
11																		
12																		
13																		
14																		
15																		

DEPTH SCALE
1 : 75

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: SS
CHECKED: ARM

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE (GEOENVIRO) RY:James 28/3/18

PROJECT No.: 1657709 / 7000

RECORD OF BOREHOLE: K19-BH18-23

SHEET 1 OF 1

DATUM: NAD 83

CLIENT: Public Services and Procurement Canada
PROJECT: Alaska Highway
LOCATION: K19
N: 6399013.02 E: 503242.85

DRILLING DATE: March 11, 2018
DRILLING CONTRACTOR: Tundra Drilling

INCLINATION: -90°

Drilling rig: CME750. Drilling method: Solid Stem Auger (Casing:152 mm;)

DEPTH SCALE METRES	SOIL PROFILE – DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	CHEMISTRY SAMPLES NUMBER	SCN	PID ppm
	Ground Surface					
0	**(ML)** CLAYEY SILT, some gravel; brown, no odour, no staining; cohesive, w<PL.		0.00	1	11147-05	⊕ (<2)
1.52	Completely weathered to residual soil (W5-W6), strong hydrocarbon-like odour, dry to moist, SILTSTONE.		1.52	2	11147-06	□ (~35)
				3	11147-07/08	□ (~80)
3.66	Highly weathered (W4), grey, strong hydrocarbon-like odour, no staining, dry, SILTSTONE.		3.66	4	11147-09	□ (~35)
				5	11147-10	□ (~20)
6.10	End of Borehole.		6.10			

Column headings: DEPTH SCALE METRES; DRILLING RIG; DRILLING METHOD; SOIL PROFILE (DESCRIPTION, STRATA PLOT, ELEV. DEPTH (m)); GEOTECH SAMPLES (NUMBER, TYPE, BLOWS/0.3m, CORE No., CORE RECOVERY %); CHEMISTRY SAMPLES (NUMBER, SCN, ANALYSED); PID ppm ⊕ 2 4 6 8; PID ppm □ 20 40 60 80; DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m 20 40 60 80; WATER CONTENT % Wp W Wl 10 20 30 40; ADDITIONAL LAB. TESTING; PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION

Depth scale: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

DEPTH SCALE
1 : 75

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: SS
CHECKED: ARM

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE (GEO/ENVIRO) RYJames 28/3/18

PROJECT No.: 1657709 / 7000

CLIENT: Public Services and Procurement Canada
PROJECT: Alaska Highway
LOCATION: K19
N: 6399024.22 E: 503251.82

RECORD OF BOREHOLE: K19-BH18-24

SHEET 1 OF 1
DATUM: NAD 83

DRILLING DATE: March 11, 2018
DRILLING CONTRACTOR: Tundra Drilling

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG	DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	GEOTECH SAMPLES: NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	CHEMISTRY SAMPLES: NUMBER	SCN	ANALYSED	PID ppm (2 4 6 8) / PID ppm (20 40 60 80)	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / WATER CONTENT % (Wp W Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
			Ground Surface														
0	CME750	Solid Stem Auger (Casing:152 mm.)	**(ML)** CLAYEY SILT, some gravel; brown, no odour, no staining; cohesive, w<PL.		0.00						1	11147-11		⊕			
1			- small rootlets and organics at 1.1m depth - iron staining from 1.52 to 1.82m depth														
2			Completely weathered to residual soil (W5-W6), grey, no odour, no staining, dry, SILTSTONE.	× × × × × ×	1.98						2	11147-12		⊕			
3			Highly weathered (W4), grey, no odour, no staining, dry, SILTSTONE.	× ×	2.44						3	11148-01		⊕			
4											4	11148-02		⊕			
5			End of Borehole.		4.57												
6																	
7																	
8																	
9																	
10																	
11																	
12																	
13																	
14																	
15																	

DEPTH SCALE
1 : 75

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: SS
CHECKED: ARM

Golder Associates

PROJECT No.: 1657709 / 7000

CLIENT: Public Services and Procurement Canada
PROJECT: Alaska Highway
LOCATION: K19
N: 6399023.77 E: 503257.28

RECORD OF BOREHOLE: K19-BH18-25

SHEET 1 OF 1
DATUM: NAD 83

DRILLING DATE: March 12, 2018
DRILLING CONTRACTOR: Tundra Drilling

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	GEOTECH SAMPLES: NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	CHEMISTRY SAMPLES: NUMBER	SCN	ANALYSED	PID ppm (⊕) 2 4 6 8	PID ppm (□) 20 40 60 80	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m 20 40 60 80	WATER CONTENT % Wp W Wl 10 20 30 40	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
		Ground Surface																
0	CME750 Solid Stem Auger (Casing:152 mm.)	**(ML)** CLAYEY SILT, some fine to medium sand, fine gravel, wood debris and trace organics; cohesive, w<PL.		0.00						1	11148-03		⊕					
1																		
2		Completely weathered to residual soil (W5-W6), grey, no odour, no staining, dry to moist, SILTSTONE.	× × × × × × × × × × × ×	1.52						2	11148-04		⊕					
3		Highly weathered (W4), grey, no odour, no staining, dry, SILTSTONE. - slightly moist at 2.4m to end of hole	× ×	2.44						3	11148-05			⊕				
4										4	11148-06			⊕				
5		End of Borehole.		4.57														
6																		
7																		
8																		
9																		
10																		
11																		
12																		
13																		
14																		
15																		

DEPTH SCALE
1 : 75

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: SS
CHECKED: ARM

PROJECT No.: 1657709 / 7000

CLIENT: Public Services and Procurement Canada
PROJECT: Alaska Highway
LOCATION: K19
N: 6399018.82 E: 503238.58

RECORD OF BOREHOLE: K19-BH18-26

SHEET 1 OF 1
DATUM: NAD 83

DRILLING DATE: March 12, 2018
DRILLING CONTRACTOR: Tundra Drilling

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG	DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	GEOTECH SAMPLES: NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	CHEMISTRY SAMPLES: NUMBER	SCN	ANALYSED	PID ppm (⊕) 2 4 6 8	PID ppm (□) 20 40 60 80	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m 20 40 60 80	WATER CONTENT % Wp W Wl 10 20 30 40	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
			Ground Surface																
0	CME750	Solid Stem Auger (Casing:152 mm;)	**(ML)** CLAYEY SILT, some fine to medium sand, some fine gravel, trace wood debris; cohesive, w<PL.		0.00						1	11148-07		⊕					
1																			
2			Highly weathered (W4), grey, very slight hydrocarbon odour, no staining, slightly moist, SILTSTONE.		1.52						2	11148-08			⊕				
3			- strong hydrocarbon odour from 3.04 to 4.57m depth								3	11148-09/10			□	126			
4			Moderately weathered (W3), grey, no odour, no staining, dry, SILTSTONE.		3.66														
5											4	11148-11/12			□				
6											5	11149-01			□				
			End of Borehole.		6.10														
7																			
8																			
9																			
10																			
11																			
12																			
13																			
14																			
15																			

DEPTH SCALE
1 : 75

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: SS
CHECKED: ARM

PROJECT No.: 1657709 / 7000

CLIENT: Public Services and Procurement Canada
PROJECT: Alaska Highway
LOCATION: K19
N: 6399013.72 E: 503236.50

RECORD OF BOREHOLE: K19-BH18-27

SHEET 1 OF 1
DATUM: NAD 83

DRILLING DATE: March 12, 2018
DRILLING CONTRACTOR: Tundra Drilling

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG	DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	GEOTECH SAMPLES: NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	CHEMISTRY SAMPLES: NUMBER	SCN	ANALYSED	PID ppm (2 4 6 8)	PID ppm (20 40 60 80)	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)	WATER CONTENT % Wp W Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
			Ground Surface																
0	CME750	Solid Stem Auger (Casing:152 mm;)	**(ML)** CLAYEY SILT, some fine gravel, trace wood debris; cohesive, w<PL.		0.00						1	11149-02		⊕					
1																			
2			Highly weathered (W4), grey, slight hydrocarbon odour from 1.52m to 3.04m depth, no staining, dry, SILTSTONE.		1.52						2	11149-03				13.7			
3											3	11149-04			□				
4			Moderately weathered (W3), grey, slight hydrocarbon odour from 3.04m to 4.57m depth, no staining, dry, SILTSTONE.		3.66														
5											4	11149-05			□				
6			End of Borehole.		6.10														
7																			
8																			
9																			
10																			
11																			
12																			
13																			
14																			
15																			

DEPTH SCALE
1 : 75

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: SS
CHECKED: ARM

Golder Associates

PROJECT No.: 1657709 / 7000

RECORD OF MONITORING WELL: K19-MW18-01/SV18-01

SHEET 1 OF 1

CLIENT: Public Services and Procurement Canada
PROJECT: Alaska Highway
LOCATION: K19
N: 6399044.10 E: 503232.92

DRILLING DATE: January 16, 2018
DRILLING CONTRACTOR: Tundra Drilling

DATUM: NAD 83

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	GEOTECH SAMPLES: NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	CHEMISTRY SAMPLES: NUMBER	SCN	ANALYSED	PID ppm (2 4 6 8) / PID ppm (20 40 60 80)	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / WATER CONTENT % (Wp W Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
0	CME750 Solid Stem Auger (Casing:152 mm.)	Ground Surface		855.05												
		(SM/GM) SILTY SAND and GRAVEL, medium to coarse sand, fine gravel; brown; non-cohesive, dry.		0.00						1	04301-07		⊕			
1																Bentonite
2										2	04301-08		⊕			
		- moist at 2.7m depth														
3																Granular Bentonite
																Vapour Probe with Pointed Weight
4		- moist to wet at 4.0m depth														Granular Bentonite
5																Bentonite
		- wet at 5.6m depth								3	04301-09		⊕			
6				848.85												
		Moderately to slightly weathered (W3-W2), grey, no odour, no staining, SILTSTONE.	× × ×	6.20												
		- moist to wet at 6.6m depth	× × ×							4	04301-10		⊕			
7		- wet at 7.1m depth	× × ×													Sand
		- wet from 7.5m to end of hole	× × ×													Screen
8			× × ×							5	04301-11		⊕			
			× × ×													Slough
9			× × ×	846.05												
		End of Monitoring Well.		9.00												
10																
11																
12																

DEPTH SCALE
1 : 60

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: KDB
CHECKED: AGH

Golder Associates

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE (GEOENVIRO) RY:James 28/3/18

PROJECT No.: 1657709 / 7000

RECORD OF MONITORING WELL: K19-MW18-02/SV18-02

SHEET 1 OF 1

CLIENT: Public Services and Procurement Canada
PROJECT: Alaska Highway
LOCATION: K19
N: 6399057.18 E: 503245.87

DRILLING DATE: January 17, 2018
DRILLING CONTRACTOR: Tundra Drilling

DATUM: NAD 83

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG	DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	GEOTECH SAMPLES: NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	CHEMISTRY SAMPLES: NUMBER	SCN	ANALYSED	PID ppm (2 4 6 8) / PID ppm (20 40 60 80)	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / WATER CONTENT % Wp W Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
0			Ground Surface		855.03												
0	CME750	Solid Stem Auger (Casing:152 mm;)	**(SM/GM)** SILTY SAND and GRAVEL, medium to coarse sand, fine gravel; no odour, no staining; non-cohesive, dry.		0.00						1	04302-01		⊕			Bentonite
1																	
2			- moist from 2.3 to 5.0m depth								2	04302-02		⊕			
3																	Granular Bentonite
4																	Vapour Probe with Pointed Weight Granular Bentonite
5			- moist to wet at 5.0m depth								3	04302-03		⊕			
6					848.93												
6			Moderately weathered (W3), grey, no odour, no staining, SILTSTONE. - slightly moist at 6.2m depth		6.10						4	04302-04		⊕			Bentonite
7			- slightly moist at approximately 7.3m depth														
8																	
9			- slightly moist at 8.8m depth								5	04302-05		⊕			
10			- wet from 9.7 to 10.5m depth								6	04302-06		⊕			Sand Screen
11																	Slough
12					843.03						7	04302-07		⊕			
12			End of Monitoring Well.		12.00												
13																	
14																	

DEPTH SCALE
1 : 70

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: KDB
CHECKED: AGH

Golder Associates

PROJECT No.: 1657709 / 7000

RECORD OF MONITORING WELL: K19-MW18-06/SV18-06

SHEET 1 OF 1

CLIENT: Public Services and Procurement Canada
PROJECT: Alaska Highway
LOCATION: K19
N: 6399057.18 E: 503191.88

DATUM: NAD 83

DRILLING DATE: January 18, 2018
DRILLING CONTRACTOR: Tundra Drilling

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	GEOTECH SAMPLES: NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	CHEMISTRY SAMPLES: NUMBER	SCN	ANALYSED	PID ppm (2 4 6 8) / PID ppm (20 40 60 80)	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / WATER CONTENT % Wp W Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
		Ground Surface		851.42												
0	CME750 Solid Stem Auger (Casing:152 mm:)	**(ML)** SILT, some fine to coarse sand, some fine gravel, contains rootlets; light brown, no odour, no staining; non-cohesive, dry.		0.00						1	04303-04		⊕			Bentonite Chip
				849.92												
1		Highly weathered (W4), brown, no odour, no staining, dry, SILTSTONE.	× × ×	1.50						2	04303-05		⊕			
2			× × ×													
3			× × ×							3	04303-06		□			Granular Bentonite Vapour Probe with Pointed Weight Granular Bentonite
4			× × ×													
			× × ×	846.62												
5		Moderately weathered (W3), grey-brown, no odour, no staining, dry, SILTSTONE.	× × ×	4.80						4	04303-07		⊕			
6			× × ×													Bentonite Chips
			× × ×	844.92												
7		Moderately to slightly weathered (W5-W2), grey-brown, no odour, no staining, dry, SILTSTONE.	× × ×	6.50						5	04303-08		⊕			
8			× × ×													Sand
9		- slightly moist from 8.7 to 8.9m depth	× × ×							6	04303-09		⊕			Screen
10			× × ×							7	04303-10		⊕			Slough
			× × ×	840.82												
11		End of Monitoring Well.		10.60												
12																

DEPTH SCALE
1 : 60

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: KDB
CHECKED: AGH

Golder Associates

PROJECT No.: 1657709 / 7000

RECORD OF MONITORING WELL: K19-MW18-07/SV18-07

SHEET 1 OF 1

CLIENT: Public Services and Procurement Canada
PROJECT: Alaska Highway
LOCATION: K19
N: 6399080.40 E: 503209.84

DRILLING DATE: January 18, 2018
DRILLING CONTRACTOR: Tundra Drilling

DATUM: NAD 83

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG	DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	GEOTECH SAMPLES: NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	CHEMISTRY SAMPLES: NUMBER	SCN	ANALYSED	PID ppm (2 4 6 8) / PID ppm (20 40 60 80)	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / WATER CONTENT % Wp W Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
0			Ground Surface		851.02												
	CME750	Solid Stem Auger (Casing:152 mm;)	**(ML)** SILT, some fine sand, some fine gravel, contains rootlets; light brown, no odour, no staining; non-cohesive, dry.		0.00						1	04303-11		⊕			Sand
1																	Bentonite Chip
2					849.02												
			Highly weathered (W4), brown, no odour, no staining, dry, SILTSTONE.		2.00						2	04303-12		⊕			Granular Bentonite
3																	Vapour Probe with Pointed Weight
			- softer rock inferred from drill reaction between 3.3 and 4.0m depth								3	04304-01/02		⊕			Granular Bentonite
4																	Bentonite Chips
											4	04304-07/08		□			Sand
5					846.02												
			Moderately weathered (W5), grey-brown, slight petroleum hydrocarbon-like odour, no staining, dry, SILTSTONE.		5.00						5	04304-03		□			Screen
6																	
			- moist at 6.7m depth								6	04304-04		⊕			
7																	Bentonite Chips
8											7	04304-05		⊕			
			- moist at 8.3m depth														Sand
			- moist at 8.6m depth														
9					841.97												Screen
			- hard layer from 9.0 to 9.05m (based on drill reaction)		9.05												
			Moderately to slightly weathered (W3-W2), grey-brown, no odour, no staining, dry, SILTSTONE. - wet from 9.0 to 10.3m depth								8	04304-06		⊕			
10			Moderately to slightly weathered (W3-W2), grey-brown, no odour, no staining, dry, SILTSTONE.		840.72												Slough
			End of Monitoring Well.		10.30												
11																	
12																	

DEPTH SCALE
1 : 60

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: KDB
CHECKED: AGH

Golder Associates

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE (GEOENVIRO) RY:James 28/3/18

PROJECT No.: 1657709 / 7000

RECORD OF MONITORING WELL: K19-MW18-08/SV18-08

SHEET 1 OF 1

CLIENT: Public Services and Procurement Canada
PROJECT: Alaska Highway
LOCATION: K19
N: 6399092.54 E: 503228.98

DRILLING DATE: January 19, 2018
DRILLING CONTRACTOR: Tundra Drilling

DATUM: NAD 83

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	GEOTECH SAMPLES: NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	CHEMISTRY SAMPLES: NUMBER	SCN	ANALYSED	PID ppm (2 4 6 8) / PID ppm (20 40 60 80)	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / WATER CONTENT % Wp W Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
		Ground Surface		851.60												
0	CME750 Solid Stem Auger (Casing:152 mm;)	**(ML)** SILT, some fine sand, some fine gravel, contains rootlets; brown, no odour, no staining; non-cohesive, dry.		0.00						1	04304-09		⊕			Sand
1																Bentonite Chips
				849.90												
		Highly weathered (W4), brown, no odour, no staining, dry, SILTSTONE.		1.70												
2										2	04304-10		⊕			Granular Bentonite Vapour Probeith Pointed Weight
3																Granular Bentonite
										3	04304-11		⊕			
4																Bentonite Chips
5										4	04304-12		⊕			
				846.10												
		Moderately weathered (W3), grey-brown, no odour, no staining, dry, SILTSTONE.		5.50												Sand
6																Screen
7																
				844.50												
		- very hard layer from 7.0 to 7.1m depth (inferred from drill reaction)		7.10						5	04305-01		⊕			
		Moderately to slightly weathered (W3-W2), grey-brown, no odour, no staining, dry, SILTSTONE.														Bentonite Chips
8																
		- softer layer from 8.6 to 8.8m depth														Sand
9										6	04305-02		⊕			Screen
		- medium hard layer from 9.5 to 9.8m depth - moist from 9.8 to 10.0m depth														
10																
										7	04305-03		⊕			
11				840.50												Slough
		End of Monitoring Well.		11.10												
12																

DEPTH SCALE
1 : 60

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: KDB
CHECKED: AGH

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE (GEOENVIRO) RY:James 28/3/18

PROJECT No.: 1657709 / 7000

RECORD OF MONITORING WELL: K19-MW18-09/SV18-09

SHEET 1 OF 1

CLIENT: Public Services and Procurement Canada
PROJECT: Alaska Highway
LOCATION: K19
N: 6399108.16 E: 503242.97

DATUM: NAD 83

DRILLING DATE: January 20, 2018
DRILLING CONTRACTOR: Tundra Drilling

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	GEOTECH SAMPLES: NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	CHEMISTRY SAMPLES: NUMBER	SCN	ANALYSED	PID ppm (2 4 6 8) / PID ppm (20 40 60 80)	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / WATER CONTENT % Wp W Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
		Ground Surface		851.55												
0	CME750 Solid Stem Auger (Casing:152 mm;)	**(ML)** SILT, some fine to medium sand, some fine gravel; brown, no odour, no staining; non-cohesive, dry.		0.00						1	04305-04		⊕			Sand
1																Bentonite Chips
				849.55												
2		Highly weathered (W4), grey-brown, no odour, no staining, dry, SILTSTONE.	×	2.00						2	04305-05		⊕			Granular Bentonite
3																Vapour Probewith Pointed Weight Granular Bentonite
4		- slight moisture within cuttings from approximately 3.5 to 4.4m depth - hard layer from 3.5 to 3.55m depth - softer from 3.55 to 4.0m depth								3	04305-06		⊕			
5				846.55												
		Moderately weathered (W3), no odour, no staining, grey-brown, dry, SILTSTONE.		5.00						4	04305-07		⊕			
		- very hard from 5.5 to 5.55m depth														
6		- hard layer at 6.0m depth - softer layer from 6.1 to 6.8m depth (inferred from drill reaction)														Bentonite Chips
		- hard layer at 6.8m depth														
7				844.45												
		Moderately to slightly weathered (W3-W2), grey-brown, no odour, no staining, dry, SILTSTONE. - hard layer at 7.1m depth		7.10						5	04305-08		⊕			
8																
										6	04305-09		⊕			
9		- wet from 9.0 to 10.0m depth - potential fractures from 9.0 to 10.2m depth														Sand Screen
10																
		- very hard layer from 10.2 to 10.5m depth								7	04305-10		⊕			
				841.05												Slough
		End of Monitoring Well.		10.50												
11																
12																

DEPTH SCALE
1 : 60

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: KDB
CHECKED: AGH

Golder Associates

PROJECT No.: 1657709 / 7000

RECORD OF MONITORING WELL: K19-MW18-10/SV18-10

SHEET 1 OF 1

CLIENT: Public Services and Procurement Canada
PROJECT: Alaska Highway
LOCATION: K19
N: 6399044.46 E: 503179.31

DRILLING DATE: January 20, 2018
DRILLING CONTRACTOR: Tundra Drilling

DATUM: NAD 83

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	GEOTECH SAMPLES: NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	CHEMISTRY SAMPLES: NUMBER	SCN	ANALYSED	PID ppm (2 4 6 8) / PID ppm (20 40 60 80)	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / WATER CONTENT % Wp W Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
		Ground Surface		851.43												
0	CME750 Solid Stem Auger (Casing:152 mm:)	**(ML)** SILT, some fine to medium sand, some fine gravel; brown, no dour, no staining; non-cohesive, dry.		0.00						1	04306-01		⊕			Sand
				850.43												
1		Highly weathered (W4), brown, no odour, no staining, dry, SILTSTONE.		1.00												Bentonite Chips
		- hard layer from 1.7 to 1.75m depth - softer layer from 1.75 to 2.6m depth														
2										2	04306-02		⊕			Granular Bentonite
				848.83												Vapour Probe with Pointed Weight
		Moderately weathered (W3), brown, no odour, no staining, dry, SILTSTONE.		2.60												
3																Granular Bentonite
																Bentonite Chips
4		- very hard from 3.7 to 4.3m depth								3	04306-03			⊕		
		- strong petroleum hydrocarbon-like odour from 4.5 to 6.0m depth		846.63												Sand
5		Moderately to slightly weathered (W3-W2), grey-brown, no odour, no staining, dry, SILTSTONE.		4.80												Screen
										4	04306-08/09 & 04306-04			□206.5		
				845.43												
6		Slightly weathered (W2), grey, no odour, no staining, dry, SILTSTONE.		6.00												
7		- very hard layer from 7.1 to 7.15m depth								5	04306-05			⊕		Bentonite Chips
		- very hard layer from 7.5 to 7.8m depth - softer layer from 7.8 to 8.3m depth														
8																
		- slightly moist at 8.7m depth								6	04306-06			⊕		Sand
9		- potential fractures from 9.1 to 10.0m depth - wet from 9.1 to 10.6m depth														Screen
10																
										7	04306-07			⊕		Slough
				840.83												
		End of Monitoring Well.		10.60												
11																
12																

DEPTH SCALE
1 : 60

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: KDB
CHECKED: AGH

Golder Associates

PROJECT No.: 1657709 / 7000

RECORD OF MONITORING WELL: K19-MW18-11/SV18-11

SHEET 1 OF 1

CLIENT: Public Services and Procurement Canada
PROJECT: Alaska Highway
LOCATION: K19
N: 6399030.89 E: 503166.57

DRILLING DATE: January 23, 2018
DRILLING CONTRACTOR: Tundra Drilling

DATUM: NAD 83

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG	DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	GEOTECH SAMPLES: NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	CHEMISTRY SAMPLES: NUMBER	SCN	ANALYSED	PID ppm (⊕) 2 4 6 8	PID ppm (□) 20 40 60 80	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m 20 40 60 80	WATER CONTENT % Wp W Wl 10 20 30 40	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
			Ground Surface		851.00														
0	CME750	Solid Stem Auger (Casing:152 mm:)	**(ML)** SILT, some fine sand, some fine gravel; brown, no odour, no staining; non-cohesive, dry.		0.00						1	04307-01		⊕					Sand
					850.00														
1			Highly weathered (W4), brown, no odour, no staining, dry, SILTSTONE.		1.00														Bentonite Chips
2											2	04307-02		⊕					Granular Bentonite Vapour Probe with Pointed Weight
3																			Granular Bentonite
					847.30														
4			Moderately to highly weathered (W3-W4), brown, no odour, no staining, dry, SILTSTONE.		3.70														
					846.80														
			Moderately weathered (W3), grey-brown, no odour, no staining, dry, SILTSTONE.		4.20						3	04307-03			⊕				
5			- hard from 5.0 to 5.05m depth - potential fractures from 5.05 to 7.2m depth																Bentonite Chips
6											4	04307-04				⊕			
7			- very slight moisture from 7.2 to 7.3m depth								5	04307-05		⊕					
8			- potential fractures from 7.6 to 9.1m depth																Bentonite Pellets
			- wet from 8.6 to 8.8m depth								6	04307-06			⊕				Sand
9					841.90														
			Moderately to slightly weathered (W3-W2), grey-brown, no odour, wet, SILTSTONE. - potential fractures from 9.1 to 10.0m depth		9.10														Screen
10					841.00														
			Slightly weathered (W2), grey-brown, no odour, wet, SILTSTONE.		10.00						7	04307-07			⊕				Slough Sand
					840.40														
			End of Monitoring Well.		10.60														
11																			
12																			

DEPTH SCALE
1 : 60

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: KDB
CHECKED: AGH

Golder Associates

PROJECT No.: 1657709 / 7000

RECORD OF MONITORING WELL: K19-MW18-12/SV18-12

SHEET 1 OF 1

CLIENT: Public Services and Procurement Canada
PROJECT: Alaska Highway
LOCATION: K19
N: 6398731.90 E: 503119.80

DRILLING DATE: January 23, 2018
DRILLING CONTRACTOR: Tundra Drilling

DATUM: NAD 83

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG	DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	GEOTECH SAMPLES: NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	CHEMISTRY SAMPLES: NUMBER	SCN	ANALYSED	PID ppm (2 4 6 8) / PID ppm (20 40 60 80)	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / WATER CONTENT % Wp W Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
			Ground Surface		863.01												
0	CME750	Solid Stem Auger (Casing:152 mm:)	**(ML)** CLAYEY SILT, contains rootlets and wood debris; brown, no odour; cohesive, w~PL.		0.00						1	04307-08		⊕			
1					861.81												
			Completely weathered to residual soil (W5-W6), dark brown, no odour, moist, SILTSTONE.		1.20												
2											2	04307-09		⊕			
					860.51												
			Highly weathered (W4), brown, no odour, dry, SILTSTONE.		2.50												
3																	
					859.01												
4			Moderately weathered (W3), grey brown, no odour, no staining, dry, SILTSTONE.		4.00						3	04307-10					
5			- very hard layer from 4.6 to 4.7m depth (W1) - softer from 4.7 to 5.0m depth (W4)														Bentonite Chips
6			- pieces of sandstone from 5.5 to 6.0m depth - very hard from 6.0 to 6.05m depth (W1)								4	04307-11					
			- very hard from 6.15 to 6.2m depth (W1)		856.56												PVC Pipe
					6.45												
7			Slightly weathered (W2), grey-brown, no odour, no staining, dry, SILTSTONE.								5	04307-12		□			
8			- potential fracture from 7.6 to 13.2m depth								6	04317-01		□			
9																	
10											7	04317-02		□			
11																	Bentonite Pellets
											8	04317-03		□			Sand
12			- wet from 12.2 to 13.7m depth														Screen
13																	
					849.31						9	04317-04		□			Slough
			End of Monitoring Well.		13.70												
14																	
15																	

DEPTH SCALE
1 : 75

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: KDB
CHECKED: AGH

Golder Associates

PROJECT No.: 1657709 / 7000

RECORD OF MONITORING WELL: K19-MW18-15/SV18-15

SHEET 1 OF 1

CLIENT: Public Services and Procurement Canada
PROJECT: Alaska Highway
LOCATION: K19
N: 6398743.82 E: 503133.67

DATUM: NAD 83

DRILLING DATE: January 24, 2018
DRILLING CONTRACTOR: Tundra Drilling

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG	DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	GEOTECH SAMPLES: NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	CHEMISTRY SAMPLES: NUMBER	SCN	ANALYSED	PID ppm (2 4 6 8) / PID ppm (20 40 60 80)	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / WATER CONTENT % (Wp W Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
			Ground Surface		863.31												
0	CME750	Solid Stem Auger (Casing:152 mm;)	**(ML)** CLAYEY SILT, some fine gravel; brown, no odour; cohesive, w<PL.		0.00						1	04318-05		⊕			Sand
1					862.21												
			Completely weathered to residual soil (W5-W6), brown, no odour, no staining, moist, SILTSTONE.	× ×	1.10												Bentonite Chips
2											2	04318-06		⊕			
					860.81												
			Highly weathered (W4), grey-brown, no odour, dry, SILTSTONE.		2.50												Granular Bentonite
3			- harder conditions from 3.0 to 3.3m depth (similar to W3)														Vapour Probe with Pointed Weight
4											3	04318-07		⊕			Granular Bentonite
			- potential fractures from 4.2 to 4.5m depth		858.81												
			Moderately weathered (W3), grey-brown, no odour, dry, SILTSTONE.		4.50												
5			- moist to wet from 4.9 to 5.1m depth														
			- very hard layer from 5.6 to 5.7m depth (similar to W1)								4	04318-08		□			
6																	Bentonite Chips
			- slightly moist at 6.4m depth														
7											5	04318-09		□			
					855.31												
8			Slightly weathered (W2), grey-brown, no odour, dry, SILTSTONE.		8.00												
			- very hard from 8.5 to 8.55m depth (similar to W1)								6	04318-10		□			
9																	
10																	Sand
											7	04318-11		□			
			- slight petroleum hydrocarbon-like odour from 10.3 to 12.2m depth														Screen
11			- very hard from 10.35 to 10.45m depth (similar to W1)														
											8	04318-12 & 04321-01		□			
12					851.11												Slough
			End of Monitoring Well.		12.20												
13																	
14																	

DEPTH SCALE
1 : 70

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: KDB
CHECKED: AGH

PROJECT No.: 1657709 / 7000

RECORD OF MONITORING WELL: K19-MW18-16

SHEET 1 OF 1

CLIENT: Public Services and Procurement Canada
PROJECT: Alaska Highway
LOCATION: K19
N: 6398756.43 E: 503106.44

DRILLING DATE: January 25, 2018
DRILLING CONTRACTOR: Tundra Drilling

DATUM: NAD 83

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	GEOTECH SAMPLES: NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	CHEMISTRY SAMPLES: NUMBER	SCN	ANALYSED	PID ppm (⊕) 2 4 6 8	PID ppm (□) 20 40 60 80	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m 20 40 60 80	WATER CONTENT % Wp W Wl 10 20 30 40	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
0		Ground Surface		861.29														
0	CME750 Solid Stem Auger (Casing:152 mm:)	**(ML)** CLAYEY SILT, contains rootlets; brown, no odour; cohesive, w<PL.		0.00						1	04321-02		⊕					Sand
1				860.09														
2		Highly to completely weathered (W4-W5), brown, no odour, dry, SILTSTONE.	×	1.20						2	04321-03		⊕					
3				858.29														
4		Highly weathered (W4), brown, no odour, no staing, dry, SILTSTONE. - hard layer from 3.5 to 3.55m depth (similar to W2) - very slightly moist at 3.8m depth - hard layer from 4.3 to 4.4m depth (similar to W2)	×	3.00						3	04321-04			⊕				Bentonite Chips
5				856.29														
6		Moderately weathered (W3), grey-brown, no odour, no staining, dry, SILTSTONE.	×	5.00						4	04321-05			□				
7										5	04321-06			□				
8				853.09														
9		Slightly weathered (W2), grey-brown, no odour, dry, SILTSTONE. - very hard layer from 9.1 to 9.3m depth (similar to W1) - moist to wet from 9.3 to 10.0m depth	×	8.20						6	04321-07			□				Sand Screen
10										7	04321-08			□				
10		- very hard layer from 10.3 to 10.4m depth (similar to W1)	×	850.69														Slough
11		End of Monitoring Well.		10.60														
12																		

DEPTH SCALE
1 : 60

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: KDB
CHECKED: AGH

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE (GEOENVIRO) RY:James 28/3/18

PROJECT No.: 1657709 / 7000

RECORD OF SOIL VAPOUR PROBE: K19-SV18-03

SHEET 1 OF 1

CLIENT: Public Services and Procurement Canada
PROJECT: Alaska Highway
LOCATION: K19
N: 6399050.38 E: 503244.09

DATUM: NAD 83

DRILLING DATE: January 17, 2018
DRILLING CONTRACTOR: Tundra Drilling

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	GEOTECH SAMPLES: NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	CHEMISTRY SAMPLES: NUMBER	SCN	ANALYSED	PID ppm (⊕) 2 4 6 8	PID ppm (□) 20 40 60 80	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m 20 40 60 80	WATER CONTENT % Wp W Wl 10 20 30 40	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
0	CME750 Solid Stem Auger (Casing:152 mm.)	Ground Surface		855.27														
		(SM/GM) SILTY SAND and GRAVEL, fine to medium sand, fine gravel; brown, no odour, no staining; non-cohesive, dry.		0.00														Bentonite
1																		
2		- moist at 2.4m depth								1	04302-08		⊕					
3																		Granular Bentonite; Vapour Probewith Pointed Weight
4																		Bentonite
5																		Granular Bentonite
6		- wet at 5.8m depth		849.17						2	04302-10		⊕					
		(Bedrock inferred from drill reaction)		6.10														
7		End of Soil Vapour Probe.																
8																		
9																		
10																		
11																		
12																		

DEPTH SCALE
1 : 60

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: KDB
CHECKED: AGH

PROJECT No.: 1657709 / 7000

RECORD OF SOIL VAPOUR PROBE: K19-SV18-04

SHEET 1 OF 1

CLIENT: Public Services and Procurement Canada
PROJECT: Alaska Highway
LOCATION: K19
N: 6399060.05 E: 503279.33

DATUM: NAD 83

DRILLING DATE: January 17, 2018
DRILLING CONTRACTOR: Tundra Drilling

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	GEOTECH SAMPLES: NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	CHEMISTRY SAMPLES: NUMBER	SCN	ANALYSED	PID ppm (⊕) 2 4 6 8	PID ppm (□) 20 40 60 80	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m 20 40 60 80	WATER CONTENT % Wp W Wl 10 20 30 40	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
		Ground Surface		855.93														
0	CME750 Solid Stem Auger (Casing:152 mm:)	**(SM/GM)** SILTY SAND and GRAVEL, fine to medium sand, fine gravel; brown, no odour, no staining; non-cohesive, dry.		0.00														Sand
1																		Bentonite Chips
2										1	04302-11		⊕					Granular Bentonite Vapour Probe with Pointed Weight
3		- moist at 2.7m depth																Bentonite Chips; Granular Bentonite
4				851.33						2	04302-12		⊕					
5		(Bedrock inferred from drill reaction) End of Soil Vapour Probe.		4.60														
6																		
7																		
8																		
9																		
10																		
11																		
12																		

DEPTH SCALE
1 : 60

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: KDB
CHECKED: AGH

Golder Associates

PROJECT No.: 1657709 / 7000

RECORD OF SOIL VAPOUR PROBE: K19-SV18-05

SHEET 1 OF 1

CLIENT: Public Services and Procurement Canada
PROJECT: Alaska Highway
LOCATION: K19
N: 6399069.17 E: 503364.31

DRILLING DATE: January 18, 2018
DRILLING CONTRACTOR: Tundra Drilling

DATUM: NAD 83

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	GEOTECH SAMPLES: NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	CHEMISTRY SAMPLES: NUMBER	SCN	ANALYSED	PID ppm (⊕) 2 4 6 8	PID ppm (□) 20 40 60 80	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m 20 40 60 80	WATER CONTENT % Wp W Wl 10 20 30 40	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
		Ground Surface		857.03														
0	CME750 Solid Stem Auger (Casing:152 mm;)	**(ML/GP)** CLAYEY SILT and GRAVEL; dark brown, no odour, no staining; cohesive, w~PL.		0.00						1	04303-01		⊕					Sand
1																		Bentonite Chips Granular Bentonite Vapour Probe with Pointed Weight
										2	04303-02		⊕					
2		- w>PL at 1.7m depth																Granular Bentonite Bentonite Chips
				854.53						3	04303-03		⊕					
		End of Soil Vapour Probe.		2.50														
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		
11																		
12																		

DEPTH SCALE
1 : 60

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: KDB
CHECKED: AGH

PROJECT No.: 1657709 / 7000

RECORD OF SOIL VAPOUR PROBE: K19-SV18-14

SHEET 1 OF 1

CLIENT: Public Services and Procurement Canada
PROJECT: Alaska Highway
LOCATION: K19
N: 6398712.14 E: 503226.90

DATUM: NAD 83

DRILLING DATE: January 24, 2018
DRILLING CONTRACTOR: Tundra Drilling

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	GEOTECH SAMPLES: NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	CHEMISTRY SAMPLES: NUMBER	SCN	ANALYSED	PID ppm (2 4 6 8)	PID ppm (20 40 60 80)	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)	WATER CONTENT % Wp W Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
		Ground Surface		867.27														
0	CME750 / Solid Stem Auger (Casing:152 mm;)	**(ML)** CLAYEY SILT, some fine gravel; dark brown, no odour, no staining; cohesive, w~PL.		0.00						1	04318-03		⊕					Sand
1																		Granular Bentonite
										2	04318-04		⊕					Vapour Probe with Pointed Weight
2				865.27														Granular Bentonite
		End of Soil Vapour Probe.		2.00														
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		
11																		
12																		

DEPTH SCALE
1 : 60

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: KDB
CHECKED: AGH

Golder Associates

APPENDIX D

Groundwater Development and Sampling Forms

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development
☐ Purging/Sampling

Well No.: K19-MW16-01

Project Name: K19 Trutch
Project No.: 1657709
Location:
Date: 14/01/2018
Weather: clear **Temperature:** -14
Completed By: BM
GPS Coordinates:
Reviewed By:

MONITORING WELL INFORMATION

Time of Measurement:
Depth to Product: — m Product Thickness: — m
Depth to Water (A): ____ m below ☐ TOP
Depth to Bottom of Well (B): ____ m below ☐ TOP
Diameter of Standpipe: ____ mm
Well Condition:

Tidally Influenced: ☐ Yes ☒ No
Pressurized: ☐ Yes ☒ No
Well Headspace: — ppm
One Well Volume:
(B-A)*2.0 = ____ Litres - for a 51 mm (2.0 inch) diameter well
(B-A)*1.1 = ____ Litres - for a 38 mm (1.5 inch) diameter well

EQUIPMENT LIST

Pump ☐ Waterra
☐ Hydrolift
☐ Bailer (Type:____)
☐ Peristaltic
☐ Submersible
☐ Bladder

Pump Details:

Multimeter Model:
pH/Temp Meter Model:
Conductivity Meter Model:
Dissolved Oxygen Meter Model:
ORP (Redex) Meter Model:
Organic Vapour Meter Model:

☐ D.O. Ampoule

☐ Rental Equipment:
☐ Field Bump
☐ pH4 ____ ☐ pH7 ____
☐ pH10 ____
☐ 1413 us/cm ____
☐ Field Calibration ____

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X ____ = ____ litres
Avg. Flow Rate: ____ L/min.
Start: ____ Finish: ____
Sample intake depth: ____

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	☐ Cond. ☐ Specific Cond. µS/cm or mS/cm *(circle one)*	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
				DRY				

* Record DO in Mg/L, not percentage

Comments:
Odour: ☐ Yes ☐ No If yes ____
Sheen: ☐ Yes ☐ No If yes ☐ Hydrocarbon-like OR ☐ Metallic-like
Turbidity: Clear I I I I I I I I I I I I I I I I I I I I I I I I I I I I I Very Silty

Analysis	Type		Container Size							Filtered		Preservatives
			40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L			
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	

SCN No. ____ Consumables: ☐ Waterra Tubing ____ ☐ HDPE/Teflon Tubing ____ ☐ Groundwater Filter
Field Dup. ____ ☐ Silicon Tubing ____ ☐ D.O. Ampoules ____ ☐ Footvalve

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development
☐ Purging/Sampling

Well No.: MW16-10

Project Name: ~~K19 Trutch~~ **Project No.:** ~~1657709~~
Location: **Date:**
Weather: **Temperature:** **Completed By:**
GPS Coordinates: **Reviewed By:**

MONITORING WELL INFORMATION

Time of Measurement: 15:19
Depth to Product: ___ m Product Thickness: ___ m
Depth to Water (A): ___ m below ☒ TOP
Depth to Bottom of Well (B): 4.317 m below ☒ TOP
Diameter of Standpipe: 51 mm
Well Condition: No plug on well

Tidally Influenced: ☐ Yes ☒ No
Pressurized: ☐ Yes ☒ No
Well Headspace: ___ ppm
One Well Volume:
(B-A)*2.0 = ___ Litres - for a 51 mm (2.0 inch) diameter well
(B-A)*1.1 = ___ Litres - for a 38 mm (1.5 inch) diameter well

EQUIPMENT LIST

Pump
☐ Waterra
☐ Hydrolift
☐ Bailer (Type: ___)
☒ Peristaltic
☐ Submersible
☐ Bladder

Multimeter Model: ___ ☐ Rental Equipment:
pH/Temp Meter Model: ___
Conductivity Meter Model: ___ ☐ Field Bump
Dissolved Oxygen Meter Model: ___ ☐ pH4 ___ ☐ pH7 ___
ORP (Redex) Meter Model: ___ ☐ pH10 ___
Organic Vapour Meter Model: ___ ☐ 1413 us/cm ___

Pump Details: ___ ☐ D.O. Ampoule ☐ Field Calibration ___

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X ___ = ___ litres Start: ___ Finish: ___
Avg. Flow Rate: ___ L/min. Sample intake depth: ___

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	☐ Cond. ☐ Specific Cond. µS/cm or mS/cm *(circle one)*	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks

DRY

* Record DO in Mg/L, not percentage

Comments:
Odour: ☐ Yes ☐ No If yes ___
Sheen: ☐ Yes ☐ No If yes ☐ Hydrocarbon-like OR ☐ Metallic-like
Turbidity: Clear I I I I I I I I I I I I I I I I I I I I I I I I I I I I I Very Silty

Analysis	Type		Container Size							Filtered		Preservatives
			40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L			
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	

SCN No. ___ Consumables: ☐ Waterra Tubing ___ ☐ HDPE/Teflon Tubing ___ ☐ Groundwater Filter
Field Dup. ___ ☐ Silicon Tubing ___ ☐ D.O. Ampoules ___ ☐ Footvalve

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☒ Development
☐ Purging/Sampling

Well No.: K19-MW17-~~03~~ 06

Project Name:	K19 Trutch	**Project No.:**	1657709
Location:		**Date:**	18/01/2018
Weather:	**Temperature:**	**Completed By:**	BM
GPS Coordinates:		**Reviewed By:**	

MONITORING WELL INFORMATION

Time of Measurement: 15:03

Depth to Product: — m   Product Thickness: — m

Depth to Water (A): 3.857 m below ☐ TOP

Depth to Bottom of Well (B): 10.445 m below ☐ TOP

Diameter of Standpipe: ______ mm

Well Condition: ______

Tidally Influenced: ☐ Yes ☐ No

Pressurized: ☐ Yes ☐ No

Well Headspace: ______ ppm

One Well Volume:

(B-A)*2.0 = 13.2 Litres - for a 51 mm (2.0 inch) diameter well

(B-A)*1.1 = ______ Litres - for a 38 mm (1.5 inch) diameter well

EQUIPMENT LIST

Pump ☐ Waterra
☐ Hydrolift
☐ Bailer (Type: ______)
☐ Peristaltic
☐ Submersible
☐ Bladder

Pump Details: ______

Multimeter Model: ______
pH/Temp Meter Model: ______
Conductivity Meter Model: ______
Dissolved Oxygen Meter Model: ______
ORP (Redex) Meter Model: ______
Organic Vapour Meter Model: ______
☐ D.O. Ampoule

☐ Rental Equipment:
☐ Field Bump
☐ pH4 ______ ☐ pH7 ______
☐ pH10 ______
☐ 1413 us/cm ______
☐ Field Calibration ______

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X ______ = ______ litres   Start: ______ Finish: ______

Avg. Flow Rate: ______ L/min.   Sample intake depth: ______

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	☐ Cond. ☒ Specific Cond. µS/cm or mS/cm (circle one)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
15:48	30	4.5	7.57	735.0	-10.6	2.05	5.781	Very Silty
15:59	60	4.4	7.29	404.5	13.1	2.63	5.845	" "
16:12	90	3.4	6.88	730.9	34.1	2.64	6.015	" "
16:23	120	3.8	6.90	382.8	49.0	2.17	6.212	" "
	135	3.4	7.92	731.4	20.4	2.66	6.323	" "

* Record DO in Mg/L, not percentage

Comments:

Odour: ☐ Yes ☒ No If yes ______

Sheen: ☐ Yes ☒ No If yes ☐ Hydrocarbon-like OR ☐ Metallic-like

Turbidity: Clear I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I (circled near end) Very Silty

Analysis	Type		40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L	Filtered		Preservatives
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	

(Container Size spans 40 mL – 4 L columns)

SCN No. ______   Consumables: ☐ Waterra Tubing ______ ☐ HDPE/Teflon Tubing ______ ☐ Groundwater Filter

Field Dup. ______   ☐ Silicon Tubing ______ ☐ D.O. Ampoules ______ ☐ Footvalve

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development
☐ Purging/Sampling

Well No.: K19-MW17-35

Project Name: K19 Trutch
Project No.: 1657709
Location:
Date:
Weather: **Temperature:**
Completed By: BM
GPS Coordinates:
Reviewed By:

MONITORING WELL INFORMATION

Time of Measurement:
Depth to Product: — m Product Thickness: ____ m
Depth to Water (A): 4.675 m below ☐ TOP
Depth to Bottom of Well (B): 4.87 m below ☐ TOP
Diameter of Standpipe: ____ mm
Well Condition:

Tidally Influenced: ☐ Yes ☐ No
Pressurized: ☐ Yes ☐ No
Well Headspace: ____ ppm
One Well Volume:
(B-A)*2.0 = 0.43 Litres - for a 51 mm (2.0 inch) diameter well
(B-A)*1.1 = ____ Litres - for a 38 mm (1.5 inch) diameter well

EQUIPMENT LIST

Pump ☐ Waterra ☐ Hydrolift ☐ Bailer (Type: ____) ☐ Peristaltic ☐ Submersible ☐ Bladder

Multimeter Model:
pH/Temp Meter Model:
Conductivity Meter Model:
Dissolved Oxygen Meter Model:
ORP (Redex) Meter Model:
Organic Vapour Meter Model:
☐ D.O. Ampoule

☐ Rental Equipment:
☐ Field Bump ☐ pH4 ☐ pH7 ☐ pH10 ☐ 1413 us/cm
☐ Field Calibration

Pump Details:

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X ____ = ____ litres Start: ____ Finish: ____
Avg. Flow Rate: ____ L/min. Sample intake depth: ____

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	☐ Cond. ☒ Specific Cond. µS/cm or mS/cm (circle one)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
12:15	<1	3.4	7.22	992	-25.9	1.30	4.85	Pumped dry
			DRY					

* Record DO in Mg/L, not percentage

Comments:
Odour: ☐ Yes ☐ No If yes
Sheen: ☐ Yes ☐ No If yes ☐ Hydrocarbon-like OR ☐ Metallic-like
Turbidity: Clear I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I Very Silty

Analysis	Type		Container Size 40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L	Filtered		Preservatives
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	

SCN No. ____ Consumables: ☐ Waterra Tubing ____ ☐ HDPE/Teflon Tubing ____ ☐ Groundwater Filter
Field Dup. ____ ☐ Silicon Tubing ____ ☐ D.O. Ampoules ____ ☐ Footvalve

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☒ Development
☐ Purging/Sampling

Well No.: K19-MW18-01

Project Name: K19 Trutch
Project No.: 1657709
Location:
Date: 18/01/2018 – 19/01/2018
Weather:
Temperature:
Completed By:
GPS Coordinates:
Reviewed By:

MONITORING WELL INFORMATION

Time of Measurement:
Depth to Product: — m
Product Thickness: — m
Depth to Water (A): 6.757 m below ☒ TOP
Depth to Bottom of Well (B): 9.265 m below ☒ TOP
Diameter of Standpipe: 51 mm
Well Condition: Good, new install

Tidally Influenced: ☐ Yes ☒ No
Pressurized: ☐ Yes ☒ No
Well Headspace: — ppm
One Well Volume:
(B-A)*2.0 = 5.0 Litres - for a 51 mm (2.0 inch) diameter well
(B-A)*1.1 = ______ Litres - for a 38 mm (1.5 inch) diameter well

EQUIPMENT LIST

Pump
☐ Waterra
☐ Hydrolift
☐ Bailer (Type: ______)
☐ Peristaltic
☐ Submersible
☐ Bladder

Multimeter Model:
pH/Temp Meter Model:
Conductivity Meter Model:
Dissolved Oxygen Meter Model:
ORP (Redex) Meter Model:
Organic Vapour Meter Model:

☐ Rental Equipment:
☐ Field Bump
☐ pH4 ______ ☐ pH7 ______
☐ pH10 ______
☐ 1413 us/cm ______

Pump Details:
☐ D.O. Ampoule
☐ Field Calibration

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X ______ = ______ litres
Start: Finish:
Avg. Flow Rate: ______ L/min.
Sample intake depth:

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	☐ Cond. ☒ Specific Cond. µS/cm or mS/cm (circle one)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
17:04	15	0.8	6.93	992	30.4	3.86		
17:13	25	1.5	7.13	898.2	2.9	9.86	8.312	
17:23	35						8.263	
19/01/2018 10:00	50							

* Record DO in Mg/L, not percentage

Comments:
Odour: ☐ Yes ☐ No If yes
Sheen: ☐ Yes ☐ No If yes ☐ Hydrocarbon-like OR ☐ Metallic-like
Turbidity: Clear I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I Very Silty

Analysis	Type		Container Size: 40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L	Filtered		Preservatives
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	

SCN No.:
Field Dup.:
Consumables: ☒ Waterra Tubing ~10 m ☐ HDPE/Teflon Tubing ______ ☐ Groundwater Filter
☐ Silicon Tubing ______ ☐ D.O. Ampoules ______ ☐ Footvalve

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☒ Development
☐ Purging/Sampling

Well No.: K19-MW18-02

Project Name: K19 Trutch
Project No.: 1657709
Location:
Date: 18/01/2018
Weather: overcast **Temperature:** -7
Completed By: BM
GPS Coordinates:
Reviewed By:

MONITORING WELL INFORMATION

Time of Measurement:
Depth to Product: — m Product Thickness: — m
Depth to Water (A): 6.749 m below ☒ TOP
Depth to Bottom of Well (B): 11.910 m below ☒ TOP
Diameter of Standpipe: 51 mm
Well Condition: Good, new install

Tidally Influenced: ☐ Yes ☒ No
Pressurized: ☐ Yes ☒ No
Well Headspace: — ppm
One Well Volume:
(B-A)*2.0 = 10.3 Litres - for a 51 mm (2.0 inch) diameter well
(B-A)*1.1 = ____ Litres - for a 38 mm (1.5 inch) diameter well

EQUIPMENT LIST

Pump ☒ Waterra
☐ Hydrolift
☐ Bailer (Type: ____)
☐ Peristaltic
☐ Submersible
☐ Bladder

Multimeter Model: YSI Pro Plus
pH/Temp Meter Model:
Conductivity Meter Model:
Dissolved Oxygen Meter Model:
ORP (Redex) Meter Model:
Organic Vapour Meter Model: —

☐ Rental Equipment:
☐ Field Bump
☐ pH4 ☐ pH7
☐ pH10
☐ 1413 us/cm

Pump Details:
☐ D.O. Ampoule
☒ Field Calibration See BM field notes

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X ____ = ____ litres
Start: 10:00 Finish:
Avg. Flow Rate: ____ L/min.
Sample intake depth:

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	☐ Cond. ☒ Specific Cond. µS/cm or mS/cm (circle one)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
10:00	—	2.2	6.64	1051	68.0	0.72	6.749	Extremely silty
10:30	30	2.6	6.42	931	49.8	3.53	6.758	" "
11:00	60	2.4	6.53	1001	53.2	4.67	6.710	" "
14:49	100	2.8	7.00	957	25.9	4.44	6.723	" "

* Record DO in Mg/L, not percentage

Comments:
Odour: ☐ Yes ☒ No If yes
Sheen: ☐ Yes ☒ No If yes ☐ Hydrocarbon-like OR ☐ Metallic-like
Turbidity: Clear I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I Very Silty (start)

Analysis	Type		Container Size 40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L	Filtered		Preservatives
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	

SCN No. ____ Consumables: ☒ Waterra Tubing ~12.5m ☐ HDPE/Teflon Tubing ____ ☐ Groundwater Filter
Field Dup. ____ ☐ Silicon Tubing ____ ☐ D.O. Ampoules ____ ☐ Footvalve

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

[x] Development
[x] Purging/Sampling

Well No.: K19 MW 18-07D

Project Name:	K19 Trotch	**Project No.:**	1657709
Location:		**Date:**	19/01/18
Weather:	Clear **Temperature:** -10	**Completed By:**	BM
GPS Coordinates:		**Reviewed By:**	

MONITORING WELL INFORMATION

Time of Measurement: 13:18

Depth to Product: / m Product Thickness: / m

Depth to Water (A): 6.952 m below [x] TOP

Depth to Bottom of Well (B): 10.807 m below [x] TOP

Diameter of Standpipe: 51 mm

Well Condition: Good, new install

Tidally Influenced: ☐ Yes [x] No

Pressurized: ☐ Yes [x] No

Well Headspace: / ppm

One Well Volume:

(B-A)*2.0 = 7.7 Litres - for a 51 mm (2.0 inch) diameter well

(B-A)*1.1 = ______ Litres - for a 38 mm (1.5 inch) diameter well

EQUIPMENT LIST

Pump: [x] Waterra ☐ Hydrolift ☐ Bailer (Type: ______) ☐ Peristaltic ☐ Submersible ☐ Bladder

Pump Details: ______

Instrument	Model
Multimeter	YSI Pro Plus
pH/Temp Meter	↓
Conductivity Meter	↓
Dissolved Oxygen Meter	↓
ORP (Redex) Meter	↓
Organic Vapour Meter	/

☐ D.O. Ampoule

☐ Rental Equipment:

☐ Field Bump: ☐ pH4 ______ ☐ pH7 ______ ☐ pH10 ______ ☐ 1413 us/cm ______

☐ Field Calibration ______

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X ______ = ______ litres Start: 13: Finish: ______

Avg. Flow Rate: ______ L/min. Sample intake depth: ______

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	☐ Cond. [x] Specific Cond. µS/cm or mS/cm (circle one)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
13:39	14	1.1	7.97	896.7	60.1	6.36	10.031	Silty
13:44	22						Dry	Silty. Dry @ 22L
14:48	36	2.5	7.54	847.2	-109.6	8.06	10.151	
15:23	48							Dry @ 48L, Clearing
15:46	63							Dry @ 63L, Clearing
16:16	73	3.2	7.38	779.8	-63.0	7.50		Dry @ 73L
16:45	77							

* Record DO in Mg/L, not percentage

Comments:

Odour: ☐ Yes [x] No If yes ______

Sheen: ☐ Yes [x] No If yes ☐ Hydrocarbon-like OR ☐ Metallic-like

Turbidity: Clear I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I Very Silty (circled toward silty end)

Analysis	Type		40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L	Filtered		Preservatives
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	

SCN No. ______ Consumables: ☐ Waterra Tubing ______ ☐ HDPE/Teflon Tubing ______ ☐ Groundwater Filter

Field Dup. ______ ☐ Silicon Tubing ______ ☐ D.O. Ampoules ______ ☐ Footvalve

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☒ Development ☐ Purging/Sampling Well No.: BH9-MW18-C

Project Name: _____ **Project No.:** 1657709

Location: _____ **Date:** 20/11/2018

Weather: _____ **Temperature:** -12 **Completed By:** BM

GPS Coordinates: _____ **Reviewed By:** _____

MONITORING WELL INFORMATION

Time of Measurement: _____

Depth to Product: _____ m Product Thickness: _____ m

Depth to Water (A): DRY m below ☒ TOP

Depth to Bottom of Well (B): 7.792 m below ☒ TOP

Diameter of Standpipe: _____ mm

Well Condition: _____

Tidally Influenced: ☐ Yes ☒ No

Pressurized: ☐ Yes ☒ No

Well Headspace: _____ ppm

One Well Volume:

(B-A)*2.0 = _____ Litres - for a 51 mm (2.0 inch) diameter well

(B-A)*1.1 = _____ Litres - for a 38 mm (1.5 inch) diameter well

EQUIPMENT LIST

Pump ☐ Waterra ☐ Hydrolift ☐ Bailer (Type: _____) ☐ Peristaltic ☐ Submersible ☐ Bladder

Pump Details: _____

Multimeter Model: _____ ☐ Rental Equipment:

pH/Temp Meter Model: _____

Conductivity Meter Model: _____ ☐ Field Bump

Dissolved Oxygen Meter Model: _____ ☐ pH4 _____ ☐ pH7 _____

ORP (Redex) Meter Model: _____ ☐ pH10 _____

Organic Vapour Meter Model: _____ ☐ 1413 us/cm _____

☐ D.O. Ampoule ☐ Field Calibration _____

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X _____ = _____ litres Start: _____ Finish: _____

Avg. Flow Rate: _____ L/min. Sample intake depth: _____

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	☐ Cond. ☐ Specific Cond. µS/cm or mS/cm *(circle one)*	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks

DRY

* Record DO in Mg/L, not percentage

Comments:

Odour: ☐ Yes ☐ No If yes _____

Sheen: ☐ Yes ☐ No If yes ☐ Hydrocarbon-like OR ☐ Metallic-like

Turbidity: Clear I I I I I I I I I I I I I I I I I I I I I I I I I I I I I Very Silty

Analysis	Type		Container Size							Filtered		Preservatives
			40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L			
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	

SCN No. _____ Consumables: ☐ Waterra Tubing _____ ☐ HDPE/Teflon Tubing _____ ☐ Groundwater Filter

Field Dup. _____ ☐ Silicon Tubing _____ ☐ D.O. Ampoules _____ ☐ Footvalve

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☒ Development
☐ Purging/Sampling

Well No.: K19-MW18-08D

Project Name: K19 Tritch
Project No.: 1657709
Location:
Date: 20/01/2018
Weather:
Temperature: -12
Completed By: BM
GPS Coordinates:
Reviewed By:

MONITORING WELL INFORMATION

Time of Measurement: —
Depth to Product: — m
Product Thickness: — m
Depth to Water (A): 7.972 m below ☒ TOP
Depth to Bottom of Well (B): 11.796 m below ☒ TOP
Diameter of Standpipe: 51 mm
Well Condition: Good, new install

Tidally Influenced: ☐ Yes ☒ No
Pressurized: ☐ Yes ☒ No
Well Headspace: — ppm
One Well Volume:
(B-A)*2.0 = 7.6 Litres - for a 51 mm (2.0 inch) diameter well
(B-A)*1.1 = Litres - for a 38 mm (1.5 inch) diameter well

EQUIPMENT LIST

Pump ☒ Waterra
☐ Hydrolift
☐ Bailer (Type:)
☐ Peristaltic
☐ Submersible
☐ Bladder

Pump Details:

Multimeter Model: YSI ProPlus
pH/Temp Meter Model:
Conductivity Meter Model:
Dissolved Oxygen Meter Model:
ORP (Redex) Meter Model:
Organic Vapour Meter Model: —
☐ D.O. Ampoule

☐ Rental Equipment:
☐ Field Bump
☐ pH4 ☐ pH7
☐ pH10
☐ 1413 us/cm
☒ Field Calibration See BM fieldnotes

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X 10 = 76 litres
Start: Finish:
Avg. Flow Rate: L/min.
Sample intake depth:

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	☐ Cond. ☒ Specific Cond. (µS/cm) or mS/cm (circle one)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
10:07	14	2.1	7.87	1054	-148.9	3.67	8.585	Silty
10:17	28	—	—	—	—	—	9.341	" "
10:20	42	2.0	7.49	561.6	-49.3	5.54	9.842	Clearing
10:25	70	2.0	7.18	1001	-27.8	5.52	9.275	" "
10:44	100	1.8	7.13	990	-124.3	6.38	9.122	" "
10:50	114	—	—	—	—	—	9.23	" "

* Record DO in Mg/L, not percentage

Comments:
Odour: ☐ Yes ☒ No If yes
Sheen: ☐ Yes ☒ No If yes ☐ Hydrocarbon-like OR ☐ Metallic-like
Turbidity: Clear I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I Very Silty (start)

Analysis	Type		40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L	Filtered		Preservatives
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	

(Container Size spans 40 mL – 4 L)

SCN No.:
Field Dup.:
Consumables: ☐ Waterra Tubing ☐ HDPE/Teflon Tubing ☐ Groundwater Filter
☐ Silicon Tubing ☐ D.O. Ampoules ☐ Footvalve

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☒ Development
☐ Purging/Sampling

Well No.: K19-MW18-09

Project Name: K19 Trutch
Location:
Weather: Clear **Temperature:** -12
GPS Coordinates:

Project No.: 1657709
Date: 20/01/2018
Completed By: BM
Reviewed By:

MONITORING WELL INFORMATION

Time of Measurement: 13:55
Depth to Product: — m Product Thickness: — m
Depth to Water (A): 7.950 m below ☐ TOP
Depth to Bottom of Well (B): 11.241 m below ☐ TOP
Diameter of Standpipe: 51 mm
Well Condition: Good, new install

Tidally Influenced: ☐ Yes ☒ No
Pressurized: ☐ Yes ☒ No
Well Headspace: — ppm
One Well Volume:
(B-A)*2.0 = 6.6 Litres - for a 51 mm (2.0 inch) diameter well
(B-A)*1.1 = — Litres - for a 38 mm (1.5 inch) diameter well

EQUIPMENT LIST

Pump ☒ Waterra
☐ Hydrolift
☐ Bailer (Type:)
☐ Peristaltic
☐ Submersible
☐ Bladder

Pump Details:

Multimeter Model: YSI Pro Plus
pH/Temp Meter Model: ↓
Conductivity Meter Model: ↓
Dissolved Oxygen Meter Model: ↓
ORP (Redex) Meter Model: ↓
Organic Vapour Meter Model: —
☐ D.O. Ampoule

☐ Rental Equipment:
☐ Field Bump
☐ pH4 ☐ pH7
☐ pH10
☐ 1413 us/cm
☒ Field Calibration See BM field notes

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X ____ = ____ litres Start: 13:55 Finish:
Avg. Flow Rate: ____ L/min. Sample intake depth:

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	☐ Cond. ☒ Specific Cond. µS/cm or mS/cm (circle one)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
13:59	14	1.0	7.95	1062	-90.1	6.61	—	Silty
14:05	28	1.5	8.05	1053	-43.8	7.25	8.395	" "
14:16	42	1.3	7.70	940	-60.2	5.74	8.298	" "
14:24	70	1.5	7.48	1015	-4.8	4.36	8.893	Clearing
14:34	100	2.4	7.63	975	-6.8	5.44	8.962	" "

* Record DO in Mg/L, not percentage

Comments:
Odour: ☐ Yes ☒ No If yes
Sheen: ☐ Yes ☒ No If yes ☐ Hydrocarbon-like OR ☐ Metallic-like
Turbidity: Clear I I I I I I I I I I I I I I I I I I I I I I I I I (I) I I I I I Very Silty
Start

Analysis	Type		40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L	Filtered		Preservatives
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	

SCN No. Consumables: ☐ Waterra Tubing ☐ HDPE/Teflon Tubing ☐ Groundwater Filter
Field Dup. ☐ Silicon Tubing ☐ D.O. Ampoules ☐ Footvalve

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☒ Development
☐ Purging/Sampling

Well No.: K19-MW18-10D

Project Name:	K19 Trutch	**Project No.:**	1657709
Location:		**Date:**	21/01/2018
Weather:	Overcast, snow **Temperature:** -12°	**Completed By:**	BM
GPS Coordinates:		**Reviewed By:**	

MONITORING WELL INFORMATION

Time of Measurement: 12:00
Depth to Product: — m Product Thickness: — m
Depth to Water (A): 5.637 m below ☒ TOP
Depth to Bottom of Well (B): 10.882 m below ☒ TOP
Diameter of Standpipe: 51 mm
Well Condition: Good, new install

Tidally Influenced: ☐ Yes ☒ No
Pressurized: ☐ Yes ☒ No
Well Headspace: — ppm
One Well Volume:
(B-A)*2.0 = 10.5 Litres - for a 51 mm (2.0 inch) diameter well
(B-A)*1.1 = ____ Litres - for a 38 mm (1.5 inch) diameter well

EQUIPMENT LIST

Pump ☒ Waterra
☐ Hydrolift
☐ Bailer (Type: ____)
☐ Peristaltic
☐ Submersible
☐ Bladder

Pump Details: ____

Multimeter Model: YSI Pro Plus
pH/Temp Meter Model: ↓
Conductivity Meter Model: ↓
Dissolved Oxygen Meter Model: ↓
ORP (Redox) Meter Model: ↓
Organic Vapour Meter Model: —
☐ D.O. Ampoule

☐ Rental Equipment:
☐ Field Bump
☐ pH4 ☐ pH7
☐ pH10
☐ 1413 us/cm
☒ Field Calibration See BM field notes

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X ____ = ____ litres
Start: 12:00 Finish: ____
Avg. Flow Rate: ____ L/min.
Sample intake depth: ____

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	☐ Cond. ☒ Specific Cond. (µS/cm circled) or mS/cm (circle one)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
12:03	15	0.8	7.19	646.5	22.1	2.76	5.972	Very Silty
12:06	30	2.7	7.05	353.0	4.2	2.28	6.062	" "
12:19	60	2.6	7.22	600.5	-2.9	2.71	6.273	" "
12:30	90	1.5	7.42	586.0	-5.1	4.82	6.369	" "
12:39	120	1.8	7.17	585.0	-0.9	6.07	6.476	" "
12:51	165	1.7	7.35	590.2	-4.3	5.89	6.657	Clearing

* Record DO in Mg/L, not percentage

Comments:
Odour: ☐ Yes ☒ No If yes ____
Sheen: ☐ Yes ☒ No If yes ☐ Hydrocarbon-like OR ☐ Metallic-like
Turbidity: Clear I I I I I I I I I I I I I I I I I I I I I I I I I I I (I I I) I I Very Silty

Analysis	Type		40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L	Filtered		Preservatives
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	

(Container Size spans 40 mL – 4 L)

SCN No. ____ Consumables: ☐ Waterra Tubing ____ ☐ HDPE/Teflon Tubing ____ ☐ Groundwater Filter
Field Dup. ____ ☐ Silicon Tubing ____ ☐ D.O. Ampoules ____ ☐ Footvalve

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☒ Development
☐ Purging/Sampling

Well No.: K19-MW018-12

Project Name: K19
Project No.: 1657709
Location:
Date: 24/01/2018
Weather: Snowing **Temperature:** -16
Completed By: BM
GPS Coordinates:
Reviewed By:

MONITORING WELL INFORMATION

Time of Measurement: [illegible]:00
Tidally Influenced: ☐ Yes ☒ No
Depth to Product: — m
Product Thickness: — m
Pressurized: ☐ Yes ☒ No
Depth to Water (A): 8.235 m below ☒ TOP
Well Headspace: — ppm
Depth to Bottom of Well (B): 14.074 m below ☒ TOP
One Well Volume:
Diameter of Standpipe: 51 mm
(B-A)*2.0 = 11.7 Litres - for a 51 mm (2.0 inch) diameter well
Well Condition: Good, New install
(B-A)*1.1 = — Litres - for a 38 mm (1.5 inch) diameter well

EQUIPMENT LIST

Pump ☒ Waterra
☒ Hydrolift
☐ Bailer (Type:)
☐ Peristaltic
☐ Submersible
☐ Bladder

Multimeter Model: YSI ProPlus
pH/Temp Meter Model:
Conductivity Meter Model:
Dissolved Oxygen Meter Model:
ORP (Redox) Meter Model:
Organic Vapour Meter Model: —

☐ Rental Equipment:
☐ Field Bump
☐ pH4 ☐ pH7
☐ pH10
☐ 1413 us/cm

Pump Details:
☐ D.O. Ampoule
☒ Field Calibration See BM field notes

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X ______ = ______ litres
Start: 11:08 Finish:
Avg. Flow Rate: ______ L/min.
Sample intake depth:

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	☐ Cond. ☒ Specific Cond. µS/cm or mS/cm (circle one)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
11:11	14	—	—	—	—	—	DRY	DRY @ 14 L
14:07	25	—	—	—	—	—	DRY	DRY @ 28 L
25/01/18 9:31	42	—	—	—	—	—	DRY	DRY @ 42 L
10:30	54	2.0	7.93	617.6	-6.0	10.77	DRY	DRY @ 54 L
11:07	62	—	—	—	—	—	" "	DRY @ 62 L
11:59	70	4.3	7.73	755.4	-4.4	10.32	" "	DRY @ 70 L
13:06	80	—	—	—	—	—	" "	Dry @ 80 L
15:00	100	—	—	—	—	—	—	Dry @ 100 L

* Record DO in Mg/L, not percentage

Comments:
Odour: ☐ Yes ☒ No If yes
Sheen: ☐ Yes ☒ No If yes ☐ Hydrocarbon-like OR ☐ Metallic-like
Turbidity: Clear I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I Very Silty

Analysis	Type		40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L	Filtered		Preservatives
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	

SCN No.
Consumables: ☐ Waterra Tubing ☐ HDPE/Teflon Tubing ☐ Groundwater Filter
Field Dup. ☐ Silicon Tubing ☐ D.O. Ampoules ☐ Footvalve

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☒ Development
☐ Purging/Sampling

Well No.: K19-MW18-15

Project Name: F K19
Location:
Weather: Snowing **Temperature:** -19°C
GPS Coordinates:

Project No.: 1657709
Date: 25/01/2018
Completed By: BM
Reviewed By:

MONITORING WELL INFORMATION

Time of Measurement: 9:40
Depth to Product: — m
Product Thickness: — m
Depth to Water (A): 7.912 m below ☒ TOP
Depth to Bottom of Well (B): 13.525 m below ☒ TOP
Diameter of Standpipe: 51 mm
Well Condition: Good, new install

Tidally Influenced: ☐ Yes ☒ No
Pressurized: ☐ Yes ☒ No
Well Headspace: — ppm
One Well Volume:
(B-A)*2.0 = 9.2 Litres - for a 51 mm (2.0 inch) diameter well
(B-A)*1.1 = ______ Litres - for a 38 mm (1.5 inch) diameter well

EQUIPMENT LIST

Pump ☒ Waterra
☒ Hydrolift
☐ Bailer (Type: ______)
☐ Peristaltic
☐ Submersible
☐ Bladder

Multimeter Model: YSI Pro Plus
pH/Temp Meter Model: |
Conductivity Meter Model: |
Dissolved Oxygen Meter Model: |
ORP (Redox) Meter Model: ↓
Organic Vapour Meter Model: —

☐ Rental Equipment:
☐ Field Bump
☐ pH4 ☐ pH7
☐ pH10
☐ 1413 us/cm

Pump Details: ☐ D.O. Ampoule ☐ Field Calibration

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X ______ = ______ litres
Start: 10:00 Finish:
Avg. Flow Rate: ______ L/min.
Sample intake depth:

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	☐ Cond. ☐ Specific Cond. µS/cm or mS/cm (circle one)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
10:00	24	—	—	—	—	—	Dry	Dry @ 24 L
10:41	36	—	—	—	—	—	dry	Dry @ 36L
11:30	48	2.9	7.83	773.1	-21.6	7.53	" "	Dry @ 48L
12:15	60	4.0	7.57	766.3	2.0	9.47	" "	Dry @ 60L, clearing
13:25	74	4.0	7.76	801.8	17.8	9.74	" "	Dry @ 74L, Clearing
14:30	90	—	—	—	—	—	" "	Dry @ 90L, Clearing

* Record DO in Mg/L, not percentage

Comments:
Odour: ☐ Yes ☒ No If yes
Sheen: ☐ Yes ☒ No If yes ☐ Hydrocarbon-like OR ☐ Metallic-like
Turbidity: Clear I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I Very Silty

Analysis	Type		Container Size 40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L	Filtered		Preservatives
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	

SCN No. ______ Consumables: ☐ Waterra Tubing ______ ☐ HDPE/Teflon Tubing ______ ☐ Groundwater Filter
Field Dup. ______ ☐ Silicon Tubing ______ ☐ D.O. Ampoules ______ ☐ Footvalve

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☒ Development ☐ Purging/Sampling — Well No.: K19-MW18-H6

Project Name: K19 **Project No.:** 1657709
Location: **Date:** 25/01/2018
Weather: Snowing **Temperature:** -19°C **Completed By:** BM
GPS Coordinates: **Reviewed By:**

MONITORING WELL INFORMATION

Time of Measurement: 13:45
Depth to Product: — m Product Thickness: — m
Depth to Water (A): 7.766 m below ☒ TOP
Depth to Bottom of Well (B): 10.951 m below ☒ TOP
Diameter of Standpipe: 51 mm
Well Condition: Good, new install

Tidally Influenced: ☐ Yes ☒ No
Pressurized: ☐ Yes ☒ No
Well Headspace: — ppm
One Well Volume:
(B-A)*2.0 = 6.4 Litres - for a 51 mm (2.0 inch) diameter well
(B-A)*1.1 = — Litres - for a 38 mm (1.5 inch) diameter well

EQUIPMENT LIST

Pump ☒ Waterra ☒ Hydrolift ☐ Bailer (Type:) ☐ Peristaltic ☐ Submersible ☐ Bladder

Multimeter Model: YSI ProPlus
pH/Temp Meter Model: ↓
Conductivity Meter Model: ↓
Dissolved Oxygen Meter Model: ↓
ORP (Redex) Meter Model: ↓
Organic Vapour Meter Model: —

☐ Rental Equipment:
☐ Field Bump ☐ pH4 ☐ pH7 ☐ pH10 ☐ 1413 us/cm

Pump Details: ☐ D.O. Ampoule ☐ Field Calibration

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X = litres Start: Finish:
Avg. Flow Rate: L/min. Sample intake depth:

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	☐ Cond. ☒ Specific Cond. (µS/cm or mS/cm) (circle one)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
14:00	14	—	—	—	—	—	—	Dry @ 14 L
15:41	30	2.3	7.84	756.9	-20.7	8.81	0.445	
15:45	35	—	—	—	—	—	—	Dry @ 35 L
16:30	50	—	—	—	—	—	—	Dry @ 50 L
17:00	60	—	—	—	—	—	—	Dry @ 60 L

* Record DO in Mg/L, not percentage

Comments:
Odour: ☐ Yes ☒ No If yes
Sheen: ☐ Yes ☒ No If yes ☐ Hydrocarbon-like OR ☐ Metallic-like
Turbidity: Clear I I I I I I I I I I I I I I I I I I I I I I I I I I (I) I I I Very Silty

Analysis	Type		40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L	Filtered		Preservatives
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	

(Container Size spans 40 mL – 4 L)

SCN No. Consumables: ☐ Waterra Tubing ☐ HDPE/Teflon Tubing ☐ Groundwater Filter
Field Dup. ☐ Silicon Tubing ☐ D.O. Ampoules ☐ Footvalve

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development
☒ Purging/Sampling

Well No.: MW09-04

Project Name: K19 Trutch
Project No.: 1657709
Location:
Date: 13 Jan 18
Weather: overcast **Temperature:** -11°C
Completed By: SS
GPS Coordinates:
Reviewed By:

MONITORING WELL INFORMATION

Time of Measurement: 1450
Depth to Product: / m Product Thickness: / m
Depth to Water (A): 3.871 m below ☒ TOP
Depth to Bottom of Well (B): 7.519 m below ☒ TOP
Diameter of Standpipe: 51 mm
Well Condition: Good

Tidally Influenced: ☐ Yes ☒ No
Pressurized: ☐ Yes ☒ No
Well Headspace: / ppm
One Well Volume:
(B-A)*2.0 = 7.2 Litres - for a 51 mm (2.0 inch) diameter well
(B-A)*1.1 = / Litres - for a 38 mm (1.5 inch) diameter well

EQUIPMENT LIST

Pump ☐ Waterra ☐ Hydrolift ☐ Bailer (Type:) ☒ Peristaltic ☐ Submersible ☐ Bladder

Multimeter Model: YSI proplus
pH/Temp Meter Model: ↓
Conductivity Meter Model: ↓
Dissolved Oxygen Meter Model: ↓
ORP (Redox) Meter Model: ↓
Organic Vapour Meter Model: ↓

☐ Rental Equipment: See field notes
☐ Field Bump
☐ pH4 ☐ pH7
☐ pH10
☐ 1413 us/cm

Pump Details:
☐ D.O. Ampoule
☐ Field Calibration

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X ______ = ______ litres Start: Finish:
Avg. Flow Rate: ______ L/min. Sample intake depth:

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	☐ Cond. ☒ Specific Cond. µS/cm (circled) or mS/cm (circle one)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
1505	1.5	3.4	7.24	587.0	-198.5	0.43	4.301	Clear.
1513	4	3.3	7.67	586.1	-220.4	0.65	4.461	"
1516	5	3.2	6.98	584.7	-228.4	0.46	4.431	"
1520	6	3.0	6.96	586.2	-233.2	0.23	4.402	"
1526	7.5	2.9	6.96	593.1	-241.7	0.46	4.396	"
	Sample after			FSL				

* Record DO in Mg/L, not percentage

Comments:
Odour: ☐ Yes ☒ No If yes
Sheen: ☐ Yes ☒ No If yes ☐ Hydrocarbon-like OR ☐ Metallic-like
Turbidity: Clear I I (I I/I I) I I I I I I I I I I I I I I I I I I I I I I I Very Silty

Analysis	Type		40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L	Filtered		Preservatives
D Metals	☒ Plastic	☒ Glass	1	1						☒ Yes	☐ No	HNO3 / HCl
BTEX/VPH	☐ Plastic	☒ Glass	3							☐ Yes	☒ No	Sod Bi
L/H/PAH	☐ Plastic	☒ Glass			2					☐ Yes	☒ No	"
Chloride.	☒ Plastic	☐ Glass		1						☐ Yes	☒ No	—
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	

(Container Size spans 40 mL – 4 L)

SCN No. 04309-02 Consumables: ☐ Waterra Tubing ☐ HDPE/Teflon Tubing ☐ Groundwater Filter
Field Dup. / ☐ Silicon Tubing ☐ D.O. Ampoules ☐ Footvalve

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GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development ☒ Purging/Sampling

K19 - Well No.: MW10-03

Project Name: K19 Trutch **Project No.:** 1657709

Location: **Date:** 14 Jun 2018

Weather: Clear **Temperature:** -12 c **Completed By:** [illegible]

GPS Coordinates: **Reviewed By:**

MONITORING WELL INFORMATION

Time of Measurement: 1530

Depth to Product: / m Product Thickness: / m

Depth to Water (A): 5.75 m below ☒ TOP

Depth to Bottom of Well (B): 11.100 m below ☒ TOP

Diameter of Standpipe: 51 mm

Well Condition: Good

Tidally Influenced: ☐ Yes ☒ No

Pressurized: ☐ Yes ☒ No

Well Headspace: / ppm

One Well Volume:

(B-A)*2.0 = 10.6 Litres - for a 51 mm (2.0 inch) diameter well

(B-A)*1.1 = / Litres - for a 38 mm (1.5 inch) diameter well

EQUIPMENT LIST

Pump ☐ Waterra ☐ Hydrolift ☐ Bailer (Type:) ☒ Peristaltic ☐ Submersible ☐ Bladder

Pump Details:

Multimeter Model: YSI ProPlus ☐ Rental Equipment: Jacobs Field Works.

pH/Temp Meter Model:

Conductivity Meter Model:

Dissolved Oxygen Meter Model:

ORP (Redex) Meter Model:

Organic Vapour Meter Model:

☐ D.O. Ampoule

☐ Field Bump ☐ pH4 ☐ pH7 ☐ pH10 ☐ 1413 us/cm

☐ Field Calibration

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X = litres Start: Finish:

Avg. Flow Rate: L/min. Sample intake depth:

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	☐ Cond. ☒ Specific Cond. µS/cm or mS/cm (circle one)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
1540	1	4.1	6.70	878	-123.1	7.74	5.780	Clear.
1543	2	3.8	6.63	883	-126.9	7.79	5.771	
1548	3	3.7	6.52	885	-131.9	6.08	11	
1553	4	3.4	6.48	888	-136.9	6.18	11	
1559	5	3.4	6.48	886	-141.6	7.05	11	
	Sample after			5 L				

* Record DO in Mg/L, not percentage

Comments:

Odour: ☐ Yes ☒ No If yes

Sheen: ☐ Yes ☒ No If yes ☐ Hydrocarbon-like OR ☐ Metallic-like

Turbidity: Clear (1) 2 3 4 5 Very Silty

Analysis	Type		Container Size							Filtered		Preservatives
			40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L			
D. Metals	☐ Plastic	☐ Glass	1	1						☒ Yes	☐ No	HCl / HNO3
VPH BTEX (VOC)	☐ Plastic	☒ Glass	3							☐ Yes	☒ No	Sod Bi.
L/H/OM	☐ Plastic	☒ Glass			2					☐ Yes	☒ No	11
Chloride	☒ Plastic	☐ Glass		1						☐ Yes	☒ No	—
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	

SCN No. 04309-07 Consumables: ☐ Waterra Tubing ☐ HDPE/Teflon Tubing ☐ Groundwater Filter

Field Dup. / ☐ Silicon Tubing ☐ D.O. Ampoules ☐ Footvalve

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development
☒ Purging/Sampling

Well No.: K19-MW16-01D

Project Name: K19 Trutch
Project No.: 1657709
Location:
Date: 14/01/2018
Weather: Clear **Temperature:** -14
Completed By: BM
GPS Coordinates:
Reviewed By:

MONITORING WELL INFORMATION

Time of Measurement: 13:25
Depth to Product: ~~/~~ m Product Thickness: ~~/~~ m
Depth to Water (A): 7.189 m below ☒ TOP
Depth to Bottom of Well (B): 8.934 m below ☐ TOP
Diameter of Standpipe: 51 mm
Well Condition: Good

Tidally Influenced: ☐ Yes ☒ No
Pressurized: ☐ Yes ☒ No
Well Headspace: ~~/~~ ppm
One Well Volume:
(B-A)*2.0 = 3.5 Litres - for a 51 mm (2.0 inch) diameter well
(B-A)*1.1 = ____ Litres - for a 38 mm (1.5 inch) diameter well

EQUIPMENT LIST

Pump
☐ Waterra
☐ Hydrolift
☐ Bailer (Type: ____)
☒ Peristaltic
☐ Submersible
☐ Bladder

Pump Details: ____

Multimeter Model: YSI Pro PLUS ☐ Rental Equipment:
pH/Temp Meter Model: ~~/~~
Conductivity Meter Model: ~~/~~ ☐ Field Bump
Dissolved Oxygen Meter Model: ~~/~~ ☐ pH4 ____ ☐ pH7 ____
ORP (Redex) Meter Model: ~~/~~ ☐ pH10 ____
Organic Vapour Meter Model: ~~/~~ ☐ 1413 us/cm ____
☐ D.O. Ampoule ☒ Field Calibration ____

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X 3 = 10.47 litres
Avg. Flow Rate: ____ L/min.
Start: 13:30 Finish: 14:06
Sample intake depth: 8.5 m

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	☐ Cond. ☒ Specific Cond. µS/cm or mS/cm (circle one)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
13:30	0	3.2	6.56	511.3	-63.7	1.06	7.212	Clear
13:38	1	2.3	6.52	532.4	-60.9	1.13	7.215	" "
13:51	3	2.8	6.50	529.5	-58.3	0.95	7.217	" "
13:58	4	2.7	6.49	517.3	-57.6	0.88	7.220	" "
14:06	5	2.5	6.48	513.3	-57.2	0.84	7.218	" " sample

* Record DO in Mg/L, not percentage

Comments:
Odour: ☐ Yes ☒ No If yes ____
Sheen: ☐ Yes ☒ No If yes ☐ Hydrocarbon-like OR ☐ Metallic-like
Turbidity: Clear I I I I I I I I I I I I I I I I I I I I I I I I I Very Silty

Analysis	Type		Container Size							Filtered		Preservatives
			40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L			
Diss. Metal	☒ Plastic	☐ Glass		2						☒ Yes	☐ No	HNO_3
Diss. Hg	☐ Plastic	☒ Glass	2							☒ Yes	☐ No	HCl
LEPH/HEPH/PAH	☐ Plastic	☒ Glass			4					☐ Yes	☒ No	Sodium Bisulphate
VOC/BTEX/VPH/HVP	☐ Plastic	☒ Glass	6							☐ Yes	☒ No	" "
PDT	☐ Plastic	☒ Glass					2			☐ Yes	☒ No	~~/~~
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	

SCN No. 04309-11
Field Dup. 04309-12

Consumables: ☐ Waterra Tubing ____ ☒ HDPE/Teflon Tubing ____ ☒ Groundwater Filter
☒ Silicon Tubing ____ ☐ D.O. Ampoules ____ ☐ Footvalve

Golder Associates

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development ☒ Purging/Sampling Well No.: K19-MW16-105

Project Name: K19 Trutch **Project No.:** 1657709
Location: **Date:** 14 Jan 2018
Weather: Clear **Temperature:** -12 c **Completed By:** SS
GPS Coordinates: **Reviewed By:**

MONITORING WELL INFORMATION

Time of Measurement: 1400
Depth to Product: / m Product Thickness: / m
Depth to Water (A): 4.569 m below ☒ TOP
Depth to Bottom of Well (B): 6.328 m below ☒ TOP
Diameter of Standpipe: 51 mm
Well Condition: Good.

Tidally Influenced: ☐ Yes ☒ No
Pressurized: ☐ Yes ☒ No
Well Headspace: / ppm
One Well Volume:
(B-A)*2.0 = 3.4 Litres - for a 51 mm (2.0 inch) diameter well
(B-A)*1.1 = / Litres - for a 38 mm (1.5 inch) diameter well

EQUIPMENT LIST

Pump ☐ Waterra ☐ Hydrolift ☐ Bailer (Type:_____) ☒ Peristaltic ☐ Submersible ☐ Bladder
Pump Details:

Multimeter Model: YSI pro
pH/Temp Meter Model:
Conductivity Meter Model:
Dissolved Oxygen Meter Model:
ORP (Redex) Meter Model:
Organic Vapour Meter Model: /

☐ D.O. Ampoule

☐ Rental Equipment: See BM Field Notes
☐ Field Bump
☐ pH4 _____ ☐ pH7 _____
☐ pH10 _____
☐ 1413 us/cm _____
☐ Field Calibration _____

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X _____ = _____ litres
Avg. Flow Rate: _____ L/min.
Start: _____ Finish: _____
Sample intake depth: 6 m

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	☐ Cond. ☐ Specific Cond. µS/cm or mS/cm (circle one)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
1422	1	2.8	6.62	453.7	-97.0	0.72	5.16	very slow recharge.
1424	2	2.7	6.59	426.3	-94.8	1.77	5.48	purge well dry and sample tomorrow
1426	3	2.8	6.51	441.9	-96.0	1.36	5.80	
1427	4	2.9	6.50	449.0	-96.7	1.33	6.10	
1430	5	3.3	6.50	495.2	-103.6	0.71	6.26	DRY @ 5L
	Slow Recharge - Purge Dry / Sample tomorrow!							
16/01/18 10:18	Not enough water after sampling to record parameters						4.542 - start DTW end	

* Record DO in Mg/L, not percentage

Comments:
Odour: ☐ Yes ☒ No If yes
Sheen: ☐ Yes ☒ No If yes ☐ Hydrocarbon-like OR ☐ Metallic-like
Turbidity: Clear (1) 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 Very Silty

Analysis	Type		Container Size							Filtered		Preservatives
			40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L			
D. Metals	☒ Plastic	☒ Glass		1						☒ Yes	☐ No	HCl/HNO3
BTEX/VPH	☐ Plastic	☒ Glass	3							☐ Yes	☒ No	Sodisi
L/H/PAH	☐ Plastic	☒ Glass			2					☐ Yes	☒ No	"
Chloride	☒ Plastic	☐ Glass		1						☐ Yes	☒ No	—
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	

SCN No. 04310-02 Consumables: ☐ Waterra Tubing ☒ HDPE/Teflon Tubing ☒ Groundwater Filter
Field Dup. ☒ Silicon Tubing ☐ D.O. Ampoules ☐ Footvalve

Golder Associates

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development ☒ Purging/Sampling Well No.: K19-MW16-10D

Project Name: K19 Trutch **Project No.:** 1657709
Location: **Date:** 14 Jun 18
Weather: overcast **Temperature:** -12 c **Completed By:** SS
GPS Coordinates: **Reviewed By:**

MONITORING WELL INFORMATION

Time of Measurement: 1230
Depth to Product: / m Product Thickness: / m
Depth to Water (A): 4.662 m below ☒ TOP
Depth to Bottom of Well (B): 12.820 m below ☒ TOP
Diameter of Standpipe: 51 mm
Well Condition: Good

Tidally Influenced: ☐ Yes ☒ No
Pressurized: ☐ Yes ☒ No
Well Headspace: / ppm
One Well Volume:
(B-A)*2.0 = 16.2 Litres - for a 51 mm (2.0 inch) diameter well
(B-A)*1.1 = / Litres - for a 38 mm (1.5 inch) diameter well

EQUIPMENT LIST

Pump
☐ Waterra
☐ Hydrolift
☐ Bailer (Type:)
☒ Peristaltic
☐ Submersible
☐ Bladder

Multimeter Model: YSI ProPlus ☐ Rental Equipment: See BM Field Notes.
pH/Temp Meter Model:
Conductivity Meter Model:
Dissolved Oxygen Meter Model:
ORP (Redex) Meter Model:
Organic Vapour Meter Model:

☐ Field Bump
☐ pH4 ☐ pH7
☐ pH10
☐ 1413 us/cm
☐ Field Calibration

Pump Details: ☐ D.O. Ampoule

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X = litres Start: Finish:
Avg. Flow Rate: L/min. Sample intake depth:

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	☐ Cond. ☒ Specific Cond. µS/cm or mS/cm (circle one)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
12:02	2	2.9	7.20	581.3	-85.3	0.65	4.903	Clear
12:07	4	2.7	6.99	576.3	-93.8	0.35	4.951	"
12:13	6	2.8	6.95	569.6	-105.2	0.32	4.975	"
12:24	8	2.9	6.93	554.0	-126.6	0.40	5.005	"
12:30	10	2.8	6.95	550.7	-136.1	0.42	5.008	"
	Sample after 10L							"

* Record DO in Mg/L, not percentage

Comments:
Odour: ☐ Yes ☒ No If yes
Sheen: ☐ Yes ☒ No If yes ☐ Hydrocarbon-like OR ☐ Metallic-like
Turbidity: Clear (5) I I I I I I I I I I I I I I I I I I I I I I I I I Very Silty

Analysis	Type		Container Size							Filtered		Preservatives
			40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L			
D. Metals	☒ Plastic	☐ Glass	1	1						☒ Yes	☐ No	HCl / HNO_3
BTEX/VPH	☐ Plastic	☒ Glass	3							☐ Yes	☒ No	Sod Bi
L/H/Part	☐ Plastic	☒ Glass			2					☐ Yes	☒ No	Sod Bi
Chloride	☒ Plastic	☐ Glass		1						☐ Yes	☒ No	—
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	

SCN No. 04309-06 Consumables: ☐ Waterra Tubing ☐ HDPE/Teflon Tubing ☐ Groundwater Filter
Field Dup. / ☐ Silicon Tubing ☐ D.O. Ampoules ☐ Footvalve

Golder Associates

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development
☒ Purging/Sampling

Well No.: MW17-04

Project Name: K19 Trutch
Project No.: 1657709
Location:
Date: 13 Jun 18
Weather: overcast **Temperature:** -11 c
Completed By: GS
GPS Coordinates:
Reviewed By:

MONITORING WELL INFORMATION

Time of Measurement: 1415
Depth to Product: — m Product Thickness: — m
Depth to Water (A): 5.685 m below ☒ TOP
Depth to Bottom of Well (B): 7.988 m below ☒ TOP
Diameter of Standpipe: 51 mm
Well Condition: Good

Tidally Influenced: ☐ Yes ☒ No
Pressurized: ☐ Yes ☒ No
Well Headspace: — ppm
One Well Volume:
(B-A)*2.0 = 4.6 Litres - for a 51 mm (2.0 inch) diameter well
(B-A)*1.1 = — Litres - for a 38 mm (1.5 inch) diameter well

EQUIPMENT LIST

Pump ☐ Waterra ☐ Hydrolift ☐ Bailer (Type:) ☒ Peristaltic ☐ Submersible ☐ Bladder

Multimeter Model: YSI Proplus
pH/Temp Meter Model: "
Conductivity Meter Model: "
Dissolved Oxygen Meter Model: "
ORP (Redex) Meter Model: "
Organic Vapour Meter Model:

☐ Rental Equipment: See Field Notes.
☐ Field Bump
☐ pH4 ☐ pH7 ☐ pH10 ☐ 1413 us/cm
Pump Details:
☐ D.O. Ampoule
☐ Field Calibration

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X ____ = ____ litres Start: Finish:
Avg. Flow Rate: ____ L/min. Sample intake depth:

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	☐ Cond. ☒ Specific Cond. µS/cm or mS/cm (circle one)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
1428	1.5	4.0	6.60	694.2	-88.6	0.74	6.28	Clear
1433	2.5	3.8	6.39	650.9	13.5	0.89	6.50	"
1437	4	4.1	6.51	629.4	-83.4	3.96	6.74	
1443	5.5	3.9	6.32	611.4	-96.5	2.38	6.899	
1449	7	3.7	6.37	625.9	-10.3	1.54	7.066	
1453	8.	3.5	6.33	636.9	-113.3	1.36	7.140	
1456	8.5	3.1	6.33	644.2	-120.8	1.28	7.195	
	Sample after 8.5 L							

* Record DO in Mg/L, not percentage

Comments:
Odour: ☐ Yes ☒ No If yes
Sheen: ☐ Yes ☒ No If yes ☐ Hydrocarbon-like OR ☐ Metallic-like
Turbidity: Clear IIIII IIIIIIIIIIIIIIIIIIIIIIIII Very Silty

Analysis	Type		40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L	Filtered		Preservatives
D Metals	☐ Plastic	☒ Glass	1	1						☒ Yes	☐ No	HNO3 / HCl
VOCs BTEX/VPH	☐ Plastic	☒ Glass	3							☐ Yes	☒ No	Sod Bi
LEH/PAH	☐ Plastic	☒ Glass			2					☐ Yes	☒ No	Sod Bi
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	

SCN No. 04309-01
Field Dup. —
Consumables: ☐ Waterra Tubing ☐ HDPE/Teflon Tubing ☐ Groundwater Filter ☐ Silicon Tubing ☐ D.O. Ampoules ☐ Footvalve

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development ☑ Purging/Sampling Well No.: K19-MW17-06

Project Name: K19 Trutch **Project No.:** 1657709
Location: **Date:** 13/01/2018
Weather: Clear **Temperature:** -21 **Completed By:** BM
GPS Coordinates: **Reviewed By:**

MONITORING WELL INFORMATION

Time of Measurement: 11:30
Depth to Product: / m Product Thickness: / m
Depth to Water (A): 10.271 m below ☐ TOP
Depth to Bottom of Well (B): 12.671 m below ☐ TOP
Diameter of Standpipe: 51 mm
Well Condition: Good

Tidally Influenced: ☐ Yes ☒ No
Pressurized: ☐ Yes ☒ No
Well Headspace: / ppm
One Well Volume:
(B-A)*2.0 = 4.8 Litres - for a 51 mm (2.0 inch) diameter well
(B-A)*1.1 = ____ Litres - for a 38 mm (1.5 inch) diameter well

EQUIPMENT LIST

Pump ☐ Waterra ☐ Hydrolift ☒ Bailer (Type: ____) ☐ Peristaltic ☐ Submersible ☐ Bladder
Pump Details: ____

Multimeter Model: YSI Pro Plus ☐ Rental Equipment:
pH/Temp Meter Model: ____
Conductivity Meter Model: ____ ☐ Field Bump
Dissolved Oxygen Meter Model: ____ ☐ pH4 ____ ☐ pH7 ____
ORP (Redex) Meter Model: ____ ☐ pH10 ____
Organic Vapour Meter Model: / ☐ 1413 us/cm ____
☐ D.O. Ampoule BOR142096 ☐ Field Calibration ____

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X 3 = 14.4 litres Start: 11:50 Finish: 12:20
Avg. Flow Rate: / L/min. Sample intake depth: /

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	☐ Cond. ☒ Specific Cond. µS/cm or mS/cm (circle one)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
11:50	1	4.3	6.77	6890	7.4	5.84	10.265	Silty
11:55	3	3.5	7.12	1431	-31.5	2.16	10.275	Clearing
12:00	6	3.6	7.14	1267	-22.7	2.75	10.280	"
12:10	10	3.6	7.12	1240	-22.3	2.82	10.275	clear
12:20	15	3.7	7.13	1251	-23.8	2.30	10.275	Clear

* Record DO in Mg/L, not percentage

Comments:
Odour: ☐ Yes ☒ No If yes ____
Sheen: ☐ Yes ☒ No If yes ☐ Hydrocarbon-like OR ☐ Metallic-like
Turbidity: Clear IIII(1)IIIIIIIIIIIIIIII(1)IIIIIIIII Very Silty
(1) End (1) Start

Analysis	Type		Container Size							Filtered		Preservatives
			40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L			
Diss. metals	☑ Plastic	☐ Glass		✓						☐ Yes	☐ No	HNO_3
BTEX/VPH	☐ Plastic	☑ Glass	✓(3)							☐ Yes	☒ No	Sodium bisulphate
PAH/LEPH/HEPH	☐ Plastic	☑ Glass			2					☐ Yes	☐ No	Sodium bisulphate
Chloride	☑ Plastic	☐ Glass		✓						☐ Yes	☒ No	
VOCs	☐ Plastic	☑ Glass	✓(3)							☐ Yes	☒ No	Sodium bisulphate
Diss. Mercury	☐ Plastic	☑ Glass	✓							☐ Yes	☐ No	HCl
	☐ Plastic	☐ Glass								☐ Yes	☐ No	

SCN No. 04309-03 Consumables: ☐ Waterra Tubing ____ ☒ HDPE/Teflon Tubing ____ ☒ Groundwater Filter
Field Dup. ____ ☒ Silicon Tubing ____ ☐ D.O. Ampoules ____ ☐ Footvalve

Golder Associates

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development
☒ Purging/Sampling

Well No.: K19-MW17-10

Project Name: K19 Trutch
Location:
Weather: Clear **Temperature:** -17 c
GPS Coordinates:
Project No.: 1657709
Date: 13 Jan 2018
Completed By: SS
Reviewed By:

MONITORING WELL INFORMATION

Time of Measurement: 0930 (Jan 14 2018)
Depth to Product: / m Product Thickness: / m
Depth to Water (A): 7.049 m below ☒ TOP 8.363
Depth to Bottom of Well (B): 9.477 m below ☒ TOP
Diameter of Standpipe: 51 mm
Well Condition: Good.

Tidally Influenced: ☐ Yes ☒ No
Pressurized: ☐ Yes ☒ No
Well Headspace: / ppm
One Well Volume:
(B-A)*2.0 = 5 Litres - for a 51 mm (2.0 inch) diameter well
(B-A)*1.1 = / Litres - for a 38 mm (1.5 inch) diameter well

EQUIPMENT LIST

Pump ☐ Waterra
☐ Hydrolift
☒ Bailer (Type: Sample.)
☒ Peristaltic Purge 6L Switch to Bailer
☐ Submersible
☐ Bladder

Multimeter Model: YSI proplus
pH/Temp Meter Model:
Conductivity Meter Model:
Dissolved Oxygen Meter Model:
ORP (Redex) Meter Model:
Organic Vapour Meter Model:

☐ Rental Equipment: See field notes (SS Jan 13, BM Jan 14)
☐ Field Bump
☐ pH4 ☐ pH7
☐ pH10
☐ 1413 us/cm

Pump Details:
☐ D.O. Ampoule
☐ Field Calibration

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X ____ = ____ litres
Avg. Flow Rate: ____ L/min.
Start: Finish:
Sample intake depth:

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	☐ Cond. ☒ Specific Cond. (µS/cm) or mS/cm (circle one)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
09:45	2	2.7	6.96.	3102	160.2	1.10	7.70.	Geo pump having
09:52	3	2.9	5.96	3130	152.1	1.08	8.25	difficulty pulling
10:04	4.5	2.4	5.98	3214	146.9	2.40	8.45.	H2O up.
10:19	6.	2.7	6.63	3107	138.1	1.04	8.55.	*Switch to Bailer @ 6L
10:32	7.5	3.5	5.83	4614	181.9	1.40	—	
10:47	9	5.1	6.08	3249	134.1	2.00	—	Very silty/turbid
11:01	13	6.7	6.09	3183	129.9	1.91	—	when bailing
* Sample on Jan 14 2018 after 13L								→ Sample after 24 Hrs.
(Next DAY Jan 14 2018) 1051 (Post sample)	MS	3.3	6.20	2990	109.6	7.35	—	CLEAR

* Record DO in Mg/L, not percentage

Comments:
Odour: ☐ Yes ☒ No If yes — when bailing.
Sheen: ☐ Yes ☒ No If yes ☐ Hydrocarbon-like OR ☐ Metallic-like
Turbidity: Clear IIIIIIIIIIIIIIIIIIIIIIIIIII Very Silty — Clear when sampling w/ Bailer

Analysis	Type		40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L	Filtered		Preservatives
D Metals	☐ Plastic	☐ Glass	1	1						☒ Yes	☐ No	HNO3/HCl
VOCs BTEX/VPH	☐ Plastic	☒ Glass	3							☐ Yes	☒ No	Sod Bi
L/H/PAH	☐ Plastic	☒ Glass			2					☐ Yes	☒ No	Sod Bi
Chloride	☒ Plastic	☐ Glass		1						☐ Yes	☐ No	—
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	

SCN No. 04309-04
Field Dup. /
Consumables: ☐ Waterra Tubing ☐ HDPE/Teflon Tubing ☐ Groundwater Filter
☐ Silicon Tubing ☐ D.O. Ampoules ☐ Footvalve

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development ☒ Purging/Sampling Well No.: K19-MW17-19

Project Name: K19 Trutch **Project No.:** 1657709
Location: **Date:** 13/14/18-14/01/2018
Weather: Clear, Sunny **Temperature:** -12 **Completed By:** BM
GPS Coordinates: **Reviewed By:**

MONITORING WELL INFORMATION

Time of Measurement: 13:00
Depth to Product: / m Product Thickness: / m
Depth to Water (A): 4.065 m below ☐ TOP
Depth to Bottom of Well (B): 7.900 m below ☐ TOP
Diameter of Standpipe: 51 mm
Well Condition: Good

Tidally Influenced: ☐ Yes ☒ No
Pressurized: ☐ Yes ☒ No
Well Headspace: / ppm
One Well Volume:
(B-A)*2.0 = 6.7 Litres - for a 51 mm (2.0 inch) diameter well
(B-A)*1.1 = ____ Litres - for a 38 mm (1.5 inch) diameter well

EQUIPMENT LIST

Pump ☐ Waterra ☐ Hydrolift ☐ Bailer (Type:____) ☑ Peristaltic ☐ Submersible ☐ Bladder
Pump Details: ____

Multimeter Model: YSI Pro Plus ☐ Rental Equipment:
pH/Temp Meter Model:
Conductivity Meter Model: ☐ Field Bump
Dissolved Oxygen Meter Model: ☐ pH4 ____ ☐ pH7 ____
ORP (Redex) Meter Model: ☐ pH10 ____
Organic Vapour Meter Model: ☐ 1413 us/cm ____
☐ D.O. Ampoule ☐ Field Calibration ____

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X 3 = 20 litres Start: 13:00 Finish: ____
Avg. Flow Rate: ____ L/min. Sample intake depth: 7 m

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	☐ Cond. ☒ Specific Cond. µS/cm or mS/cm (circle one)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
13:00	0	3.5	7.02	322.3	-15.4	1.34	4.365	Clear
13:11	2	3.1	6.73	459.4	8.6	8.41	5.020	" "
13:21	4	2.9	6.71	455.7	14.1	7.94	5.536	" "
Very little (no) recharge observed, purging dry & returning to sample next day.					0	0	0	
14/01/18 12:59		2.8	6.72	450.6	47.8	8.26	4.115	Sample

* Record DO in Mg/L, not percentage

Comments:
Odour: ☐ Yes ☒ No If yes ____
Sheen: ☐ Yes ☒ No If yes ☐ Hydrocarbon-like OR ☐ Metallic-like
Turbidity: Clear 1 1 1 (1) 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 Very Silty

Analysis	Type		Container Size							Filtered		Preservatives
			40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L			
Diss. Metals	☑ Plastic	☐ Glass		✓						☑ Yes	☐ No	HNO_3
Diss. Hg	☐ Plastic	☑ Glass	✓							☑ Yes	☐ No	HCl
BTEX/VPH	☐ Plastic	☑ Glass	3							☐ Yes	☐ No	Sodium Bisulphate
PAH/LEAH/HEAH	☐ Plastic	☑ Glass			2					☐ Yes	☐ No	" "
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	

SCN No. 04309-10 Consumables: ☐ Waterra Tubing ____ ☑ HDPE/Teflon Tubing ____ ☑ Groundwater Filter
Field Dup. ____ ☑ Silicon Tubing ____ ☐ D.O. Ampoules ____ ☐ Footvalve

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development
☒ Purging/Sampling

Well No.: K19-MW 17-22

Project Name: K19 Trutch
Project No.: 1657709
Location:
Date: 13 Jan 2018 / 14 Jan 18.
Weather: Clear **Temperature:** -11 C
Completed By: SS
GPS Coordinates:
Reviewed By:

MONITORING WELL INFORMATION

Time of Measurement: 12:40 Jan 14.18
Depth to Product: — m Product Thickness: — m
Depth to Water (A): 4.648 m below ☒ TOP >4.830
Depth to Bottom of Well (B): 9.788 m below ☒ TOP
Diameter of Standpipe: 51 mm
Well Condition: Good.

Tidally Influenced: ☐ Yes ☒ No
Pressurized: ☐ Yes ☒ No
Well Headspace: — ppm
One Well Volume:
(B-A)*2.0 = 10.4 Litres - for a 51 mm (2.0 inch) diameter well
(B-A)*1.1 = — Litres - for a 38 mm (1.5 inch) diameter well

EQUIPMENT LIST

Pump ☐ Waterra ☐ Hydrolift ☐ Bailer (Type:) ☒ Peristaltic ☐ Submersible ☐ Bladder

Multimeter Model: YSI proplus
pH/Temp Meter Model: |
Conductivity Meter Model: |
Dissolved Oxygen Meter Model: |
ORP (Redex) Meter Model: ↓
Organic Vapour Meter Model:

☐ Rental Equipment: See Field notes (SS Jan 13 BM Jan 14)
☐ Field Bump
☐ pH4 ☐ pH7
☐ pH10
☐ 1413 us/cm
☐ Field Calibration

Pump Details: Geo pump ☐ D.O. Ampoule

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X ____ = ____ litres Start: ____ Finish: ____
Avg. Flow Rate: ____ L/min. Sample intake depth: ____

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	☐ Cond. ☒ Specific Cond. µS/cm or mS/cm (circle one)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
12:04	3	3.5	7.04	632.4	109.2	2.65	5.93	Clear.
13:14	5	3.9	6.91	592.9	74.5	3.33	6.66.	to no
13:23	7	2.8	6.95	395.2	-6.2	3.50	7.70	little recharge.
13:30	9	3.2	6.71	320.7	-29.7	2.90	8.24	
Purge DRY and return following day to sample!								DRY @ ~10.5 L
Jan 14 2018 — 11:41	12	3.5	6.97	555.5	10.3	1.05	5.33	Clear
11:45	13	3.4	6.78	533.4	-8.4	0.72	5.87	
Sample after 13 L								

* Record DO in Mg/L, not percentage

Comments:
Odour: ☐ Yes ☒ No If yes
Sheen: ☐ Yes ☒ No If yes ☐ Hydrocarbon-like OR ☐ Metallic-like
Turbidity: Clear I(III)IIIIIIIIIIIIIIIIIIIIIIIIII Very Silty

Analysis	Type		40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L	Filtered		Preservatives
D. Metals	☒ Plastic	☒ Glass	1	1						☒ Yes	☐ No	HNO3 / HCl
BTEX/VPH	☐ Plastic	☐ Glass	3							☐ Yes	☐ No	
L/H/PAH	☐ Plastic	☒ Glass			2					☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	

SCN No. 04309-05
Field Dup. —

Consumables: ☐ Waterra Tubing ☐ HDPE/Teflon Tubing ☐ Groundwater Filter ☐ Silicon Tubing ☐ D.O. Ampoules ☐ Footvalve

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development
☒ Purging/Sampling

Well No.: K19-MW17-26

Project Name: K19 Trutch
Location:
Weather: **Temperature:**
GPS Coordinates:

Project No.: 1657709
Date: 13/01/2018
Completed By: BM
Reviewed By:

MONITORING WELL INFORMATION

Time of Measurement: 14:30
Depth to Product: — m Product Thickness: — m
Depth to Water (A): 7.412 m below ☐ TOP
Depth to Bottom of Well (B): 11.588 m below ☐ TOP
Diameter of Standpipe: 51 mm
Well Condition: Good

Tidally Influenced: ☐ Yes ☒ No
Pressurized: ☐ Yes ☒ No
Well Headspace: — ppm
One Well Volume:
(B-A)*2.0 = 8.4 Litres - for a 51 mm (2.0 inch) diameter well
(B-A)*1.1 = ____ Litres - for a 38 mm (1.5 inch) diameter well

EQUIPMENT LIST

Pump ☐ Waterra ☐ Hydrolift ☒ Bailer (Type:____) ☐ Peristaltic ☐ Submersible ☐ Bladder

Multimeter Model: YSI Pro Plus
pH/Temp Meter Model: ↓
Conductivity Meter Model: ↓
Dissolved Oxygen Meter Model: ↓
ORP (Redox) Meter Model: ↓
Organic Vapour Meter Model: —

☐ Rental Equipment:
☐ Field Bump ☐ pH4 ☐ pH7 ☐ pH10 ☐ 1413 us/cm
☐ Field Calibration

Pump Details: ☐ D.O. Ampoule

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X 3 = 25 litres Start: 14:30 Finish:
Avg. Flow Rate: ____ L/min. Sample intake depth:

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	☐ Cond. ☒ Specific Cond. µS/cm or mS/cm (circle one)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
14:40	5	3.17	7.14	754.0	48.3	4.65	7.400	Clear
15:05	8	3.3	6.94	762.2	37.9	4.64	10.702	Silty
Purged dry, return next day to sample								
14/01/2018 12:09	—						7.083	Sample

* Record DO in Mg/L, not percentage

Comments:
Odour: ☐ Yes ☒ No If yes
Sheen: ☐ Yes ☒ No If yes ☐ Hydrocarbon-like OR ☐ Metallic-like
Turbidity: Clear I I I I (I) I I I I I I I I I I I I I (I) I I I I I I I I I Very Silty (Start … END)

Analysis	Type		40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L	Filtered		Preservatives
Diss. metals	☒ Plastic	☐ Glass		✓						☒ Yes	☐ No	HNO3
Diss. Hg	☐ Plastic	☒ Glass	✓							☒ Yes	☐ No	HCl
BTEX/VOH/VOC	☐ Plastic	☒ Glass	3							☐ Yes	☐ No	
PAH/LEPH/HEPH	☐ Plastic	☒ Glass			2					☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	

SCN No. 04309-09
Field Dup.

Consumables: ☐ Waterra Tubing ☒ HDPE/Teflon Tubing ☒ Groundwater Filter ☒ Silicon Tubing ☐ D.O. Ampoules ☐ Footvalve

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development
☒ Purging/Sampling

Well No.: K19-MW17-29C

Project Name: K19 Trutch
Project No.: 1657709
Location:
Date: 16/01/2018
Weather: Clear **Temperature:** -8
Completed By: BM
GPS Coordinates:
Reviewed By:

MONITORING WELL INFORMATION

Time of Measurement: 13:47
Depth to Product: — m
Product Thickness: — m
Depth to Water (A): 5.908 m below ☒ TOP
Depth to Bottom of Well (B): 8.992 m below ☒ TOP
Diameter of Standpipe: 51 mm
Well Condition: Good

Tidally Influenced: ☐ Yes ☒ No
Pressurized: ☐ Yes ☒ No
Well Headspace: — ppm
One Well Volume:
(B-A)*2.0 = 6.2 Litres - for a 51 mm (2.0 inch) diameter well
(B-A)*1.1 = ____ Litres - for a 38 mm (1.5 inch) diameter well

EQUIPMENT LIST

Pump: ☐ Waterra ☐ Hydrolift ☐ Bailer (Type: ____) ☒ Peristaltic ☐ Submersible ☐ Bladder

Multimeter Model: YSI Pro Plus
pH/Temp Meter Model: ↓
Conductivity Meter Model: ↓
Dissolved Oxygen Meter Model: ↓
ORP (Redex) Meter Model: ↓
Organic Vapour Meter Model: —

☐ Rental Equipment:
☐ Field Bump
☐ pH4 ____ ☐ pH7 ____
☐ pH10 ____
☐ 1413 us/cm

Pump Details: ____
☐ D.O. Ampoule
☒ Field Calibration See SS field notes

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X 3 = 18.5 litres
Start: 13:50 Finish:
Avg. Flow Rate: ____ L/min.
Sample intake depth: 8.5 m

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	☐ Cond. ☒ Specific Cond. (µS/cm circled) or mS/cm (circle one)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
13:50	Ø	4.0	6.88	763.3	-57.5	1.56	6.122	Clear
13:54	1	3.7	6.61	807.7	-66.0	1.03	6.263	" "
14:00	2	3.6	6.56	808.6	-72.5	1.04	6.300	" "
14:10	4	4.1	6.52	848	-80.3	0.85	6.585	" "
14:20	6	4.2	6.50	827.6	-90.5	0.70	6.672	" "
14:30	8	4.3	6.47	810.1	-99.2	0.83	6.653	" "
14:40	10	4.3	6.47	807.1	-105.3	0.70	6.713	" "
14:50	12	4.2	6.47	789.2	-111.8	0.64	6.709	" & Sample

* Record DO in Mg/L, not percentage

Comments:

Odour: ☐ Yes ☒ No If yes
Sheen: ☐ Yes ☒ No If yes ☐ Hydrocarbon-like OR ☐ Metallic-like
Turbidity: Clear I I (I I I) I I I I I I I I I I I I I I I I I I I I I I I I Very Silty

Analysis	Type		40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L	Filtered		Preservatives
Diss. Metals	☒ Plastic	☐ Glass		1						☒ Yes	☐ No	HNO3
Diss. Hg	☐ Plastic	☒ Glass	1							☒ Yes	☐ No	HCl
F1/VOC/BTEX/VPH	☐ Plastic	☒ Glass	3							☐ Yes	☒ No	Sodium Bisulphate
F2-F4/LEPH/HEPH/PAH	☐ Plastic	☒ Glass			2					☐ Yes	☒ No	" "
Chloride	☒ Plastic	☐ Glass		1						☐ Yes	☒ No	—
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	

SCN No. 04310-03
Field Dup. ____

Consumables: ☐ Waterra Tubing ____ ☒ HDPE/Teflon Tubing ____ ☒ Groundwater Filter
☒ Silicon Tubing ____ ☐ D.O. Ampoules ____ ☐ Footvalve

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development ☑ Purging/Sampling Well No.: K19-MW17-31 KEY #1

Project Name: K19 Trutch **Project No.:** 1657709
Location: **Date:** 13/01/2018
Weather: Overcast **Temperature:** -12 **Completed By:** BM
GPS Coordinates: **Reviewed By:**

MONITORING WELL INFORMATION

Time of Measurement: 15:45
Depth to Product: / m Product Thickness: / m
Depth to Water (A): 2.517 m below ☒ TOP
Depth to Bottom of Well (B): 7.425 m below ☒ TOP
Diameter of Standpipe: 51 mm
Well Condition: Good

Tidally Influenced: ☐ Yes ☒ No
Pressurized: ☐ Yes ☒ No
Well Headspace: / ppm
One Well Volume:
(B-A)*2.0 = 9.8 Litres - for a 51 mm (2.0 inch) diameter well
(B-A)*1.1 = / Litres - for a 38 mm (1.5 inch) diameter well

EQUIPMENT LIST

Pump ☐ Waterra ☐ Hydrolift ☐ Bailer (Type:_____) ☒ Peristaltic ☐ Submersible ☐ Bladder
Pump Details: _____

Multimeter Model: YSI Pro Plus ☐ Rental Equipment:
pH/Temp Meter Model:
Conductivity Meter Model:
Dissolved Oxygen Meter Model:
ORP (Redex) Meter Model:
Organic Vapour Meter Model: /
☐ D.O. Ampoule

☐ Field Bump
☐ pH4 _____ ☐ pH7 _____
☐ pH10 _____
☐ 1413 us/cm _____
☐ Field Calibration _____

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X 3 = 29 litres Start: 15:48 Finish:
Avg. Flow Rate: _____ L/min. Sample intake depth: 7 m

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	☐ Cond. ☒ Specific Cond. (µS/cm or mS/cm) (circle one)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
15:48	0	2.4	7.34	481.0	32.3	0.69	2.734	clear
15:56	2	1.8	7.19	479.9	33.6	0.36	3.365	clear
16:18	6	1.5	7.17	477.7	26.9	0.78	4.956	" "
Little to no recharge, purged dry, sample on next day.								
16:39	10	3.1	7.26	484.8	13.4	0.90	6.255	" "
10:17 (14/01/18)	/	2.7	6.78	418.2	48.2	3.53	3.235	Sample

* Record DO in Mg/L, not percentage

Comments:
Odour: ☐ Yes ☒ No If yes
Sheen: ☐ Yes ☒ No If yes ☐ Hydrocarbon-like OR ☐ Metallic-like
Turbidity: Clear I I I I I I I I I I I I I I I I I I I I I I I I I I I Very Silty

Analysis	Type		Container Size							Filtered		Preservatives
			40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L			
Diss. metals	☒ Plastic	☐ Glass		✓						☒ Yes	☐ No	HNO_3
Diss. Hg	☐ Plastic	☒ Glass	✓							☒ Yes	☐ No	HCl
BTEX/VPH	☐ Plastic	☒ Glass	3							☐ Yes	☒ No	Sodium Bisulphate
PAH/LEAP/HEAP	☐ Plastic	☒ Glass			2					☐ Yes	☒ No	" "
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	

SCN No. 24309-08 Consumables: ☐ Waterra Tubing _____ ☒ HDPE/Teflon Tubing _____ ☒ Groundwater Filter
Field Dup. _____ ☒ Silicon Tubing _____ ☐ D.O. Ampoules _____ ☐ Footvalve

Golder Associates

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development
☒ Purging/Sampling

Well No.: K19-MW17-3i

Project Name: K19 Trutch
Location:
Weather: Clear **Temperature:** -14
GPS Coordinates:
Project No.: 1657709
Date: 14/01/2018
Completed By: BM
Reviewed By:

MONITORING WELL INFORMATION

Time of Measurement: 15:26
Depth to Product: — m Product Thickness: — m
Depth to Water (A): 4.066 m below ☒ TOP
Depth to Bottom of Well (B): 5.895 m below ☒ TOP
Diameter of Standpipe: 51 mm
Well Condition: Good

Tidally Influenced: ☐ Yes ☒ No
Pressurized: ☐ Yes ☒ No
Well Headspace: — ppm
One Well Volume:
(B-A)*2.0 = 3.6 Litres - for a 51 mm (2.0 inch) diameter well
(B-A)*1.1 = Litres - for a 38 mm (1.5 inch) diameter well

EQUIPMENT LIST

Pump ☐ Waterra ☐ Hydrolift ☐ Bailer (Type:) ☒ Peristaltic ☐ Submersible ☐ Bladder
Pump Details:

Multimeter Model: YSI Pro Plus
pH/Temp Meter Model: ↓
Conductivity Meter Model: ↓
Dissolved Oxygen Meter Model: ↓
ORP (Redox) Meter Model: ↓
Organic Vapour Meter Model: —
☐ D.O. Ampoule

☐ Rental Equipment:
☐ Field Bump
☐ pH4 ☐ pH7
☐ pH10
☐ 1413 us/cm
☒ Field Calibration

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X 3 = 11 litres
Avg. Flow Rate: L/min.
Start: 15:47 Finish:
Sample intake depth: 5.4 m

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	☐ Cond. ☒ Specific Cond. (µS/cm) or mS/cm (circle one)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
15:47	0	3.1	7.15	562.6	-6.7	0.83	4.225	Clear
15:52	1	2.5	7.12	563.7	-20.4	1.01	4.428	" "
16:00	2	2.8	7.11	562.1	-21.4	1.10	4.532	" "
16:05	3	2.6	7.10	579.4	-23.1	0.80	4.615	" "
16:09	4	2.6	7.10	586.6	-25.0	0.79	4.728	" "
16:13	5	2.4	7.09	583.3	-31.7	0.84	4.780	" "
16:18	6	2.6	7.09	579.5	-33.2	0.79	4.842	" "
16:22	7	2.4	7.09	574.4	-33.0	0.75	4.884	sample

* Record DO in Mg/L, not percentage

Comments:
Odour: ☐ Yes ☒ No If yes
Sheen: ☐ Yes ☒ No If yes ☐ Hydrocarbon-like OR ☐ Metallic-like
Turbidity: Clear I I (I) I I I I I I I I I I I I I I I I I I I I I I I I I I I Very Silty

Analysis	Type		40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L	Filtered		Preservatives
Diss. Metals	☒ Plastic	☐ Glass		1						☒ Yes	☐ No	HNO3
Diss Hg	☐ Plastic	☒ Glass	1							☒ Yes	☐ No	HCl
VOC/BTEX/VPH/F1	☐ Plastic	☒ Glass	3							☐ Yes	☒ No	Sodium Bisulphate
LEPH/HEPH/PAH	☐ Plastic	☒ Glass			2					☐ Yes	☒ No	" "
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	

SCN No. 04310-01
Field Dup.
Consumables: ☐ Waterra Tubing ☒ Silicon Tubing ☒ HDPE/Teflon Tubing ☐ D.O. Ampoules ☒ Groundwater Filter ☐ Footvalve

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development ☒ Purging/Sampling Well No.: K19-MW17-355

Project Name: K19 Trutch **Project No.:** 1657709
Location: **Date:** 16/01/18
Weather: Clear **Temperature:** -8 **Completed By:** BM
GPS Coordinates: **Reviewed By:**

MONITORING WELL INFORMATION

Time of Measurement: 10.54
Depth to Product: / m Product Thickness: / m
Depth to Water (A): 5.986 m below ☒ TOP
Depth to Bottom of Well (B): 7.707 m below ☒ TOP
Diameter of Standpipe: 51 mm
Well Condition: Good

Tidally Influenced: ☐ Yes ☒ No
Pressurized: ☐ Yes ☒ No
Well Headspace: / ppm
One Well Volume:
(B-A)*2.0 = 3.4 Litres - for a 51 mm (2.0 inch) diameter well
(B-A)*1.1 = ____ Litres - for a 38 mm (1.5 inch) diameter well

EQUIPMENT LIST

Pump ☐ Waterra ☐ Hydrolift ☐ Bailer (Type: ____) ☒ Peristaltic ☐ Submersible ☐ Bladder
Pump Details: ____

Multimeter Model: YSI Pro Plus ☐ Rental Equipment:
pH/Temp Meter Model: /
Conductivity Meter Model: / ☐ Field Bump
Dissolved Oxygen Meter Model: / ☐ pH4 ____ ☐ pH7 ____
ORP (Redex) Meter Model: / ☐ pH10 ____
Organic Vapour Meter Model: / ☐ 1413 us/cm ____
☐ D.O. Ampoule ☒ Field Calibration See SS field notes

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X 3 = 10 litres Start: 10:56 Finish: ____
Avg. Flow Rate: ____ L/min. Sample intake depth: 7.2 m

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	☐ Cond. ☒ Specific Cond. µS/cm or mS/cm (circle one)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
10:56	0	3.1	6.35	805.8	-115.7	4.32	6.020	Clear
11:01	1	3.7	6.37	863	-119.1	1.98	6.023	" "
11:06	2	3.9	6.37	860	-120.6	1.43	6.032	" "
11:13	3	3.6	6.38	852	-131.3	1.42	6.028	" "
11:19	4	3.9	6.39	839	-136.4	1.51	6.025	" "
11:25	5	3.8	6.39	838.1	-137.5	1.50	6.025	" "
								Sample

* Record DO in Mg/L, not percentage

Comments:
Odour: ☐ Yes ☒ No If yes ____
Sheen: ☐ Yes ☒ No If yes ☐ Hydrocarbon-like OR ☐ Metallic-like
Turbidity: Clear I I I (I) I I I I I I I I I I I I I I I I I I I I I I Very Silty

Analysis	Type		Container Size							Filtered		Preservatives
			40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L			
Diss Metals	☒ Plastic	☐ Glass		2						☒ Yes	☐ No	HNO_3
Diss Hg	☐ Plastic	☒ Glass	2							☒ Yes	☐ No	HCl
F2-F4/LEPH/HEPH/PAH	☐ Plastic	☒ Glass			2					☐ Yes	☒ No	Sodium Bisulphate
Chloride	☒ Plastic	☐ Glass		2						☐ Yes	☒ No	/
F1/VOC/BTEX/VPH	☐ Plastic	☒ Glass	6							☐ Yes	☒ No	Sodium Bisulphate
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	

SCN No. 04310-04 Consumables: ☐ Waterra Tubing ____ ☒ HDPE/Teflon Tubing ____ ☒ Groundwater Filter
Field Dup. 04310-05 ☒ Silicon Tubing ____ ☐ D.O. Ampoules ____ ☐ Footvalve

Golder Associates

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development
☒ Purging/Sampling

Well No.: K19-MW18-01

Project Name: K19 Trutch
Project No.: 1657709
Location:
Date: 21/01/18
Weather: Overcast, snow **Temperature:** -10
Completed By: BM
GPS Coordinates:
Reviewed By:

MONITORING WELL INFORMATION

Time of Measurement: 15:00
Tidally Influenced: ☐ Yes ☒ No
Depth to Product: — m Product Thickness: — m
Pressurized: ☐ Yes ☒ No
Depth to Water (A): 6.832 m below ☒ TOP
Well Headspace: — ppm
Depth to Bottom of Well (B): 9.357 m below ☒ TOP
One Well Volume:
Diameter of Standpipe: 51 mm
(B-A)*2.0 = 5 Litres - for a 51 mm (2.0 inch) diameter well
Well Condition: Good, new install
(B-A)*1.1 = — Litres - for a 38 mm (1.5 inch) diameter well

EQUIPMENT LIST

Pump: ☐ Waterra ☐ Hydrolift ☐ Bailer (Type:) ☒ Peristaltic ☐ Submersible ☐ Bladder

Multimeter Model: YSI ProPlus
pH/Temp Meter Model: |
Conductivity Meter Model: |
Dissolved Oxygen Meter Model: |
ORP (Redox) Meter Model: ↓
Organic Vapour Meter Model: —

☐ Rental Equipment:
☐ Field Bump
☐ pH4 ☐ pH7
☐ pH10
☐ 1413 us/cm

Pump Details:
☐ D.O. Ampoule
☒ Field Calibration See field notes

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X ______ = ______ litres
Start: 15:58
Finish:
Avg. Flow Rate: ______ L/min.
Sample intake depth: 6.03 m

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	☐ Cond. ☒ Specific Cond. µS/cm or mS/cm (circle one)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
16:03	1	0.1	6.58	903.8	36.0	2.36	6.948	Clear
16:08	2	0.5	6.55	888.2	8.8	1.93	6.964	" "
16:13	3	0.6	6.51	875.0	-15.9	1.53	6.973	" "
16:18	4	0.5	6.50	867.4	-26.1	1.51	6.975	" "
16:23	5	0.6	6.49	863.4	-30.2	1.58	6.976	" "
16:28	6	0.6	6.48	855.3	-33.1	1.51	6.975	" "
16:33	7	0.6	6.48	856.9	-33.0	1.56	6.981	" "
								SAMPLE

* Record DO in Mg/L, not percentage

Comments:
Odour: ☐ Yes ☒ No If yes
Sheen: ☐ Yes ☒ No If yes ☐ Hydrocarbon-like OR ☐ Metallic-like
Turbidity: Clear I I I I I (I) I I I I I I I I I I I I I I I I I I I I I I I Very Silty

Analysis	Type		40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L	Filtered		Preservatives
Diss Metal	☒ Plastic	☐ Glass		1						☒ Yes	☐ No	HNO3
Diss Hg	☐ Plastic	☒ Glass								☒ Yes	☐ No	HCl
VOC, BTEX, VPH, F1	☐ Plastic	☒ Glass	3							☐ Yes	☒ No	Sodium Bisulphate
LEPH, HEPH, PAH	☐ Plastic	☒ Glass			2					☐ Yes	☒ No	" "
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	

SCN No. 04319-04
Consumables: ☐ Waterra Tubing ☒ HDPE/Teflon Tubing ☒ Groundwater Filter
Field Dup.
☒ Silicon Tubing ☐ D.O. Ampoules ☐ Footvalve

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development
☒ Purging/Sampling

Well No.: K19-MW18-02

Project Name: K19 Trutch
Project No.: 1657709
Location:
Date: 20/01/2018
Weather: Clear **Temperature:** -12
Completed By: BM
GPS Coordinates:
Reviewed By:

MONITORING WELL INFORMATION

Time of Measurement: 12:04
Depth to Product: — m Product Thickness: — m
Depth to Water (A): 6.947 m below ☒ TOP
Depth to Bottom of Well (B): 11.865 m below ☒ TOP
Diameter of Standpipe: 51 mm
Well Condition: Good, new install

Tidally Influenced: ☐ Yes ☒ No
Pressurized: ☐ Yes ☒ No
Well Headspace: — ppm
One Well Volume:
(B-A)*2.0 = 9.8 Litres - for a 51 mm (2.0 inch) diameter well
(B-A)*1.1 = ____ Litres - for a 38 mm (1.5 inch) diameter well

EQUIPMENT LIST

Pump
☐ Waterra
☐ Hydrolift
☐ Bailer (Type: ____)
☒ Peristaltic
☐ Submersible
☐ Bladder

Pump Details: ____

Multimeter Model: YSI Pro Plus
pH/Temp Meter Model:
Conductivity Meter Model:
Dissolved Oxygen Meter Model:
ORP (Redex) Meter Model:
Organic Vapour Meter Model:
☐ D.O. Ampoule

☐ Rental Equipment:
☐ Field Bump
☐ pH4 ____ ☐ pH7 ____
☐ pH10 ____
☐ 1413 us/cm ____
☒ Field Calibration See BM field notes

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X ____ = ____ litres
Avg. Flow Rate: ____ L/min.
Start: 12:24 Finish: ____
Sample intake depth: 11.3 m

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	☐ Cond. ☒ Specific Cond. µS/cm or mS/cm (circle one)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
12:24	0	1.2	7.81	860.6	-37.0	0.71	7.002	Clear
12:32	1.5	1.2	7.25	876.2	-29.2	0.82	6.987	" "
12:42	3.0	1.4	7.74	870.6	-27.2	1.19	6.998	" "
12:50	5.0	1.8	8.90	869.7	-71.3	1.18	7.014	" "
12:55	6	1.8	8.72	869.0	-60.8	1.20	7.013	" "
13:03	8	1.9	8.67	869.2	-57.1	1.20	7.013	" "
13:11	10	1.8	8.75	870.4	-56.5	1.19	7.014	" "
								SAMPLE

* Record DO in Mg/L, not percentage

Resample due to broken sample vials

Comments:
Odour: ☐ Yes ☒ No If yes ____
Sheen: ☐ Yes ☒ No If yes ☐ Hydrocarbon-like OR ☐ Metallic-like
Turbidity: Clear (I) Very Silty

Analysis	Type		Container Size 40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L	Filtered		Preservatives
Diss. Metals	☒ Plastic	☐ Glass		1						☒ Yes	☐ No	HNO3
Diss Hg	☐ Plastic	☒ Glass	1							☒ Yes	☐ No	HCl
VOC/BTEX, VPH/F1	☐ Plastic	☒ Glass	3							☐ Yes	☒ No	Sodium Bisulphate
LEPH/HEPH/PAH/F2-F4	☐ Plastic	☒ Glass			2					☐ Yes	☒ No	" "
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	

SCN No. 04319-02
Consumables: ☐ Waterra Tubing ____ ☒ HDPE/Teflon Tubing ____ ☒ Groundwater Filter
Field Dup. ____ ☒ Silicon Tubing ____ ☐ D.O. Ampoules ____ ☐ Footvalve

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development
☒ Purging/Sampling

Well No.: K19-MW15-02 Resample

Project Name: K19 Trutch
Project No.: 1657709
Location: Overcast, snow
Date: 21/9/2015
Weather: **Temperature:** -12°
Completed By: BM
GPS Coordinates:
Reviewed By:

MONITORING WELL INFORMATION

Time of Measurement: 13:55
Depth to Product: / m Product Thickness: / m
Depth to Water (A): 6.951 m below ☒ TOP
Depth to Bottom of Well (B): 11.870 m below ☐ TOP
Diameter of Standpipe: 51 mm
Well Condition: Good, new install

Tidally Influenced: ☐ Yes ☒ No
Pressurized: ☐ Yes ☒ No
Well Headspace: / ppm
One Well Volume:
(B-A)*2.0 = 10 Litres - for a 51 mm (2.0 inch) diameter well
(B-A)*1.1 = ____ Litres - for a 38 mm (1.5 inch) diameter well

EQUIPMENT LIST

Pump
☐ Waterra
☐ Hydrolift
☐ Bailer (Type: ____)
☒ Peristaltic
☐ Submersible
☐ Bladder

Pump Details: ____

Multimeter Model: YSI ProPlus ☐ Rental Equipment:
pH/Temp Meter Model: ____
Conductivity Meter Model: ____ ☐ Field Bump
Dissolved Oxygen Meter Model: ____ ☐ pH4 ____ ☐ pH7 ____
ORP (Redex) Meter Model: / ☐ pH10 ____
Organic Vapour Meter Model: ____ ☐ 1413 us/cm ____
☐ D.O. Ampoule ☒ Field Calibration See field notes

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X ____ = ____ litres
Avg. Flow Rate: ____ L/min.
Start: 13:55 Finish: ____
Sample intake depth: 11.3 m

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	☐ Cond. ☒ Specific Cond. µS/cm or mS/cm (circle one)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
14:00	1	1.6	6.48	843.5	-7.1	0.50	6.995	Clear
14:10	3	1.0	6.44	844.9	-16.1	0.95	6.979	" "
14:20	5	1.2	6.47	843.2	-21.1	1.05	6.987	" "
14:25	6	1.1	6.46	841.0	-22.0	1.06	6.992	" "
14:30	7	1.2	6.45	838.4	-23.1	1.07	6.988	" "
14:35	8							

* Record DO in Mg/L, not percentage

Comments:
Odour: ☐ Yes ☒ No If yes ____
Sheen: ☐ Yes ☒ No If yes ☐ Hydrocarbon-like OR ☐ Metallic-like
Turbidity: Clear I I I I I I I I I I I I I I I I I I I I I I I I I I I I I Very Silty

Analysis	Type		Container Size 40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L	Filtered		Preservatives
Diss. Metals	☒ Plastic	☐ Glass		1						☒ Yes	☐ No	HNO3
Diss Hg	☐ Plastic	☒ Glass	1							☒ Yes	☐ No	HCl
VOC, BTEX, VPH, F1	☐ Plastic	☒ Glass	3							☐ Yes	☐ No	Sodium Bisulphate
LEPH, HEPH, PAH	☐ Plastic	☒ Glass			2					☐ Yes	☐ No	" "
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	

SCN No. 04319-02 Consumables: ☐ Waterra Tubing ____ ☒ HDPE/Teflon Tubing ____ ☒ Groundwater Filter
Field Dup. ____ ☒ Silicon Tubing ____ ☐ D.O. Ampoules ____ ☐ Footvalve

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development
☒ Purging/Sampling

Well No.: K19-MW18-06

Project Name: K19 Trutch
Project No.: 1657709
Location:
Date: 20/01/2018
Weather: Clear **Temperature:** -12
Completed By: BM
GPS Coordinates:
Reviewed By:

MONITORING WELL INFORMATION

Time of Measurement: 15:09
Depth to Product: — m
Product Thickness: — m
Depth to Water (A): 5.389 m below ☒ TOP
Depth to Bottom of Well (B): 10.374 m below ☒ TOP
Diameter of Standpipe: 51 mm
Well Condition: Good, new install

Tidally Influenced: ☐ Yes ☒ No
Pressurized: ☐ Yes ☒ No
Well Headspace: — ppm
One Well Volume:
(B-A)*2.0 = 10 Litres - for a 51 mm (2.0 inch) diameter well
(B-A)*1.1 = ____ Litres - for a 38 mm (1.5 inch) diameter well

EQUIPMENT LIST

Pump: ☐ Waterra ☐ Hydrolift ☐ Bailer (Type: ____) ☒ Peristaltic ☐ Submersible ☐ Bladder

Multimeter Model: YSI Pro Plus
pH/Temp Meter Model: ↓
Conductivity Meter Model: ↓
Dissolved Oxygen Meter Model: ↓
ORP (Redox) Meter Model: ↓
Organic Vapour Meter Model: —

☐ Rental Equipment:
☐ Field Bump
☐ pH4 ☐ pH7
☐ pH10
☐ 1413 us/cm

Pump Details:
☐ D.O. Ampoule
☒ Field Calibration: See BM field notes

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X ____ = ____ litres
Start: 15:20 Finish:
Avg. Flow Rate: ____ L/min.
Sample intake depth: ~10.0m

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	☐ Cond. ☒ Specific Cond. µS/cm or mS/cm (circle one)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
15:27	1.20	2.8	6.77	735.3	-34.7	0.30	5.411	
15:32	2.20	2.9	6.73	731.6	-31.4	0.45	5.412	
15:37	3.20	2.6	6.71	727.6	-30.7	0.87	5.421	
15:42	4.20	2.5	6.70	727.6	-29.0	0.89	5.423	
15:47	5.20	2.8	6.70	729.5	-30.0	0.70	5.425	
Resample as vials broke due to cold weather								
21/01/18 09:44	1.0	2.6	6.60	712.4	-35.1	0.93	5.409	
09:49	2.0	2.1	6.51	713.1	-40.8	0.91	5.415	

* Record DO in Mg/L, not percentage

Comments:
Odour: ☐ Yes ☒ No If yes
Sheen: ☐ Yes ☒ No If yes ☐ Hydrocarbon-like OR ☐ Metallic-like
Turbidity: Clear I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I Very Silty

Analysis	Type		40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L	Filtered		Preservatives
Diss Metals	☒ Plastic	☐ Glass		1						☒ Yes	☐ No	HNO3
Diss Hg	☐ Plastic	☒ Glass	1							☒ Yes	☐ No	HCl
LEPH/HEPH/PAH	☐ Plastic	☒ Glass			2					☐ Yes	☒ No	Sodium Bisulphate
VOC/BTEX/VPH	☐ Plastic	☒ Glass	3							☐ Yes	☒ No	" "
Chloride	☒ Plastic	☐ Glass		1						☐ Yes	☒ No	—
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	

SCN No. 04319-01
Field Dup.
Consumables: ☐ Waterra Tubing ☒ Silicon Tubing ☒ HDPE/Teflon Tubing ☐ D.O. Ampoules ☒ Groundwater Filter ☐ Footvalve

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development
☒ Purging/Sampling

Well No.: K19-MW18-06

Project Name: K19 Trutch
Project No.: 1657709
Location:
Date: 21/01/18
Weather: **Temperature:**
Completed By: BM
GPS Coordinates:
Reviewed By:

MONITORING WELL INFORMATION

Time of Measurement: 09:40
Depth to Product: — m
Product Thickness: — m
Depth to Water (A): 5.4 m below ☒ TOP
Depth to Bottom of Well (B): 10.374 m below ☒ TOP
Diameter of Standpipe: 51 mm
Well Condition: Good, new install

Tidally Influenced: ☐ Yes ☒ No
Pressurized: ☐ Yes ☒ No
Well Headspace: — ppm
One Well Volume:
(B-A)*2.0 = 10 Litres - for a 51 mm (2.0 inch) diameter well
(B-A)*1.1 = ____ Litres - for a 38 mm (1.5 inch) diameter well

EQUIPMENT LIST

Pump: ☐ Waterra ☐ Hydrolift ☐ Bailer (Type: ____) ☒ Peristaltic ☐ Submersible ☐ Bladder

Multimeter Model: YSI Pro Plus
pH/Temp Meter Model: ↓
Conductivity Meter Model: ↓
Dissolved Oxygen Meter Model: ↓
ORP (Redex) Meter Model: ↓
Organic Vapour Meter Model: —

☐ Rental Equipment:
☐ Field Bump
☐ pH4 ☐ pH7
☐ pH10
☐ 1413 us/cm
☒ Field Calibration

Pump Details:
☐ D.O. Ampoule

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X ____ = ____ litres
Start: Finish:
Avg. Flow Rate: ____ L/min.
Sample intake depth:

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	☐ Cond. ☒ Specific Cond. (µS/cm (circled) or mS/cm)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
09:54	2	2.3	6.52	712.9	-41.1	0.89	5.419	
09:59	3	2.5	6.53	709.2	-41.2	0.90	5.241	
10:03	4	2.6	6.53	710.1	-41.7	0.93	5.242	Resample

* Record DO in Mg/L, not percentage

Comments:
Odour: ☐ Yes ☐ No If yes
Sheen: ☐ Yes ☐ No If yes ☐ Hydrocarbon-like OR ☐ Metallic-like
Turbidity: Clear I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I Very Silty

Analysis	Type		40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L	Filtered		Preservatives
			Container Size									
Diss. Metal	☒ Plastic	☐ Glass		1						☒ Yes	☐ No	HNO3
Diss. Hg	☐ Plastic	☒ Glass	1							☒ Yes	☐ No	HCl
LEPH/HEPH/PAH	☐ Plastic	☒ Glass			2					☐ Yes	☒ No	Sodium Bisulphate
VOC/BTEX/VPH	☐ Plastic	☒ Glass	3							☐ Yes	☒ No	" "
Chloride	☒ Plastic	☐ Glass		1						☐ Yes	☒ No	—
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	

SCN No. 04319-01
Field Dup.
Consumables: ☐ Waterra Tubing ☒ Silicon Tubing ☒ HDPE/Teflon Tubing ☐ D.O. Ampoules ☒ Groundwater Filter ☐ Footvalve

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development
☒ Purging/Sampling

Well No.: K19-MW18-07

Project Name: K19 Trutch
Project No.: 1657709
Location:
Date: 21/01/18
Weather: Overcast, Snow **Temperature:** -10
Completed By: BM
GPS Coordinates:
Reviewed By:

MONITORING WELL INFORMATION

Time of Measurement: 10:30
Depth to Product: — m
Product Thickness: — m
Depth to Water (A): 6.162 m below ☒ TOP
Depth to Bottom of Well (B): 10.814 m below ☒ TOP
Diameter of Standpipe: 51 mm
Well Condition: Good, new install

Tidally Influenced: ☐ Yes ☒ No
Pressurized: ☐ Yes ☒ No
Well Headspace: — ppm
One Well Volume:
(B-A)*2.0 = ____ Litres - for a 51 mm (2.0 inch) diameter well
(B-A)*1.1 = ____ Litres - for a 38 mm (1.5 inch) diameter well

EQUIPMENT LIST

Pump: ☐ Waterra ☐ Hydrolift ☐ Bailer (Type: ____) ☒ Peristaltic ☐ Submersible ☐ Bladder

Multimeter Model: YSI Pro Plus
pH/Temp Meter Model: ↓
Conductivity Meter Model: ↓
Dissolved Oxygen Meter Model: ↓
ORP (Redex) Meter Model: ↓
Organic Vapour Meter Model: —

☐ Rental Equipment:
☐ Field Bump
☐ pH4 ☐ pH7
☐ pH10
☐ 1413 us/cm

Pump Details:
☐ D.O. Ampoule
☒ Field Calibration See BM field notes

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X ____ = ____ litres
Start: 10:30 Finish: 11:12
Avg. Flow Rate: ____ L/min.
Sample intake depth: 10.3

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	☐ Cond. ☒ Specific Cond. (µS/cm or mS/cm, circle one)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
10:37	1	2.1	6.73	709.8	-26.0	2.67	6.479	Clear
10:42	2	2.2	6.72	708.6	-24.3	2.60	6.564	" "
10:47	3	2.5	6.70	708.8	-21.2	2.78	6.674	" "
10:52	4	2.3	6.70	711.5	-17.1	2.81	6.748	" "
10:57	5	2.3	6.70	713.5	-9.9	3.29	6.791	" "
11:02	6	2.1	6.71	731.1	-7.3	3.14	6.782	" "
11:07	7	2.1	6.71	730.7	-7.5	2.88	6.830	" "
11:12	8	2.1	6.72	731.2	-8.0	2.73	6.884	" " SAMPLE

* Record DO in Mg/L, not percentage

Comments:
Odour: ☐ Yes ☒ No If yes
Sheen: ☐ Yes ☒ No If yes ☐ Hydrocarbon-like OR ☐ Metallic-like
Turbidity: Clear IIIII (marked) IIIIIIIIIIIIIIIIIIIIIIII Very Silty

Analysis	Type		40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L	Filtered		Preservatives
Diss. Metal	☒ Plastic	☐ Glass		1						☒ Yes	☐ No	HNO3
Diss. Hg	☐ Plastic	☒ Glass	1							☒ Yes	☐ No	HCl
VOC, BTEX, VPH, F1	☐ Plastic	☒ Glass	3							☐ Yes	☒ No	Sodium Bisulphate
LEPH, HEPH, PAH, F2-F4	☐ Plastic	☒ Glass			2					☐ Yes	☒ No	" "
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	

SCN No. 04319-03
Field Dup.
Consumables: ☐ Waterra Tubing ☒ Silicon Tubing ☒ HDPE/Teflon Tubing ☐ D.O. Ampoules ☒ Groundwater Filter ☐ Footvalve

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development ☒ Purging/Sampling

Well No.: K19-MW18-08D

Project Name: K19
Project No.: 1657709
Location:
Date: 22/01/2018
Weather: Overcast **Temperature:** -13
Completed By: BM
GPS Coordinates:
Reviewed By:

MONITORING WELL INFORMATION

Time of Measurement: 15:51
Depth to Product: — m
Product Thickness: — m
Depth to Water (A): 7.998 m below ☒ TOP
Depth to Bottom of Well (B): 11.80 m below ☒ TOP
Diameter of Standpipe: 51 mm
Well Condition: Good, new install

Tidally Influenced: ☐ Yes ☒ No
Pressurized: ☐ Yes ☒ No
Well Headspace: — ppm
One Well Volume:
(B-A)*2.0 = 7.6 Litres - for a 51 mm (2.0 inch) diameter well
(B-A)*1.1 = ____ Litres - for a 38 mm (1.5 inch) diameter well

EQUIPMENT LIST

Pump: ☐ Waterra ☐ Hydrolift ☒ Bailer (Type: Teflon) ☐ Peristaltic ☐ Submersible ☐ Bladder

Multimeter Model: YSI Pro Plus
pH/Temp Meter Model: ↓
Conductivity Meter Model: ↓
Dissolved Oxygen Meter Model: ↓
ORP (Redex) Meter Model: ↓
Organic Vapour Meter Model: —

☐ Rental Equipment:
☐ Field Bump
☐ pH4 ☐ pH7
☐ pH10
☐ 1413 us/cm

Pump Details:
☐ D.O. Ampoule
☒ Field Calibration See BM field notes

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X ______ = ______ litres
Start: ______ Finish: ______
Avg. Flow Rate: ______ L/min.
Sample intake depth: ______

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	☐ Cond. ☒ Specific Cond. (µS/cm circled) or mS/cm (circle one)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
16:06	7.0	3.1	8.72	1007	-92.2	3.93		Clear
16:26	14	3.2	7.93	986	-55.7	2.33	8.367	" "
16:46	22	3.3	7.22	1004				SAMPLE

* Record DO in Mg/L, not percentage

Comments:
Odour: ☐ Yes ☐ No If yes ______
Sheen: ☐ Yes ☐ No If yes ☐ Hydrocarbon-like OR ☐ Metallic-like
Turbidity: Clear I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I Very Silty

Analysis	Type		40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L	Filtered		Preservatives
Diss. Metal	☒ Plastic	☐ Glass		1						☒ Yes	☐ No	HNO3
Diss Hg	☐ Plastic	☒ Glass	1							☒ Yes	☐ No	HCl
LEPH/HEPH/PAH	☐ Plastic	☒ Glass			2					☐ Yes	☒ No	Sodium Bisulphate
VOC/BTEX/VPH	☐ Plastic	☒ Glass	3							☐ Yes	☒ No	" "
Chloride	☒ Plastic	☐ Glass		1						☐ Yes	☒ No	—
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	

SCN No. 04255-03
Field Dup. ______

Consumables: ☐ Waterra Tubing ☒ HDPE/Teflon Tubing ☒ Groundwater Filter ☒ Silicon Tubing ☐ D.O. Ampoules ☐ Footvalve

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development
☒ Purging/Sampling

Well No.: K19-MW18-09

Project Name:	K19	**Project No.:**	1657709
Location:		**Date:**	22/01/2018
Weather:	Overcast **Temperature:** -14	**Completed By:**	BM
GPS Coordinates:		**Reviewed By:**	

MONITORING WELL INFORMATION

Time of Measurement: 11:00
Depth to Product: — m Product Thickness: — m
Depth to Water (A): 7.833 m below ☒ TOP
Depth to Bottom of Well (B): 11.245 m below ☒ TOP
Diameter of Standpipe: 51 mm
Well Condition: Good, new install

Tidally Influenced: ☐ Yes ☒ No
Pressurized: ☐ Yes ☒ No
Well Headspace: — ppm
One Well Volume:
(B-A)*2.0 = 7 Litres - for a 51 mm (2.0 inch) diameter well
(B-A)*1.1 = ____ Litres - for a 38 mm (1.5 inch) diameter well

EQUIPMENT LIST

Pump ☐ Waterra ☐ Hydrolift ☒ Bailer (Type: ____) ☒ Peristaltic ☐ Submersible ☐ Bladder

Multimeter Model: YSI Pro Plus ☐ Rental Equipment:
pH/Temp Meter Model: ↓
Conductivity Meter Model: ↓ ☐ Field Bump
Dissolved Oxygen Meter Model: ↓ ☐ pH4 ____ ☐ pH7 ____
ORP (Redex) Meter Model: ↓ ☐ pH10 ____
Organic Vapour Meter Model: — ☐ 1413 us/cm
Pump Details: ____ ☐ D.O. Ampoule ☒ Field Calibration See BM field notes

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X 3 = 21 litres Start: ____ Finish: ____
Avg. Flow Rate: ____ L/min. Sample intake depth: ~10.8 m

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	☐ Cond. ☒ Specific Cond. (µS/cm (circled) or mS/cm (circle one))	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
14:42	2	3.3	7.22	995	-56.3	6.38	7.913	Silty
14:47	4	3.4	7.20	1015	-26.9	5.40	7.952	Clearing
14:52	6	3.3	7.50	1008	-31.3	5.67	7.943	" "
14:57	8	3.5	7.19	1036	-22.7	5.03	7.967	" "
15:01	10	3.3	7.24	1007	-51.5	4.93	7.951	" "
15:05	12	3.3	7.20	997	-24.4	4.63	7.971	" "
15:10	14	3.2	7.23	989	-23.2	4.75	7.945	" "
								SAMPLE

* Record DO in Mg/L, not percentage

Comments:
Odour: ☐ Yes ☒ No If yes ____
Sheen: ☐ Yes ☒ No If yes ☐ Hydrocarbon-like OR ☐ Metallic-like
Turbidity: Clear IIIIIIIIIIIIIIIIIIIIIIIIIIIIIII Very Silty (marked/circled near the silty end)

Analysis	Type		40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L	Filtered		Preservatives
Diss. Metal	☒ Plastic	☐ Glass		1						☒ Yes	☐ No	HNO3
Diss. Hg	☐ Plastic	☒ Glass	1							☒ Yes	☐ No	HCl
LEPH/HEPH/PAH	☐ Plastic	☒ Glass			2					☐ Yes	☒ No	Sodium Bisulphate
VOC/BTEX/VPH	☐ Plastic	☒ Glass	3							☐ Yes	☒ No	" "
Chloride	☒ Plastic	☐ Glass		1						☐ Yes	☒ No	—
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	

SCN No. 04255-02 Consumables: ☐ Waterra Tubing ____ ☒ HDPE/Teflon Tubing ____ ☒ Groundwater Filter
Field Dup. ____ ☒ Silicon Tubing ____ ☐ D.O. Ampoules ____ ☐ Footvalve

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development
☒ Purging/Sampling

Well No.: K19-MW18-0D

Project Name:	K19	**Project No.:**	1657709
Location:		**Date:**	22/01/2018
Weather:	Overcast **Temperature:** -14	**Completed By:**	BM
GPS Coordinates:		**Reviewed By:**	

MONITORING WELL INFORMATION

Time of Measurement:	11:24	Tidally Influenced:	☐ Yes ☒ No
Depth to Product:	— m Product Thickness: — m	Pressurized:	☐ Yes ☒ No
Depth to Water (A):	5.649 m below ☒ TOP	Well Headspace:	— ppm
Depth to Bottom of Well (B):	10.88 m below ☒ TOP	One Well Volume:	
Diameter of Standpipe:	51 mm	(B-A)*2.0 = 10.5	Litres - for a 51 mm (2.0 inch) diameter well
Well Condition:	Good, new install	(B-A)*1.1 =	Litres - for a 38 mm (1.5 inch) diameter well

EQUIPMENT LIST

Pump	☐ Waterra	Multimeter	Model: YSI Pro Plus	☐ Rental Equipment:
	☐ Hydrolift	pH/Temp Meter	Model: ↓	
	☐ Bailer (Type:)	Conductivity Meter	Model: ↓	☐ Field Bump
	☒ Peristaltic	Dissolved Oxygen Meter	Model: ↓	☐ pH4 ☐ pH7
	☐ Submersible	ORP (Redex) Meter	Model: ↓	☐ pH10
	☐ Bladder	Organic Vapour Meter	Model: —	☐ 1413 us/cm
Pump Details:		☐ D.O. Ampoule		☒ Field Calibration See BM field notes

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X ______ = ______ litres Start: 11:30 Finish: ______

Avg. Flow Rate: ______ L/min. Sample intake depth: ~10.4 m

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	☐ Cond. ☒ Specific Cond. (µS/cm) or mS/cm (circle one)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
11:36	1	2.7	6.88	698.4	-23.3	1.27	5.689	Clear
11:42	2	2.4	6.79	644.1	-15.2	1.07	5.693	" "
11:48	3	2.7	6.83	646.4	-17.4	1.06	6.713	" "
11:53	4	2.0	6.83	649.9	-19.9	1.01	6.710	" "
11:58	5	2.0	6.84	653.4	-17.2	0.92	6.713	" "
12:03	6	2.3	6.85	664.3	96.1	0.99	6.713	" "
12:13	8	2.4	6.76	640.8	100.8	0.93	6.724	" "
12:23	10	2.5	6.73	630.5	99.4	0.89	6.726	" "

* Record DO in Mg/L, not percentage

PAH resample 24/01/2018 11:29

Comments:

Odour: ☐ Yes ☒ No If yes

Sheen: ☐ Yes ☒ No If yes ☐ Hydrocarbon-like OR ☐ Metallic-like

Turbidity: Clear I I I I (I) I I I I I I I I I I I I I I I I I I I I I I I Very Silty

Analysis	Type		40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L	Filtered		Preservatives
Diss. Metal	☒ Plastic	☐ Glass		1						☒ Yes	☐ No	HNO3
Diss. Hg	☐ Plastic	☒ Glass	1							☒ Yes	☐ No	HCl
LEPH/HEPH/PAH	☐ Plastic	☒ Glass			2					☐ Yes	☒ No	Sodium Bisulphate
VOC/BTEX/VPH	☐ Plastic	☒ Glass	3							☐ Yes	☒ No	" "
Chloride	☒ Plastic	☐ Glass		1						☐ Yes	☒ No	—
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	

SCN No. 04255-01, 04255-04 Consumables: ☐ Waterra Tubing ☒ HDPE/Teflon Tubing ☒ Groundwater Filter

Field Dup. ✓ ☒ Silicon Tubing ☐ D.O. Ampoules ☐ Footvalve

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development
☒ Purging/Sampling

Well No.: K19-MW18-11

Project Name: K19 Trutch
Project No.: 1657709
Location:
Date: 24/01/2018
Weather: Overcast **Temperature:** -16
Completed By: BM
GPS Coordinates:
Reviewed By:

MONITORING WELL INFORMATION

Time of Measurement: 11:44
Tidally Influenced: ☐ Yes ☒ No
Depth to Product: — m
Product Thickness: — m
Pressurized: ☐ Yes ☒ No
Depth to Water (A): 5.708 m below ☒ TOP
Well Headspace: — ppm
Depth to Bottom of Well (B): 10.978 m below ☒ TOP
One Well Volume:
Diameter of Standpipe: 51 mm
(B-A)*2.0 = 10.5 Litres - for a 51 mm (2.0 inch) diameter well
Well Condition: Good, new install
(B-A)*1.1 = — Litres - for a 38 mm (1.5 inch) diameter well

EQUIPMENT LIST

Pump ☐ Waterra ☐ Hydrolift ☐ Bailer (Type:) ☒ Peristaltic ☐ Submersible ☐ Bladder

Multimeter Model: YSI Pro Plus
pH/Temp Meter Model:
Conductivity Meter Model:
Dissolved Oxygen Meter Model:
ORP (Redex) Meter Model:
Organic Vapour Meter Model:

☐ Rental Equipment:
☐ Field Bump
☐ pH4 ☐ pH7
☐ pH10
☐ 1413 us/cm

Pump Details:
☐ D.O. Ampoule
☒ Field Calibration See BM field notes

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X ______ = ______ litres
Start: 12:03 Finish:
Avg. Flow Rate: ______ L/min.
Sample intake depth: ~10.5 m

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	☐ Cond. ☒ Specific Cond. µS/cm or mS/cm (circle one)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
12:08	1	2.4	6.77	579.6	-22.0	0.51	5.805	~~Clear~~ Slightly silty
12:13	2	2.2	6.70	581.3	-18.4	0.53	5.823	Clearing
12:18	3	2.2	6.67	566.5	-22.1	0.74	5.832	Clearing
12:28	5	2.4	6.70	574.0	-18.7	0.72	5.849	" "
12:38	7	2.4	6.67	563.6	-17.3	0.76	5.872	" "
12:48	9	2.6	6.67	555.1	-18.6	0.74	5.886	" "
12:58	11	2.5	6.68	551.7	-20.4	0.72	5.895	Clear

* Record DO in Mg/L, not percentage

Comments:
Odour: ☐ Yes ☒ No If yes
Sheen: ☐ Yes ☒ No If yes ☐ Hydrocarbon-like OR ☐ Metallic-like
Turbidity: Clear I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I Very Silty (End, Start marked)

Analysis	Type		40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L	Filtered		Preservatives
Diss. Metals	☒ Plastic	☐ Glass		1						☐ Yes	☐ No	
Diss. Hg	☐ Plastic	☒ Glass	1							☐ Yes	☐ No	
LEPH, HEPH/PAH	☐ Plastic	☒ Glass			2					☐ Yes	☐ No	
VOC/BTEX/VPH	☐ Plastic	☒ Glass	3							☐ Yes	☐ No	
Chloride	☒ Plastic	☐ Glass		1						☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	

SCN No. 04255-05
Field Dup.
Consumables: ☐ Waterra Tubing ☒ HDPE/Teflon Tubing ☒ Groundwater Filter ☒ Silicon Tubing ☐ D.O. Ampoules ☐ Footvalve

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development ☒ Purging/Sampling — Well No.: K19-MW18-12

Project Name: K19 **Project No.:** 1657709
Location: **Date:** 26/01/2018
Weather: Snow **Temperature:** -21 **Completed By:** BM
GPS Coordinates: **Reviewed By:**

MONITORING WELL INFORMATION

Time of Measurement: 14:00
Depth to Product: m Product Thickness: m
Depth to Water (A): 8.062 m below ☒ TOP
Depth to Bottom of Well (B): 14.074 m below ☒ TOP
Diameter of Standpipe: 51 mm
Well Condition: Good, new install

Tidally Influenced: ☐ Yes ☒ No
Pressurized: ☐ Yes ☒ No
Well Headspace: ppm
One Well Volume:
(B-A)*2.0 = 12 Litres - for a 51 mm (2.0 inch) diameter well
(B-A)*1.1 = Litres - for a 38 mm (1.5 inch) diameter well

EQUIPMENT LIST

Pump: ☐ Waterra ☐ Hydrolift ☒ Bailer (Type: Teflon) ☒ Peristaltic ☐ Submersible ☐ Bladder

Multimeter Model: YSI Pro Plus
pH/Temp Meter Model:
Conductivity Meter Model:
Dissolved Oxygen Meter Model:
ORP (Redox) Meter Model:
Organic Vapour Meter Model:

☐ Rental Equipment:
☐ Field Bump ☐ pH4 ☐ pH7 ☐ pH10 ☐ 1413 us/cm
☒ Field Calibration See BM field notes

Pump Details: ☐ D.O. Ampoule

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X = litres Start: 11:03 Finish:
Avg. Flow Rate: L/min. Sample intake depth:

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	☐ Cond. ☒ Specific Cond. µS/cm or mS/cm (circle one)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
11:19	4	2.6	7.78	639.8	39.7	4.24	9.657	Clear
11:40	7	2.6	7.55	739.5	40.4	2.89	9.741	" "
11:44	10	2.7	7.68	730.7	44.6	4.66	10.552	" "
11:51	13	2.8	7.75	733.9	51.6	4.21	11.192	" "
11:59	20	2.7	7.41	698.0	26.3	3.31	Dry	Dry @ 20L

* Record DO in Mg/L, not percentage

Comments:
Odour: ☐ Yes ☒ No If yes
Sheen: ☐ Yes ☒ No If yes ☐ Hydrocarbon-like OR ☐ Metallic-like
Turbidity: Clear IIII(II)IIIIIIIIIIIIIIIIIIIIIIII Very Silty

Analysis	Type		40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L	Filtered		Preservatives
Diss Metals	☒ Plastic	☐ Glass		1						☒ Yes	☐ No	HNO3
Diss Hg	☐ Plastic	☒ Glass	1							☒ Yes	☐ No	HCl
Chloride	☒ Plastic	☐ Glass		1						☐ Yes	☒ No	
LEPH/HEPH/PAH	☐ Plastic	☒ Glass			2					☐ Yes	☒ No	Sodium Bisulphate
VOC/BTEX/VPH	☐ Plastic	☒ Glass	3							☐ Yes	☒ No	" "
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	

SCN No. 04254-01 Consumables: ☐ Waterra Tubing ☒ HDPE/Teflon Tubing ☒ Groundwater Filter
Field Dup. 04254-02 ☒ Silicon Tubing ☐ D.O. Ampoules ☐ Footvalve

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development ☒ Purging/Sampling Well No.: KM9-MW18-15

Project Name: KM9 **Project No.:** 1657709
Location: **Date:** 26/01/2018
Weather: Clear **Temperature:** -19°C **Completed By:** BM
GPS Coordinates: **Reviewed By:**

MONITORING WELL INFORMATION

Time of Measurement: 14:14
Depth to Product: / m Product Thickness: / m
Depth to Water (A): 8.091 m below ☐ TOP
Depth to Bottom of Well (B): 12.525 m below ☐ TOP
Diameter of Standpipe: 51 mm
Well Condition: Good, new install

Tidally Influenced: ☐ Yes ☒ No
Pressurized: ☐ Yes ☒ No
Well Headspace: / ppm
One Well Volume:
(B-A)*2.0 = 9 Litres - for a 51 mm (2.0 inch) diameter well
(B-A)*1.1 = / Litres - for a 38 mm (1.5 inch) diameter well

EQUIPMENT LIST

Pump ☐ Waterra ☐ Hydrolift ☒ Bailer (Type: Teflon) ☐ Peristaltic ☐ Submersible ☐ Bladder
Pump Details: ☐ D.O. Ampoule

Multimeter Model: YSI ProPlus ☐ Rental Equipment:
pH/Temp Meter Model:
Conductivity Meter Model: ☐ Field Bump
Dissolved Oxygen Meter Model: ☐ pH4 ☐ pH7
ORP (Redex) Meter Model: ☐ pH10
Organic Vapour Meter Model: ☐ 1413 us/cm
☒ Field Calibration See BM fieldnotes.

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X = litres Start: 14:14 Finish:
Avg. Flow Rate: L/min. Sample intake depth:

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	☐ Cond. ☐ Specific Cond. µS/cm or mS/cm (circle one)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
14:19	3	2.6	7.58	755.3	10.9	5.20		
14:21	6	3.3	7.52	746.6	6.4	5.67	9.911	
14:24	9	3.3	7.43	749.8	5.9	5.15	10.553	
14:26	12	3.1	7.35	750.8	5.7	5.56	10.761	
14:32	18	3.1	7.56	766.4	-3.3	5.37	11.42	~~DRY~~ DRY @ 20L
14:36	19	3.2	7.48	768.3	7.8	6.01	8.701	SAMPLE

* Record DO in Mg/L, not percentage

Comments:
Odour: ☐ Yes ☒ No If yes
Sheen: ☐ Yes ☒ No If yes ☐ Hydrocarbon-like OR ☐ Metallic-like
Turbidity: Clear Very Silty

Analysis	Type		Container Size							Filtered		Preservatives
			40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L			
Diss Metals	☒ Plastic	☐ Glass		1						☒ Yes	☐ No	HNO3
Diss Hg	☐ Plastic	☒ Glass	1							☒ Yes	☐ No	HCl
Chloride	☒ Plastic	☐ Glass		1						☐ Yes	☒ No	
LEPH/HEPH/PAH	☐ Plastic	☒ Glass			2					☐ Yes	☒ No	Sodium Bisulphate
VOC/BTEX/VPH	☐ Plastic	☒ Glass	3							☐ Yes	☒ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	

SCN No. 04254-~~0004~~ Consumables: ☐ Waterra Tubing ☒ HDPE/Teflon Tubing ☒ Groundwater Filter
Field Dup. ☒ Silicon Tubing ☐ D.O. Ampoules ☐ Footvalve

GROUNDWATER DEVELOPMENT AND SAMPLING DATA	☐ Development ☒ Purging/Sampling	Well No.: K19-MW18-16

Project Name: K19 **Project No.:** 1657709
Location: **Date:** 26/01/2018
Weather: Clear **Temperature:** -18°C **Completed By:** BM
GPS Coordinates: **Reviewed By:**

MONITORING WELL INFORMATION

Time of Measurement: ______ Tidally Influenced: ☐ Yes ☒ No
Depth to Product: ⟋ m Product Thickness: ⟋ m Pressurized: ☐ Yes ☒ No
Depth to Water (A): 6.551 m below ☒ TOP Well Headspace: ⟋ ppm
Depth to Bottom of Well (B): 11.010 m below ☒ TOP One Well Volume:
Diameter of Standpipe: 51 mm (B-A)*2.0 = 9 Litres - for a 51 mm (2.0 inch) diameter well
Well Condition: Good, new condition (B-A)*1.1 = ⟋ Litres - for a 38 mm (1.5 inch) diameter well

EQUIPMENT LIST

Pump ☐ Waterra Multimeter Model: YSI ProPlus ☐ Rental Equipment:
☐ Hydrolift pH/Temp Meter Model:
☒ Bailer (Type: ~~Teflon~~) Conductivity Meter Model: ☐ Field Bump
☒ Peristaltic Dissolved Oxygen Meter Model: ☐ pH4 ☐ pH7
☐ Submersible ORP (Redex) Meter Model: ☐ pH10
☐ Bladder Organic Vapour Meter Model: ⟋ ☐ 1413 us/cm
Pump Details: ☐ D.O. Ampoule ☒ Field Calibration See BM field notes

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X ______ = ______ litres Start: 3:47 Finish:
Avg. Flow Rate: ______ L/min. Sample intake depth:

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	☐ Cond. ☒ Specific Cond. µS/cm or mS/cm (circle one)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
16:01	3	1.9	7.44	687.6	-21.8	6.27	7.92	Clear
16:05	9	2.5	7.45	713.3	-5.6	6.54	9.405	" "
16:08	15	2.8	7.13	700.8	2.8	6.66	Dry	Dry @ 15 L
16:47	18	1.6	7.61	678.9	61.0	4.02	8.978	Clear
16:56	21	2.2	7.64	674.7	70.7	4.32	9.528	Silty
17:03	27	2.4	7.78	610.8	82.9	4.68	Dry	
Purged dry			& samp. next day					
27/01/18 1347	⟋	2.0	7.51	720.6	-45.0	5.72	6.601	Sample

* Record DO in Mg/L, not percentage

Comments:
Odour: ☐ Yes ☐ No If yes ______
Sheen: ☐ Yes ☐ No If yes ☐ Hydrocarbon-like OR ☐ Metallic-like
Turbidity: Clear I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I Very Silty

Analysis	Type		40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L	Filtered		Preservatives
Diss Metal	☒ Plastic	☐ Glass		1						☒ Yes	☐ No	HNO3
Diss Hg	☐ Plastic	☒ Glass	1							☒ Yes	☐ No	HCl
Chloride	☒ Plastic	☐ Glass		1						☐ Yes	☒ No	—
LEPH/HEPH/PAH	☐ Plastic	☒ Glass			2					☐ Yes	☒ No	Sodium Bisulphate
VOC/BTEX/VPH	☐ Plastic	☒ Glass	3							☐ Yes	☒ No	" "
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	

SCN No. 04254-03 Consumables: ☐ Waterra Tubing ______ ☒ HDPE/Teflon Tubing ______ ☒ Groundwater Filter
Field Dup. ______ ☒ Silicon Tubing ______ ☐ D.O. Ampoules ______ ☐ Footvalve

APPENDIX E

Soil Vapour Sampling Forms

SOIL VAPOUR SAMPLING DATA

☐ Probe Installation
☒ Purging/Sampling
☐ Field Blank
☐ Equipment Blank

Sample ID: K19-SV18-01 (K19-MW18-01)

Project Name: K19
Location: Trutch, BC
GPS Coordinates:
Weather & Temperature: -14°C
Wind Direction: **Speed:**
Mean Humidity **Est. Precipitation (w/ 48 hrs):**

Project No.: 1657709/6000
Date: 22-Jan-2018
Completed By: C Lovejoy
Reviewed By:
Barometric Pressure: **Trend:**

SOIL GAS PROBE INFORMATION

Condition of sample location? Land use?: good
Land use of adjacent site?:
Probe type (steel drive point, PVC): 6" SS
Probe location (indoor? subslab? subsurface?): subsurface
Slab depth: m bgs
Building use within 30 m? no Basement present?: no
Depth to water in nearby well: Well ID:

Probe diameter: 0.025 m
Borehole diameter: 0.150 m
Length of sandpack: m
Length of probe: m
Diameter of tubing: 0.006 (1/4 in. = 0.006 m)
Length of tubing: m
Probe and 30% sandpack volume: litres *

(volume is calculated using the soil purge volume calculator spreadsheet at: http://golderportal/Technical/GroupBcRegionalRemediation_1/Field%20Procedures/Forms/Procedures.aspx?RootFolder=%2FTechnical%2FGroupBcRegionalRemediation%5F1%2FField%20Procedures%2FProcedures%2FPROC%2D34%2D37%20Soil%20Vapour%20and%20Air%20Sampling%20Procedures&FolderCTID=0x012000839DDA92DA17D04A8FC928D7E521E61F&View={0562CD87-9575-4318-95D3-20C60AB87A1B})*

FIELD SCREENING EQUIPMENT LIST

Fixed Gas Meter: Model: ~~La~~ Gem 2000 Gases Detected: CH_4, CO_2, O_2
Organic Vapour Meter: Model: Mini Rae 3000 Lamp eV:
Other: Model: MGD 2002 Gases Detected: helium
Pump: ☐ None ☒ SKC ☐ Peristaltic ☐ Other:

LEAK TRACER TEST

Completed: ☒ Today ☐ Other
Type of leak tracer used: helium

	Test 1	Test 2	Test 3
Volume Purged:	1.4 (L)	(L)	(L)
A. [He] below shroud, start:	1. 33.8%	1.	1.
B. [He] below shroud, finish:	2. 20.3%	2.	2.
C. [He] in tedlar bag:	3. 175 ppm (0.0175%)	3.	3.
$D = \left(\frac{C}{(\frac{A+B}{2})10{,}000}\right)100$	D=0.0006 % P/F (P circled) PASS	D= % P/F	D= % P/F

D must be < 2% to pass. If fail, improve seal and repeat.

PURGING / FIELD SCREENING

Purge Volume: Probe Vol. X ____ = ____ litres
Sample Container: 1.4L Summa
Equilibration Time After Purging: 15min
Calibrated Flow Rate: 200mL/m Actual Flow Rate: 201.6mL/min
Start: 14:23 Finish: 14:50 Total Purge Time: 27
Equilibration Time Between Consecutive Samples:

Time	Volume Purged (L)	CH_4 (%)	CO_2 (%)	O_2 (%)	H_2S (ppm)	Vacuum ("H2O)	Flow Rate (mL/min)	PID (ppm)	Remarks (moisture, restricted flow, etc.)
14:34	1.4	0.1	0.1	19.4	–	0.0	203.1	0.0	
14:41	3.6	0.1	0.1	19.6	–	0.1	195.7	0.0	
14:50	5.4	0.1	0.1	19.5	–	0.0	201.8	0.0	

SAMPLE COLLECTION RECORD

Sample ID:	K19-SV18-01	Sample Elevation:	920
Lab ID/Serial No.:	04320-03	Canister Vacuum Pressure: Pre Sampling:	-23.5"
Sample Media Type:	SV	Canister Vacuum Pressure: Post Sampling:	-2.5
Sample Time Required (min):	10:00	Flow Regulator Serial No.:	EI 3117
Sample Start Time:	15:05	Laboratory:	AGAT
Sample End Time:	15:13:30	Sample Pump Type and ID:	
Sample Total Elapsed Time (min):	8.5 min	Sample Pump Calibrated Flow Rate (lab cal'd):	
Sample Volume:	1.4L	Sample Pump Actual Flow Rate (at probe):	

SOIL VAPOUR SAMPLING DATA

☐ Probe Installation
☒ Purging/Sampling
☐ Field Blank
☐ Equipment Blank

Sample ID: K19-MW/SV18 18-02

Project Name:	K19 Investigation	**Project No.:**	1657709
Location:	Tulita, NT	**Date:**	19 Jan 2018
GPS Coordinates:		**Completed By:**	SS
Weather & Temperature:	-10<, clear.	**Reviewed By:**	
Wind Direction:	**Speed:**		
Mean Humidity	**Est. Precipitation (w/ 48 hrs):** 0	**Barometric Pressure:**	**Trend:**

SOIL GAS PROBE INFORMATION

Condition of sample location? Land use?:	Federal	Probe diameter:	0.0127 m
Land use of adjacent site?:		Borehole diameter:	0.155 m
Probe type (steel drive point, PVC):	steel point	Length of sandpack:	0.45 m
Probe location (indoor? subslab? subsurface?):	subsurface	Length of probe:	0.155 m
Slab depth:	/ m bgs	Diameter of tubing:	0.006 (1/4 in. = 0.006 m)
Building use within 30 m?	NO	Basement present?: /	Length of tubing: 4 m
Depth to water in nearby well:		Well ID:	Probe and 30% sandpack volume: 7.99 litres *

(volume is calculated using the soil purge volume calculator spreadsheet at:*
http://golderportal/Technical/GroupBcRegionalRemediation_1/Field%20Procedures/Forms/Procedures.aspx?RootFolder=%2FTechnical%2FGroupBcRegionalRemediation%5F1%2FField%20Procedures%2FProcedures%2FPROC%2D34%2D37%20Soil%20Vapour%20and%20Air%20Sampling%20Procedures&FolderCTID=0x012000839DDA92DA17D04A8FC928D7E521E61F&View={0562CD87-9575-4318-95D3-20C60AB87A1B}

FIELD SCREENING EQUIPMENT LIST

Fixed Gas Meter:	Model:	Landtec Gem 2000	Gases Detected:	CH_4, O_2, CO_2
Organic Vapour Meter:	Model:	MiniRae 3000	Lamp eV:	10.6 eV
Other:	Model:	MGD 2002	Gases Detected:	Helium.

Pump: ☐ None ☒ SKC ☐ Peristaltic ☐ Other:

LEAK TRACER TEST

Completed: ☒ Today ☐ Other

Type of leak tracer used: Helium.

Volume Purged:	2 (L)	(L)	(L)
A. [He] below shroud, start:	1. 55%	1.	1.
B. [He] below shroud, finish:	2. 52%	2.	2.
C. [He] in tedlar bag:	3. 0	3.	3.
$D = \left(\frac{C}{\left(\frac{A+B}{2}\right)10{,}000}\right)100$	D= 0 %P/F	D= % P/F	D= % P/F

D must be < 2% to pass. If fail, improve seal and repeat.

PURGING / FIELD SCREENING

Purge Volume: Probe Vol. X ____ = 8 litres
Calibrated Flow Rate: 200 Actual Flow Rate: ____
Sample Container: Tedlar Start: 1317 Finish: 1411 Total Purge Time: ____
Equilibration Time After Purging: 2 min Equilibration Time Between Consecutive Samples: ____

Time	Volume Purged (L)	CH_4 (%)	CO_2 (%)	O_2 (%)	H_2S (ppm)	Vacuum ("H2O)	Flow Rate (mL/min)	PID (ppm)	Remarks (moisture, restricted flow, etc.)
1317-1322 1324-1329	2	0	0.3	17.1	/	0.15	200/300	-*	*limited sample in bag
1329-1334 1336-1341	4	0	0.2	15.7	/	0.1	205	0.6	
1341-1346 1351-1356	6	0	0.3	15.5	/	0.1	208	0.6	
1357-1402 1406-1411	8	0	0.3	15.3	/	0.1	207	0.7	

SAMPLE COLLECTION RECORD

Sample ID:	04316-02		Sample Elevation:	/	
Lab ID/Serial No.:	131		Canister Vacuum Pressure: Pre Sampling:	-25.5	
Sample Media Type:	Summa		Canister Vacuum Pressure: Post Sampling:	-3.5	
Sample Time Required (min):	10 min		Flow Regulator Serial No.:	3122	
Sample Start Time:	15:02		Laboratory:	ARI	
Sample End Time:	15:12		Sample Pump Type and ID:	/	
Sample Total Elapsed Time (min):	10 min		Sample Pump Calibrated Flow Rate (lab cal'd):	/	
Sample Volume:	1.4		Sample Pump Actual Flow Rate (at probe):	/	

NOTES: - Discovered small hole in tedlar bag during purging. Purged ~1 and gas volume ↑ in bag.
- #183 Summa compromised on this location - loosened a connection point by mistake

Golder Associates

SOIL VAPOUR SAMPLING DATA

☐ Probe Installation
☒ Purging/Sampling Sample ID: KI9-SV18-03
☐ Field Blank
☐ Equipment Blank

Project Name: KI9 Investigation **Project No.:** 1657709
Location: Tuktu Rd **Date:** 19 Jun 2018
GPS Coordinates: **Completed By:** SS
Weather & Temperature: -10 °C **Reviewed By:**
Wind Direction: **Speed:**
Mean Humidity **Est. Precipitation (w/ 48 hrs):** 0 **Barometric Pressure:** **Trend:**

SOIL GAS PROBE INFORMATION

Condition of sample location? Land use?:	Federal	Probe diameter:	0.0127 m
Land use of adjacent site?:		Borehole diameter:	0.155 m
Probe type (steel drive point, PVC):	Steel Point	Length of sandpack:	0.45 m
Probe location (indoor? subslab? subsurface?):	Subsurface	Length of probe:	0.155 m
Slab depth:	✓ m bgs	Diameter of tubing:	0.006 (1/4 in. = 0.006 m)
Building use within 30 m?	NO	Basement present?: ✓	Length of tubing: 4 m
Depth to water in nearby well:		Well ID:	Probe and 30% sandpack volume: 7.11 litres *

(volume is calculated using the soil purge volume calculator spreadsheet at:*
http://golderportal/Technical/GroupBcRegionalRemediation_1/Field%20Procedures/Forms/Procedures.aspx?RootFolder=%2FTechnical%2FGroupBcRegionalRemediation%5F1%2FField%20Procedures%2FProcedures%2FPROC%2D34%2D37%20Soil%20Vapour%20and%20Air%20Sampling%20Procedures&FolderCTID=0x012000839DDA92DA17D04A8FC928D7E521E61F&View={0562CD87-9575-4318-95D3-20C60AB87A1B}

FIELD SCREENING EQUIPMENT LIST

Fixed Gas Meter:	Model:	Landtec GEM 2000	Gases Detected:	CH_4, O_2, CO_2	
Organic Vapour Meter:	Model:	MiniRae 3000	Lamp eV:	10.6	
Other:	Model:	MGD 7002	Gases Detected:	Helium	

Pump: ☐ None ☒ SKC ☐ Peristaltic ☐ Other:

LEAK TRACER TEST

Completed: ☒ Today ☐ Other
Type of leak tracer used: Helium

Volume Purged:	2 (L)	(L)	(L)
A. [He] below shroud, start:	1. 43%	1.	1.
B. [He] below shroud, finish:	2. 63%	2.	2.
C. [He] in tedlar bag:	3. 0	3.	3.
$D = \left(\frac{C}{\left(\frac{A+B}{2}\right)_{10,000}}\right) 100$	D= 0 % P/F	D= % P/F	D= % P/F

D must be < 2% to pass. If fail, improve seal and repeat.

PURGING / FIELD SCREENING

Purge Volume: Probe Vol. X ____ = 8 litres Calibrated Flow Rate: 200 Actual Flow Rate:
Sample Container: Tedlar. Start: 1524 Finish: 1612 Total Purge Time:
Equilibration Time After Purging: 2 min Equilibration Time Between Consecutive Samples:

Time	Volume Purged (L)	CH_4 (%)	CO_2 (%)	O_2 (%)	H_2S (ppm)	Vacuum ("H2O)	Flow Rate (mL/min)	PID (ppm)	Remarks (moisture, restricted flow, etc.)
1524 - 1529 1531 - 1536	2	0	0.5	14.6	✓	0.05	203.01	0.6	
1536 - 1541 1543 - 1548	4	0	0.5	14.7	✓	0.05	205.23	0.5	
1548 - 1553 1555 - 1600	6	0	0.5	14.6	✓	0.05	207.71	0.8	
1600 - 1605 1607 - 1612	8	0	0.5	14.8	✓	0.05	206.66	0.8	

SAMPLE COLLECTION RECORD

	FDA	FD			
Sample ID:	04316-03	04316-04	Sample Elevation:	✓	✓
Lab ID/Serial No.:	138	153	Canister Vacuum Pressure: Pre Sampling:	25"	25"
Sample Media Type:	Summa	Summa	Canister Vacuum Pressure: Post Sampling:	3.5"	3.5"
Sample Time Required (min):	10	10	Flow Regulator Serial No.:	3101	3144
Sample Start Time:	1637	1637	Laboratory:	AGAT	
Sample End Time:	1648	1648	Sample Pump Type and ID:	✓	
Sample Total Elapsed Time (min):	11	11	Sample Pump Calibrated Flow Rate (lab cal'd):	✓	
Sample Volume:	1.4	1.4	Sample Pump Actual Flow Rate (at probe):	✓	

* Duplicate Sample - 10 min Regulators on each Summa
↳ 10 min total for 2 x 1.4 L canisters.

Golder Associates

Shut-in test: passed
24.2" -> 16.5" in 5 min.

SOIL VAPOUR SAMPLING DATA

☐ Probe Installation
☒ Purging/Sampling Sample ID: K19-SV18-04
☐ Field Blank
☐ Equipment Blank

Project Name:	K19 Investigation	**Project No.:**	1657709
Location:	Tatuk, BC	**Date:**	17 Jan 2018
GPS Coordinates:		**Completed By:**	SS
Weather & Temperature:	-10°, clear	**Reviewed By:**	
Wind Direction:		**Speed:**	
Mean Humidity		**Est. Precipitation (w/ 48 hrs):**	0
Barometric Pressure:		**Trend:**	

SOIL GAS PROBE INFORMATION

Condition of sample location? Land use?:	Federal land	Probe diameter:	0.0127 m
Land use of adjacent site?:		Borehole diameter:	0.155 m
Probe type (steel drive point, PVC):	Steel 6" probe	Length of sandpack:	0.45 m
Probe location (indoor? subslab? subsurface?):	Subsurface	Length of probe:	0.155 m
Slab depth:	/ m bgs	Diameter of tubing:	0.006 (1/4 in. = 0.006 m)
Building use within 30 m?	No	Basement present?: /	Length of tubing: 4 m
Depth to water in nearby well:		Well ID:	Probe and 30% sandpack volume: 7.99 litres *

(volume is calculated using the soil purge volume calculator spreadsheet at:*
http://golderportal/Technical/GroupBcRegionalRemediation_1/Field%20Procedures/Forms/Procedures.aspx?RootFolder=%2FTechnical%2FGroupBcRegionalRemediation%5F1%2FField%20Procedures%2FProcedures%2FPROC%2D34%2D37%20Soil%20Vapour%20and%20Air%20Sampling%20Procedures&FolderCTID=0x012000839DDA92DA17D04A8FC928D7E521E61F&View={0562CD87-9575-4318-95D3-20C60AB87A1B}

FIELD SCREENING EQUIPMENT LIST

Fixed Gas Meter:	Model: Landtec GEM 2000	Gases Detected:	CH_4, O_2, CO_2,
Organic Vapour Meter:	Model: MiniRae 3000	Lamp eV:	10.6 ev
Other:	Model: MGB 2002	Gases Detected:	Helium.

Pump: ☐ None ☒ SKC ☐ Peristaltic ☐ Other:

LEAK TRACER TEST

Completed: ☒ Today ☐ Other
Type of leak tracer used: Helium.

Volume Purged:	2 (L)	(L)	(L)
A. [He] below shroud, start:	1. 42 %	1.	1.
B. [He] below shroud, finish:	2. 55 %	2.	2.
C. [He] in tedlar bag:	3. 0	3.	3.
$D = \left(\frac{C}{\left(\frac{A+B}{2}\right)_{10,000}}\right) 100$	D= 0 %P/F	D= % P/F	D= % P/F

D must be < 2% to pass. If fail, improve seal and repeat.

PURGING / FIELD SCREENING

Purge Volume: Probe Vol. X ____ = 8 litres
Calibrated Flow Rate: 200 Actual Flow Rate: ~210
Sample Container: Tedlar
Start: 11:04 Finish: 11:57 Total Purge Time:
Equilibration Time After Purging: 2 min
Equilibration Time Between Consecutive Samples:

Time	Volume Purged (L)	CH_4 (%)	CO_2 (%)	O_2 (%)	H_2S (ppm)	Vacuum ("H2O)	Flow Rate (mL/min)	PID (ppm)	Remarks (moisture, restricted flow, etc.)
1104-1109 1111-1116	2	0	0.1	17.2	/	0.15	*200/400	0	
1116-1121 1123-1128	4	0	0.1	18.4	/	0.15	*200/410	0.1	
1130-1135 1135-1140	6	0	0.3	14.9	/	0.15	*200/400	—	Limited Sample - No PID reading possible
1147-1152 1152-1157	8	0	0.5	14.6	/	0.15	*200/400	—	"

SAMPLE COLLECTION RECORD

Sample ID:	04316-01		Sample Elevation:	/	
Lab ID/Serial No.:	#185		Canister Vacuum Pressure: Pre Sampling:	-24	
Sample Media Type:	Tedlar		Canister Vacuum Pressure: Post Sampling:	-4	
Sample Time Required (min):	10 min		Flow Regulator Serial No.:	(2)089	check w/ Field Notes / Bing M.
Sample Start Time:	12:31		Laboratory:	ALS	
Sample End Time:	12:40		Sample Pump Type and ID:	/	
Sample Total Elapsed Time (min):	9 min		Sample Pump Calibrated Flow Rate (lab cal'd):	/	
Sample Volume:	1.4 L		Sample Pump Actual Flow Rate (at probe):	/	

* Issue w/ seal between landtec & tedlar bag.
* Purging @ 200 ml/min increased to 400 ml/min for sampling (tedlar parameters) for 5 min - due to limited volume in tedlar.

Golder Associates

SOIL VAPOUR SAMPLING DATA

☐ Probe Installation
☒ Purging/Sampling Sample ID: K19-SV18-05
☐ Field Blank
☐ Equipment Blank

Project Name: K19 (Trulch)
Location: Trulch, BC
GPS Coordinates:
Weather & Temperature: -10°C, snow
Wind Direction: _____ **Speed:** _____
Mean Humidity _____ **Est. Precipitation (w/ 48 hrs):** _____

Project No.: 1657709
Date: 21-Jan-2017
Completed By: CLaveja/
Reviewed By: _____
Barometric Pressure: _____ **Trend:** _____

SOIL GAS PROBE INFORMATION

Condition of sample location? Land use?: good
Land use of adjacent site?:
Probe type (steel drive point, PVC): 6"SS
Probe location (indoor? subslab? subsurface?): subsurface
Slab depth: _____ m bgs
Building use within 30 m? no Basement present?: no
Depth to water in nearby well: _____ Well ID: K19 ~~SV~~18-05

Probe diameter: 0.025 m
Borehole diameter: 0.15 m
Length of sandpack: _____ m
Length of probe: _____ m
Diameter of tubing: 0.006 (1/4 in. = 0.006 m)
Length of tubing: _____ m
Probe and 30% sandpack volume: _____ litres *

(volume is calculated using the soil purge volume calculator spreadsheet at: http://golderportal/Technical/GroupBcRegionalRemediation_1/Field%20Procedures/Forms/Procedures.aspx?RootFolder=%2FTechnical%2FGroupBcRegionalRemediation%5F1%2FField%20Procedures%2FProcedures%2FPROC%2D34%2D37%20Soil%20Vapour%20and%20Air%20Sampling%20Procedures&FolderCTID=0x012000839DDA92DA17D04A8FC928D7E521E61F&View={0562CD87-9575-4318-95D3-20C60AB87A1B}*

FIELD SCREENING EQUIPMENT LIST

Fixed Gas Meter: Model: Gem 2000 Gases Detected: CH_4, CO_2, O_2
Organic Vapour Meter: Model: Mini Rae Lamp eV: _____
Other: Model: - Gases Detected: _____
Pump: ☐ None ☑ SKC ☐ Peristaltic ☐ Other: _____

LEAK TRACER TEST

Completed: ☑ Today ☐ Other _____
Type of leak tracer used: helium

Volume Purged:	0.500 (L)	1.0 (L)	1.5 (L)
A. [He] below shroud, start:	1. 31.2 %	1. 41.7 %	1. 43.7
B. [He] below shroud, finish:	2. 24.5 %	2. 31.9 %	2. 26.3
C. [He] in tedlar bag:	3. 0 ppm	3. 2000 ppm (0.002%)	3. 0 ppm
$D = \left(\frac{C}{\left(\frac{A+B}{2}\right)10{,}000}\right)100$	D= 0 % P/F	D= 0.005 % P/F	D= 0 % P/F

D must be < 2% to pass. If fail, improve seal and repeat.

PURGING / FIELD SCREENING

Purge Volume: Probe Vol. X _____ = 2.58 litres
Sample Container: 1.4 L Summa
Equilibration Time After Purging: 30
Calibrated Flow Rate: 200 mL/m Actual Flow Rate: ~~140~~ 140 mL/m
Start: 10:56 Finish: 11:59 Total Purge Time: 1:03
Equilibration Time Between Consecutive Samples: -

Time	Volume Purged (L)	CH_4 (%)	CO_2 (%)	O_2 (%)	H_2S (ppm)	Vacuum ("H2O)	Flow Rate (mL/min)	PID (ppm)	Remarks (moisture, restricted flow, etc.)
11:04	1.12	0.8	3.3	6.2	-	~~8.75~~	~~140~~	0.9	
11:17	2.62	0.7	4.0	4.9	-	~~7.0~~	135	5.0	
11:26	3.88	0.6	3.6	3.7	-	~~7.0~~	135	2.6	
11:37	5.42	0.6	3.4	4.9	-	3.6	140	4.9	

SAMPLE COLLECTION RECORD

Sample ID:	K19-SV18-05		Sample Elevation:	920 masl
Lab ID/Serial No.:	04316-06		Canister Vacuum Pressure: Pre Sampling:	-26 " Hg
Sample Media Type:	SV		Canister Vacuum Pressure: Post Sampling:	-4 " Hg
Sample Time Required (min):	10:00		Flow Regulator Serial No.:	E13191
Sample Start Time:	12:30		Laboratory:	AGAT
Sample End Time:	12:40		Sample Pump Type and ID:	
Sample Total Elapsed Time (min):	10:00		Sample Pump Calibrated Flow Rate (lab cal'd):	
Sample Volume:	1.4L		Sample Pump Actual Flow Rate (at probe):	

Golder Associates

SOIL VAPOUR SAMPLING DATA

☐ Probe Installation
☐ Purging/Sampling
☐ Field Blank
☐ Equipment Blank

Sample ID: KIG-SV18-05

Project Name: _____ **Project No.:** _____
Location: _____ **Date:** _____
GPS Coordinates: _____ **Completed By:** _____
Weather & Temperature: _____ **Reviewed By:** _____
Wind Direction: _____ **Speed:** _____
Mean Humidity _____ **Est. Precipitation (w/ 48 hrs):** _____ **Barometric Pressure:** _____ **Trend:** _____

SOIL GAS PROBE INFORMATION

Condition of sample location? Land use?: _____
Land use of adjacent site?: _____
Probe type (steel drive point, PVC): _____
Probe location (indoor? subslab? subsurface?): _____
Slab depth: _____ m bgs
Building use within 30 m? _____ Basement present?: _____
Depth to water in nearby well: _____ Well ID: _____

Probe diameter: _____ m
Borehole diameter: _____ m
Length of sandpack: _____ m
Length of probe: _____ m
Diameter of tubing: _____ (1/4 in. = 0.006 m)
Length of tubing: _____ m
Probe and 30% sandpack volume: _____ litres *

(volume is calculated using the soil purge volume calculator spreadsheet at: http://golderportal/Technical/GroupBcRegionalRemediation_1/Field%20Procedures/Forms/Procedures.aspx?RootFolder=%2FTechnical%2FGroupBcRegionalRemediation%5F1%2FField%20Procedures%2FProcedures%2FPROC%2D34%2D37%20Soil%20Vapour%20and%20Air%20Sampling%20Procedures&FolderCTID=0x012000839DDA92DA17D04A8FC928D7E521E61F&View={0562CD87-9575-4318-95D3-20C60AB87A1B}*

FIELD SCREENING EQUIPMENT LIST

Fixed Gas Meter: Model: _____ Gases Detected: _____
Organic Vapour Meter: Model: _____ Lamp eV: _____
Other: Model: _____ Gases Detected: _____
Pump: ☐ None ☐ SKC ☐ Peristaltic ☐ Other: _____

LEAK TRACER TEST

Completed: ☐ Today ☐ Other _____
Type of leak tracer used: _____

	Volume Purged:		
	_____ (L)	_____ (L)	_____ (L)
A. [He] below shroud, start:	1. _____	1. _____	1. _____
B. [He] below shroud, finish:	2. _____	2. _____	2. _____
C. [He] in tedlar bag:	3. _____	3. _____	3. _____
$D = \left(\frac{C}{\left(\frac{A+B}{2}\right)10{,}000}\right)100$	D= _____ % P/F	D= _____ % P/F	D= _____ % P/F

D must be < 2% to pass. If fail, improve seal and repeat.

PURGING / FIELD SCREENING

Purge Volume: Probe Vol. X _____ = _____ litres
Sample Container: _____
Equilibration Time After Purging: _____
Calibrated Flow Rate: _____ Actual Flow Rate: _____
Start: _____ Finish: _____ Total Purge Time: _____
Equilibration Time Between Consecutive Samples: _____

Time	Volume Purged (L)	CH_4 (%)	CO_2 (%)	O_2 (%)	H_2S (ppm)	Vacuum ("H2O)	Flow Rate (mL/min)	PID (ppm)	Remarks (moisture, restricted flow, etc.)
11:46	6.92	0.6	~~2.0~~ 5.1	2.8	–	3.8	174.2	5.3	
11:54	8.49	0.6	5.2	2.8	–	3.8	174.8	5.5	

SAMPLE COLLECTION RECORD

Sample ID:			Sample Elevation:		
Lab ID/Serial No.:			Canister Vacuum Pressure: Pre Sampling:		
Sample Media Type:			Canister Vacuum Pressure: Post Sampling:		
Sample Time Required (min):			Flow Regulator Serial No.:		
Sample Start Time:			Laboratory:		
Sample End Time:			Sample Pump Type and ID:		
Sample Total Elapsed Time (min):			Sample Pump Calibrated Flow Rate (lab cal'd):		
Sample Volume:			Sample Pump Actual Flow Rate (at probe):		

SOIL VAPOUR SAMPLING DATA

☐ Probe Installation
☒ Purging/Sampling Sample ID: K19-SV18-07
☐ Field Blank
☐ Equipment Blank

Project Name: K19
Location: Trutch, BC
GPS Coordinates:
Weather & Temperature: -10°C, snow
Wind Direction: **Speed:**
Mean Humidity **Est. Precipitation (w/ 48 hrs):**

Project No.: 1657709/6000
Date: 21-Jan-2018
Completed By: C. Lovejoy
Reviewed By:
Barometric Pressure: **Trend:**

SOIL GAS PROBE INFORMATION

Condition of sample location? Land use?: good
Land use of adjacent site?:
Probe type (steel drive point, PVC): 6" SS
Probe location (indoor? subslab? subsurface?): subsurface
Slab depth: m bgs
Building use within 30 m? no Basement present?: no
Depth to water in nearby well: Well ID:

Probe diameter: 0.025 m
Borehole diameter: 0.15 m
Length of sandpack: m
Length of probe: m
Diameter of tubing: 0.006 (1/4 in. = 0.006 m)
Length of tubing: m
Probe and 30% sandpack volume: litres *

(volume is calculated using the soil purge volume calculator spreadsheet at: http://golderportal/Technical/GroupBcRegionalRemediation_1/Field%20Procedures/Forms/Procedures.aspx?RootFolder=%2FTechnical%2FGroupBcRegionalRemediation%5F1%2FField%20Procedures%2FProcedures%2FPROC%2D34%2D37%20Soil%20Vapour%20and%20Air%20Sampling%20Procedures&FolderCTID=0x012000839DDA92DA17D04A8FC928D7E521E61F&View={0562CD87-9575-4318-95D3-20C60AB87A1B}*

FIELD SCREENING EQUIPMENT LIST

Fixed Gas Meter: Model: Gem 2000 Gases Detected: CH4, CO2, O2
Organic Vapour Meter: Model: MiniRae Lamp eV:
Other: Model: - Gases Detected:
Pump: ☐ None ☒ SKC ☐ Peristaltic ☐ Other:

LEAK TRACER TEST

Completed: ☒ Today ☐ Other
Type of leak tracer used: helium
Volume Purged: 1.4 (L)

A. [He] below shroud, start:	1. 27.8 %	1.	1.
B. [He] below shroud, finish:	2. 25.1 %	2.	2.
C. [He] in tedlar bag:	3. 0ppm	3.	3.
$D = \left(\frac{C}{\left(\frac{A+B}{2}\right)10{,}000}\right)100$	D= 0 % P/F	D= % P/F	D= % P/F

D must be < 2% to pass. If fail, improve seal and repeat.

PURGING / FIELD SCREENING

Purge Volume: Probe Vol. X = litres
Sample Container: 1.4L Summa
Equilibration Time After Purging: 17min

Calibrated Flow Rate: 180 Actual Flow Rate: 188
Start: 15.05 Finish: 15.50 Total Purge Time: 45 min
Equilibration Time Between Consecutive Samples: -

Time	Volume Purged (L)	CH_4 (%)	CO_2 (%)	O_2 (%)	H_2S (ppm)	Vacuum ("H2O)	Flow Rate (mL/min)	PID (ppm)	Remarks (moisture, restricted flow, etc.)
15:26	1.4	0.0	1.2	19.2	-	-0.6	189.2	10.6	
15:34	2.85	0.0	1.6	18.7	-	-0.6	188.1	9.3	
15:43	4.25	0.0	1.6	18.9	-	-0.6	188.2	10.8	
15:50	5.65	0.0	1.6	19.0	-	-0.6	183.3	13.9	

SAMPLE COLLECTION RECORD

Sample ID:	K19-SV18-07		Sample Elevation:	905	masl
Lab ID/Serial No.:	04316-08		Canister Vacuum Pressure: Pre Sampling:	EM3142	-26 "Hg
Sample Media Type:	SV		Canister Vacuum Pressure: Post Sampling:		-4 "Hg
Sample Time Required (min):	10:00		Flow Regulator Serial No.:	EL3142	
Sample Start Time:	16:07		Laboratory:	AGAT	
Sample End Time:	16:17		Sample Pump Type and ID:		
Sample Total Elapsed Time (min):	10:00		Sample Pump Calibrated Flow Rate (lab cal'd):		
Sample Volume:	1.4L		Sample Pump Actual Flow Rate (at probe):		

Golder Associates

SOIL VAPOUR SAMPLING DATA

☐ Probe Installation
☒ Purging/Sampling Sample ID: K19-SV18-08
☐ Field Blank
☐ Equipment Blank

Project Name: K19
Location: Trutch, BC
GPS Coordinates:
Weather & Temperature: -14°c, cloudy
Wind Direction: **Speed:**
Mean Humidity **Est. Precipitation (w/ 48 hrs):**

Project No.: 165T09/6000
Date: 22-Jan-2018
Completed By: Clovejoy
Reviewed By:
Barometric Pressure: **Trend:**

SOIL GAS PROBE INFORMATION

Condition of sample location? Land use?:	good	Probe diameter:	0.025 m
Land use of adjacent site?:		Borehole diameter:	0.150 m
Probe type (steel drive point, PVC):	6" SS	Length of sandpack:	m
Probe location (indoor? subslab? subsurface?):	subsurface	Length of probe:	m
Slab depth:	m bgs	Diameter of tubing:	0.006 (1/4 in. = 0.006 m)
Building use within 30 m?	no	Basement present?:	no
Depth to water in nearby well:	1998	Well ID:	K19-MW18-08D
		Length of tubing:	m
		Probe and 30% sandpack volume:	litres *

(volume is calculated using the soil purge volume calculator spreadsheet at: http://golderportal/Technical/GroupBcRegionalRemediation_1/Field%20Procedures/Forms/Procedures.aspx?RootFolder=%2FTechnical%2FGroupBcRegionalRemediation%5F1%2FField%20Procedures%2FProcedures%2FPROC%2D34%2D37%20Soil%20Vapour%20and%20Air%20Sampling%20Procedures&FolderCTID=0x012000839DDA92DA17D04A8FC928D7E521E61F&View={0562CD87-9575-4318-95D3-20C60AB87A1B})*

FIELD SCREENING EQUIPMENT LIST

Fixed Gas Meter:	Model:	Gem 2000	Gases Detected:	CH_4, CO_2, O_2
Organic Vapour Meter:	Model:	MiniRae 3000	Lamp eV:	
Other:	Model:	MGD 2002	Gases Detected:	helium

Pump: ☐ None ☑ SKC ☐ Peristaltic ☐ Other:

LEAK TRACER TEST

Completed: ☑ Today ☐ Other
Type of leak tracer used: helium

Volume Purged:	1.4 (L)	(L)	(L)
A. [He] below shroud, start:	1. 49.4 %	1.	1.
B. [He] below shroud, finish:	2. 23.5 %	2.	2.
C. [He] in tedlar bag:	3. 0 ppm	3.	3.
$D = \left(\frac{C}{\left(\frac{A+B}{2}\right)10{,}000}\right)100$	D= % P/F	D= % P/F	D= % P/F

D must be < 2% to pass. If fail, improve seal and repeat.

PURGING / FIELD SCREENING

Purge Volume: Probe Vol. X = litres
Sample Container: 1.4L Summa
Equilibration Time After Purging: 11 min

Calibrated Flow Rate: 200 mL/m Actual Flow Rate: 178 mL/min
Start: 11:01 Finish: 11:38 Total Purge Time: ~~0:37~~ min
Equilibration Time Between Consecutive Samples: —

Time	Volume Purged (L)	CH_4 (%)	CO_2 (%)	O_2 (%)	H_2S (ppm)	Vacuum ("H2O)	Flow Rate (mL/min)	PID (ppm)	Remarks (moisture, restricted flow, etc.)
11:18	3.0	0.0	0.5	21.5	—	0.7	183.6	0.2	
11:23	3.6	0.0	1.1	20.8	—	0.8	181.7	0.3	
11:29	5.0	0.0	1.1	20.3	-	0.6	183.5	0.5	
11:36	6.5	0.0	1.1	20.8	-	0.8	178.8	0.6	

SAMPLE COLLECTION RECORD

Sample ID:	K19-SV18-08		Sample Elevation:	905 masl
Lab ID/Serial No.:	04320-01		Canister Vacuum Pressure: Pre Sampling:	-25" Hg
Sample Media Type:	SV		Canister Vacuum Pressure: Post Sampling:	-3.5" Hg
Sample Time Required (min):	10:00		Flow Regulator Serial No.:	EI 4088
Sample Start Time:	11:49		Laboratory:	AGAT
Sample End Time:	11:56		Sample Pump Type and ID:	
Sample Total Elapsed Time (min):	7.00		Sample Pump Calibrated Flow Rate (lab cal'd):	
Sample Volume:	1.4L		Sample Pump Actual Flow Rate (at probe):	

SOIL VAPOUR SAMPLING DATA

☐ Probe Installation
☒ Purging/Sampling Sample ID: K19-SV18-09
☐ Field Blank
☐ Equipment Blank

Project Name: K19
Location: Truth, BC
GPS Coordinates:
Weather & Temperature: -14°C, partly cloudy
Wind Direction: **Speed:**
Mean Humidity **Est. Precipitation (w/ 48 hrs):**

Project No.: 165T709 | 6000
Date: 22-Jan-2018
Completed By: CLaveja
Reviewed By:
Barometric Pressure: **Trend:**

SOIL GAS PROBE INFORMATION

Condition of sample location? Land use?: good
Land use of adjacent site?:
Probe type (steel drive point, PVC): Gilson
Probe location (indoor? subslab? subsurface?): subsurface
Slab depth: m bgs
Building use within 30 m? no Basement present?: no
Depth to water in nearby well: 7.833 Well ID: K19-MW18-09

Probe diameter: 0.025 m
Borehole diameter: 0.150 m
Length of sandpack: m
Length of probe: m
Diameter of tubing: 0.006 (1/4 in. = 0.006 m)
Length of tubing: m
Probe and 30% sandpack volume: litres *

(volume is calculated using the soil purge volume calculator spreadsheet at: http://golderportal/Technical/GroupBcRegionalRemediation_1/Field%20Procedures/Forms/Procedures.aspx?RootFolder=%2FTechnical%2FGroupBcRegionalRemediation%5F1%2FField%20Procedures%2FProcedures%2FPROC%2D34%2D37%20Soil%20Vapour%20and%20Air%20Sampling%20Procedures&FolderCTID=0x012000839DDA92DA17D04A8FC928D7E521E61F&View={0562CD87-9575-4318-95D3-20C60AB87A1B}*

FIELD SCREENING EQUIPMENT LIST

Fixed Gas Meter: Model: Gem2000 Gases Detected: CH_4, O_2, CO_2
Organic Vapour Meter: Model: MiniRae 3000 Lamp eV:
Other: Model: MGD 2002 Gases Detected: helium
Pump: ☐ None ☑ SKC ☐ Peristaltic ☐ Other:

LEAK TRACER TEST

Completed: ☑ Today ☐ Other
Type of leak tracer used: helium

Volume Purged:	1.4 (L)	(L)	(L)
A. [He] below shroud, start:	1. 30.0%	1.	1.
B. [He] below shroud, finish:	2. 19.8%	2.	2.
C. [He] in tedlar bag:	3. 125 ppm	3.	3.
$D = \left(\frac{C}{\left(\frac{A+B}{2}\right)10{,}000}\right) 100$	D= 0.05 % P/F	D= % P/F	D= % P/F

D must be < 2% to pass. If fail, improve seal and repeat.

PURGING / FIELD SCREENING

Purge Volume: Probe Vol. X = litres
Sample Container: 1.4 L Summa
Equilibration Time After Purging: 13 min

Calibrated Flow Rate: 200 mL/m Actual Flow Rate: 197.6 mL/min
Start: 12:28 Finish: 13.13 Total Purge Time: 40 min
Equilibration Time Between Consecutive Samples:

stopped purging 3 times

Time	Volume Purged (L)	CH_4 (%)	CO_2 (%)	O_2 (%)	H_2S (ppm)	Vacuum ("H2O)	Flow Rate (mL/min)	PID (ppm)	Remarks (moisture, restricted flow, etc.)
13:00	6.0	0.1	0.2	20.1	-	0.8	198.2	0.4	
13:06	7.0	0.1	0.2	20.0	-	1.1	193.6	0.4	
13.13	8.0	0.1	0.2	19.9	-	0.0	198.7	0.4	

SAMPLE COLLECTION RECORD

Sample ID:	K19-SV18-09		Sample Elevation:	905
Lab ID/Serial No.:	0320-02		Canister Vacuum Pressure: Pre Sampling:	-25" Hg
Sample Media Type:	SV		Canister Vacuum Pressure: Post Sampling:	-3.5" Hg.
Sample Time Required (min):	10:00		Flow Regulator Serial No.:	FI 3150
Sample Start Time:	13.27		Laboratory:	AGAT
Sample End Time:	13:36		Sample Pump Type and ID:	
Sample Total Elapsed Time (min):	9.00		Sample Pump Calibrated Flow Rate (lab cal'd):	
Sample Volume:	1.4L		Sample Pump Actual Flow Rate (at probe):	

Golder Associates

SOIL VAPOUR SAMPLING DATA

☐ Probe Installation
☒ Purging/Sampling Sample ID: K19-SV18-10
☐ Field Blank
☐ Equipment Blank

Project Name: K19
Location: Truth, BC
GPS Coordinates:
Weather & Temperature: -10°C, snow
Wind Direction: **Speed:**
Mean Humidity **Est. Precipitation (w/ 48 hrs):**

Project No.: 1657709
Date: 21-Jan-2018
Completed By: C. Lagoy
Reviewed By:
Barometric Pressure: **Trend:**

SOIL GAS PROBE INFORMATION

Condition of sample location? Land use?: good
Land use of adjacent site?:
Probe type (steel drive point, PVC): 6" SS
Probe location (indoor? subslab? subsurface?): subsurface
Slab depth: m bgs
Building use within 30 m? no Basement present?: no
Depth to water in nearby well: 5.649 Well ID: K19-MW18-10D

Probe diameter: (1") 0.025 m
Borehole diameter: (6") 0.15 m
Length of sandpack: m
Length of probe: m
Diameter of tubing: 0.006 (1/4 in. = 0.006 m)
Length of tubing: m
Probe and 30% sandpack volume: litres *

(volume is calculated using the soil purge volume calculator spreadsheet at: http://golderportal/Technical/GroupBcRegionalRemediation_1/Field%20Procedures/Forms/Procedures.aspx?RootFolder=%2FTechnical%2FGroupBcRegionalRemediation%5F1%2FField%20Procedures%2FProcedures%2FPROC%2D34%2D37%20Soil%20Vapour%20and%20Air%20Sampling%20Procedures&FolderCTID=0x012000839DDA92DA17D04A8FC928D7E521E61F&View={0562CD87-9575-4318-95D3-20C60AB87A1B}*

FIELD SCREENING EQUIPMENT LIST

Fixed Gas Meter: Model: Gem2000 Gases Detected: CH_4, CO_2, O_2
Organic Vapour Meter: Model: MiniRae Lamp eV:
Other: Model: Gases Detected:
Pump: ☐ None ☒ SKC ☐ Peristaltic ☐ Other:

LEAK TRACER TEST

Completed: ☒ Today ☐ Other
Type of leak tracer used: helium

Volume Purged:	0.6 (L)	1.4 (L)	(L)
A. [He] below shroud, start:	1. 29.9	1. 20.1	1.
B. [He] below shroud, finish:	2. 20.1	2. 26.7	2.
C. [He] in tedlar bag:	3. 25ppm	3. 0 ppm	3.
$D = \left(\frac{C}{\left(\frac{A+B}{2}\right)10{,}000}\right)100$	D= 0.0001 % P/F	D= 0.0 % P/F	D= % P/F

D must be < 2% to pass. If fail, improve seal and repeat.

PURGING / FIELD SCREENING

Purge Volume: Probe Vol. X = litres Calibrated Flow Rate: 180 mL/m Actual Flow Rate: 180.7
Sample Container: 1.4L Summa Start: 14:05 Finish: 14:28 Total Purge Time: 23
Equilibration Time After Purging: 12min Equilibration Time Between Consecutive Samples:

Time	Volume Purged (L)	CH_4 (%)	CO_2 (%)	O_2 (%)	H_2S (ppm)	Vacuum ("H2O)	Flow Rate (mL/min)	PID (ppm)	Remarks (moisture, restricted flow, etc.)
14:12	1.4	0.0	1.9	18.5	-	1.4	180.0	20.1	
14:20	2.85	0.0	1.7	18.7	-	1.3	181.0	15.4	
14:26	3.95	0.0	1.8	18.9	-	1.3	181.3	15.7	

SAMPLE COLLECTION RECORD

Sample ID:	K19-SV18-10S		Sample Elevation:	905	m
Lab ID/Serial No.:	04316-07		Canister Vacuum Pressure: Pre Sampling:	-27	"Hg
Sample Media Type:	SV		Canister Vacuum Pressure: Post Sampling:	-3	"Hg
Sample Time Required (min):	10:00		Flow Regulator Serial No.:	EI 3135	
Sample Start Time:	14:40		Laboratory:	AGAT	
Sample End Time:	14:48		Sample Pump Type and ID:		
Sample Total Elapsed Time (min):	48:00		Sample Pump Calibrated Flow Rate (lab cal'd):		
Sample Volume:	1.4		Sample Pump Actual Flow Rate (at probe):		

SOIL VAPOUR SAMPLING DATA

☐ Probe Installation
☒ Purging/Sampling
☐ Field Blank
☐ Equipment Blank

Sample ID: K19-SV18-14

Project Name: K19
Location: Tratch, BC
GPS Coordinates:
Weather & Temperature: cloudy + -17°C
Wind Direction: **Speed:**
Mean Humidity **Est. Precipitation (w/ 48 hrs):**

Project No.: 1657709/6000
Date: 24 Jan 2018
Completed By: Claepy
Reviewed By:
Barometric Pressure: **Trend:**

SOIL GAS PROBE INFORMATION

Condition of sample location? Land use?: good
Land use of adjacent site?:
Probe type (steel drive point, PVC): 6"SS
Probe location (indoor? subslab? subsurface?): subsurface
Slab depth: m bgs
Building use within 30 m? yes Basement present?: no
Depth to water in nearby well: Well ID:

Probe diameter: 0.025 m
Borehole diameter: 0.152 m
Length of sandpack: m
Length of probe: m
Diameter of tubing: 0.006 (1/4 in. = 0.006 m)
Length of tubing: m
Probe and 30% sandpack volume: litres *

(volume is calculated using the soil purge volume calculator spreadsheet at: http://golderportal/Technical/GroupBcRegionalRemediation_1/Field%20Procedures/Forms/Procedures.aspx?RootFolder=%2FTechnical%2FGroupBcRegionalRemediation%5F1%2FField%20Procedures%2FProcedures%2FPROC%2D34%2D37%20Soil%20Vapour%20and%20Air%20Sampling%20Procedures&FolderCTID=0x012000839DDA92DA17D04A8FC928D7E521E61F&View={0562CD87-9575-4318-95D3-20C60AB87A1B}*

FIELD SCREENING EQUIPMENT LIST

Fixed Gas Meter: Model: Gem2000 Gases Detected: CH_4, CO_2, O_2
Organic Vapour Meter: Model: MiniRae3000 Lamp eV:
Other: Model: MGD2002 Gases Detected: helium
Pump: ☐ None ☒ SKC ☐ Peristaltic ☐ Other:

LEAK TRACER TEST

Completed: ☒ Today ☐ Other
Type of leak tracer used: helium

Volume Purged:	1.4 (L)	(L)	(L)
A. [He] below shroud, start:	1. 33.4 %	1.	1.
B. [He] below shroud, finish:	2. 30.9 %	2.	2.
C. [He] in tedlar bag:	3. 0 ppm	3.	3.
$D = \left(\frac{C}{\left(\frac{A+B}{2}\right)10{,}000}\right)100$	D= 0 % P/F	D= % P/F	D= % P/F

D must be < 2% to pass. If fail, improve seal and repeat.

PURGING / FIELD SCREENING

Purge Volume: Probe Vol. X = litres
Sample Container: 1.4L summa
Equilibration Time After Purging: 20 min

Calibrated Flow Rate: 200 mL/m Actual Flow Rate: ~~125~~ 198.72 mL/min
Start: 14:43 Finish: 15:25 Total Purge Time: 42
Equilibration Time Between Consecutive Samples:

Time	Volume Purged (L)	CH_4 (%)	CO_2 (%)	O_2 (%)	H_2S (ppm)	Vacuum ("H2O)	Flow Rate (mL/min)	PID (ppm)	Remarks (moisture, restricted flow, etc.)
15:01	3.4	0.1	0.3	21.0	–	0.8	200	0.4	
15:06	4.6	0.0	0.3	20.9	–	0.8	199	0.3	
15:12	5.8	0.0	0.3	21.0	–	0.7	195	0.5	
15:19	7.2	0.0	0.3	21.0	–	0.7	195	0.9	

SAMPLE COLLECTION RECORD

Sample ID:	K19-SV18-14		Sample Elevation:	925	
Lab ID/Serial No.:	04320-04		Canister Vacuum Pressure: Pre Sampling:	-26"	
Sample Media Type:	SV		Canister Vacuum Pressure: Post Sampling:	-3"	
Sample Time Required (min):	10:00		Flow Regulator Serial No.:	FI 3157	
Sample Start Time:	15:38		Laboratory:	AGAT	
Sample End Time:	15:48		Sample Pump Type and ID:		
Sample Total Elapsed Time (min):	10:00		Sample Pump Calibrated Flow Rate (lab cal'd):		
Sample Volume:	1.4L		Sample Pump Actual Flow Rate (at probe):		

SOIL VAPOUR SAMPLING DATA

☐ Probe Installation
☒ Purging/Sampling
☐ Field Blank
☐ Equipment Blank

Sample ID: K19-SV18-17

Project Name: K19
Location: Trutch, BC
GPS Coordinates:
Weather & Temperature: -20°C, cloudy
Wind Direction: **Speed:**
Mean Humidity **Est. Precipitation (w/ 48 hrs):**

Project No.: 1657709/6000
Date: 27 Jan 2018
Completed By: CLaggy
Reviewed By:
Barometric Pressure: **Trend:**

SOIL GAS PROBE INFORMATION

Condition of sample location? Land use?: good
Land use of adjacent site?:
Probe type (steel drive point, PVC): 6" SS
Probe location (indoor? subslab? subsurface?): subsurface
Slab depth: m bgs
Building use within 30 m? no
Depth to water in nearby well: Well ID:

Basement present?: no

Probe diameter: 0. m
Borehole diameter: 0.150 m
Length of sandpack: m
Length of probe: m
Diameter of tubing: 0.006 (1/4 in. = 0.006 m)
Length of tubing: m
Probe and 30% sandpack volume: litres *

(volume is calculated using the soil purge volume calculator spreadsheet at: http://golderportal/Technical/GroupBcRegionalRemediation_1/Field%20Procedures/Forms/Procedures.aspx?RootFolder=%2FTechnical%2FGroupBcRegionalRemediation%5F1%2FField%20Procedures%2FProcedures%2FPROC%2D34%2D37%20Soil%20Vapour%20and%20Air%20Sampling%20Procedures&FolderCTID=0x012000839DDA92DA17D04A8FC928D7E521E61F&View={0562CD87-9575-4318-95D3-20C60AB87A1B}*

FIELD SCREENING EQUIPMENT LIST

Fixed Gas Meter: Model: Gem2000 Gases Detected: CH_4, CO_2, O_2
Organic Vapour Meter: Model: MiniRae3000 Lamp eV:
Other: Model: MGD2002 Gases Detected: helium
Pump: ☐ None ☒ SKC ☐ Peristaltic ☐ Other:

LEAK TRACER TEST

Completed: ☒ Today ☐ Other
Type of leak tracer used: helium

Volume Purged:	1.4 (L)	(L)	(L)
A. [He] below shroud, start:	1. 21.8%	1.	1.
B. [He] below shroud, finish:	2. 15.6%	2.	2.
C. [He] in tedlar bag:	3. 25 ppm	3.	3.
$D = \left(\frac{C}{\left(\frac{A+B}{2}\right)10{,}000}\right)100$	D= % P/F	D= % P/F	D= % P/F

D must be < 2% to pass. If fail, improve seal and repeat.

PURGING / FIELD SCREENING

Purge Volume: Probe Vol. X = litres
Sample Container: 1.4L Summa
Equilibration Time After Purging: 10

Calibrated Flow Rate: 200 mL/m Actual Flow Rate: 200 mL/m
Start: 13:37 Finish: Total Purge Time:
Equilibration Time Between Consecutive Samples:

Time	Volume Purged (L)	CH_4 (%)	CO_2 (%)	O_2 (%)	H_2S (ppm)	Vacuum ("H2O)	Flow Rate (mL/min)	PID (ppm)	Remarks (moisture, restricted flow, etc.)
13:51	3.0	0.0	0.1	20.6	-	0.5	200.1	0.0	
14:00	4.8	0.0	0.1	21.0	-	0.6	200.6	0.0	
14:06	6.0	0.0	0.1	21.2	-	0.6	198.1	0.0	
14:13	7.4	0.0	0.1	21.4	-	0.7	195.0	0.0	

SAMPLE COLLECTION RECORD

Sample ID:	K19-SV18-17		Sample Elevation:	920 masl
Lab ID/Serial No.:	04254.05		Canister Vacuum Pressure: Pre Sampling:	-25.5"
Sample Media Type:	SV		Canister Vacuum Pressure: Post Sampling:	-3.5"
Sample Time Required (min):	10:00		Flow Regulator Serial No.:	EI 3153
Sample Start Time:	14:26		Laboratory:	
Sample End Time:	14:36		Sample Pump Type and ID:	
Sample Total Elapsed Time (min):	10.00		Sample Pump Calibrated Flow Rate (lab cal'd):	
Sample Volume:	1.4L		Sample Pump Actual Flow Rate (at probe):	

APPENDIX F

Analytical Reports

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA
219-800 BURRARD ST
VANCOUVER, BC V6Z 0B9
604-671-1831

ATTENTION TO: Erin O'Brien

PROJECT: 1657709/6000

AGAT WORK ORDER: 18N303317

TRACE ORGANICS REVIEWED BY: Neli Popnikolova, Senior Chemist

WATER ANALYSIS REVIEWED BY: Andrew Garrard, B.Sc., General Manager

DATE REPORTED: Jan 24, 2018

PAGES (INCLUDING COVER): 39

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (778) 452-4000

*NOTES
VERSION 1: Sample receipt temperature 0°C.

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

AGAT Laboratories
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CANADA V5J 0B6
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FAX (778)452-4074
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 18N303317

PROJECT: 1657709/6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

AGAT Western Canada - OC Pesticides (Water)

DATE RECEIVED: 2018-01-18

DATE REPORTED: 2018-01-24

				SAMPLE DESCRIPTION:	04309-11	04309-12
				SAMPLE TYPE:	Water	Water
				DATE SAMPLED:	2018-01-14	2018-01-14
Parameter	Unit	G / S	RDL		9018113	9018115
DDT	µg/L		0.04		<0.04	<0.04
Surrogate	**Unit**	**Acceptable Limits**				
TCMX	%	50-140			76	107
Decachlorobiphenyl	%	60-140			105	115

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9018113-9018115 Results relate only to the items tested.

Certified By: N Popruk

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 18N303317

PROJECT: 1657709/6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

BTEX / VPH (C6-C10) Water

DATE RECEIVED: 2018-01-18

DATE REPORTED: 2018-01-24

		SAMPLE DESCRIPTION:		04309-02	04309-05	04309-06	04309-08	04309-09	04309-10	04310-01	04310-02
		SAMPLE TYPE:		Water	Water	Water	Water	Water	Water	Water	Water
		DATE SAMPLED:		2018-01-13	2018-01-14	2018-01-14	2018-01-14	2018-01-14	2018-01-14	2018-01-14	2018-01-16
Parameter	**Unit**	**G / S**	**RDL**	**9018098**	**9018104**	**9018106**	**9018109**	**9018111**	**9018112**	**9018117**	**9018125**
Methyl tert-butyl ether (MTBE)	µg/L		1	<1	<1	<1	<1	<1	<1	<1	<1
Benzene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
m&p-Xylene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
o-Xylene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Styrene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
VPH	µg/L		100	<100	<100	<100	<100	<100	<100	<100	<100
VH	µg/L		100	<100	<100	<100	<100	<100	<100	<100	<100
Total Xylenes	ug/L		1	<1	<1	<1	<1	<1	<1	<1	<1
Surrogate	**Unit**	**Acceptable Limits**									
Bromofluorobenzene	%	70-130		99	98	96	97	99	96	101	98
Dibromofluoromethane	%	70-130		102	102	102	101	104	102	105	103
Toluene - d8	%	70-130		98	101	98	99	99	98	102	98

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9018098-9018125 VPH results have been corrected for BTEX contributions.

Certified By: N Popruchof

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 18N303317

PROJECT: 1657709/6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

CCME F1 (C6-C10) (Water)

DATE RECEIVED: 2018-01-18

DATE REPORTED: 2018-01-24

		SAMPLE DESCRIPTION:		04310-03	04310-04	04310-05
		SAMPLE TYPE:		Water	Water	Water
		DATE SAMPLED:		2018-01-16	2018-01-16	2018-01-16
Parameter	**Unit**	**G / S**	**RDL**	**9018127**	**9018129**	**9018131**
F1 (C6-C10)	µg/L		100	<100	840	880
F1 minus BTEX (C6-C10)	µg/L		100	<100	560	630
Surrogate	**Unit**	**Acceptable Limits**				
Bromofluorobenzene	%	70-130		99	96	97
Dibromofluoromethane	%	70-130		105	103	103
Toluene - d8	%	70-130		100	102	101

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9018127-9018131 The F1 (C6 - C10) fraction is determined by integrating the FID chromatogram from the beginning of the n-C6 peak to the apex of the last n-C10 peak.
The C6 - C10 fraction is calculated from the FID toluene response factor.
Quality control for the calibration follows the guidelines set out in the CCME Contaminated Sites Method for Soils.
The (F1 minus BTEX) has been calculated by subtracting the BTEX concentration from Fraction 1.

Certified By: N Popruk

AGAT Laboratories

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Burnaby, British Columbia
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Certificate of Analysis

AGAT WORK ORDER: 18N303317

PROJECT: 1657709/6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

CCME F2-F4 (Water)

DATE RECEIVED: 2018-01-18

DATE REPORTED: 2018-01-24

		SAMPLE DESCRIPTION:		04310-03	04310-04	04310-05
		SAMPLE TYPE:		Water	Water	Water
		DATE SAMPLED:		2018-01-16	2018-01-16	2018-01-16
Parameter	Unit	G / S	RDL	9018127	9018129	9018131
F2 (C10-C16)	µg/L		100	<100	<100	<100
F3 (C16-C34)	µg/L		100	<100	110	<100
F4 (C34-C50)	µg/L		100	<100	<100	<100

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9018127-9018131 The C10 - C16 (F2), C16 - C34 (F3), and C34 - C50 (F4) fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Quality control data is available upon request.
Assistance in the interpretation of data is available upon request.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
The chromatogram has returned to baseline by the retention time of nC50.
Extraction and holding times were met for this sample.

Certified By: N Popowkolof

AGAT Laboratories

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CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
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Certificate of Analysis

AGAT WORK ORDER: 18N303317

PROJECT: 1657709/6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works LEPH/HEPH in Water Low Level

DATE RECEIVED: 2018-01-18

DATE REPORTED: 2018-01-24

		SAMPLE DESCRIPTION:		04309-01	04309-02	04309-03	04309-04	04309-05	04309-06	04309-07	04309-08
		SAMPLE TYPE:		Water	Water	Water	Water	Water	Water	Water	Water
		DATE SAMPLED:		2018-01-13	2018-01-13	2018-01-13	2018-01-14	2018-01-14	2018-01-14	2018-01-14	2018-01-14
Parameter	**Unit**	**G / S**	**RDL**	**9018095**	**9018098**	**9018099**	**9018101**	**9018104**	**9018106**	**9018107**	**9018109**
Naphthalene	µg/L		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Quinoline	µg/L		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Acenaphthylene	µg/L		0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Acenaphthene	µg/L		0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Fluorene	µg/L		0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Phenanthrene	µg/L		0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Anthracene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Acridine	µg/L		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fluoranthene	µg/L		0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Pyrene	µg/L		0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Benzo(a)anthracene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chrysene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(b)fluoranthene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(j)fluoranthene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(k)fluoranthene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)pyrene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Indeno(1,2,3-c,d)pyrene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dibenzo(a,h)anthracene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(g,h,i)perylene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
1-Methylnaphthalene	µg/L		0.05	<0.05	<0.05	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
2-Methylnaphthalene	µg/L		0.05	<0.05	<0.05	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
EPH C10-C19	µg/L		100	<100	<100	<100	<100	<100	<100	<100	<100
EPH C19-C32	µg/L		100	<100	<100	<100	<100	<100	<100	<100	<100
LEPH C10-C19	µg/L		100	<100	<100	<100	<100	<100	<100	<100	<100
HEPH C19-C32	µg/L		100	<100	<100	<100	<100	<100	<100	<100	<100
Benzo(b+j)fluoranthene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Surrogate	**Unit**	**Acceptable Limits**									
Naphthalene - d8	%	50-130		96	88	83	89	77	82	87	87
2-Fluorobiphenyl	%	50-130		96	88	80	90	78	82	87	88
P-Terphenyl - d14	%	60-130		106	92	94	93	87	88	83	86

Certified By: N Popowkolof

AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 18N303317

PROJECT: 1657709/6000

Unit 120, 8600 Glenlyon Parkway
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CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works LEPH/HEPH in Water Low Level

DATE RECEIVED: 2018-01-18

DATE REPORTED: 2018-01-24

Certified By: N Popowkolof

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SAMPLING SITE:

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Public Works LEPH/HEPH in Water Low Level

DATE RECEIVED: 2018-01-18

DATE REPORTED: 2018-01-24

		SAMPLE DESCRIPTION:		04309-09	04309-10	04309-11	04309-12	04310-01	04310-02	04310-03	04310-04
		SAMPLE TYPE:		Water	Water	Water	Water	Water	Water	Water	Water
		DATE SAMPLED:		2018-01-14	2018-01-14	2018-01-14	2018-01-14	2018-01-14	2018-01-16	2018-01-16	2018-01-16
Parameter	**Unit**	**G / S**	**RDL**	**9018111**	**9018112**	**9018113**	**9018115**	**9018117**	**9018125**	**9018127**	**9018129**
Naphthalene	µg/L		0.05	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Quinoline	µg/L		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Acenaphthylene	µg/L		0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Acenaphthene	µg/L		0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Fluorene	µg/L		0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Phenanthrene	µg/L		0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Anthracene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Acridine	µg/L		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fluoranthene	µg/L		0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Pyrene	µg/L		0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Benzo(a)anthracene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chrysene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(b)fluoranthene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(j)fluoranthene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(k)fluoranthene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)pyrene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Indeno(1,2,3-c,d)pyrene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dibenzo(a,h)anthracene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(g,h,i)perylene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
1-Methylnaphthalene	µg/L		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
2-Methylnaphthalene	µg/L		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
EPH C10-C19	µg/L		100	<100	<100	<100	<100	<100	<100	<100	<100
EPH C19-C32	µg/L		100	<100	<100	<100	<100	<100	<100	<100	<100
LEPH C10-C19	µg/L		100	<100	<100	<100	<100	<100	<100	<100	<100
HEPH C19-C32	µg/L		100	<100	<100	<100	<100	<100	<100	<100	<100
Benzo(b+j)fluoranthene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Surrogate	**Unit**	**Acceptable Limits**		**9018111**	**9018112**	**9018113**	**9018115**	**9018117**	**9018125**	**9018127**	**9018129**
Naphthalene - d8	%	50-130		82	97	89	87	89	84	87	81
2-Fluorobiphenyl	%	50-130		82	98	90	87	89	85	88	84
P-Terphenyl - d14	%	60-130		88	103	85	87	81	90	80	79

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SAMPLING SITE:

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Public Works LEPH/HEPH in Water Low Level

DATE RECEIVED: 2018-01-18

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Public Works LEPH/HEPH in Water Low Level

DATE RECEIVED: 2018-01-18

DATE REPORTED: 2018-01-24

		SAMPLE DESCRIPTION:		04310-05
		SAMPLE TYPE:		Water
		DATE SAMPLED:		2018-01-16
Parameter	**Unit**	**G / S**	**RDL**	**9018131**
Naphthalene	µg/L		0.05	<0.05
Quinoline	µg/L		0.05	<0.05
Acenaphthylene	µg/L		0.02	<0.02
Acenaphthene	µg/L		0.02	<0.02
Fluorene	µg/L		0.02	<0.02
Phenanthrene	µg/L		0.04	<0.04
Anthracene	µg/L		0.01	<0.01
Acridine	µg/L		0.05	<0.05
Fluoranthene	µg/L		0.02	<0.02
Pyrene	µg/L		0.02	<0.02
Benzo(a)anthracene	µg/L		0.01	<0.01
Chrysene	µg/L		0.01	<0.01
Benzo(b)fluoranthene	µg/L		0.01	<0.01
Benzo(j)fluoranthene	µg/L		0.01	<0.01
Benzo(k)fluoranthene	µg/L		0.01	<0.01
Benzo(a)pyrene	µg/L		0.01	<0.01
Indeno(1,2,3-c,d)pyrene	µg/L		0.01	<0.01
Dibenzo(a,h)anthracene	µg/L		0.01	<0.01
Benzo(g,h,i)perylene	µg/L		0.01	<0.01
1-Methylnaphthalene	µg/L		0.05	<0.05
2-Methylnaphthalene	µg/L		0.05	<0.05
EPH C10-C19	µg/L		100	<100
EPH C19-C32	µg/L		100	<100
LEPH C10-C19	µg/L		100	<100
HEPH C19-C32	µg/L		100	<100
Benzo(b+j)fluoranthene	µg/L		0.01	<0.01
Surrogate	**Unit**	**Acceptable Limits**		**9018131**
Naphthalene - d8	%	50-130		80
2-Fluorobiphenyl	%	50-130		83
P-Terphenyl - d14	%	60-130		79

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Public Works LEPH/HEPH in Water Low Level

DATE RECEIVED: 2018-01-18

DATE REPORTED: 2018-01-24

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9018095-9018131 LEPH & HEPH results have been corrected for PAH contributions.

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SAMPLING SITE:

SAMPLED BY:

Volatile Organic Compounds in Water

DATE RECEIVED: 2018-01-18

DATE REPORTED: 2018-01-24

SAMPLE DESCRIPTION:				04309-01	04309-03	04309-04	04309-07	04309-11	04309-12	04310-03	04310-04
SAMPLE TYPE:				Water	Water	Water	Water	Water	Water	Water	Water
DATE SAMPLED:				2018-01-13	2018-01-13	2018-01-14	2018-01-14	2018-01-14	2018-01-14	2018-01-16	2018-01-16
Parameter	Unit	G / S	RDL	9018095	9018099	9018101	9018107	9018113	9018115	9018127	9018129
Chloromethane	µg/L		1	<1	<1	<1	<1	<1	<1	<1	<1
Vinyl Chloride	µg/L		1	<1	<1	<1	<1	<1	<1	<1	<1
Bromomethane	µg/L		1	<1	<1	<1	<1	<1	<1	<1	<1
Chloroethane	µg/L		1	<1	<1	<1	<1	<1	<1	<1	<1
Trichlorofluoromethane	µg/L		1	<1	<1	<1	<1	<1	<1	<1	<1
Acetone	µg/L		10	<10	<10	<10	<10	<10	<10	<10	<10
1,1-Dichloroethylene	µg/L		1	<1	<1	<1	<1	<1	<1	<1	<1
Dichloromethane	µg/L		1	<1	<1	<1	<1	<1	<1	<1	<1
Methyl tert-butyl ether (MTBE)	µg/L		1	<1	<1	<1	<1	<1	<1	<1	<1
2-Butanone (MEK)	µg/L		10	<10	<10	<10	<10	<10	<10	<10	<10
trans-1,2-Dichloroethylene	µg/L		1	<1	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethane	µg/L		1	<1	<1	<1	<1	<1	<1	<1	<1
cis-1,2-Dichloroethylene	µg/L		1	<1	<1	<1	<1	<1	<1	<1	<1
Chloroform	µg/L		1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	µg/L		1	<1	<1	<1	<1	<1	<1	<1	52
1,1,1-Trichloroethane	µg/L		1	<1	<1	<1	<1	<1	<1	<1	<1
Carbon Tetrachloride	µg/L		0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	271
1,2-Dichloropropane	µg/L		1	<1	<1	<1	<1	<1	<1	<1	<1
Trichloroethene	µg/L		1	<1	<1	<1	<1	<1	<1	<1	<1
Bromodichloromethane	µg/L		1	<1	<1	<1	<1	<1	<1	<1	<1
trans-1,3-Dichloropropene	µg/L		1	<1	<1	<1	<1	<1	<1	<1	<1
4-Methyl-2-pentanone (MIBK)	µg/L		10	<10	<10	<10	<10	<10	<10	<10	<10
cis-1,3-Dichloropropene	µg/L		1	<1	<1	<1	<1	<1	<1	<1	<1
1,1,2-Trichloroethane	µg/L		1	<1	<1	<1	<1	<1	<1	<1	<1
Toluene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	8.1
Dibromochloromethane	µg/L		1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-Dibromoethane	µg/L		0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Tetrachloroethylene	µg/L		1	<1	<1	<1	<1	<1	<1	<1	<1
1,1,1,2-Tetrachloroethane	µg/L		1	<1	<1	<1	<1	<1	<1	<1	<1

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AGAT WORK ORDER: 18N303317

PROJECT: 1657709/6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Volatile Organic Compounds in Water

DATE RECEIVED: 2018-01-18

DATE REPORTED: 2018-01-24

		SAMPLE DESCRIPTION:		04309-01	04309-03	04309-04	04309-07	04309-11	04309-12	04310-03	04310-04
		SAMPLE TYPE:		Water	Water	Water	Water	Water	Water	Water	Water
		DATE SAMPLED:		2018-01-13	2018-01-13	2018-01-14	2018-01-14	2018-01-14	2018-01-14	2018-01-16	2018-01-16
Parameter	**Unit**	**G / S**	**RDL**	**9018095**	**9018099**	**9018101**	**9018107**	**9018113**	**9018115**	**9018127**	**9018129**
Chlorobenzene	µg/L		1	<1	<1	<1	<1	<1	<1	<1	<1
Ethylbenzene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
m&p-Xylene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromoform	µg/L		1	<1	<1	<1	<1	<1	<1	<1	<1
Styrene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,2,2-Tetrachloroethane	µg/L		0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8
o-Xylene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichlorobenzene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2,4-Trichlorobenzene	µg/L		1	<1	<1	<1	<1	<1	<1	<1	<1
VH	µg/L		100	<100	<100	<100	<100	<100	<100	<100	380
VPH	µg/L		100	<100	<100	<100	<100	<100	<100	<100	100
1,3-Dichloropropene (cis + trans)	µg/L		1	<1	<1	<1	<1	<1	<1	<1	<1
Total Trihalomethanes	µg/L		2	<2	<2	<2	<2	<2	<2	<2	<2
Total Xylenes	µg/L		1	<1	<1	<1	<1	<1	<1	<1	<1
Surrogate	**Unit**	**Acceptable Limits**									
Bromofluorobenzene	%	70-130		87	92	93	95	91	83	90	97
Dibromofluoromethane	%	70-130		94	103	104	106	101	94	101	92
Toluene - d8	%	70-130		98	112	111	113	110	96	105	105

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Volatile Organic Compounds in Water

DATE RECEIVED: 2018-01-18

DATE REPORTED: 2018-01-24

		SAMPLE DESCRIPTION:		04310-05
		SAMPLE TYPE:		Water
		DATE SAMPLED:		2018-01-16
Parameter	Unit	G / S	RDL	9018131
Chloromethane	µg/L		1	<1
Vinyl Chloride	µg/L		1	<1
Bromomethane	µg/L		1	<1
Chloroethane	µg/L		1	<1
Trichlorofluoromethane	µg/L		1	<1
Acetone	µg/L		10	<10
1,1-Dichloroethylene	µg/L		1	<1
Dichloromethane	µg/L		1	<1
Methyl tert-butyl ether (MTBE)	µg/L		1	<1
2-Butanone (MEK)	µg/L		10	<10
trans-1,2-Dichloroethylene	µg/L		1	<1
1,1-Dichloroethane	µg/L		1	<1
cis-1,2-Dichloroethylene	µg/L		1	<1
Chloroform	µg/L		1	<1
1,2-Dichloroethane	µg/L		1	49
1,1,1-Trichloroethane	µg/L		1	<1
Carbon Tetrachloride	µg/L		0.5	<0.5
Benzene	µg/L		0.5	237
1,2-Dichloropropane	µg/L		1	<1
Trichloroethene	µg/L		1	<1
Bromodichloromethane	µg/L		1	<1
trans-1,3-Dichloropropene	µg/L		1	<1
4-Methyl-2-pentanone (MIBK)	µg/L		10	<10
cis-1,3-Dichloropropene	µg/L		1	<1
1,1,2-Trichloroethane	µg/L		1	<1
Toluene	µg/L		0.5	7.7
Dibromochloromethane	µg/L		1	<1
1,2-Dibromoethane	µg/L		0.3	<0.3
Tetrachloroethylene	µg/L		1	<1
1,1,1,2-Tetrachloroethane	µg/L		1	<1

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DATE RECEIVED: 2018-01-18

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		SAMPLE DESCRIPTION:		04310-05
		SAMPLE TYPE:		Water
		DATE SAMPLED:		2018-01-16
Parameter	**Unit**	**G / S**	**RDL**	**9018131**
Chlorobenzene	µg/L		1	<1
Ethylbenzene	µg/L		0.5	<0.5
m&p-Xylene	µg/L		0.5	<0.5
Bromoform	µg/L		1	<1
Styrene	µg/L		0.5	<0.5
1,1,2,2-Tetrachloroethane	µg/L		0.8	<0.8
o-Xylene	µg/L		0.5	<0.5
1,3-Dichlorobenzene	µg/L		0.5	<0.5
1,4-Dichlorobenzene	µg/L		0.5	<0.5
1,2-Dichlorobenzene	µg/L		0.5	<0.5
1,2,4-Trichlorobenzene	µg/L		1	<1
VH	µg/L		100	410
VPH	µg/L		100	160
1,3-Dichloropropene (cis + trans)	µg/L		1	<1
Total Trihalomethanes	µg/L		2	<2
Total Xylenes	µg/L		1	<1
Surrogate	**Unit**	**Acceptable Limits**		
Bromofluorobenzene	%	70-130		94
Dibromofluoromethane	%	70-130		87
Toluene - d8	%	70-130		98

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

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AGAT Laboratories

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Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 18N303317

PROJECT: 1657709/6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Chloride in Water

DATE RECEIVED: 2018-01-18

DATE REPORTED: 2018-01-24

		SAMPLE DESCRIPTION:		04309-02		04309-03		04309-04		04309-06
		SAMPLE TYPE:		Water		Water		Water		Water
		DATE SAMPLED:		2018-01-13		2018-01-13		2018-01-14		2018-01-14
Parameter	Unit	G / S	RDL	9018098	RDL	9018099	RDL	9018101	RDL	9018106
Chloride	mg/L		0.05	0.32	0.5	217	5	873	0.05	22.5

		SAMPLE DESCRIPTION:		04309-07		04310-02		04310-03		04310-04	04310-05
		SAMPLE TYPE:		Water		Water		Water		Water	Water
		DATE SAMPLED:		2018-01-14		2018-01-16		2018-01-16		2018-01-16	2018-01-16
Parameter	Unit	G / S	RDL	9018107	RDL	9018125	RDL	9018127	RDL	9018129	9018131
Chloride	mg/L		0.5	106	0.05	35.8	0.5	58.9	0.05	6.52	6.60

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

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CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works Dissolved Metals

DATE RECEIVED: 2018-01-18

DATE REPORTED: 2018-01-24

		SAMPLE DESCRIPTION:		04309-01		04309-02	04309-03		04309-04		04309-05
		SAMPLE TYPE:		Water		Water	Water		Water		Water
		DATE SAMPLED:		2018-01-13		2018-01-13	2018-01-13		2018-01-14		2018-01-14
Parameter	Unit	G / S	RDL	9018095	RDL	9018098	9018099	RDL	9018101	RDL	9018104
Aluminum Dissolved	µg/L		2	36	2	4	<2	2	25	2	<2
Antimony Dissolved	µg/L		0.2	0.3	0.2	<0.2	<0.2	0.2	<0.2	0.2	<0.2
Arsenic Dissolved	µg/L		0.1	0.4	0.1	0.2	0.4	0.1	0.4	0.1	0.2
Barium Dissolved	µg/L		0.2	67.0	2	1060	11300	2	4190	0.2	76.7
Beryllium Dissolved	µg/L		0.01	0.19	0.01	<0.01	0.01	0.01	0.20	0.01	<0.01
Bismuth Dissolved	µg/L		0.05	<0.05	0.05	<0.05	<0.05	0.05	<0.05	0.05	<0.05
Boron Dissolved	µg/L		2	314	2	203	278	2	173	2	315
Cadmium Dissolved	µg/L		0.01	0.03	0.01	<0.01	<0.01	0.01	0.08	0.01	<0.01
Calcium Dissolved	µg/L		50	76900	50	30600	124000	250	332000	50	57800
Chromium Dissolved	µg/L		0.5	<0.5	0.5	<0.5	<0.5	0.5	<0.5	0.5	<0.5
Cobalt Dissolved	µg/L		0.05	7.56	0.05	<0.05	0.06	0.05	5.10	0.05	0.49
Copper Dissolved	µg/L		0.2	<0.2	0.2	<0.2	<0.2	0.2	1.8	0.2	<0.2
Iron Dissolved	µg/L		10	16	10	1040	1670	10	5850	10	772
Lead Dissolved	µg/L		0.05	<0.05	0.05	<0.05	<0.05	0.05	<0.05	0.05	<0.05
Lithium Dissolved	µg/L		1.0	173	1.0	113	153	2.5	219	1.0	130
Magnesium Dissolved	µg/L		50	28400	50	11400	43600	50	87100	50	25700
Manganese Dissolved	µg/L		1	1140	1	288	1550	1	13100	1	833
Mercury Dissolved	µg/L		0.01	<0.01	0.01	<0.01	<0.01	0.01	<0.01	0.01	<0.01
Molybdenum Dissolved	µg/L		0.05	0.65	0.05	<0.05	0.09	0.05	0.72	0.05	0.29
Nickel Dissolved	µg/L		0.2	14.7	0.2	<0.2	0.2	0.2	8.4	0.2	0.5
Potassium Dissolved	µg/L		50	3240	50	1530	2890	50	5550	50	2380
Selenium Dissolved	µg/L		0.5	5.3	0.5	<0.5	<0.5	0.5	<0.5	0.5	<0.5
Silicon Dissolved	µg/L		50	6250	50	3760	5070	50	8330	50	6170
Silver Dissolved	µg/L		0.02	<0.02	0.02	<0.02	<0.02	0.02	<0.02	0.02	<0.02
Sodium Dissolved	µg/L		50	16200	50	78900	36200	50	31300	50	12600
Strontium Dissolved	µg/L		0.1	482	0.1	377	1320	0.5	2060	0.1	632
Sulphur Dissolved	µg/L		500	24200	500	<500	1910	500	4150	500	8510
Thallium Dissolved	µg/L		0.01	0.04	0.01	0.01	<0.01	0.01	0.03	0.01	<0.01
Tin Dissolved	µg/L		0.05	0.15	0.05	<0.05	0.10	0.05	0.12	0.05	<0.05
Titanium Dissolved	µg/L		0.5	1.6	0.5	1.1	1.3	0.5	1.9	0.5	1.3

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PROJECT: 1657709/6000

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ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works Dissolved Metals

DATE RECEIVED: 2018-01-18

DATE REPORTED: 2018-01-24

		SAMPLE DESCRIPTION:		04309-01		04309-02	04309-03		04309-04		04309-05
		SAMPLE TYPE:		Water		Water	Water		Water		Water
		DATE SAMPLED:		2018-01-13		2018-01-13	2018-01-13		2018-01-14		2018-01-14
Parameter	Unit	G / S	RDL	9018095	RDL	9018098	9018099	RDL	9018101	RDL	9018104
Uranium Dissolved	µg/L		0.01	3.38	0.01	<0.01	0.32	0.01	0.55	0.01	0.46
Vanadium Dissolved	µg/L		0.5	0.9	0.5	<0.5	<0.5	0.5	<0.5	0.5	<0.5
Zinc Dissolved	µg/L		2	4	2	<2	8	2	14	2	<2
Zirconium Dissolved	µg/L		0.1	0.2	0.1	<0.1	0.1	0.1	<0.1	0.1	<0.1
Hardness (calc)	ug CaCO3/L		100	309000	100	123000	489000	100	1190000	100	250000

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DATE RECEIVED: 2018-01-18

DATE REPORTED: 2018-01-24

		SAMPLE DESCRIPTION:		04309-06		04309-07		04309-08		04309-09
		SAMPLE TYPE:		Water		Water		Water		Water
		DATE SAMPLED:		2018-01-14		2018-01-14		2018-01-14		2018-01-14
Parameter	Unit	G / S	RDL	9018106	RDL	9018107	RDL	9018109	RDL	9018111
Aluminum Dissolved	µg/L		2	<2	2	<2	2	2	2	<2
Antimony Dissolved	µg/L		0.2	<0.2	0.2	<0.2	0.2	<0.2	0.2	<0.2
Arsenic Dissolved	µg/L		0.1	0.5	0.1	<0.1	0.1	0.2	0.1	0.2
Barium Dissolved	µg/L		2	11300	2	10400	2	573	0.2	40.8
Beryllium Dissolved	µg/L		0.01	<0.01	0.01	<0.01	0.01	0.02	0.01	<0.01
Bismuth Dissolved	µg/L		0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05
Boron Dissolved	µg/L		2	295	2	148	2	164	2	260
Cadmium Dissolved	µg/L		0.01	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01
Calcium Dissolved	µg/L		50	51600	50	110000	50	47900	50	92600
Chromium Dissolved	µg/L		0.5	<0.5	0.5	<0.5	0.5	<0.5	0.5	<0.5
Cobalt Dissolved	µg/L		0.05	0.12	0.05	<0.05	0.05	0.43	0.05	0.50
Copper Dissolved	µg/L		0.2	1.2	0.2	<0.2	0.2	0.2	0.2	<0.2
Iron Dissolved	µg/L		10	834	10	6000	10	311	10	580
Lead Dissolved	µg/L		0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05
Lithium Dissolved	µg/L		2.5	239	0.5	80.2	1.0	112	1.0	121
Magnesium Dissolved	µg/L		50	27700	50	33100	50	17900	50	27900
Manganese Dissolved	µg/L		1	701	1	543	1	439	1	773
Mercury Dissolved	µg/L		0.01	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01
Molybdenum Dissolved	µg/L		0.05	0.07	0.05	<0.05	0.05	0.24	0.05	0.57
Nickel Dissolved	µg/L		0.2	0.4	0.2	<0.2	0.2	0.6	0.2	1.3
Potassium Dissolved	µg/L		50	1870	50	2000	50	1910	50	3440
Selenium Dissolved	µg/L		0.5	<0.5	0.5	<0.5	0.5	<0.5	0.5	<0.5
Silicon Dissolved	µg/L		50	2660	50	5580	50	4040	50	6030
Silver Dissolved	µg/L		0.02	<0.02	0.02	<0.02	0.02	<0.02	0.02	<0.02
Sodium Dissolved	µg/L		50	18500	50	14800	50	23300	50	25900
Strontium Dissolved	µg/L		0.1	1260	0.1	850	0.1	545	0.1	679
Sulphur Dissolved	µg/L		500	582	500	3410	500	1110	500	23200
Thallium Dissolved	µg/L		0.01	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01
Tin Dissolved	µg/L		0.05	<0.05	0.05	<0.05	0.05	0.15	0.05	0.14
Titanium Dissolved	µg/L		0.5	0.6	0.5	1.5	0.5	0.8	0.5	1.2

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CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works Dissolved Metals

DATE RECEIVED: 2018-01-18

DATE REPORTED: 2018-01-24

		SAMPLE DESCRIPTION:		04309-06		04309-07		04309-08		04309-09
		SAMPLE TYPE:		Water		Water		Water		Water
		DATE SAMPLED:		2018-01-14		2018-01-14		2018-01-14		2018-01-14
Parameter	Unit	G / S	RDL	9018106	RDL	9018107	RDL	9018109	RDL	9018111
Uranium Dissolved	µg/L		0.01	0.02	0.01	<0.01	0.01	0.43	0.01	0.10
Vanadium Dissolved	µg/L		0.5	<0.5	0.5	<0.5	0.5	<0.5	0.5	<0.5
Zinc Dissolved	µg/L		2	5	2	5	2	2	2	<2
Zirconium Dissolved	µg/L		0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1
Hardness (calc)	ug CaCO3/L		100	243000	100	411000	100	193000	100	346000

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		SAMPLE DESCRIPTION:		04309-10		04309-11	04309-12		04310-01	04310-02
		SAMPLE TYPE:		Water		Water	Water		Water	Water
		DATE SAMPLED:		2018-01-14		2018-01-14	2018-01-14		2018-01-14	2018-01-16
Parameter	Unit	G / S	RDL	9018112	RDL	9018113	9018115	RDL	9018117	9018125
Aluminum Dissolved	µg/L		2	2	2	3	3	2	4	5
Antimony Dissolved	µg/L		0.2	<0.2	0.2	<0.2	<0.2	0.2	<0.2	<0.2
Arsenic Dissolved	µg/L		0.1	<0.1	0.1	1.8	1.8	0.1	1.0	0.4
Barium Dissolved	µg/L		0.2	147	2	2000	1990	0.2	62.6	104
Beryllium Dissolved	µg/L		0.01	0.01	0.01	<0.01	<0.01	0.01	<0.01	0.01
Bismuth Dissolved	µg/L		0.05	<0.05	0.05	<0.05	<0.05	0.05	<0.05	<0.05
Boron Dissolved	µg/L		2	137	2	101	93	2	105	90
Cadmium Dissolved	µg/L		0.01	<0.01	0.01	<0.01	<0.01	0.01	<0.01	0.11
Calcium Dissolved	µg/L		50	62900	50	60600	59500	50	82400	31500
Chromium Dissolved	µg/L		0.5	<0.5	0.5	<0.5	<0.5	0.5	<0.5	<0.5
Cobalt Dissolved	µg/L		0.05	0.15	0.05	0.31	0.30	0.05	0.55	1.90
Copper Dissolved	µg/L		0.2	<0.2	0.2	<0.2	<0.2	0.2	<0.2	0.2
Iron Dissolved	µg/L		10	918	10	18200	17400	10	2470	6700
Lead Dissolved	µg/L		0.05	<0.05	0.05	<0.05	<0.05	0.05	<0.05	<0.05
Lithium Dissolved	µg/L		0.5	80.2	0.5	63.1	60.8	0.5	59.7	75.2
Magnesium Dissolved	µg/L		50	20100	50	23600	23100	50	27300	11800
Manganese Dissolved	µg/L		1	736	1	71	71	1	163	1060
Mercury Dissolved	µg/L		0.01	<0.01	0.01	<0.01	<0.01	0.01	<0.01	<0.01
Molybdenum Dissolved	µg/L		0.05	0.37	0.05	1.45	1.55	0.05	0.74	0.34
Nickel Dissolved	µg/L		0.2	0.3	0.2	1.2	1.2	0.2	0.8	3.8
Potassium Dissolved	µg/L		50	1720	50	1910	1840	50	2400	1240
Selenium Dissolved	µg/L		0.5	<0.5	0.5	<0.5	<0.5	0.5	<0.5	<0.5
Silicon Dissolved	µg/L		50	5820	50	5870	5850	50	5540	5340
Silver Dissolved	µg/L		0.02	<0.02	0.02	<0.02	<0.02	0.02	<0.02	<0.02
Sodium Dissolved	µg/L		50	12000	50	6830	6810	50	7420	16000
Strontium Dissolved	µg/L		0.1	257	0.1	290	300	0.1	252	129
Sulphur Dissolved	µg/L		500	3420	500	2140	2110	500	10800	3340
Thallium Dissolved	µg/L		0.01	<0.01	0.01	<0.01	<0.01	0.01	<0.01	<0.01
Tin Dissolved	µg/L		0.05	0.11	0.05	0.09	0.07	0.05	0.08	0.06
Titanium Dissolved	µg/L		0.5	1.2	0.5	2.3	2.3	0.5	1.2	1.1

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ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works Dissolved Metals

DATE RECEIVED: 2018-01-18

DATE REPORTED: 2018-01-24

		SAMPLE DESCRIPTION:		04309-10		04309-11	04309-12		04310-01	04310-02
		SAMPLE TYPE:		Water		Water	Water		Water	Water
		DATE SAMPLED:		2018-01-14		2018-01-14	2018-01-14		2018-01-14	2018-01-16
Parameter	Unit	G / S	RDL	9018112	RDL	9018113	9018115	RDL	9018117	9018125
Uranium Dissolved	µg/L		0.01	0.11	0.01	0.04	0.04	0.01	0.78	0.30
Vanadium Dissolved	µg/L		0.5	<0.5	0.5	<0.5	<0.5	0.5	<0.5	<0.5
Zinc Dissolved	µg/L		2	<2	2	4	3	2	<2	6
Zirconium Dissolved	µg/L		0.1	<0.1	0.1	<0.1	<0.1	0.1	<0.1	<0.1
Hardness (calc)	ug CaCO3/L		100	240000	100	249000	244000	100	318000	127000

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DATE REPORTED: 2018-01-24

		SAMPLE DESCRIPTION:		04310-03	04310-04	04310-05
		SAMPLE TYPE:		Water	Water	Water
		DATE SAMPLED:		2018-01-16	2018-01-16	2018-01-16
Parameter	Unit	G / S	RDL	9018127	9018129	9018131
Aluminum Dissolved	µg/L		2	5	4	4
Antimony Dissolved	µg/L		0.2	<0.2	<0.2	<0.2
Arsenic Dissolved	µg/L		0.1	1.0	0.8	0.8
Barium Dissolved	µg/L		2	7470	1820	1780
Beryllium Dissolved	µg/L		0.01	<0.01	<0.01	0.01
Bismuth Dissolved	µg/L		0.05	<0.05	<0.05	<0.05
Boron Dissolved	µg/L		2	228	73	68
Cadmium Dissolved	µg/L		0.01	<0.01	<0.01	<0.01
Calcium Dissolved	µg/L		50	82800	99100	97700
Chromium Dissolved	µg/L		0.5	<0.5	<0.5	<0.5
Cobalt Dissolved	µg/L		0.05	0.18	0.15	0.16
Copper Dissolved	µg/L		0.2	<0.2	<0.2	<0.2
Iron Dissolved	µg/L		10	9330	39900	39700
Lead Dissolved	µg/L		0.05	<0.05	<0.05	<0.05
Lithium Dissolved	µg/L		0.5	98.2	57.6	57.5
Magnesium Dissolved	µg/L		50	31900	32400	31800
Manganese Dissolved	µg/L		1	600	357	356
Mercury Dissolved	µg/L		0.01	<0.01	<0.01	<0.01
Molybdenum Dissolved	µg/L		0.05	0.12	0.44	0.45
Nickel Dissolved	µg/L		0.2	0.5	0.6	0.6
Potassium Dissolved	µg/L		50	2040	1460	1540
Selenium Dissolved	µg/L		0.5	<0.5	<0.5	<0.5
Silicon Dissolved	µg/L		50	5860	5260	5140
Silver Dissolved	µg/L		0.02	<0.02	<0.02	<0.02
Sodium Dissolved	µg/L		50	26200	11600	11800
Strontium Dissolved	µg/L		0.1	746	405	428
Sulphur Dissolved	µg/L		500	1950	2290	2230
Thallium Dissolved	µg/L		0.01	<0.01	<0.01	<0.01
Tin Dissolved	µg/L		0.05	0.05	<0.05	<0.05
Titanium Dissolved	µg/L		0.5	2.0	3.2	2.8

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Public Works Dissolved Metals

DATE RECEIVED: 2018-01-18

DATE REPORTED: 2018-01-24

		SAMPLE DESCRIPTION:		04310-03	04310-04	04310-05
		SAMPLE TYPE:		Water	Water	Water
		DATE SAMPLED:		2018-01-16	2018-01-16	2018-01-16
Parameter	Unit	G / S	RDL	9018127	9018129	9018131
Uranium Dissolved	µg/L		0.01	0.13	0.14	0.14
Vanadium Dissolved	µg/L		0.5	<0.5	<0.5	<0.5
Zinc Dissolved	µg/L		2	5	<2	<2
Zirconium Dissolved	µg/L		0.1	<0.1	0.1	0.1
Hardness (calc)	ug CaCO3/L		100	338000	381000	375000

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Certified By:

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Quality Assurance

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N303317

PROJECT: 1657709/6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis

RPT Date: Jan 24, 2018			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Public Works LEPH/HEPH in Water Low Level															
Naphthalene	68613	W-MS1	0.40	0.40	0.0%	< 0.05	102%	80%	120%				83%	50%	130%
Quinoline	68613	W-MS1	0.54	0.52	3.8%	< 0.05	101%	80%	120%				109%	50%	130%
Acenaphthylene	68613	W-MS1	0.42	0.43	2.4%	< 0.02	100%	80%	120%				85%	50%	130%
Acenaphthene	68613	W-MS1	0.43	0.43	0.0%	< 0.02	101%	80%	120%				86%	50%	130%
Fluorene	68613	W-MS1	0.44	0.45	2.2%	< 0.02	100%	80%	120%				89%	50%	130%
Phenanthrene	68613	W-MS1	0.40	0.40	0.0%	< 0.04	98%	80%	120%				84%	60%	130%
Anthracene	68613	W-MS1	0.42	0.42	0.0%	< 0.01	101%	80%	120%				85%	60%	130%
Acridine	68613	W-MS1	0.49	0.47	4.2%	< 0.05	101%	80%	120%				98%	50%	130%
Fluoranthene	68613	W-MS1	0.42	0.42	0.0%	< 0.02	100%	80%	120%				85%	60%	130%
Pyrene	68613	W-MS1	0.44	0.44	0.0%	< 0.02	99%	80%	120%				88%	60%	130%
Benzo(a)anthracene	68613	W-MS1	0.41	0.42	2.4%	< 0.01	100%	80%	120%				83%	60%	130%
Chrysene	68613	W-MS1	0.46	0.46	0.0%	< 0.01	100%	80%	120%				92%	60%	130%
Benzo(b)fluoranthene	68613	W-MS1	0.36	0.37	2.7%	< 0.01	102%	80%	120%				73%	60%	130%
Benzo(j)fluoranthene	68613	W-MS1	0.47	0.51	8.2%	< 0.01	98%	80%	120%				95%	60%	130%
Benzo(k)fluoranthene	68613	W-MS1	0.44	0.40	9.5%	< 0.01	99%	80%	120%				89%	60%	130%
Benzo(a)pyrene	68613	W-MS1	0.40	0.40	0.0%	< 0.01	100%	80%	120%				81%	60%	130%
Indeno(1,2,3-c,d)pyrene	68613	W-MS1	0.39	0.39	0.0%	< 0.01	100%	80%	120%				80%	60%	130%
Dibenzo(a,h)anthracene	68613	W-MS1	0.38	0.37	2.7%	< 0.01	100%	80%	120%				76%	60%	130%
Benzo(g,h,i)perylene	68613	W-MS1	0.42	0.41	2.4%	< 0.01	101%	80%	120%				85%	60%	130%
1-Methylnaphthalene	68613	W-MS1	0.40	0.40	0.0%	< 0.05	100%	80%	120%				80%	50%	130%
2-Methylnaphthalene	68613	W-MS1	0.35	0.35	0.0%	< 0.05	99%	80%	120%				71%	50%	130%
EPH C10-C19	68613	W-MS1	8260	8750	5.8%	< 100	110%	70%	130%				78%	70%	130%
EPH C19-C32	68613	W-MS1	13200	14400	8.7%	< 100	99%	70%	130%				83%	70%	130%
Naphthalene - d8	68613	W-MS1	92	93	1.1%		100%	80%	120%				92%	50%	130%
2-Fluorobiphenyl	68613	W-MS1	94	96	2.1%		101%	80%	120%				94%	50%	130%
P-Terphenyl - d14	68613	W-MS1	93	93	0.0%		100%	80%	120%				93%	60%	130%

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

Volatile Organic Compounds in Water															
Chloromethane	68636	9013031	<1	<1	NA	< 1	98%	80%	120%				99%	70%	130%
Vinyl Chloride	68636	9013031	<1	<1	NA	< 1	99%	80%	120%				106%	70%	130%
Bromomethane	68636	9013031	<1	<1	NA	< 1	97%	80%	120%				85%	70%	130%
Chloroethane	68636	9013031	<1	<1	NA	< 1	100%	80%	120%				104%	70%	130%
Trichlorofluoromethane	68636	9013031	<1	<1	NA	< 1	100%	80%	120%				99%	70%	130%
Acetone	68636	9013031	<10	<10	NA	< 10	100%	80%	120%						
1,1-Dichloroethylene	68636	9013031	<1	<1	NA	< 1	100%	80%	120%				105%	70%	130%
Dichloromethane	68636	9013031	<1	<1	NA	< 1	100%	80%	120%				90%	70%	130%
Methyl tert-butyl ether (MTBE)	68636	9013031	<1	<1	NA	< 1	101%	80%	120%				95%	70%	130%
2-Butanone (MEK)	68636	9013031	<10	<10	NA	< 10	100%	80%	120%						

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Quality Assurance

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Trace Organics Analysis (Continued)

RPT Date: Jan 24, 2018

PARAMETER	Batch	Sample Id	DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
			Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
trans-1,2-Dichloroethylene	68636	9013031	<1	<1	NA	< 1	100%	80%	120%				99%	70%	130%
1,1-Dichloroethane	68636	9013031	<1	<1	NA	< 1	100%	80%	120%				98%	70%	130%
cis-1,2-Dichloroethylene	68636	9013031	<1	<1	NA	< 1	101%	80%	120%				95%	70%	130%
Chloroform	68636	9013031	<1	<1	NA	< 1	100%	80%	120%				97%	70%	130%
1,2-Dichloroethane	68636	9013031	<1	<1	NA	< 1	100%	80%	120%				96%	70%	130%
1,1,1-Trichloroethane	68636	9013031	<1	<1	NA	< 1	101%	80%	120%				96%	70%	130%
Carbon Tetrachloride	68636	9013031	<0.5	<0.5	NA	< 0.5	101%	80%	120%				94%	70%	130%
Benzene	68636	9013031	1.9	1.8	NA	< 0.5	100%	80%	120%				96%	70%	130%
1,2-Dichloropropane	68636	9013031	<1	<1	NA	< 1	101%	80%	120%				98%	70%	130%
Trichloroethene	68636	9013031	<1	<1	NA	< 1	101%	80%	120%				96%	70%	130%
Bromodichloromethane	68636	9013031	<1	<1	NA	< 1	101%	80%	120%				94%	70%	130%
trans-1,3-Dichloropropene	68636	9013031	<1	<1	NA	< 1	102%	80%	120%				97%	70%	130%
4-Methyl-2-pentanone (MIBK)	68636	9013031	<10	<10	NA	< 10	101%	80%	120%						
cis-1,3-Dichloropropene	68636	9013031	<1	<1	NA	< 1	101%	80%	120%				93%	70%	130%
1,1,2-Trichloroethane	68636	9013031	<1	<1	NA	< 1	101%	80%	120%				97%	70%	130%
Toluene	68636	9013031	4.5	4.3	4.5%	< 0.5	101%	80%	120%				96%	70%	130%
Dibromochloromethane	68636	9013031	<1	<1	NA	< 1	101%	80%	120%				96%	70%	130%
1,2-Dibromoethane	68636	9013031	<0.3	<0.3	NA	< 0.3	101%	80%	120%				97%	70%	130%
Tetrachloroethylene	68636	9013031	<1	<1	NA	< 1	101%	80%	120%				82%	70%	130%
1,1,1,2-Tetrachloroethane	68636	9013031	<1	<1	NA	< 1	101%	80%	120%				95%	70%	130%
Chlorobenzene	68636	9013031	<1	<1	NA	< 1	100%	80%	120%				96%	70%	130%
Ethylbenzene	68636	9013031	0.5	<0.5	NA	< 0.5	101%	80%	120%				96%	70%	130%
m&p-Xylene	68636	9013031	1.6	1.6	NA	< 0.5	101%	80%	120%				96%	70%	130%
Bromoform	68636	9013031	<1	<1	NA	< 1	101%	80%	120%				97%	70%	130%
Styrene	68636	9013031	<0.5	<0.5	NA	< 0.5	101%	80%	120%				96%	70%	130%
1,1,2,2-Tetrachloroethane	68636	9013031	<0.8	<0.8	NA	< 0.8	100%	80%	120%				98%	70%	130%
o-Xylene	68636	9013031	0.9	0.9	NA	< 0.5	101%	80%	120%				97%	70%	130%
1,3-Dichlorobenzene	68636	9013031	<0.5	<0.5	NA	< 0.5	100%	80%	120%				96%	70%	130%
1,4-Dichlorobenzene	68636	9013031	<0.5	<0.5	NA	< 0.5	100%	80%	120%				97%	70%	130%
1,2-Dichlorobenzene	68636	9013031	<0.5	<0.5	NA	< 0.5	101%	80%	120%				98%	70%	130%
1,2,4-Trichlorobenzene	68636	9013031	<1	<1	NA	< 1	101%	80%	120%				96%	70%	130%
Bromofluorobenzene	68636	9013031	89	86	3.4%		99%	70%	130%				102%	70%	130%
Dibromofluoromethane	68636	9013031	93	89	4.4%		105%	70%	130%				93%	70%	130%
Toluene - d8	68636	9013031	98	93	5.2%		95%	70%	130%				101%	70%	130%
VH	68636	9013031	<100	<100	NA	< 100									
VPH	68636	9013031	<100	<100	NA	< 100									

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

BTEX / VPH (C6-C10) Water

Methyl tert-butyl ether (MTBE)	68621	9019835	<1	<1	NA	< 1	97%	80%	120%				89%	70%	130%

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Quality Assurance

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Trace Organics Analysis (Continued)

RPT Date: Jan 24, 2018			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Benzene	68621	9019835	<0.5	<0.5	NA	< 0.5	100%	80%	120%				91%	70%	130%
Toluene	68621	9019835	<0.5	<0.5	NA	< 0.5	99%	80%	120%				91%	70%	130%
Ethylbenzene	68621	9019835	5.0	5.2	3.9%	< 0.5	98%	80%	120%				90%	70%	130%
m&p-Xylene	68621	9019835	3.2	3.3	3.1%	< 0.5	98%	80%	120%				91%	70%	130%
o-Xylene	68621	9019835	<0.5	<0.5	NA	< 0.5	98%	80%	120%				92%	70%	130%
Styrene	68621	9019835	<0.5	<0.5	NA	< 0.5	100%	80%	120%				95%	70%	130%
VPH	68621	9019835	<100	<100	NA	< 100									
VH	68621	9019835	<100	<100	NA	< 100									
Bromofluorobenzene	68621	9019835	97	101	4.0%		100%	70%	130%				99%	70%	130%
Dibromofluoromethane	68621	9019835	102	102	0.0%		99%	70%	130%				101%	70%	130%
Toluene - d8	68621	9019835	97	99	2.0%		100%	70%	130%				99%	70%	130%

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

CCME F1 (C6-C10) (Water)

F1 (C6-C10)	68621	9019835	<100	<100	NA	< 100									
F1 minus BTEX (C6-C10)	68621	9019835	<100	<100	NA	< 100									
Bromofluorobenzene	68621	9019835	97	101	4.0%		100%	70%	130%				99%	70%	130%
Dibromofluoromethane	68621	9019835	102	102	0.0%		99%	70%	130%				101%	70%	130%
Toluene - d8	68621	9019835	97	99	2.0%		100%	70%	130%				99%	70%	130%

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

CCME F2-F4 (Water)

F2 (C10-C16)	68613	W-MS1	5720	5980	4.4%	< 100	109%	80%	120%				78%	70%	130%
F3 (C16-C34)	68613	W-MS1	17700	19300	8.6%	< 100	114%	80%	120%				78%	70%	130%
F4 (C34-C50)	68613	W-MS1	4470	4950	10.2%	< 100	101%	80%	120%				83%	70%	130%

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

AGAT Western Canada - OC Pesticides (Water)

DDT		TW	< 0.04	< 0.04	NA	< 0.04	96%	50%	140%	105%	50%	140%	91%	50%	140%

Comments: Tap water analysis has been performed as QC sample testing for duplicate and matrix spike due to insufficient sample volume.
When the average of the sample and duplicate results is less than 5x the RDL, the Relative Percent Difference (RPD) will be indicated as Not Applicable (NA).

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Water Analysis

RPT Date: Jan 24, 2018			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Public Works Dissolved Metals															
Aluminum Dissolved	9019686		23	22	4.1%	< 2	104%	90%	110%	104%	90%	110%			
Antimony Dissolved	9019686		<0.2	<0.2	NA	< 0.2	99%	90%	110%	97%	90%	110%			
Arsenic Dissolved	9019686		<0.1	<0.1	NA	< 0.1	92%	90%	110%	98%	90%	110%			
Barium Dissolved	9019686		12.4	12.2	1.8%	< 0.2	110%	90%	110%	100%	90%	110%			
Beryllium Dissolved	9019686		<0.01	<0.01	NA	< 0.01	104%	90%	110%	101%	90%	110%			
Bismuth Dissolved	9019686		<0.05	<0.05	NA	< 0.05				99%	90%	110%			
Boron Dissolved	9019686		4	3	NA	< 2	108%	90%	110%	95%	90%	110%			
Cadmium Dissolved	9019686		<0.01	<0.01	NA	< 0.01	91%	90%	110%	104%	90%	110%			
Calcium Dissolved	9019686		6120	6130	0.2%	< 50	99%	90%	110%	106%	90%	110%			
Chromium Dissolved	9019686		<0.5	<0.5	NA	< 0.5	93%	90%	110%	94%	90%	110%			
Cobalt Dissolved	9019686		0.06	<0.05	NA	< 0.05	105%	90%	110%	101%	90%	110%			
Copper Dissolved	9019686		0.4	0.4	NA	< 0.2	99%	90%	110%	97%	90%	110%			
Iron Dissolved	9019686		85	85	0.4%	< 10	101%	90%	110%	106%	90%	110%			
Lead Dissolved	9019686		<0.05	<0.05	NA	< 0.05	106%	90%	110%	109%	90%	110%			
Lithium Dissolved	9019686		<0.5	<0.5	NA	< 0.5				95%	90%	110%			
Magnesium Dissolved	9019686		1700	1700	0.3%	< 50	100%	90%	110%	106%	90%	110%			
Manganese Dissolved	9019686		15	15	2.6%	< 1	104%	90%	110%	108%	90%	110%			
Mercury Dissolved	9019797		<0.01	<0.01	NA	< 0.01	103%	90%	110%	105%	90%	110%			
Molybdenum Dissolved	9019686		0.58	0.51	12.3%	< 0.05	105%	90%	110%	95%	90%	110%			
Nickel Dissolved	9019686		<0.2	<0.2	NA	< 0.2	102%	90%	110%	97%	90%	110%			
Potassium Dissolved	9019686		750	790	5.2%	< 50	93%	90%	110%	103%	90%	110%			
Selenium Dissolved	9019686		<0.5	<0.5	NA	< 0.5	104%	90%	110%	98%	90%	110%			
Silicon Dissolved	9019686		2070	2080	0.3%	< 50				108%	90%	110%			
Silver Dissolved	9019686		<0.02	<0.02	NA	< 0.02				104%	90%	110%			
Sodium Dissolved	9019686		10600	10500	0.3%	< 50	97%	90%	110%	103%	90%	110%			
Strontium Dissolved	9019686		44.6	44.7	0.2%	< 0.1	99%	90%	110%	98%	90%	110%			
Sulphur Dissolved	9019686		1570	1600	NA	< 500				107%	90%	110%			
Thallium Dissolved	9019686		0.03	0.02	NA	< 0.01	104%	90%	110%	97%	90%	110%			
Tin Dissolved	9019686		<0.05	<0.05	NA	< 0.05				95%	90%	110%			
Titanium Dissolved	9019686		0.6	0.6	NA	< 0.5				94%	90%	110%			
Uranium Dissolved	9019686		0.08	0.08	1.9%	< 0.01	98%	90%	110%	100%	90%	110%			
Vanadium Dissolved	9019686		<0.5	<0.5	NA	< 0.5	97%	90%	110%	97%	90%	110%			
Zinc Dissolved	9019686		<2	<2	NA	< 2	108%	90%	110%	101%	90%	110%			
Zirconium Dissolved	9019686		<0.1	<0.1	NA	< 0.1				100%	70%	130%			

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

Chloride in Water															
Chloride	9017325		15.7	15.7	0.2%	< 0.05	102%	90%	110%	93%	90%	110%			

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PROJECT: 1657709/6000

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SAMPLING SITE:

SAMPLED BY:

Water Analysis (Continued)

RPT Date: Jan 24, 2018			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

Certified By:

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Method Summary

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PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
DDT	ORG-91-5112	EPA SW-846 3510 & 8081	GC/ECD
TCMX	ORG-91-5112	EPA SW-846 3510 & 8081	GC/ECD
Decachlorobiphenyl	ORG-91-5112	EPA SW-846 3510 & 8081	GC/ECD
Methyl tert-butyl ether (MTBE)	ORG-180-5130	Modified from BC MOE Lab Manual Section D	GC/MS/FID
Benzene	ORG-180-5130	Modified from BC MOE Lab Manual Section D	GC/MS/FID
Toluene	ORG-180-5130	Modified from BC MOE Lab Manual Section D	GC/MS/FID
Ethylbenzene	ORG-180-5130	Modified from BC MOE Lab Manual Section D	GC/MS/FID
m&p-Xylene	ORG-180-5130	Modified from BC MOE Lab Manual Section D	GC/MS/FID
o-Xylene	ORG-180-5130	Modified from BC MOE Lab Manual Section D	GC/MS/FID
Styrene	ORG-180-5130	Modified from BC MOE Lab Manual Section D	GC/MS/FID
VPH	ORG-180-5130	Modified from BC MOE Lab Manual Section D	GC/MS/FID
VH	ORG-180-5130	Modified from BC MOE Lab Manual Section D	GC/MS/FID
Bromofluorobenzene	ORG-180-5130	modified from BC MOE Lab Manual Section D	GC/MS
Dibromofluoromethane	ORG-180-5130	modified from BC MOE Lab Manual Section D	GC/MS
Toluene - d8	ORG-180-5130	modified from BC MOE Lab Manual Section D	GC/MS
F1 (C6-C10)	ORG-180-5130	CCME Tier 1 Method	GC/MS/FID
F1 minus BTEX (C6-C10)	ORG-180-5130	CCME Tier 1 Method	GC/MS/FID
Bromofluorobenzene			GC/MS
Dibromofluoromethane			GC/MS
Toluene - d8			GC/MS
F2 (C10-C16)	ORG-180-5134	CCME Tier 1 Method	GC/FID
F3 (C16-C34)	ORG-180-5134	CCME Tier 1 Method	GC/FID
F4 (C34-C50)	ORG-180-5134	CCME Tier 1 Method	GC/FID
Naphthalene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Quinoline	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Acenaphthylene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Acenaphthene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Fluorene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Phenanthrene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Anthracene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Acridine	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Fluoranthene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS

AGAT Laboratories

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Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA **AGAT WORK ORDER: 18N303317**

PROJECT: 1657709/6000 **ATTENTION TO: Erin O'Brien**

SAMPLING SITE: **SAMPLED BY:**

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Pyrene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(a)anthracene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Chrysene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(b)fluoranthene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(j)fluoranthene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(k)fluoranthene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(a)pyrene	ORG-180-5133	Modified from BC MOE Lab Manual Section D	GC/MS
Indeno(1,2,3-c,d)pyrene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Dibenzo(a,h)anthracene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(g,h,i)perylene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
1-Methylnaphthalene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
2-Methylnaphthalene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
EPH C10-C19	ORG-180-5134	Modified from BC MOE Lab Manual Section D (EPH)	GC/FID
EPH C19-C32	ORG-180-5134	Modified from BC MOE Lab Manual Section D (EPH)	GC/FID
LEPH C10-C19	ORG-180-5134	Modified from BC MOE Lab Manual Section D (EPH)	GC/FID
HEPH C19-C32	ORG-180-5134	Modified from BC MOE Lab Manual Section D (EPH)	GC/FID
Naphthalene - d8			GC/MS
2-Fluorobiphenyl	ORG-180-5133	Modified form BCMOE Lab Manual Section D (PAH)	GC/MS
P-Terphenyl - d14	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Chloromethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Vinyl Chloride	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Bromomethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Chloroethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Trichlorofluoromethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Acetone	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,1-Dichloroethylene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Dichloromethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Methyl tert-butyl ether (MTBE)	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS

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Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA **AGAT WORK ORDER: 18N303317**

PROJECT: 1657709/6000 **ATTENTION TO: Erin O'Brien**

SAMPLING SITE: **SAMPLED BY:**

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
2-Butanone (MEK)	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
trans-1,2-Dichloroethylene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,1-Dichloroethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
cis-1,2-Dichloroethylene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Chloroform	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,2-Dichloroethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,1,1-Trichloroethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Carbon Tetrachloride	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Benzene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,2-Dichloropropane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Trichloroethene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Bromodichloromethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
trans-1,3-Dichloropropene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
4-Methyl-2-pentanone (MIBK)	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
cis-1,3-Dichloropropene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,1,2-Trichloroethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Toluene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Dibromochloromethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,2-Dibromoethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Tetrachloroethylene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,1,1,2-Tetrachloroethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D	GC/MS
Chlorobenzene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Ethylbenzene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
m&p-Xylene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Bromoform	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Styrene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,1,2,2-Tetrachloroethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
o-Xylene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS

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Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N303317

PROJECT: 1657709/6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
1,3-Dichlorobenzene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,4-Dichlorobenzene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,2-Dichlorobenzene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,2,4-Trichlorobenzene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Bromofluorobenzene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Dibromofluoromethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Toluene - d8	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
VH	ORG-180-5133	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS/FID
VPH	ORG-180-5131	Modified from BC MOE Lab Manual Sec D (VOC)	GC/MS/FID

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Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA **AGAT WORK ORDER: 18N303317**

PROJECT: 1657709/6000 **ATTENTION TO: Erin O'Brien**

SAMPLING SITE: **SAMPLED BY:**

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
Chloride	INOR-181-6002	Modified from SM 4110 B	ION CHROMATOGRAPH
Aluminum Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Antimony Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Arsenic Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Barium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Beryllium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Bismuth Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Boron Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Cadmium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Calcium Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Chromium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Cobalt Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Copper Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Iron Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Lead Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Lithium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Magnesium Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Manganese Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Mercury Dissolved	MET-181-6103, LAB-181-4015	Modified from EPA 245.7	CV/AA
Molybdenum Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Nickel Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Potassium Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Selenium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Silicon Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Silver Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Sodium Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Strontium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Sulphur Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES

AGAT Laboratories

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Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N303317

PROJECT: 1657709/6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Thallium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Tin Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Titanium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Uranium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Vanadium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Zinc Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Zirconium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS

CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

1BN303317

No. 04309 page 1 of 2

Golder Associates

200 – 2920 Virtual Way
Vancouver, British Columbia, Canada V5M 0C4
Telephone (604) 296-4200 Fax (604) 298-5253

Project Number: 1657709/6000		Laboratory Name: AGAT	
Short Title: K19 Investigation	Golder Contact: Erin O'Brien	Address: 120-8600 Glenlyon Pkwy	
Golder E-mail Address 1: erin_o'brien @golder.com	Golder E-mail Address 2: agarcido @golder.com	Telephone/Fax: 778-452-4029	Contact: Yasmine Galindo

Office Name: Vancouver

EQuIS Facility Code: 2X433859

EQuIS upload: ☒

Jan 18 8:55

Turnaround Time: ☐ 24 hr ☐ 48 hr ☐ 72 hr ☒ Regular (5 Days)

Criteria: ☒ CSR ☒ CCME ☐ BC Water Quality ☐ Other

Note: Final Reports to be issued by e-mail

Quote No.:

Analyses Required

Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D / M / Y)	Time Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	Diss Metals (incl. Hg)	BTEX / VPH	VOC's	LEPH / HEPH / PAHs	Chloride	Pesticides - APT				RUSH (Select TAT above)	Remarks (over)
	K19-MW17-04																				AGAT Sample ID
04309-01	~~MW17-04~~		7.4	W6	13/01/18	15:00	GRAB			7	X	X	X	X							9018695
-02	K19-MW09-04		6.9	↓	↓	16:30	↓			8	X	X		X	X						098
-03	K19-MW17-06					12:20				8	X	X	X	X	X						099
-04	K19-MW17-10		8.8		14/01/18	11:00				8	X	X	X	X	X						101
-05	K19-MW17-22		9.1			12:00				7	X	X		X							104
-06	K19-MW16-10D		12.1			13:30				8	X	X		X	X						106
-07	K19-MW10-03		10.4			16:00				8	X	X	X	X	X						107
-08	K19-MW17-31		6.7			10:20				7	X	X		X							109
-09	K19-MW17-26		10.9			11:15				7	X	X		X							111
-10	K19-MW17-18		6.8			13:00				7	X	X		X							112
-11	K19-MW16-01D		8.2			14:10		FDA	04309-12	8	X	X	X	X		X					113
-12	K19-MW16-01D		↓	↓	↓	↓	↓	FD	04309-11	8	X	X	X	X		X					115

Sampler's Signature:	Relinquished by: Signature	Company: Golder	Date: 17/01/18	Time: 0834	Received by: Signature	Company: AGAT	
Comments: Invoice Dave Osgthorpe	Method of Shipment:	Waybill No.:	Received for Lab by:	Date	Time: 7:40		
	Shipped by:	Shipment Condition: Seal Intact:	Temp (°C): 0	Cooler opened by:	Date	Time	

WHITE: Golder Copy YELLOW: Lab Copy

ESED

18W303317

CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

No. 04310 page 2 of 2

Golder Associates
200 – 2920 Virtual Way
Vancouver, British Columbia, Canada V5M 0C4
Telephone (604) 296-4200 Fax (604) 298-5253

Project Number: 1657709 / 6000		Laboratory Name: AGAT	
Short Title: K19 Investigation	Golder Contact: Erin O'Brien	Address: 120-8600 Glenlyon Parkway	
Golder E-mail Address 1: erin_O'brien @golder.com	Golder E-mail Address 2: ajerrido @golder.com	Telephone/Fax: 778452 4009	Contact: Yasmine Badinski

Office Name: Vancouver

EQuIS Facility Code: 28433859
EQuIS upload: ☐

Jan 18 . 8:55

Turnaround Time: ☐ 24 hr ☐ 48 hr ☐ 72 hr ☒ Regular (5 Days)
Criteria: ☒ CSR ☒ CCME ☐ BC Water Quality ☐ Other

Note: Final Reports to be issued by e-mail

Quote No.:

Analyses Required

Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D / M / Y)	Time Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	DISS Metals (incl Hg)	BTEX / VPH	VOC's	LEPH/HEPH/PAHs	Chloride	F1	F2-F4			RUSH (Select TAT above)	AGAT Sample ID Remarks (over)
04310 - 01	K19-MW17-32		5.2	WG	14/01/18	10:25	GRAB			7	X	X		X							117
- 02	K19-MW16-10S		6	WG	16/01/18	10:18	↓			8	X	X		X	X						125
- 03	K19-MW17-29		8.5	↓	↓	14:50	↓			8	X	X	X	X	X	X	X				127
- 04	K19-MW17-35D		7.2	↓	↓	11:25	↓	FDA	04310-05	8	X	X	X	X	X	X	X				129
- 05 ✓	K19-MWA-35D		7.2	↓	↓	11:25	↓	FD	04310-04	8	X	X	X	X	X	X	X				131
- 06																					
- 07																					
- 08																					
- 09																					
- 10																					
- 11																					
- 12																					

Sampler's Signature: [signature]	Relinquished by: Signature [signature]	Company Golder	Date 17/01/18	Time 0845	Received by: Signature [signature]	Company AGAT
Comments: Invoice Dave Osguthorpe	Method of Shipment:	Waybill No.:	Received for Lab by: [signature]		Date	Time 845
	Shipped by:	Shipment Condition: Seal Intact:	Temp (°C) 0°	Cooler opened by:	Date	Time

WHITE: Golder Copy YELLOW: Lab Copy

ESED

AGAT Laboratories

SAMPLE INTEGRITY RECEIPT FORM

RECEIVING BASICS - Shipping

Company/Consultant: GOLDER

Courier: _____ Prepaid Collect

Waybill# _____

Branch: EDM GP (FN) FM RD VAN LYD FSJ EST Other:_____

Custody Seal Intact: Yes (No) NA

TAT: <24hr 24-48hr 48-72hr (Reg) Other_____

Cooler Quantity: 2

TIME SENSITIVE ISSUES - Shipping

ALREADY EXCEEDED HOLD TIME? Yes (No)

Inorganic Tests (Please Circle): Mibi , BOD , Nitrate/Nitrite , Turbidity , Microtox , Ortho PO4 , Tedlar Bag , Residual Chlorine , Chlorophyll* , Chloroamines*

Earliest Expiry:_____

Hydrocarbons: Earliest Expiry _____

SAMPLE INTEGRITY - Shipping

Hazardous Samples: YES (NO) Precaution Taken:_____

Legal Samples: Yes (No)

International Samples: Yes (No)

Tape Sealed: Yes (No)

Coolant Used: Icepack Bagged Ice Free Ice Free Water None

Temperature (Bottles/Jars only) N/A if only Soil Bags Received

FROZEN (Please Circle if samples received Frozen)

1 (Bottle/Jar) 0 + 3 + 6 = 3 °C 2(Bottle/Jar)___+___+___=___°C

3 (Bottle/Jar) 4 + 1 + 2 = 2 °C 4 (Bottle/Jar)___+___+___=___°C

5 (Bottle/Jar)___+___+___=___°C 6 (Bottle/Jar)___+___+___=___°C

7 (Bottle/Jar)___+___+___=___°C 8 (Bottle/Jar)___+___+___=___°C

9 (Bottle/Jar)___+___+___=___°C 10 (Bottle/Jar)___+___+___=___°C

(If more than 10 coolers are received use another sheet of paper and attach)

LOGISTICS USE ONLY

Workorder No: _____

Samples Damaged: Yes No If YES why?

No Bubble Wrap Frozen Courier

Other: _____

Account Project Manager: _____have they been notified of the above issues: Yes No

Whom spoken to: _____ Date/Time: _____

CPM Initial_____

General Comments: _____

_____

_____

_____

_____

* Subcontracted Analysis (See CPM)

Date issued: May 22, 2015

AGAT Laboratories

SAMPLE INTEGRITY RECEIPT FORM - BURNABY

Work Order # 18N3033 17

RECEIVING BASICS:

Received From: NOVEX Waybill #: _____

SAMPLE QUANTITIES:

Coolers: 1 Containers: 130

TIME SENSITIVE ISSUES:

Earliest Date Sampled: Jan 13, 2018 ALREADY EXCEEDED? Yes (No)

NON-CONFORMANCES:

3 temperatures of samples* and average of each cooler: (record differing temperatures on the CoC next to sample ID's) *use jars when available

(1) 0 + 0 + 0 = 0 °C (2) 0 + 0 + 0 = 0 °C (3) ___ + ___ + ___ = ___ °C (4) ___ + ___ + ___ = ___ °C

Was ice or ice pack present: (Yes) No

Integrity Issues:

Account Project Manager: _____ have they been notified of the above issues: Yes No

Whom spoken to: _____ Date and Time: _____

ADDITIONAL NOTES: not frozen

Document #: SR-186-9504.001
Revision Date: July 9, 2014

Page 1 of 1

AGAT Laboratories

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Burnaby, British Columbia
CANADA V5J 0B6
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FAX (778)452-4074
http://www.agatlabs.com

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA
219-800 BURRARD ST
VANCOUVER, BC V6Z 0B9
604-671-1831

ATTENTION TO: Erin O'Brien

PROJECT: 1657709-6000 K19 Investigation

AGAT WORK ORDER: 18N303338

SOIL ANALYSIS REVIEWED BY: Angela Bond, Technical Reviewer

TRACE ORGANICS REVIEWED BY: Andrew Garrard, B.Sc., General Manager

DATE REPORTED: Feb 14, 2018

PAGES (INCLUDING COVER): 23

VERSION*: 3

Should you require any information regarding this analysis please contact your client services representative at (778) 452-4000

*NOTES

VERSION 3: Sample receipt temperature 0°C.

Version 3 is issued on March 1st, 2018 to report additional arsenic analysis for samples "04301-07" and "04301-09" as requested by Alvaro Garrido Hernan-Gomez of Golder Associates on February 27th, 2018. Version 3 is an amendment to all previous versions.

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 18N303338

PROJECT: 1657709-6000 K19 Investigation

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Arsenic in Soil

DATE RECEIVED: 2018-01-18

DATE REPORTED: 2018-02-14

SAMPLE DESCRIPTION:				04301-07	04301-09
SAMPLE TYPE:				Soil	Soil
DATE SAMPLED:				2018-01-16	2018-01-16
Parameter	Unit	G / S	RDL	9018187	9018189
Arsenic	µg/g		0.1	10.9	12.1
pH 1:2	pH units		0.05	8.49	8.45

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9018187-9018189 Results are based on the dry weight of the sample

Certified By: Angela Bond

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 18N303338

PROJECT: 1657709-6000 K19 Investigation

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works LEPH/HEPH in Soil Low Level

DATE RECEIVED: 2018-01-18

DATE REPORTED: 2018-02-14

		SAMPLE DESCRIPTION:		04308-02	04308-05	04308-07	04308-08	04308-11	04299-03	04299-05	04299-10
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-01-12	2018-01-12	2018-01-13	2018-01-13	2018-01-13	2018-01-13	2018-01-13	2018-01-14
Parameter	Unit	G / S	RDL	9018142	9018146	9018148	9018149	9018152	9018157	9018159	9018164
Naphthalene	µg/g		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.005	<0.005	<0.005
2-Methylnaphthalene	µg/g		0.005	0.009	<0.005	<0.005	<0.005	<0.005	0.008	0.009	0.022
1-Methylnaphthalene	µg/g		0.005	0.009	<0.005	<0.005	<0.005	<0.005	0.007	<0.005	0.032
Acenaphthylene	µg/g		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Acenaphthene	µg/g		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Fluorene	µg/g		0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Phenanthrene	µg/g		0.02	0.03	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	0.12
Anthracene	µg/g		0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Fluoranthene	µg/g		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02
Pyrene	µg/g		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.03
Benzo(a)anthracene	µg/g		0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Chrysene	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.09
Benzo(b)fluoranthene	µg/g		0.02	0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.06
Benzo(j)fluoranthene	µg/g		0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Benzo(k)fluoranthene	µg/g		0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Benzo(a)pyrene	µg/g		0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Indeno(1,2,3-c,d)pyrene	µg/g		0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Dibenzo(a,h)anthracene	µg/g		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Benzo(g,h,i)perylene	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.10
Quinoline	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
IACR CCME (Soil)	µg/g		0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	0.6
B[a]P TPE (Soil)	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
EPH C10-C19	µg/g		20	33	<20	<20	<20	<20	38	33	54
EPH C19-C32	µg/g		20	51	29	<20	28	31	51	228	86
LEPH C10-C19	µg/g		20	33	<20	<20	<20	<20	38	33	54
HEPH C19-C32	µg/g		20	51	29	<20	28	31	50	228	86
Benzo(b+j)fluoranthene	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.06

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 18N303338

PROJECT: 1657709-6000 K19 Investigation

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works LEPH/HEPH in Soil Low Level

DATE RECEIVED: 2018-01-18

DATE REPORTED: 2018-02-14

		SAMPLE DESCRIPTION:	04308-02	04308-05	04308-07	04308-08	04308-11	04299-03	04299-05	04299-10
		SAMPLE TYPE:	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:	2018-01-12	2018-01-12	2018-01-13	2018-01-13	2018-01-13	2018-01-13	2018-01-13	2018-01-14
Surrogate	Unit	Acceptable Limits	9018142	9018146	9018148	9018149	9018152	9018157	9018159	9018164
Naphthalene - d8	%	50-130	76	61	64	64	63	84	66	65
2-Fluorobiphenyl	%	50-130	80	62	71	69	70	86	66	69
P-Terphenyl - d14	%	60-130	86	75	77	77	75	93	69	76

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SAMPLED BY:

Public Works LEPH/HEPH in Soil Low Level

DATE RECEIVED: 2018-01-18

DATE REPORTED: 2018-02-14

		SAMPLE DESCRIPTION:		04299-11		04299-12		04300-03	04300-05	04300-10	04301-01
		SAMPLE TYPE:		Soil		Soil		Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-01-14		2018-01-14		2018-01-14	2018-01-14	2018-01-15	2018-01-15
Parameter	Unit	G / S	RDL	9018165	RDL	9018166	RDL	9018171	9018173	9018178	9018181
Naphthalene	µg/g		0.05	0.57	0.005	0.367	0.005	<0.005	0.005	0.025	<0.005
2-Methylnaphthalene	µg/g		0.05	1.33	0.05	0.72	0.005	0.020	0.007	0.070	0.006
1-Methylnaphthalene	µg/g		0.05	0.79	0.005	0.573	0.005	0.020	0.007	0.154	0.008
Acenaphthylene	µg/g		0.005	<0.005	0.005	<0.005	0.005	<0.005	<0.005	<0.005	<0.005
Acenaphthene	µg/g		0.005	<0.005	0.005	<0.005	0.005	<0.005	<0.005	<0.005	<0.005
Fluorene	µg/g		0.02	0.06	0.02	0.04	0.02	0.02	<0.02	0.03	<0.02
Phenanthrene	µg/g		0.02	0.18	0.02	0.15	0.02	0.16	0.03	0.03	0.02
Anthracene	µg/g		0.004	<0.004	0.004	<0.004	0.004	<0.004	<0.004	<0.004	<0.004
Fluoranthene	µg/g		0.01	0.02	0.01	0.02	0.01	0.01	<0.01	<0.01	<0.01
Pyrene	µg/g		0.01	0.05	0.01	0.04	0.01	0.03	<0.01	<0.01	<0.01
Benzo(a)anthracene	µg/g		0.03	<0.03	0.03	<0.03	0.03	<0.03	<0.03	<0.03	<0.03
Chrysene	µg/g		0.05	0.08	0.05	0.07	0.05	0.06	<0.05	<0.05	<0.05
Benzo(b)fluoranthene	µg/g		0.02	0.04	0.02	0.04	0.02	0.03	0.02	<0.02	0.03
Benzo(j)fluoranthene	µg/g		0.02	<0.02	0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02
Benzo(k)fluoranthene	µg/g		0.02	<0.02	0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02
Benzo(a)pyrene	µg/g		0.03	<0.03	0.03	<0.03	0.03	<0.03	<0.03	<0.03	<0.03
Indeno(1,2,3-c,d)pyrene	µg/g		0.02	<0.02	0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02
Dibenzo(a,h)anthracene	µg/g		0.005	<0.005	0.005	<0.005	0.005	<0.005	<0.005	<0.005	<0.005
Benzo(g,h,i)perylene	µg/g		0.05	0.10	0.05	0.08	0.05	0.08	<0.05	<0.05	<0.05
Quinoline	µg/g		0.05	<0.05	0.05	<0.05	0.05	<0.05	<0.05	<0.05	<0.05
IACR CCME (Soil)	µg/g		0.6	<0.6	0.6	<0.6	0.6	<0.6	<0.6	<0.6	<0.6
B[a]P TPE (Soil)	µg/g		0.05	<0.05	0.05	<0.05	0.05	<0.05	<0.05	<0.05	<0.05
EPH C10-C19	µg/g		20	383	20	324	20	103	28	134	<20
EPH C19-C32	µg/g		20	232	20	180	20	91	47	70	30
LEPH C10-C19	µg/g		20	382	20	323	20	103	28	134	<20
HEPH C19-C32	µg/g		20	232	20	180	20	91	46	70	30
Benzo(b+j)fluoranthene	µg/g		0.05	<0.05	0.05	<0.05	0.05	<0.05	<0.05	<0.05	<0.05

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 18N303338

PROJECT: 1657709-6000 K19 Investigation

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works LEPH/HEPH in Soil Low Level

DATE RECEIVED: 2018-01-18

DATE REPORTED: 2018-02-14

		SAMPLE DESCRIPTION:	04299-11	04299-12	04300-03	04300-05	04300-10	04301-01
		SAMPLE TYPE:	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:	2018-01-14	2018-01-14	2018-01-14	2018-01-14	2018-01-15	2018-01-15
Surrogate	Unit	Acceptable Limits	9018165	9018166	9018171	9018173	9018178	9018181
Naphthalene - d8	%	50-130	80	65	87	71	85	66
2-Fluorobiphenyl	%	50-130	84	69	87	68	81	71
P-Terphenyl - d14	%	60-130	85	74	98	67	84	84

Certified By:

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PROJECT: 1657709-6000 K19 Investigation

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works LEPH/HEPH in Soil Low Level

DATE RECEIVED: 2018-01-18

DATE REPORTED: 2018-02-14

		SAMPLE DESCRIPTION:		04301-06	04301-10
		SAMPLE TYPE:		Soil	Soil
		DATE SAMPLED:		2018-01-15	2018-01-16
Parameter	Unit	G / S	RDL	9018186	9018190
Naphthalene	µg/g		0.005	<0.005	0.101
2-Methylnaphthalene	µg/g		0.005	<0.005	0.493
1-Methylnaphthalene	µg/g		0.005	0.013	0.298
Acenaphthylene	µg/g		0.005	<0.005	<0.005
Acenaphthene	µg/g		0.005	<0.005	<0.005
Fluorene	µg/g		0.02	<0.02	0.09
Phenanthrene	µg/g		0.02	0.11	0.23
Anthracene	µg/g		0.004	<0.004	<0.004
Fluoranthene	µg/g		0.01	0.01	0.01
Pyrene	µg/g		0.01	0.02	0.03
Benzo(a)anthracene	µg/g		0.03	<0.03	<0.03
Chrysene	µg/g		0.05	0.05	<0.05
Benzo(b)fluoranthene	µg/g		0.02	0.03	0.03
Benzo(j)fluoranthene	µg/g		0.02	<0.02	<0.02
Benzo(k)fluoranthene	µg/g		0.02	<0.02	<0.02
Benzo(a)pyrene	µg/g		0.03	<0.03	<0.03
Indeno(1,2,3-c,d)pyrene	µg/g		0.02	<0.02	<0.02
Dibenzo(a,h)anthracene	µg/g		0.005	<0.005	0.005
Benzo(g,h,i)perylene	µg/g		0.05	0.06	0.07
Quinoline	µg/g		0.05	<0.05	<0.05
IACR CCME (Soil)	µg/g		0.6	<0.6	<0.6
B[a]P TPE (Soil)	µg/g		0.05	<0.05	<0.05
EPH C10-C19	µg/g		20	133	101
EPH C19-C32	µg/g		20	184	112
LEPH C10-C19	µg/g		20	133	101
HEPH C19-C32	µg/g		20	184	112
Benzo(b+j)fluoranthene	µg/g		0.05	<0.05	<0.05

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Certificate of Analysis

AGAT WORK ORDER: 18N303338

PROJECT: 1657709-6000 K19 Investigation

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works LEPH/HEPH in Soil Low Level

DATE RECEIVED: 2018-01-18

DATE REPORTED: 2018-02-14

		SAMPLE DESCRIPTION:	04301-06	04301-10
		SAMPLE TYPE:	Soil	Soil
		DATE SAMPLED:	2018-01-15	2018-01-16
Surrogate	Unit	Acceptable Limits	9018186	9018190
Naphthalene - d8	%	50-130	73	64
2-Fluorobiphenyl	%	50-130	69	65
P-Terphenyl - d14	%	60-130	68	65

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9018142-9018164 Results are based on dry weight of sample.
LEPH & HEPH results have been corrected for PAH contributions.
Soil sample is visibly heterogeneous.

9018165-9018166 Results are based on dry weight of sample.
LEPH & HEPH results have been corrected for PAH contributions.
Soil sample is visibly heterogeneous.
PAH detection limits increased due to sample matrix interference. Sample extract was diluted.

9018171-9018190 Results are based on dry weight of sample.
LEPH & HEPH results have been corrected for PAH contributions.
Soil sample is visibly heterogeneous.

Certified By:

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PROJECT: 1657709-6000 K19 Investigation

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

BTEX / VPH (C6-C10) Soil

DATE RECEIVED: 2018-01-18

DATE REPORTED: 2018-02-14

		SAMPLE DESCRIPTION:		04308-02	04308-05	04308-07	04308-08	04308-11	04299-03	04299-05	04299-10
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-01-12	2018-01-12	2018-01-13	2018-01-13	2018-01-13	2018-01-13	2018-01-13	2018-01-14
Parameter	Unit	G / S	RDL	9018142	9018146	9018148	9018149	9018152	9018157	9018159	9018164
Methyl tert-butyl ether (MTBE)	µg/g		0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzene	µg/g		0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Toluene	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
m&p-Xylene	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
o-Xylene	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Styrene	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
VPH	µg/g		10	<10	<10	<10	<10	<10	<10	<10	<10
VH	µg/g		10	<10	<10	<10	<10	<10	<10	<10	<10
Total Xylenes	ug/g		0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate	Unit	Acceptable Limits									
Bromofluorobenzene	%	60-140		95	97	100	99	97	99	93	97
Dibromofluoromethane	%	60-140		108	111	115	113	113	116	109	113
Toluene - d8	%	60-140		101	102	106	105	104	105	101	104

Certified By:

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AGAT WORK ORDER: 18N303338

PROJECT: 1657709-6000 K19 Investigation

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

BTEX / VPH (C6-C10) Soil

DATE RECEIVED: 2018-01-18

DATE REPORTED: 2018-02-14

		SAMPLE DESCRIPTION:		04299-11	04299-12	04300-03	04300-05	04300-10	04301-01	04301-05	04301-06
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-01-14	2018-01-14	2018-01-14	2018-01-14	2018-01-15	2018-01-15	2018-01-15	2018-01-15
Parameter	Unit	G / S	RDL	9018165	9018166	9018171	9018173	9018178	9018181	9018185	9018186
Methyl tert-butyl ether (MTBE)	µg/g		0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzene	µg/g		0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.04
Toluene	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
m&p-Xylene	µg/g		0.05	0.16	0.15	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
o-Xylene	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Styrene	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
VPH	µg/g		10	<10	<10	10	<10	<10	<10	<10	<10
VH	µg/g		10	<10	<10	10	<10	<10	<10	<10	<10
Total Xylenes	ug/g		0.1	0.2	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate	Unit	Acceptable Limits									
Bromofluorobenzene	%	60-140		95	94	94	94	95	95	109	95
Dibromofluoromethane	%	60-140		110	108	110	111	112	112	102	112
Toluene - d8	%	60-140		102	100	102	102	102	101	108	102

Certified By:

AGAT Laboratories
Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 18N303338

PROJECT: 1657709-6000 K19 Investigation

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

BTEX / VPH (C6-C10) Soil

DATE RECEIVED: 2018-01-18

DATE REPORTED: 2018-02-14

		SAMPLE DESCRIPTION:		04301-10
		SAMPLE TYPE:		Soil
		DATE SAMPLED:		2018-01-16
Parameter	Unit	G / S	RDL	9018190
Methyl tert-butyl ether (MTBE)	µg/g		0.1	<0.1
Benzene	µg/g		0.02	<0.02
Toluene	µg/g		0.05	<0.05
Ethylbenzene	µg/g		0.05	<0.05
m&p-Xylene	µg/g		0.05	<0.05
o-Xylene	µg/g		0.05	<0.05
Styrene	µg/g		0.05	<0.05
VPH	µg/g		10	14
VH	µg/g		10	14
Total Xylenes	ug/g		0.1	<0.1
Surrogate	Unit	Acceptable Limits		
Bromofluorobenzene	%	60-140		94
Dibromofluoromethane	%	60-140		112
Toluene - d8	%	60-140		101

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9018142-9018190 Results are based on dry weight of sample.
VPH results have been corrected for BTEX contributions.

Certified By:

AGAT Laboratories

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Quality Assurance

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N303338

PROJECT: 1657709-6000 K19 Investigation

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Soil Analysis

RPT Date: Feb 14, 2018			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Arsenic in Soil															
Arsenic	9093386		5.5	4.4	20.8%	< 0.1	112%	70%	130%	103%	90%	110%			
pH 1:2	9018189		8.45	8.43	0.2%	< 0.1	98%	90%	110%	99%	95%	105%			

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

Certified By: Angela Bond

AGAT Laboratories

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Quality Assurance

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N303338

PROJECT: 1657709-6000 K19 Investigation

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis

RPT Date: Feb 14, 2018			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Public Works LEPH/HEPH in Soil Low Level															
Naphthalene	68612	9018190	0.101	0.099	2.0%	< 0.005	99%	80%	120%				105%	50%	130%
2-Methylnaphthalene	68612	9018190	0.493	0.435	12.5%	< 0.005	99%	80%	120%				85%	50%	130%
1-Methylnaphthalene	68612	9018190	0.298	0.263	12.5%	< 0.005	100%	80%	120%				98%	50%	130%
Acenaphthylene	68612	9018190	<0.005	<0.005	NA	< 0.005	100%	80%	120%				86%	50%	130%
Acenaphthene	68612	9018190	<0.005	<0.005	NA	< 0.005	101%	80%	120%				91%	50%	130%
Fluorene	68612	9018190	0.09	0.08	NA	< 0.02	100%	80%	120%				92%	50%	130%
Phenanthrene	68612	9018190	0.23	0.21	9.1%	< 0.02	98%	80%	120%				73%	60%	130%
Anthracene	68612	9018190	<0.004	<0.004	NA	< 0.004	102%	80%	120%				108%	60%	130%
Fluoranthene	68612	9018190	0.01	0.01	NA	< 0.01	101%	80%	120%				92%	60%	130%
Pyrene	68612	9018190	0.03	0.02	NA	< 0.01	100%	80%	120%				96%	60%	130%
Benzo(a)anthracene	68612	9018190	<0.03	<0.03	NA	< 0.03	99%	80%	120%				74%	60%	130%
Chrysene	68612	9018190	<0.05	<0.05	NA	< 0.05	100%	80%	120%				96%	60%	130%
Benzo(b)fluoranthene	68612	9018190	0.03	0.02	NA	< 0.02	98%	80%	120%				86%	60%	130%
Benzo(j)fluoranthene	68612	9018190	<0.02	<0.02	NA	< 0.02	102%	80%	120%				108%	60%	130%
Benzo(k)fluoranthene	68612	9018190	<0.02	<0.02	NA	< 0.02	102%	80%	120%				81%	60%	130%
Benzo(a)pyrene	68612	9018190	<0.03	<0.03	NA	< 0.03	99%	80%	120%				102%	60%	130%
Indeno(1,2,3-c,d)pyrene	68612	9018190	<0.02	<0.02	NA	< 0.02	100%	80%	120%				83%	60%	130%
Dibenzo(a,h)anthracene	68612	9018190	0.005	<0.005	NA	< 0.005	100%	80%	120%				79%	60%	130%
Benzo(g,h,i)perylene	68612	9018190	0.07	0.06	NA	< 0.05	100%	80%	120%				95%	60%	130%
Quinoline	68612	9018190	<0.05	<0.05	NA	< 0.05	101%	80%	120%				104%	50%	130%
EPH C10-C19	68612	9018190	101	106	4.8%	< 20	111%	70%	130%				88%	65%	120%
EPH C19-C32	68612	9018190	112	122	8.5%	< 20	103%	70%	130%				91%	80%	120%
Naphthalene - d8	68612	9018190	64	83	25.9%		99%	80%	120%				103%	50%	130%
2-Fluorobiphenyl	68612	9018190	65	84	25.5%		100%	80%	120%				101%	50%	130%
P-Terphenyl - d14	68612	9018190	65	96	38.5%		99%	80%	120%				100%	60%	130%

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

BTEX / VPH (C6-C10) Soil															
Methyl tert-butyl ether (MTBE)	68608	9018142	<0.1	<0.1	NA	< 0.1	97%	80%	120%				101%	70%	130%
Benzene	68608	9018142	<0.02	<0.02	NA	< 0.02	100%	80%	120%				101%	70%	130%
Toluene	68608	9018142	<0.05	<0.05	NA	< 0.05	99%	80%	120%				99%	70%	130%
Ethylbenzene	68608	9018142	<0.05	<0.05	NA	< 0.05	98%	80%	120%				97%	70%	130%
m&p-Xylene	68608	9018142	<0.05	<0.05	NA	< 0.05	98%	80%	120%				97%	70%	130%
o-Xylene	68608	9018142	<0.05	<0.05	NA	< 0.05	98%	80%	120%				99%	70%	130%
Styrene	68608	9018142	<0.05	<0.05	NA	< 0.05	100%	80%	120%				102%	70%	130%
VPH	68608	9018142	<10	<10	NA	< 10									
VH	68608	9018142	<10	<10	NA	< 10									
Bromofluorobenzene	68608	9018142	95	94	1.1%		100%	60%	140%				93%	60%	140%
Dibromofluoromethane	68608	9018142	108	109	0.9%		99%	60%	140%				104%	60%	140%

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Quality Assurance

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA
AGAT WORK ORDER: 18N303338
PROJECT: 1657709-6000 K19 Investigation
ATTENTION TO: Erin O'Brien
SAMPLING SITE:
SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date: Feb 14, 2018			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Toluene - d8	68608	9018142	101	100	1.0%		100%	60%	140%				95%	60%	140%
Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.															
BTEX / VPH (C6-C10) Soil															
Methyl tert-butyl ether (MTBE)	68737	9035952	<0.1	<0.1	NA	< 0.1	101%	80%	120%				99%	70%	130%
Benzene	68737	9035952	<0.02	<0.02	NA	< 0.02	100%	80%	120%				95%	70%	130%
Toluene	68737	9035952	<0.05	<0.05	NA	< 0.05	101%	80%	120%				107%	70%	130%
Ethylbenzene	68737	9035952	<0.05	<0.05	NA	< 0.05	102%	80%	120%				107%	70%	130%
m&p-Xylene	68737	9035952	<0.05	<0.05	NA	< 0.05	101%	80%	120%				107%	70%	130%
o-Xylene	68737	9035952	<0.05	<0.05	NA	< 0.05	101%	80%	120%				104%	70%	130%
Styrene	68737	9035952	<0.05	<0.05	NA	< 0.05	101%	80%	120%				100%	70%	130%
VPH	68737	9035952	<10	<10	NA	< 10									
VH	68737	9035952	<10	<10	NA	< 10									
Bromofluorobenzene	68737	9035952	98	100	2.0%		100%	60%	140%				90%	60%	140%
Dibromofluoromethane	68737	9035952	88	89	1.1%		99%	60%	140%				85%	60%	140%
Toluene - d8	68737	9035952	111	110	0.9%		100%	60%	140%				104%	60%	140%

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

Certified By:

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Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N303338

PROJECT: 1657709-6000 K19 Investigation

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Arsenic	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
pH 1:2	INOR-181-6031	BC MOE Lab Manual B (pH, Electrometric, Soil)	PH METER

Unit 120, 8600 Glenlyon Parkway
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Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N303338

PROJECT: 1657709-6000 K19 Investigation

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Naphthalene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
2-Methylnaphthalene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
1-Methylnaphthalene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Acenaphthylene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Acenaphthene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Fluorene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Phenanthrene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Anthracene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Fluoranthene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Pyrene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(a)anthracene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Chrysene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(b)fluoranthene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(j)fluoranthene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(k)fluoranthene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(a)pyrene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Indeno(1,2,3-c,d)pyrene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Dibenzo(a,h)anthracene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(g,h,i)perylene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Quinoline	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
IACR CCME (Soil)	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
B[a]P TPE (Soil)	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
EPH C10-C19	ORG-180-5101	Modified from BCMOE Lab Manual Section D (EPH)	GC/FID
EPH C19-C32	ORG-180-5101	Modified from BCMOE Lab Manual Section D (EPH)	GC/FID
LEPH C10-C19	ORG-180-5101	Modified from BCMOE Lab Manual Section D (EPH)	GC/FID
HEPH C19-C32	ORG-180-5101	Modified from BCMOE Lab Manual Section D (EPH)	GC/FID
Naphthalene - d8	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS

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Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N303338

PROJECT: 1657709-6000 K19 Investigation

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
2-Fluorobiphenyl	ORG-180-5102	Modified form BCMOE Lab Manual Section D (PAH)	GC/MS
P-Terphenyl - d14	ORG-180-5102	Modified form BCMOE Lab Manual Section D (PAH)	GC/MS
Methyl tert-butyl ether (MTBE)	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
Benzene	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
Toluene	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
Ethylbenzene	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
m&p-Xylene	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
o-Xylene	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
Styrene	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
VPH	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
VH	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
Bromofluorobenzene	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS
Dibromofluoromethane	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS
Toluene - d8	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS

18N303338

Golder Associates
200 – 2920 Virtual Way
Vancouver, British Columbia, Canada V5M 0C4
Telephone (604) 296-4200 Fax (604) 298-5253

CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

No. 04308 page 1 of 4

Project Number: 1657709/6000		Laboratory Name: AGAT	
Short Title: K19 Investigation	Golder Contact: erin o'brien	Address: 120-Glenlyon Pkwy Burnaby BC	
Golder E-mail Address 1: erin_o'brien @golder.com	Golder E-mail Address 2: agarrido @golder.com	Telephone/Fax: 778-452-4009	Contact: Yasmine Galindo

Office Name: Vancouver

EQuIS Facility Code: 28433859
EQuIS upload: ☒

JAN 18 AM8:57

Turnaround Time: ☐ 24 hr ☐ 48 hr ☐ 72 hr ☒ Regular (5 Days)
Criteria: ☒ CSR ☒ CCME ☐ BC Water Quality ☐ Other

Note: Final Reports to be issued by e-mail

Quote No.:

Analyses Required

Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D / M / Y)	Time Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	BTEX / VPH	LEPH / HEPH / PAHs							HOLD	RUSH (Select TAT above)	Remarks (over)
04308 - 01	K19-TP13-01	1	0.5	Soil	12/01/18	12:15	Discrete			4									X		9018141
- 02	↓	2	1.5	↓	↓	12:30	↓			4	X	X									142
- 03	↓	3	2.5			12:50				4									X		143
04308 - 04	K19-TP18-02	1	0.4			14:00				2									X		145
- 05	↓	2	1.5			14:20				4	X	X									146
- 06	↓	3	2.6			14:40				4									X		147
- 07	K19-TP18-03	1	0.5		13/01/18	10:30		FDA	04308-08	4	X	X									148
- 08		1	0.5			10:30		FD	04308-07	4	X	X									149
- 09		2	1.5			10:50				4									X		150
- 10	↓	3	2.6			11:10				2									X		151
- 11	K19-TP18-04	1	0.5			11:50				4	X	X									152
- 12	↓	2	1.5	↓	↓	12:10	↓			4									X		153

Sampler's Signature: [signature]	Relinquished by: Signature [signature]	Company Golder.	Date 17/01/18	Time 0845.	Received by: Signature [signature]	Company AGAT
Comments: Travis Dave Osguthorpe.	Method of Shipment:	Waybill No.:	Received for Lab by: Ann [signature]		Date	Time 8:35
	Shipped by:	Shipment Condition: Seal Intact:	Temp (°C) 0	Cooler opened by:	Date	Time

WHITE: Golder Copy YELLOW: Lab Copy

ESED

18N303338

CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

No. 04299 page 2 of 4

Golder Associates
200 – 2920 Virtual Way
Vancouver, British Columbia, Canada V5M 0C4
Telephone (604) 296-4200 Fax (604) 298-5253

Project Number: 1657709/6000
Short Title: K19 Investigation
Golder Contact: Erin O'Brien
Golder E-mail Address 1: erin_o'brien @golder.com
Golder E-mail Address 2: agarrido @golder.com
Laboratory Name: AGAT
Address: 120-8600 Glenlyon Pkwy
Telephone/Fax: 778-452-4009
Contact: Yasmine Galvão

Office Name: Vancouver
EQuIS Facility Code: 28433859
EQuIS upload: ☒
JAN 18 AM 8:57

Turnaround Time: ☐ 24 hr ☐ 48 hr ☐ 72 hr ☒ Regular (5 Days)
Criteria: ☒ CSR ☒ CCME ☐ BC Water Quality ☐ Other

Note: Final Reports to be issued by e-mail
Quote No.:

Analyses Required

Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D / M / Y)	Time Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	BTEX/VPH	LEPH/HEPH/PAH	HOLD.	RUSH (Select TAT above)	Remarks (over)
04299 - 01	K19-TP18-04	3	2.5	Soil	13/01/18	12:20	Discrete			2			X		9018155
- 02	K19-TP18-05	1	0.5			13:50	13:50			4			X		156
- 03	↓	2	1.5			14:20	14:20			4	X	X			157
- 04	↓	3	2.5			14:40	14:40			4			X		158
- 05	K19-TP18-06	1	0.5			15:20				4	X	X			159
- 06	↓	2	1.5			15:30				4			X		160
- 07	↓	3	2.5		↓	15:40				2			X		161
- 08	K19-TP18-07	1	0.5		14/01/18	10:30				2			X		162
- 09	↓	2	1.5		↓	10:40				4			X		163
- 10	↓	3	2.5		↓	10:50				4	X	X			164
- 11	↓	4	3.4		↓	11:10		FDA	04299-12	4	X	X			165
- 12	↓	4	3.4	↓	↓	11:10	↓	FD	04299-11	4	X	X			166

Sampler's Signature:	Relinquished by: Signature	Company: Golder	Date: 17/01/18	Time: 0845
Received by: Signature	Company: AGAT			
Comments: Invoice Dave Osgnthorpe	Method of Shipment:	Waybill No.:	Received for Lab by: Ann	Date: / /	Time: 8:35
	Shipped by:	Shipment Condition: Seal Intact:	Temp (°C): 5	Cooler opened by:	Date:	Time:

WHITE: Golder Copy YELLOW: Lab Copy

ESED

18N303338

CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

No. 04300 page 3 of 4

Golder Associates
200 – 2920 Virtual Way
Vancouver, British Columbia, Canada V5M 0C4
Telephone (604) 296-4200 Fax (604) 298-5253

Project Number: 1657709/6000
Short Title: Kiq Investigation
Golder Contact: Erin O'Brien
Golder E-mail Address 1: erin_o'brien @golder.com
Golder E-mail Address 2: kourne_dino-belair @golder.com
Laboratory Name: AGAT
Address: 200 8600 Glenlyon Pky
Telephone/Fax: 778-452-4009
Contact: Yasmine Galindo

Office Name: Vancouver
EQuIS Facility Code: 28433859
EQuIS upload: ☐
JAN 18 AM 8:57

Turnaround Time: ☐ 24 hr ☐ 48 hr ☐ 72 hr ☒ Regular (5 Days)
Criteria: ☒ CSR ☒ CCME ☐ BC Water Quality ☐ Other

Note: Final Reports to be issued by e-mail
Quote No.:

Analyses Required

Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D / M / Y)	Time Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	BTEX/VPH	EPH/HEPH/PAH							HOLD	RUSH (Select TAT above)	Remarks (over)
04300-01	K19-TP18-08	1	0.5	Soil	14/01/18	12:20	Discrete			2									X		9018169
-02	↓	2	1.5	↓	↓	12:30	↓			4									X		170
-03	↓	3	2.5	↓	↓	12:50	↓			4	X	X									171
-04	K19-TP18-09	1	0.5	↓	↓	14:50	↓			4									X		172
-05	↓	2	1.5	↓	↓	15:30	↓			4	X	X									173
-06	↓	3	2.5	↓	↓	15:50	↓			4									X		174
-07	K19-TP18-10	1	0.5	↓	15/01/18	10:00	↓			4									X		175
-08	↓	2	1.5	↓	↓	10:30	↓	FDA	04300-09	4									X		176
-09	↓	2	1.5	↓	↓	10:30	↓	FD	04300-08	4									X		177
-10	↓	3	2.5	↓	↓	11:00	↓			4	X	X									178
-11	↓	4	3.3	↓	↓	11:30	↓			4									X		179
-12	K19-TP18-11	1	0.5	↓	↓	12:30	↓			4									X		180

Sampler's Signature: [signature]
Relinquished by: Signature [signature]
Company: Golder
Date: 17/01/18
Time: 0845
Received by: Signature [signature]
Company: AGAT

Comments: Invoice Dave Osguthorpe
Method of Shipment:
Waybill No.:
Received for Lab by: Ann Ar
Date:
Time: 8:35
Shipped by:
Shipment Condition:
Seal Intact:
Temp (°C): 0
Cooler opened by:
Date:
Time:

WHITE: Golder Copy YELLOW: Lab Copy

ESED

18N303338

Golder Associates
200 – 2920 Virtual Way
Vancouver, British Columbia, Canada V5M 0C4
Telephone (604) 296-4200 Fax (604) 298-5253

CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

No. 04301 page 4 of 4.

Project Number: 1657709/6000		Laboratory Name: AGAT	
Short Title: K19 Field Investigation	Golder Contact: Erin O'Brien	Address: 120-8600 Glenlyon Pky, Burnaby, BC	
Golder E-mail Address 1: erin_o'brien @golder.com	Golder E-mail Address 2: Kevern_der_bolar @golder.com	Telephone/Fax: 778-452-4009	Contact: Yasmine Galindo

Office Name: Vancouver

EQuIS Facility Code: 28433859
EQuIS upload: ☒

JAN 18 AM 8:57

Turnaround Time: ☐ 24 hr ☐ 48 hr ☐ 72 hr ☒ Regular (5 Days)
Criteria: ☒ CSR ☒ CCME ☐ BC Water Quality ☐ Other

Note: Final Reports to be issued by e-mail

Quote No.:

Analyses Required

Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D / M / Y)	Time Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	BTEX/VPH	LEPH/HEPH/PAH							HOLD	RUSH (Select TAT above)	Remarks (over)
04301 - 01	K19-TP16-11	2	1.5	Soil	15/01/17	13:00	Discrete			4	X	X									9018181
- 02	↓	3	2.5	↓	↓	13:10	↓			2									X		182
- 03	K19-TP18-12	1	0.5			14:00				2									X		183
- 04		2	1.5			14:30				4									X		184
- 05		3	2.5			14:40				4									X		185
- 06	↓	4	3.0		↓	14:55				4	X	X									186
- 07	K19-MW18-01	1	0.3-0.5		16/01/17	13:10				2									X		187
- 08		2	2.0-2.3			13:20				2									X		188
- 09		3	5.5-5.8			13:30				2									X		189
- 10		4	6.5-7.0			16:00				4	X	X									190
- 11	↓	5	8.0-8.5	↓	↓	16:30	↓			4									X		↓ 191
- 12																					

17/01/18

Sampler's Signature: [signature]	Relinquished by: Signature [signature]	Company Golder.	Date 17/01/18.	Time 0845.	Received by: Signature [signature]	Company AGAT
Comments: Invoice Dave Osgathorpe	Method of Shipment:	Waybill No.:	Received for Lab by: Ann [signature]		Date	Time 8:35
	Shipped by:	Shipment Condition: Seal Intact:	Temp (°C) 0	Cooler opened by:	Date	Time

WHITE: Golder Copy YELLOW: Lab Copy

ESED

AGAT Laboratories

SAMPLE INTEGRITY RECEIPT FORM

RECEIVING BASICS - Shipping

Company/Consultant: GOLDER

Courier: _____ Prepaid Collect

Waybill# _____

Branch: EDM GP FN FM RD VAN LYD FSJ EST Other: _____

Custody Seal Intact: Yes No NA

TAT: <24hr 24-48hr 48-72hr Reg Other _____

Cooler Quantity: 2

TIME SENSITIVE ISSUES - Shipping

ALREADY EXCEEDED HOLD TIME? Yes No

Inorganic Tests (Please Circle): Mibi , BOD , Nitrate/Nitrite , Turbidity , Microtox , Ortho PO4 , Tedlar Bag , Residual Chlorine , Chlorophyll* , Chloroamines*

Earliest Expiry: _____

Hydrocarbons: Earliest Expiry _____

SAMPLE INTEGRITY - Shipping

Hazardous Samples: YES NO Precaution Taken: _____

Legal Samples: Yes No

International Samples: Yes No

Tape Sealed: Yes No

Coolant Used: Icepack Bagged Ice Free Ice Free Water None

Temperature (Bottles/Jars only) N/A if only Soil Bags Received

FROZEN (Please Circle if samples received Frozen)

1 (Bottle/Jar) 7 + 6 + 7 = 6 °C 2(Bottle/Jar) ~~7 + 6 + 7~~ = ___ °C

3 (Bottle/Jar) 4 + 4 + 4 = 5 °C 4 (Bottle/Jar) ___ + ___ + ___ = ___ °C

5 (Bottle/Jar) ___ + ___ + ___ = ___ °C 6 (Bottle/Jar) ___ + ___ + ___ = ___ °C

7 (Bottle/Jar) ___ + ___ + ___ = ___ °C 8 (Bottle/Jar) ___ + ___ + ___ = ___ °C

9 (Bottle/Jar) ___ + ___ + ___ = ___ °C 10 (Bottle/Jar) ___ + ___ + ___ = ___ °C

(If more than 10 coolers are received use another sheet of paper and attach)

LOGISTICS USE ONLY

Workorder No: _____

Samples Damaged: Yes No If YES why?

No Bubble Wrap Frozen Courier

Other: _____

Account Project Manager: _____ have they been notified of the above issues: Yes No

Whom spoken to: _____ Date/Time: _____

CPM Initial _____

General Comments: _____

* Subcontracted Analysis (See CPM)

Date issued: May 22, 2015

AGAT Laboratories

SAMPLE INTEGRITY RECEIPT FORM - BURNABY

Work Order # 18N303338

RECEIVING BASICS:

Received From: Novex Waybill #: _____

SAMPLE QUANTITIES:

Coolers: 2 Containers: 166

TIME SENSITIVE ISSUES:

Earliest Date Sampled: 17-JAN-18 ALREADY EXCEEDED? Yes (No)

NON-CONFORMANCES:

3 temperatures of samples* and average of each cooler: (record differing temperatures on the CoC next to sample ID's) *use jars when available

(1) 0 + 0 + 0 = 0 °C (2) 0 + 0 + 0 = 0 °C (3) ___ + ___ + ___ = ___ °C (4) ___ + ___ + ___ = ___ °C

Was ice or ice pack present: (Yes) No

Integrity Issues:

Account Project Manager: _____ have they been notified of the above issues: Yes No

Whom spoken to: _____ Date and Time: _____

ADDITIONAL NOTES:

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA
219-800 BURRARD ST
VANCOUVER, BC V6Z 0B9
604-671-1831

ATTENTION TO: Erin O'Brien

PROJECT: 1657709-6000

AGAT WORK ORDER: 18N303359

SOIL ANALYSIS REVIEWED BY: Andrew Garrard, B.Sc., General Manager

TRACE ORGANICS REVIEWED BY: Andrew Garrard, B.Sc., General Manager

DATE REPORTED: Jan 24, 2018

PAGES (INCLUDING COVER): 15

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (778) 452-4000

*NOTES

VERSION 1: Sample receipt temperature 0°C.

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

AGAT Laboratories

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http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 18N303359

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works Arsenic in Soil

DATE RECEIVED: 2018-01-18

DATE REPORTED: 2018-01-24

SAMPLE DESCRIPTION:				04313-06	04313-07	04313-08	04313-09	04313-10
SAMPLE TYPE:				Soil	Soil	Soil	Soil	Soil
DATE SAMPLED:				2018-01-15	2018-01-15	2018-01-15	2018-01-15	2018-01-15
Parameter	Unit	G / S	RDL	9018333	9018335	9018336	9018337	9018338
Arsenic	µg/g		0.1	9.7	9.6	11.7	10.7	10.4
pH 1:2	pH units		0.05	7.58	7.52	7.50	7.50	7.48

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9018333-9018338 Results are based on the dry weight of the sample

Certified By:

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 18N303359

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works Metals in Soil

DATE RECEIVED: 2018-01-18

DATE REPORTED: 2018-01-24

SAMPLE DESCRIPTION:				04313-01	04313-02	04313-03	04313-04	04313-05
SAMPLE TYPE:				Soil	Soil	Soil	Soil	Soil
DATE SAMPLED:				2018-01-15	2018-01-15	2018-01-15	2018-01-15	2018-01-15
Parameter	Unit	G / S	RDL	9018314	9018329	9018330	9018331	9018332
Aluminum	µg/g		10	4890	5200	5200	5210	4760
Antimony	µg/g		0.1	0.8	0.5	0.5	0.5	0.4
Arsenic	µg/g		0.1	21.4	6.4	7.0	6.5	8.4
Barium	µg/g		0.5	177	131	148	176	144
Beryllium	µg/g		0.1	0.4	0.3	0.4	0.3	0.3
Bismuth	µg/g		0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Cadmium	µg/g		0.01	0.90	0.48	0.46	0.46	0.61
Calcium	µg/g		10	75300	76000	82300	85000	80000
Chromium	µg/g		1	11	14	12	12	12
Cobalt	µg/g		0.1	9.3	6.1	6.7	6.5	6.2
Copper	µg/g		0.2	12.3	11.9	22.4	14.4	13.4
Iron	µg/g		10	18800	15600	21200	21800	21900
Lead	µg/g		0.1	8.8	5.2	6.7	5.7	5.9
Lithium	µg/g		0.5	9.0	10.2	11.1	9.0	8.9
Magnesium	µg/g		10	8090	11500	13000	14300	11300
Manganese	µg/g		1	463	335	557	445	437
Mercury	µg/g		0.01	0.06	0.03	0.02	0.03	0.03
Molybdenum	µg/g		0.2	2.6	2.0	2.7	2.4	3.2
Nickel	µg/g		0.5	26.5	15.7	19.3	17.2	18.6
Phosphorus	µg/g		5	1320	355	430	398	399
Potassium	µg/g		5	1020	1130	1050	1180	1090
Selenium	µg/g		0.1	0.8	0.7	0.5	0.6	0.7
Silver	µg/g		0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Sodium	µg/g		5	115	80	79	89	77
Strontium	µg/g		1	95	56	84	80	73
Thallium	µg/g		0.1	0.2	0.2	0.2	0.2	0.3
Tin	µg/g		0.2	0.3	0.3	0.3	0.3	0.3
Titanium	µg/g		1	136	166	145	189	202
Uranium	µg/g		0.2	1.6	1.1	1.2	1.2	1.5
Vanadium	µg/g		1	30	18	20	22	19

Certified By:

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http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 18N303359

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works Metals in Soil

DATE RECEIVED: 2018-01-18

DATE REPORTED: 2018-01-24

		SAMPLE DESCRIPTION:		04313-01	04313-02	04313-03	04313-04	04313-05
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-01-15	2018-01-15	2018-01-15	2018-01-15	2018-01-15
Parameter	Unit	G / S	RDL	9018314	9018329	9018330	9018331	9018332
Zinc	µg/g		1	83	64	72	65	84
Zirconium	µg/g		0.1	5.1	3.0	3.2	3.8	3.3
pH 1:2	pH units		0.05	8.30	8.53	8.37	8.46	8.63

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9018314-9018332 Results are based on the dry weight of the sample

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 18N303359

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works LEPH/HEPH in Soil Low Level

DATE RECEIVED: 2018-01-18

DATE REPORTED: 2018-01-24

		SAMPLE DESCRIPTION:		04313-01	04313-02	04313-03	04313-04	04313-05
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-01-15	2018-01-15	2018-01-15	2018-01-15	2018-01-15
Parameter	Unit	G / S	RDL	9018314	9018329	9018330	9018331	9018332
Naphthalene	µg/g		0.005	<0.005	<0.005	<0.005	<0.005	<0.005
2-Methylnaphthalene	µg/g		0.005	<0.005	<0.005	<0.005	<0.005	<0.005
1-Methylnaphthalene	µg/g		0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Acenaphthylene	µg/g		0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Acenaphthene	µg/g		0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Fluorene	µg/g		0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Phenanthrene	µg/g		0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Anthracene	µg/g		0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Fluoranthene	µg/g		0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pyrene	µg/g		0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)anthracene	µg/g		0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Chrysene	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(b)fluoranthene	µg/g		0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Benzo(j)fluoranthene	µg/g		0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Benzo(k)fluoranthene	µg/g		0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Benzo(a)pyrene	µg/g		0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Indeno(1,2,3-c,d)pyrene	µg/g		0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Dibenzo(a,h)anthracene	µg/g		0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Benzo(g,h,i)perylene	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Quinoline	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	<0.05
IACR CCME (Soil)	µg/g		0.6	<0.6	<0.6	<0.6	<0.6	<0.6
B[a]P TPE (Soil)	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	<0.05
EPH C10-C19	µg/g		20	<20	<20	<20	<20	<20
EPH C19-C32	µg/g		20	<20	<20	<20	<20	<20
LEPH C10-C19	µg/g		20	<20	<20	<20	<20	<20
HEPH C19-C32	µg/g		20	<20	<20	<20	<20	<20
Benzo(b+j)fluoranthene	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	<0.05

Certified By:

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http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 18N303359

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works LEPH/HEPH in Soil Low Level

DATE RECEIVED: 2018-01-18

DATE REPORTED: 2018-01-24

		SAMPLE DESCRIPTION:	04313-01	04313-02	04313-03	04313-04	04313-05
		SAMPLE TYPE:	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:	2018-01-15	2018-01-15	2018-01-15	2018-01-15	2018-01-15
Surrogate	Unit	Acceptable Limits	9018314	9018329	9018330	9018331	9018332
Naphthalene - d8	%	50-130	82	75	76	71	71
2-Fluorobiphenyl	%	50-130	86	79	79	74	74
P-Terphenyl - d14	%	60-130	99	92	92	87	86

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9018314-9018332 Results are based on dry weight of sample.
LEPH & HEPH results have been corrected for PAH contributions.
Soil sample is visibly heterogeneous.

Certified By:

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Quality Assurance

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N303359

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Soil Analysis

RPT Date: Jan 24, 2018			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Public Works Metals in Soil															
Aluminum	9018596		9560	10700	11.4%	< 10	93%	70%	130%	98%	90%	110%			
Antimony	9018596		<0.1	<0.1	NA	< 0.1	121%	70%	130%	109%	90%	110%			
Arsenic	9018596		0.9	0.7	22.2%	< 0.1	109%	70%	130%	104%	90%	110%			
Barium	9018596		40.1	42.5	6.0%	< 0.5	118%	70%	130%	106%	90%	110%			
Beryllium	9018596		<0.1	<0.1	NA	< 0.1	92%	70%	130%	93%	90%	110%			
Bismuth	9018596		<0.5	<0.5	NA	< 0.5				110%	85%	115%			
Cadmium	9018596		0.09	0.09	4.6%	< 0.01	104%	70%	130%	103%	90%	110%			
Calcium	9018596		3070	3410	10.4%	< 10	100%	70%	130%	98%	90%	110%			
Chromium	9018596		6	8	18.0%	< 1	120%	70%	130%	107%	90%	110%			
Cobalt	9018596		2.7	3.0	13.8%	< 0.1	117%	70%	130%	108%	90%	110%			
Copper	9018596		12.2	13.5	10.2%	< 0.2	113%	70%	130%	106%	90%	110%			
Iron	9018596		13900	16600	17.7%	< 10	92%	70%	130%	107%	90%	110%			
Lead	9018596		2.3	2.4	2.7%	< 0.1	109%	70%	130%	109%	90%	110%			
Lithium	9018596		2.0	2.2	NA	< 0.5				108%	85%	115%			
Magnesium	9018596		1600	1960	19.8%	< 10	99%	70%	130%	106%	90%	110%			
Manganese	9018596		164	173	5.5%	< 1	110%	70%	130%	107%	90%	110%			
Mercury	9018596		<0.01	<0.01	NA	< 0.01	92%	70%	130%	97%	90%	110%			
Molybdenum	9018596		<0.2	0.2	NA	< 0.2	125%	70%	130%	101%	90%	110%			
Nickel	9018596		2.2	2.6	NA	< 0.5	112%	70%	130%	99%	90%	110%			
Phosphorus	9018596		333	398	17.8%	< 5	87%	70%	130%	98%	90%	110%			
Potassium	9018596		411	448	8.5%	< 5	113%	70%	130%	92%	90%	110%			
Selenium	9018596		<0.1	<0.1	NA	< 0.1				103%	90%	110%			
Silver	9018596		<0.5	<0.5	NA	< 0.5	119%	70%	130%	97%	90%	110%			
Sodium	9018596		337	346	2.7%	< 5	129%	70%	130%	95%	90%	110%			
Strontium	9018596		41	42	2.0%	< 1	126%	70%	130%	109%	90%	110%			
Thallium	9018596		<0.1	<0.1	NA	< 0.1	118%	70%	130%	103%	90%	110%			
Tin	9018596		0.2	0.2	NA	< 0.2	112%	70%	130%	105%	90%	110%			
Titanium	9018596		619	718	14.8%	< 1	130%	70%	130%	96%	90%	110%			
Uranium	9018596		0.5	0.5	NA	< 0.2	122%	70%	130%	110%	90%	110%			
Vanadium	9018596		40	45	11.7%	< 1	112%	70%	130%	99%	90%	110%			
Zinc	9018596		17	17	4.5%	< 1	116%	70%	130%	110%	90%	110%			
Zirconium	9018596		1.6	1.5	3.2%	< 0.1	110%	70%	130%	110%	90%	110%			
pH 1:2	9018596		7.18	7.20	0.3%		100%	90%	110%	99%	95%	105%			

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

Certified By:

AGAT Laboratories

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Quality Assurance

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N303359

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis

RPT Date: Jan 24, 2018			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Public Works LEPH/HEPH in Soil Low Level															
Naphthalene	68607	9016713	<0.005	<0.005	NA	< 0.005	100%	80%	120%				104%	50%	130%
2-Methylnaphthalene	68607	9016713	<0.005	<0.005	NA	< 0.005	98%	80%	120%				88%	50%	130%
1-Methylnaphthalene	68607	9016713	<0.005	<0.005	NA	< 0.005	101%	80%	120%				100%	50%	130%
Acenaphthylene	68607	9016713	<0.005	<0.005	NA	< 0.005	100%	80%	120%				91%	50%	130%
Acenaphthene	68607	9016713	<0.005	<0.005	NA	< 0.005	99%	80%	120%				94%	50%	130%
Fluorene	68607	9016713	<0.02	<0.02	NA	< 0.02	100%	80%	120%				97%	50%	130%
Phenanthrene	68607	9016713	<0.02	<0.02	NA	< 0.02	98%	80%	120%				77%	60%	130%
Anthracene	68607	9016713	<0.004	<0.004	NA	< 0.004	102%	80%	120%				103%	60%	130%
Fluoranthene	68607	9016713	<0.01	<0.01	NA	< 0.01	100%	80%	120%				101%	60%	130%
Pyrene	68607	9016713	<0.01	<0.01	NA	< 0.01	101%	80%	120%				106%	60%	130%
Benzo(a)anthracene	68607	9016713	<0.03	<0.03	NA	< 0.03	100%	80%	120%				88%	60%	130%
Chrysene	68607	9016713	<0.05	<0.05	NA	< 0.05	101%	80%	120%				105%	60%	130%
Benzo(b)fluoranthene	68607	9016713	<0.02	<0.02	NA	< 0.02	102%	80%	120%				92%	60%	130%
Benzo(j)fluoranthene	68607	9016713	<0.02	<0.02	NA	< 0.02	101%	80%	120%				107%	60%	130%
Benzo(k)fluoranthene	68607	9016713	<0.02	<0.02	NA	< 0.02	101%	80%	120%				87%	60%	130%
Benzo(a)pyrene	68607	9016713	<0.03	<0.03	NA	< 0.03	98%	80%	120%				99%	60%	130%
Indeno(1,2,3-c,d)pyrene	68607	9016713	<0.02	<0.02	NA	< 0.02	100%	80%	120%				85%	60%	130%
Dibenzo(a,h)anthracene	68607	9016713	<0.005	<0.005	NA	< 0.005	100%	80%	120%				82%	60%	130%
Benzo(g,h,i)perylene	68607	9016713	<0.05	<0.05	NA	< 0.05	100%	80%	120%				96%	60%	130%
Quinoline	68607	9016713	<0.05	<0.05	NA	< 0.05	101%	80%	120%				108%	50%	130%
EPH C10-C19	68607	9016713	<20	<20	NA	< 20	109%	70%	130%				91%	65%	120%
EPH C19-C32	68607	9016713	<20	<20	NA	< 20	102%	70%	130%				95%	80%	120%
Naphthalene - d8	68607	9016713	95	99	4.1%		101%	80%	120%				101%	50%	130%
2-Fluorobiphenyl	68607	9016713	95	97	2.1%		101%	80%	120%				101%	50%	130%
P-Terphenyl - d14	68607	9016713	103	105	1.9%		99%	80%	120%				106%	60%	130%

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

Certified By:

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Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA
AGAT WORK ORDER: 18N303359
PROJECT: 1657709-6000
ATTENTION TO: Erin O'Brien
SAMPLING SITE:
SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Arsenic	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
pH 1:2	INOR-181-6031	BC MOE Lab Manual B (pH, Electrometric, Soil)	PH METER
Aluminum	MET-181-6106, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP/OES
Antimony	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Barium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Beryllium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Bismuth	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Cadmium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Calcium	MET-181-6106, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP/OES
Chromium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Cobalt	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Copper	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Iron	MET-181-6106, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP/OES
Lead	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Lithium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Magnesium	MET-181-6106, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP/OES
Manganese	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP-MS
Mercury	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Molybdenum	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Nickel	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Phosphorus	MET-181-6106, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP/OES
Potassium	MET-181-6106, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP/OES
Selenium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Silver	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Sodium	MET-181-6106, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP/OES
Strontium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP-MS
Thallium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS

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Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N303359

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Tin	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Titanium	MET-181-6106, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP/OES
Uranium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Vanadium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Zinc	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Zirconium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS

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Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N303359

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Naphthalene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
2-Methylnaphthalene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
1-Methylnaphthalene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Acenaphthylene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Acenaphthene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Fluorene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Phenanthrene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Anthracene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Fluoranthene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Pyrene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(a)anthracene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Chrysene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(b)fluoranthene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(j)fluoranthene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(k)fluoranthene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(a)pyrene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Indeno(1,2,3-c,d)pyrene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Dibenzo(a,h)anthracene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(g,h,i)perylene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Quinoline	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
IACR CCME (Soil)	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
B[a]P TPE (Soil)	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
EPH C10-C19	ORG-180-5101	Modified from BCMOE Lab Manual Section D (EPH)	GC/FID
EPH C19-C32	ORG-180-5101	Modified from BCMOE Lab Manual Section D (EPH)	GC/FID
LEPH C10-C19	ORG-180-5101	Modified from BCMOE Lab Manual Section D (EPH)	GC/FID
HEPH C19-C32	ORG-180-5101	Modified from BCMOE Lab Manual Section D (EPH)	GC/FID
Naphthalene - d8	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS

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Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N303359

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
2-Fluorobiphenyl	ORG-180-5102	Modified form BCMOE Lab Manual Section D (PAH)	GC/MS
P-Terphenyl - d14	ORG-180-5102	Modified form BCMOE Lab Manual Section D (PAH)	GC/MS

18N303359

CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

No. 04313 page 1 of 1

Golder Associates
200 – 2920 Virtual Way
Vancouver, British Columbia, Canada V5M 0C4
Telephone (604) 296-4200 Fax (604) 298-5253

Project Number: 1657709 / 6000
Short Title: K19 Investigation
Golder Contact: Erin O'Brien
Golder E-mail Address 1: erin_o'brien@golder.com
Golder E-mail Address 2: agarrido @golder.com

Laboratory Name: AGAT
Address: 120 - Glenlyon Parkway BBY, BC
Telephone/Fax: 778-452-4009
Contact: Yasmine Galindo

Office Name: Vancouver
EQuIS Facility Code: 28433859
EQuIS upload: ☒

JAN 18 AM 8:51

Turnaround Time: ☐ 24 hr ☐ 48 hr (CS 16/01/18) ☐ 72 hr ☒ Regular (5 Days)
Criteria: ☒ CSR ~~☒ CCME~~ ☐ BC Water Quality ☐ Other

Note: Final Reports to be issued by e-mail
Quote No.:

Analyses Required

Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D / M / Y)	Time Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	Arsenic	Metals	LEPH/HEPH/PAHs			AGAT Sample ID			RUSH (Select TAT above)	Remarks (over)
04313 - 01	K19-SP18-01	D1	0.05	SO	15/01/18	13:00	Discrete			2		X	X			9018314				Clay Backfill
- 02	↓	D2	↓	↓	↓	13:05	↓			↓		X	X			319				↓
- 03	↓	D3	↓	↓	↓	13:10	↓			↓		X	X			330				↓
- 04	↓	D4	↓	↓	↓	13:15	↓			↓		X	X			331				↓
- 05	↓	D5	↓	↓	↓	13:20	↓			↓		X	X			332				↓
- 06	K19-SP18-02	D1	↓	↓	↓	15:00	↓			↓	X					333				Sand Backfill
- 07	↓	D2	↓	↓	↓	15:10	↓			↓	X					335				↓
- 08	↓	D3	↓	↓	↓	15:20	↓			↓	X					336				↓
- 09	↓	D4	↓	↓	↓	15:30	↓			↓	X					337				↓
- 10	↓	D5	↓	↓	↓	15:40	↓			↓	X					338				↓
- 11																				
- 12																				

Sampler's Signature: [signature]
Relinquished by: Signature [signature]
Company: Golder
Date: 17/01/18
Time: 0845
Received by: Signature [signature]
Company: AGAT
Time: 845

Comments: Invoice to Dave Oxgnthorpe.
Method of Shipment:
Waybill No.:
Received for Lab by: Ann
Date:
Shipped by:
Shipment Condition:
Seal Intact:
Temp (°C): 0
Cooler opened by:
Date:
Time:

WHITE: Golder Copy YELLOW: Lab Copy

ESED

AGAT Laboratories

SAMPLE INTEGRITY RECEIPT FORM

RECEIVING BASICS - Shipping

Company/Consultant: GOLDER

Courier: _____ Prepaid Collect

Waybill# _____

Branch: EDM GP FN FM RD VAN LYD FSJ EST Other: _____

Custody Seal Intact: Yes No NA

TAT: <24hr 24-48hr 48-72hr Reg Other _____

Cooler Quantity: 1

TIME SENSITIVE ISSUES - Shipping

ALREADY EXCEEDED HOLD TIME? Yes No

Inorganic Tests (Please Circle): Mibi , BOD , Nitrate/Nitrite , Turbidity , Microtox , Ortho PO4 , Tedlar Bag , Residual Chlorine , Chlorophyll* , Chloroamines*

Earliest Expiry: _____

Hydrocarbons: Earliest Expiry _____

SAMPLE INTEGRITY - Shipping

Hazardous Samples: YES NO Precaution Taken: _____

Legal Samples: Yes No

International Samples: Yes No

Tape Sealed: Yes No

Coolant Used: Icepack Bagged Ice Free Ice Free Water None

Temperature (Bottles/Jars only) N/A if only Soil Bags Received

FROZEN (Please Circle if samples received Frozen)

1 (Bottle/Jar) 5 + 4 + 3 = 4 °C 2(Bottle/Jar) ___ + ___ + ___ = ___ °C

3 (Bottle/Jar) ___ + ___ + ___ = ___ °C 4 (Bottle/Jar) ___ + ___ + ___ = ___ °C

5 (Bottle/Jar) ___ + ___ + ___ = ___ °C 6 (Bottle/Jar) ___ + ___ + ___ = ___ °C

7 (Bottle/Jar) ___ + ___ + ___ = ___ °C 8 (Bottle/Jar) ___ + ___ + ___ = ___ °C

9 (Bottle/Jar) ___ + ___ + ___ = ___ °C 10 (Bottle/Jar) ___ + ___ + ___ = ___ °C

(If more than 10 coolers are received use another sheet of paper and attach)

LOGISTICS USE ONLY

Workorder No: _____

Samples Damaged: Yes No If YES why?

No Bubble Wrap Frozen Courier

Other: _____

Account Project Manager: _____ have they been notified of the above issues: Yes No

Whom spoken to: _____ Date/Time: _____

CPM Initial _____

General Comments: _____

* Subcontracted Analysis (See CPM)

Date issued: May 22, 2015

AGAT Laboratories

SAMPLE INTEGRITY RECEIPT FORM - BURNABY

Work Order # 18N303359

RECEIVING BASICS:

Received From: NOV ex Waybill #: _____

SAMPLE QUANTITIES:

Coolers: 1 Containers: 20

TIME SENSITIVE ISSUES:

Earliest Date Sampled: Jan 15, 2018 ALREADY EXCEEDED? Yes (No)

NON-CONFORMANCES:

3 temperatures of samples* and average of each cooler: (record differing temperatures on the CoC next to sample ID's) ***use jars when available**

(1) 0 + 0 + 0 = 0 °C (2) ___ + ___ + ___ = ___ °C (3) ___ + ___ + ___ = ___ °C (4) ___ + ___ + ___ = ___ °C

Was ice or ice pack present: (Yes) No

Integrity Issues:

Account Project Manager: _____ have they been notified of the above issues: Yes No

Whom spoken to: _____ Date and Time: _____

ADDITIONAL NOTES:

AGAT Laboratories

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TEL (778)452-4000
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CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA
219-800 BURRARD ST
VANCOUVER, BC V6Z 0B9
604-671-1831

ATTENTION TO: Erin O'Brien

PROJECT: 1657709-6000

AGAT WORK ORDER: 18N304491

SOIL ANALYSIS REVIEWED BY: Andrew Garrard, B.Sc., General Manager

TRACE ORGANICS REVIEWED BY: Andrew Garrard, B.Sc., General Manager

WATER ANALYSIS REVIEWED BY: Andrew Garrard, B.Sc., General Manager

DATE REPORTED: Jan 29, 2018

PAGES (INCLUDING COVER): 51

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (778) 452-4000

*NOTES

VERSION 1: Sample receipt temperature 5°C.

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works Metals in Soil

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-01-29

		SAMPLE DESCRIPTION:		04304-09
		SAMPLE TYPE:		Soil
		DATE SAMPLED:		2018-01-19
Parameter	Unit	G / S	RDL	9025012
Aluminum	µg/g		10	9800
Antimony	µg/g		0.1	0.6
Arsenic	µg/g		0.1	8.4
Barium	µg/g		0.5	168
Beryllium	µg/g		0.1	0.5
Bismuth	µg/g		0.5	<0.5
Cadmium	µg/g		0.01	0.34
Calcium	µg/g		10	9540
Chromium	µg/g		1	17
Cobalt	µg/g		0.1	6.3
Copper	µg/g		0.2	13.2
Iron	µg/g		10	17300
Lead	µg/g		0.1	25.7
Lithium	µg/g		0.5	8.4
Magnesium	µg/g		10	2840
Manganese	µg/g		1	171
Mercury	µg/g		0.01	0.04
Molybdenum	µg/g		0.2	1.8
Nickel	µg/g		0.5	13.4
Phosphorus	µg/g		5	511
Potassium	µg/g		5	1380
Selenium	µg/g		0.1	0.6
Silver	µg/g		0.5	<0.5
Sodium	µg/g		5	54
Strontium	µg/g		1	30
Thallium	µg/g		0.1	0.2
Tin	µg/g		0.2	0.8
Titanium	µg/g		1	35
Uranium	µg/g		0.2	1.0
Vanadium	µg/g		1	37

Certified By:

AGAT Laboratories

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AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works Metals in Soil

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-01-29

		SAMPLE DESCRIPTION:		04304-09
		SAMPLE TYPE:		Soil
		DATE SAMPLED:		2018-01-19
Parameter	Unit	G / S	RDL	9025012
Zinc	µg/g		1	58
Zirconium	µg/g		0.1	0.4
pH 1:2	pH units		0.05	7.68

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9025012 Results are based on the dry weight of the sample

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Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works LEPH/HEPH in Soil Low Level

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-01-29

		SAMPLE DESCRIPTION:		04306-04		04305-01	04305-07	04304-01
		SAMPLE TYPE:		Soil		Soil	Soil	Soil
		DATE SAMPLED:		2018-01-20		2018-01-19	2018-01-20	2018-01-18
Parameter	Unit	G / S	RDL	9024976	RDL	9024984	9024992	9024998
Naphthalene	µg/g		0.005	0.678	0.005	0.024	0.051	<0.005
2-Methylnaphthalene	µg/g		0.05	1.10	0.005	0.119	0.187	<0.005
1-Methylnaphthalene	µg/g		0.05	1.22	0.005	0.152	0.198	<0.005
Acenaphthylene	µg/g		0.005	<0.005	0.005	<0.005	<0.005	<0.005
Acenaphthene	µg/g		0.005	<0.005	0.005	<0.005	<0.005	<0.005
Fluorene	µg/g		0.02	0.13	0.02	<0.02	<0.02	<0.02
Phenanthrene	µg/g		0.02	0.53	0.02	0.33	0.39	0.02
Anthracene	µg/g		0.004	<0.004	0.004	<0.004	<0.004	<0.004
Fluoranthene	µg/g		0.01	0.03	0.01	0.04	0.03	<0.01
Pyrene	µg/g		0.01	0.03	0.01	0.08	0.06	<0.01
Benzo(a)anthracene	µg/g		0.03	<0.03	0.03	<0.03	<0.03	<0.03
Chrysene	µg/g		0.05	0.13	0.05	0.10	0.11	<0.05
Benzo(b)fluoranthene	µg/g		0.02	0.06	0.02	0.06	0.07	<0.02
Benzo(j)fluoranthene	µg/g		0.02	<0.02	0.02	<0.02	<0.02	<0.02
Benzo(k)fluoranthene	µg/g		0.02	<0.02	0.02	<0.02	<0.02	<0.02
Benzo(a)pyrene	µg/g		0.03	<0.03	0.03	<0.03	<0.03	<0.03
Indeno(1,2,3-c,d)pyrene	µg/g		0.02	<0.02	0.02	<0.02	<0.02	<0.02
Dibenzo(a,h)anthracene	µg/g		0.005	0.005	0.005	<0.005	<0.005	<0.005
Benzo(g,h,i)perylene	µg/g		0.05	0.11	0.05	0.07	0.07	<0.05
Quinoline	µg/g		0.05	<0.05	0.05	<0.05	<0.05	<0.05
IACR CCME (Soil)	µg/g		0.6	0.6	0.6	0.6	0.7	<0.6
B[a]P TPE (Soil)	µg/g		0.05	<0.05	0.05	<0.05	<0.05	<0.05
EPH C10-C19	µg/g		20	299	20	62	56	<20
EPH C19-C32	µg/g		20	84	20	84	78	<20
LEPH C10-C19	µg/g		20	298	20	62	56	<20
HEPH C19-C32	µg/g		20	84	20	83	77	<20
Benzo(b+j)fluoranthene	µg/g		0.05	0.06	0.05	0.06	0.07	<0.05

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Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works LEPH/HEPH in Soil Low Level

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-01-29

		SAMPLE DESCRIPTION:	04306-04	04305-01	04305-07	04304-01
		SAMPLE TYPE:	Soil	Soil	Soil	Soil
		DATE SAMPLED:	2018-01-20	2018-01-19	2018-01-20	2018-01-18
Surrogate	Unit	Acceptable Limits	9024976	9024984	9024992	9024998
Naphthalene - d8	%	50-130	76	67	69	68
2-Fluorobiphenyl	%	50-130	79	68	67	71
P-Terphenyl - d14	%	60-130	83	82	84	83

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9024976 Results are based on dry weight of sample.
LEPH & HEPH results have been corrected for PAH contributions.
Soil sample is visibly heterogeneous.
PAH detection limits increased due to sample matrix interference. Sample extract was diluted.

9024984-9024998 Results are based on dry weight of sample.
LEPH & HEPH results have been corrected for PAH contributions.
Soil sample is visibly heterogeneous.

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AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

BC Routine VOC package in Air (Canister) -ug/m3

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-01-29

		SAMPLE DESCRIPTION:		04316-01	04316-02		04316-06	04316-07	04316-08
		SAMPLE TYPE:		Air	Air		Air	Air	Air
		DATE SAMPLED:		2018-01-19	2018-01-19		2018-01-21	2018-01-21	2018-01-21
Parameter	Unit	G / S	RDL	9025032	9025036	RDL	9025040	9025041	9025042
1,2,4-Trimethylbenzene	ug/m3		6.0	<6.0	<6.0	15.0	<15.0	<15.0	<15.0
1,3,5-Trimethylbenzene	ug/m3		6.0	<6.0	<6.0	15.0	<15.0	<15.0	<15.0
1,3-Butadiene	ug/m3		4.0	<4.0	<4.0	10.0	<10.0	<10.0	<10.0
Isopropylbenzene	ug/m3		3.20	<3.20	<3.20	8.00	<8.00	<8.00	<8.00
Methylcyclohexane	ug/m3		2.80	51	21	7.00	<7.00	57	77
Methyl tert-Butyl ether (MTBE)	ug/m3		3.20	<3.20	<3.20	8.00	<8.00	<8.00	<8.00
Naphthalene	ug/m3		8.0	<8.0	<8.0	20.0	<20.0	<20.0	<20.0
n-Decane	ug/m3		5.2	15	<5.2	13.0	<13.0	210	160
n-Hexane	ug/m3		4.4	4.7	50	11.0	21	310	110
VPHv (C>6-C13)	ug/m3		60	3000	3000	150	25000	27000	25000
Surrogate	Unit	Acceptable Limits							
4-Bromofluorobenzene	%	70-130		110	109		112	112	123

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AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

BC Routine VOC package in Air (Canister) -ug/m3

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-01-29

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9025032-9025036 Air anaylsis was performed from an air canister sample, using a Cold Vapor Trap preconcentrator and GC/MSD.
Note: Methylcyclohexane is a non routine parameter, identification is done using the GC/MS and the appropriate m/z fragments. If the compound is present it will be quantitated using cyclohexane calibration standards and the TIC area.

Due to the presence of high levels of hydrocarbons the nominal volume could not be used, this is considered a dilution.
Dilution factor=4.
The Reporting Detection Limit has been adjusted accordingly.

Analysis done at AGAT 5623 McAdam Road Mississauga location.

9025040 Air anaylsis was performed from an air canister sample, using a Cold Vapor Trap preconcentrator and GC/MSD.
Note: Methylcyclohexane is a non routine parameter, identification is done using the GC/MS and the appropriate m/z fragments. If the compound is present it will be quantitated using cyclohexane calibration standards and the TIC area.

Due to the presence of high levels of hydrocarbons the nominal volume could not be used, this is considered a dilution.
Dilution factor=10.
The Reporting Detection Limit has been adjusted accordingly.

Analysis done at AGAT 5623 McAdam Road Mississauga location.

9025041-9025042 Air anaylsis was performed from an air canister sample, using a Cold Vapor Trap preconcentrator and GC/MSD.
Note: Methylcyclohexane is a non routine parameter, identification is done using the GC/MS and the appropriate m/z fragments. If the compound is present it will be quantitated using cyclohexane calibration standards and the TIC area.

Due to the presence of high levels of hydrocarbons the nominal volume could not be used, this is considered a dilution.
Dilution factor=10.
The Reporting Detection Limit has been adjusted accordingly.
Analysis done at AGAT 5623 McAdam Road Mississauga location.

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AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

BTEX / VPH (C6-C10) Soil

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-01-29

		SAMPLE DESCRIPTION:		04305-01	04305-07	04304-01
		SAMPLE TYPE:		Soil	Soil	Soil
		DATE SAMPLED:		2018-01-19	2018-01-20	2018-01-18
Parameter	Unit	G / S	RDL	9024984	9024992	9024998
Methyl tert-butyl ether (MTBE)	µg/g		0.1	<0.1	<0.1	<0.1
Benzene	µg/g		0.02	<0.02	<0.02	<0.02
Toluene	µg/g		0.05	<0.05	<0.05	<0.05
Ethylbenzene	µg/g		0.05	<0.05	<0.05	<0.05
m&p-Xylene	µg/g		0.05	<0.05	<0.05	<0.05
o-Xylene	µg/g		0.05	<0.05	<0.05	<0.05
Styrene	µg/g		0.05	<0.05	<0.05	<0.05
VPH	µg/g		10	<10	<10	<10
VH	µg/g		10	<10	<10	<10
Total Xylenes	ug/g		0.1	<0.1	<0.1	<0.1
Surrogate	Unit	Acceptable Limits				
Bromofluorobenzene	%	60-140		93	97	101
Dibromofluoromethane	%	60-140		113	118	121
Toluene - d8	%	60-140		105	108	113

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9024984-9024998 Results are based on dry weight of sample.
VPH results have been corrected for BTEX contributions.

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AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

CCME BTEX/F1-F4 (Water)

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-01-29

		SAMPLE DESCRIPTION:		04319-01	04319-02	04319-03	04319-04
		SAMPLE TYPE:		Water	Water	Water	Water
		DATE SAMPLED:		2018-01-21	2018-01-21	2018-01-21	2018-01-21
Parameter	Unit	G / S	RDL	9025059	9025067	9025068	9025069
Benzene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
Toluene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
m&p-Xylene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
o-Xylene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
F1 (C6-C10)	µg/L		100	<100	<100	<100	250
F1 minus BTEX (C6-C10)	µg/L		100	<100	<100	<100	250
F2 (C10-C16)	µg/L		100	<100	<100	<100	<100
F3 (C16-C34)	µg/L		100	<100	<100	<100	<100
F4 (C34-C50)	µg/L		100	<100	<100	<100	<100
Total Xylenes	ug/L		1	<1	<1	<1	<1
Surrogate	Unit	Acceptable Limits					
Bromofluorobenzene	%	70-130		97	94	92	96
Dibromofluoromethane	%	70-130		107	106	104	103
Toluene - d8	%	70-130		101	99	95	102

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9025059-9025069 The F1 (C6 - C10) fraction is determined by integrating the FID chromatogram from the beginning of the n-C6 peak to the apex of the last n-C10 peak.
The C6 - C10 fraction is calculated from the FID toluene response factor.
Quality control for the calibration follows the guidelines set out in the CCME Contaminated Sites Method for Soils.
The (F1 minus BTEX) has been calculated by subtracting the BTEX concentration from Fraction 1.
The C10 - C16 (F2), C16 - C34 (F3), and C34 - C50 (F4) fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Quality control data is available upon request.
Assistance in the interpretation of data is available upon request.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
The chromatogram has returned to baseline by the retention time of nC50.
Extraction and holding times were met for this sample.

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AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works : BC VOCs in Air (Canister) - ug/m3

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-01-29

SAMPLE DESCRIPTION:				04316-01	04316-02		04316-06	04316-07	04316-08
SAMPLE TYPE:				Air	Air		Air	Air	Air
DATE SAMPLED:				2018-01-19	2018-01-19		2018-01-21	2018-01-21	2018-01-21
Parameter	Unit	G / S	RDL	9025032	9025036	RDL	9025040	9025041	9025042
Dichlorodifluoromethane	ug/m3		4.0	<4.0	<4.0	10.0	<10.0	<10.0	<10.0
1,2-Dichlorotetrafluoroethane	ug/m3		5.6	<5.6	<5.6	14.0	<14.0	<14.0	<14.0
1,1,2-Trichloro-1,2,2-trifluoroethane	ug/m3		6.0	<6.0	<6.0	15.0	<15.0	<15.0	<15.0
Chloromethane	ug/m3		2.40	<2.40	<2.40	6.00	<6.00	<6.00	<6.00
Vinyl Chloride	ug/m3		1.60	<1.60	<1.60	4.00	<4.00	<4.00	<4.00
Bromomethane	ug/m3		7.6	<7.6	<7.6	19.0	<19.0	<19.0	<19.0
Chloroethane	ug/m3		4.0	<4.0	<4.0	10.0	<10.0	<10.0	<10.0
Vinyl Bromide	ug/m3		3.20	<3.20	<3.20	8.00	<8.00	<8.00	<8.00
Trichlorofluoromethane	ug/m3		9.2	<9.2	<9.2	23.0	<23.0	<23.0	<23.0
1,1-Dichloroethene	ug/m3		4.0	<4.0	<4.0	10.0	<10.0	<10.0	<10.0
Methylene Chloride	ug/m3		4.0	<4.0	<4.0	10.0	<10.0	<10.0	<10.0
trans-1,2-Dichloroethene	ug/m3		3.20	<3.20	<3.20	8.00	<8.00	<8.00	<8.00
1,1-Dichloroethane	ug/m3		4.8	<4.8	<4.8	12.0	<12.0	<12.0	<12.0
cis-1,2-Dichloroethene	ug/m3		3.20	<3.20	<3.20	8.00	<8.00	<8.00	<8.00
Chloroform	ug/m3		4.0	<4.0	7.5	10.0	<10.0	<10.0	<10.0
1,2-Dichloroethane	ug/m3		1.20	<1.20	<1.20	3.00	<3.00	<3.00	<3.00
1,1,1-Trichloroethane	ug/m3		6.4	<6.4	<6.4	16.0	<16.0	<16.0	<16.0
Carbon Tetrachloride	ug/m3		8.0	<8.0	<8.0	20.0	<20.0	<20.0	<20.0
Benzene	ug/m3		2.00	2.7	3.2	5.00	<5.00	44	71
1,2-Dichloropropane	ug/m3		8.0	<8.0	<8.0	20.0	<20.0	<20.0	<20.0
2,2-Dichloropropane	ug/m3		8.0	<8.0	<8.0	20.0	<20.0	<20.0	<20.0
Trichloroethene	ug/m3		4.0	<4.0	<4.0	10.0	<10.0	<10.0	<10.0
Bromodichloromethane	ug/m3		5.2	<5.2	<5.2	13.0	<13.0	<13.0	<13.0
cis-1,3-Dichloropropene	ug/m3		4.0	<4.0	<4.0	10.0	<10.0	<10.0	<10.0
trans-1,3-Dichloropropene	ug/m3		4.0	<4.0	<4.0	10.0	<10.0	<10.0	<10.0
Methyl Isobutyl Ketone (MIBK)	ug/m3		8.0	<8.0	<8.0	20.0	<20.0	<20.0	<20.0
1,1,2-Trichloroethane	ug/m3		6.4	<6.4	<6.4	16.0	<16.0	<16.0	<16.0
Toluene	ug/m3		3.20	8.4	6.0	8.00	<8.00	9.2	<8.00
2-Hexanone	ug/m3		8.0	<8.0	<8.0	20.0	<20.0	<20.0	<20.0
Dibromochloromethane	ug/m3		8.0	<8.0	<8.0	20.0	<20.0	<20.0	<20.0

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AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works : BC VOCs in Air (Canister) - ug/m3

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-01-29

		SAMPLE DESCRIPTION:		04316-01	04316-02		04316-06	04316-07	04316-08
		SAMPLE TYPE:		Air	Air		Air	Air	Air
		DATE SAMPLED:		2018-01-19	2018-01-19		2018-01-21	2018-01-21	2018-01-21
Parameter	Unit	G / S	RDL	9025032	9025036	RDL	9025040	9025041	9025042
1,2-Dibromoethane	ug/m3		6.0	<6.0	<6.0	15.0	<15.0	<15.0	<15.0
Tetrachloroethene	ug/m3		4.0	17	20	10.0	<10.0	<10.0	<10.0
Chlorobenzene	ug/m3		4.0	<4.0	<4.0	10.0	<10.0	<10.0	<10.0
Ethylbenzene	ug/m3		3.6	<3.6	<3.6	9.0	<9.0	<9.0	<9.0
m&p-Xylene	ug/m3		6.0	8.1	6.6	15.0	35	<15.0	<15.0
Bromoform	ug/m3		8.0	<8.0	<8.0	20.0	<20.0	<20.0	<20.0
Styrene	ug/m3		4.0	<4.0	<4.0	10.0	<10.0	<10.0	<10.0
1,1,2,2-Tetrachloroethane	ug/m3		6.0	<6.0	<6.0	15.0	<15.0	<15.0	<15.0
o-Xylene	ug/m3		3.6	<3.6	<3.6	9.0	16	<9.0	<9.0
1,3-Dichlorobenzene	ug/m3		10.0	<10.0	<10.0	25.0	<25.0	<25.0	<25.0
1,4-Dichlorobenzene	ug/m3		10.0	<10.0	<10.0	25.0	<25.0	<25.0	<25.0
1,2-Dichlorobenzene	ug/m3		10.0	<10.0	<10.0	25.0	<25.0	<25.0	<25.0
Total Xylenes	ug/m3		8.0	8.1	<8.0	20.0	41	<20.0	<20.0
Surrogate	Unit	Acceptable Limits							
4-Bromofluorobenzene	%	70-130		110	114		113	112	123

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works : BC VOCs in Air (Canister) - ug/m3

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-01-29

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9025032 VOC anaylsis was performed from an air canister sample, using a Cold Vapor Trap preconcentrator and GC/MSD.
Pressure upon arrival to the lab = 11.35 psia.

Due to the presence of high levels of hydrocarbons the nominal volume could not be used, this is considered a dilution.
Dilution factor=4.
The Reporting Detection Limit has been adjusted accordingly.

Analysis done at AGAT 5623 McAdam Road Mississauga location.

2,2-Dichloropropane was analyzed using GC/MS full scan and the specific m/z fragments for this compound, if it is present in the sample quantitation was done using the TIC area and the TIC area of 1, 2-Dichloropropane in the calibration standards.

9025036 VOC anaylsis was performed from an air canister sample, using a Cold Vapor Trap preconcentrator and GC/MSD.
Pressure upon arrival to the lab = 12.80 psia.

Due to the presence of high levels of hydrocarbons the nominal volume could not be used, this is considered a dilution.
Dilution factor=4.
The Reporting Detection Limit has been adjusted accordingly.

Analysis done at AGAT 5623 McAdam Road Mississauga location.

2,2-Dichloropropane was analyzed using GC/MS full scan and the specific m/z fragments for this compound, if it is present in the sample quantitation was done using the TIC area and the TIC area of 1, 2-Dichloropropane in the calibration standards.

9025040 VOC anaylsis was performed from an air canister sample, using a Cold Vapor Trap preconcentrator and GC/MSD.
Pressure upon arrival to the lab = 12.66 psia.

Due to the presence of high levels of hydrocarbons the nominal volume could not be used, this is considered a dilution.
Dilution factor=10.
The Reporting Detection Limit has been adjusted accordingly.
Analysis done at AGAT 5623 McAdam Road Mississauga location.

2,2-Dichloropropane was analyzed using GC/MS full scan and the specific m/z fragments for this compound, if it is present in the sample quantitation was done using the TIC area and the TIC area of 1, 2-Dichloropropane in the calibration standards.

9025041 VOC anaylsis was performed from an air canister sample, using a Cold Vapor Trap preconcentrator and GC/MSD.
Pressure upon arrival to the lab = 13.69 psia.

Due to the presence of high levels of hydrocarbons the nominal volume could not be used, this is considered a dilution.
Dilution factor=10.
The Reporting Detection Limit has been adjusted accordingly.
Analysis done at AGAT 5623 McAdam Road Mississauga location.

2,2-Dichloropropane was analyzed using GC/MS full scan and the specific m/z fragments for this compound, if it is present in the sample quantitation was done using the TIC area and the TIC area of 1, 2-Dichloropropane in the calibration standards.

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works : BC VOCs in Air (Canister) - ug/m3

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-01-29

9025042

VOC anaylsis was performed from an air canister sample, using a Cold Vapor Trap preconcentrator and GC/MSD.
Pressure upon arrival to the lab = 12.32 psia.

Due to the presence of high levels of hydrocarbons the nominal volume could not be used, this is considered a dilution.
Dilution factor=10.
The Reporting Detection Limit has been adjusted accordingly.
Analysis done at AGAT 5623 McAdam Road Mississauga location.

2,2-Dichloropropane was analyzed using GC/MS full scan and the specific m/z fragments for this compound, if it is present in the sample quantitation was done using the TIC area and the TIC area of 1, 2-Dichloropropane in the calibration standards.

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Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works LEPH/HEPH in Water Low Level

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-01-29

		SAMPLE DESCRIPTION:		04319-01	04319-02	04319-03	04319-04
		SAMPLE TYPE:		Water	Water	Water	Water
		DATE SAMPLED:		2018-01-21	2018-01-21	2018-01-21	2018-01-21
Parameter	Unit	G / S	RDL	9025059	9025067	9025068	9025069
Naphthalene	µg/L		0.05	<0.05	<0.05	<0.05	0.14
Quinoline	µg/L		0.05	<0.05	<0.05	<0.05	<0.05
Acenaphthylene	µg/L		0.02	<0.02	<0.02	<0.02	<0.02
Acenaphthene	µg/L		0.02	<0.02	<0.02	<0.02	<0.02
Fluorene	µg/L		0.02	<0.02	<0.02	<0.02	0.04
Phenanthrene	µg/L		0.04	<0.04	<0.04	<0.04	0.11
Anthracene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01
Acridine	µg/L		0.05	<0.05	<0.05	<0.05	<0.05
Fluoranthene	µg/L		0.02	<0.02	<0.02	<0.02	<0.02
Pyrene	µg/L		0.02	<0.02	<0.02	<0.02	<0.02
Benzo(a)anthracene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01
Chrysene	µg/L		0.01	<0.01	<0.01	<0.01	0.03
Benzo(b)fluoranthene	µg/L		0.01	<0.01	<0.01	<0.01	0.01
Benzo(j)fluoranthene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01
Benzo(k)fluoranthene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)pyrene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01
Indeno(1,2,3-c,d)pyrene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01
Dibenzo(a,h)anthracene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01
Benzo(g,h,i)perylene	µg/L		0.01	<0.01	<0.01	<0.01	0.01
1-Methylnaphthalene	µg/L		0.05	<0.05	<0.05	<0.05	0.22
2-Methylnaphthalene	µg/L		0.05	<0.05	<0.05	<0.05	0.29
EPH C10-C19	µg/L		100	<100	<100	<100	<100
EPH C19-C32	µg/L		100	<100	<100	<100	<100
LEPH C10-C19	µg/L		100	<100	<100	<100	<100
HEPH C19-C32	µg/L		100	<100	<100	<100	<100
Benzo(b+j)fluoranthene	µg/L		0.01	<0.01	<0.01	<0.01	0.01
Surrogate	Unit	Acceptable Limits					
Naphthalene - d8	%	50-130		83	83	82	82
2-Fluorobiphenyl	%	50-130		84	83	83	74
P-Terphenyl - d14	%	60-130		81	81	79	77

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Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works LEPH/HEPH in Water Low Level

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-01-29

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9025059-9025069 LEPH & HEPH results have been corrected for PAH contributions.

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AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Volatile Organic Compounds in Soil

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-01-29

		SAMPLE DESCRIPTION:		04306-04
		SAMPLE TYPE:		Soil
		DATE SAMPLED:		2018-01-20
Parameter	Unit	G / S	RDL	9024976
Chloromethane	µg/g		0.05	<0.05
Vinyl Chloride	µg/g		0.05	<0.05
Bromomethane	µg/g		0.05	<0.05
Chloroethane	µg/g		0.05	<0.05
Trichlorofluoromethane	µg/g		0.05	<0.05
Acetone	µg/g		0.5	<0.5
1,1-Dichloroethylene	µg/g		0.05	<0.05
Dichloromethane	µg/g		0.05	<0.05
Methyl tert-butyl ether (MTBE)	µg/g		0.1	<0.1
2-Butanone (MEK)	µg/g		0.5	<0.5
trans-1,2-Dichloroethene	µg/g		0.05	<0.05
1,1-Dichloroethane	µg/g		0.05	<0.05
cis-1,2-Dichloroethene	µg/g		0.05	<0.05
Chloroform	µg/g		0.05	<0.05
1,2-Dichloroethane	µg/g		0.05	<0.05
1,1,1-Trichloroethane	µg/g		0.05	<0.05
Carbon Tetrachloride	µg/g		0.02	<0.02
Benzene	µg/g		0.02	0.17
1,2-Dichloropropane	µg/g		0.05	<0.05
Trichloroethene	µg/g		0.01	<0.01
Bromodichloromethane	µg/g		0.05	<0.05
trans-1,3-Dichloropropene	µg/g		0.05	<0.05
4-Methyl-2-pentanone (MIBK)	µg/g		0.5	<0.5
cis-1,3-Dichloropropene	µg/g		0.05	<0.05
1,1,2-Trichloroethane	µg/g		0.05	<0.05
Toluene	µg/g		0.05	0.12
Dibromochloromethane	µg/g		0.05	<0.05
1,2-Dibromoethane	µg/g		0.05	<0.05
Tetrachloroethylene	µg/g		0.05	<0.05
1,1,1,2-Tetrachloroethane	µg/g		0.05	<0.05

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Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Volatile Organic Compounds in Soil

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-01-29

		SAMPLE DESCRIPTION:		04306-04
		SAMPLE TYPE:		Soil
		DATE SAMPLED:		2018-01-20
Parameter	Unit	G / S	RDL	9024976
Chlorobenzene	µg/g		0.05	<0.05
Ethylbenzene	µg/g		0.05	0.09
m&p-Xylene	µg/g		0.05	0.39
Bromoform	µg/g		0.05	<0.05
Styrene	µg/g		0.05	<0.05
1,1,2,2-Tetrachloroethane	µg/g		0.05	<0.05
o-Xylene	µg/g		0.05	0.10
1,3-Dichlorobenzene	µg/g		0.05	<0.05
1,4-Dichlorobenzene	µg/g		0.05	<0.05
1,2-Dichlorobenzene	µg/g		0.05	<0.05
1,2,4-Trichlorobenzene	µg/g		0.05	<0.05
VH	µg/g		10	19
VPH	µg/g		10	18
1,3-Dichloropropene (cis + trans)	µg/g		0.05	<0.05
Total Xylenes	µg/g		0.2	0.5
Surrogate	Unit	Acceptable Limits		
Bromofluorobenzene	%	60-140		109
Dibromofluoromethane	%	60-140		109
Toluene - d8	%	60-140		118

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9024976 Results are based on dry weight of sample.

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AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Volatile Organic Compounds in Water

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-01-29

		SAMPLE DESCRIPTION:		04319-01	04319-02	04319-03	04319-04
		SAMPLE TYPE:		Water	Water	Water	Water
		DATE SAMPLED:		2018-01-21	2018-01-21	2018-01-21	2018-01-21
Parameter	Unit	G / S	RDL	9025059	9025067	9025068	9025069
Chloromethane	µg/L		1	<1	<1	<1	<1
Vinyl Chloride	µg/L		1	<1	<1	<1	<1
Bromomethane	µg/L		1	<1	<1	<1	<1
Chloroethane	µg/L		1	<1	<1	<1	<1
Trichlorofluoromethane	µg/L		1	<1	<1	<1	<1
Acetone	µg/L		10	<10	<10	<10	<10
1,1-Dichloroethylene	µg/L		1	<1	<1	<1	<1
Dichloromethane	µg/L		1	<1	<1	<1	<1
Methyl tert-butyl ether (MTBE)	µg/L		1	<1	<1	<1	<1
2-Butanone (MEK)	µg/L		10	<10	<10	<10	<10
trans-1,2-Dichloroethylene	µg/L		1	<1	<1	<1	<1
1,1-Dichloroethane	µg/L		1	<1	<1	<1	<1
cis-1,2-Dichloroethylene	µg/L		1	<1	<1	<1	<1
Chloroform	µg/L		1	<1	<1	<1	<1
1,2-Dichloroethane	µg/L		1	<1	<1	<1	<1
1,1,1-Trichloroethane	µg/L		1	<1	<1	<1	<1
Carbon Tetrachloride	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
Benzene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	µg/L		1	<1	<1	<1	<1
Trichloroethene	µg/L		1	<1	<1	<1	<1
Bromodichloromethane	µg/L		1	<1	<1	<1	<1
trans-1,3-Dichloropropene	µg/L		1	<1	<1	<1	<1
4-Methyl-2-pentanone (MIBK)	µg/L		10	<10	<10	<10	<10
cis-1,3-Dichloropropene	µg/L		1	<1	<1	<1	<1
1,1,2-Trichloroethane	µg/L		1	<1	<1	<1	<1
Toluene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	µg/L		1	<1	<1	<1	<1
1,2-Dibromoethane	µg/L		0.3	<0.3	<0.3	<0.3	<0.3
Tetrachloroethylene	µg/L		1	<1	<1	<1	<1
1,1,1,2-Tetrachloroethane	µg/L		1	<1	<1	<1	<1

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Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Volatile Organic Compounds in Water

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-01-29

		SAMPLE DESCRIPTION:		04319-01	04319-02	04319-03	04319-04
		SAMPLE TYPE:		Water	Water	Water	Water
		DATE SAMPLED:		2018-01-21	2018-01-21	2018-01-21	2018-01-21
Parameter	Unit	G / S	RDL	9025059	9025067	9025068	9025069
Chlorobenzene	µg/L		1	<1	<1	<1	<1
Ethylbenzene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
m&p-Xylene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
Bromoform	µg/L		1	<1	<1	<1	<1
Styrene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
1,1,2,2-Tetrachloroethane	µg/L		0.8	<0.8	<0.8	<0.8	<0.8
o-Xylene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichlorobenzene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
1,2,4-Trichlorobenzene	µg/L		1	<1	<1	<1	<1
VH	µg/L		100	<100	<100	<100	<100
VPH	µg/L		100	<100	<100	<100	<100
1,3-Dichloropropene (cis + trans)	µg/L		1	<1	<1	<1	<1
Total Trihalomethanes	µg/L		2	<2	<2	<2	<2
Total Xylenes	µg/L		1	<1	<1	<1	<1
Surrogate	Unit	Acceptable Limits					
Bromofluorobenzene	%	70-130		99	86	90	100
Dibromofluoromethane	%	70-130		97	85	91	100
Toluene - d8	%	70-130		109	94	99	113

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Chloride in Water

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-01-29

			SAMPLE DESCRIPTION:	04319-03
			SAMPLE TYPE:	Water
			DATE SAMPLED:	2018-01-21
Parameter	Unit	G / S	RDL	9025068
Chloride	mg/L		0.5	81.3

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Certified By:

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AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works Dissolved Metals

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-01-29

		SAMPLE DESCRIPTION:		04319-01	04319-02	04319-03	04319-04
		SAMPLE TYPE:		Water	Water	Water	Water
		DATE SAMPLED:		2018-01-21	2018-01-21	2018-01-21	2018-01-21
Parameter	Unit	G / S	RDL	9025059	9025067	9025068	9025069
Aluminum Dissolved	µg/L		2	4	5	2	3
Antimony Dissolved	µg/L		0.2	<0.2	<0.2	<0.2	0.7
Arsenic Dissolved	µg/L		0.1	0.2	0.3	9.5	0.4
Barium Dissolved	µg/L		2	10100	1280	579	4720
Beryllium Dissolved	µg/L		0.01	0.02	0.02	<0.01	<0.01
Bismuth Dissolved	µg/L		0.05	<0.05	<0.05	<0.05	<0.05
Boron Dissolved	µg/L		2	138	138	110	92
Cadmium Dissolved	µg/L		0.01	<0.01	<0.01	0.03	<0.01
Calcium Dissolved	µg/L		50	100000	75400	84900	106000
Chromium Dissolved	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
Cobalt Dissolved	µg/L		0.05	0.09	1.28	0.84	2.16
Copper Dissolved	µg/L		0.2	0.2	0.3	0.4	0.2
Iron Dissolved	µg/L		10	2580	3920	5060	6640
Lead Dissolved	µg/L		0.05	<0.05	<0.05	<0.05	<0.05
Lithium Dissolved	µg/L		0.5	79.8	81.9	80.0	69.3
Magnesium Dissolved	µg/L		50	33700	29400	28800	32200
Manganese Dissolved	µg/L		1	959	651	742	575
Mercury Dissolved	µg/L		0.01	<0.01	<0.01	<0.01	<0.01
Molybdenum Dissolved	µg/L		0.05	0.79	0.49	0.61	0.80
Nickel Dissolved	µg/L		0.2	0.2	1.7	1.6	4.6
Potassium Dissolved	µg/L		50	1920	2840	2610	5270
Selenium Dissolved	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
Silicon Dissolved	µg/L		50	6180	5610	5900	6440
Silver Dissolved	µg/L		0.02	<0.02	<0.02	<0.02	<0.02
Sodium Dissolved	µg/L		50	12500	11200	11500	10100
Strontium Dissolved	µg/L		0.1	683	605	610	397
Sulphur Dissolved	µg/L		500	1400	1210	1840	2690
Thallium Dissolved	µg/L		0.01	<0.01	<0.01	0.01	<0.01
Tin Dissolved	µg/L		0.05	0.06	0.19	0.27	0.44
Titanium Dissolved	µg/L		0.5	2.1	1.7	1.8	2.1

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works Dissolved Metals

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-01-29

		SAMPLE DESCRIPTION:		04319-01	04319-02	04319-03	04319-04
		SAMPLE TYPE:		Water	Water	Water	Water
		DATE SAMPLED:		2018-01-21	2018-01-21	2018-01-21	2018-01-21
Parameter	Unit	G / S	RDL	9025059	9025067	9025068	9025069
Uranium Dissolved	µg/L		0.01	0.11	0.26	0.86	0.77
Vanadium Dissolved	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
Zinc Dissolved	µg/L		2	4	2	3	4
Zirconium Dissolved	µg/L		0.1	<0.1	<0.1	<0.1	0.3
Hardness (calc)	ug CaCO3/L		100	388000	309000	331000	397000

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

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Quality Assurance

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Soil Analysis

RPT Date: Jan 29, 2018			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Public Works Metals in Soil															
Aluminum	9025012		9800	9260	5.7%	< 10	105%	70%	130%	96%	90%	110%			
Antimony	9025012		0.6	0.5	5.9%	< 0.1	111%	70%	130%	107%	90%	110%			
Arsenic	9025012		8.4	7.6	10.3%	< 0.1	125%	70%	130%	106%	90%	110%			
Barium	9025012		168	161	4.2%	< 0.5	109%	70%	130%	103%	90%	110%			
Beryllium	9025012		0.5	0.5	NA	< 0.1	105%	70%	130%	102%	90%	110%			
Bismuth	9025012		<0.5	<0.5	NA	< 0.5				98%	85%	115%			
Cadmium	9025012		0.34	0.30	12.8%	< 0.01	106%	70%	130%	104%	90%	110%			
Calcium	9025012		9540	8700	9.2%	< 10	113%	70%	130%	94%	90%	110%			
Chromium	9025012		17	17	1.4%	< 1	108%	70%	130%	102%	90%	110%			
Cobalt	9025012		6.3	5.9	6.4%	< 0.1	107%	70%	130%	102%	90%	110%			
Copper	9025012		13.2	12.9	2.1%	< 0.2	101%	70%	130%	103%	90%	110%			
Iron	9025012		17300	16100	7.4%	< 10	101%	70%	130%	110%	90%	110%			
Lead	9025012		25.7	24.0	6.7%	< 0.1	106%	70%	130%	108%	90%	110%			
Lithium	9025012		8.4	8.3	1.1%	< 0.5				97%	85%	115%			
Magnesium	9025012		2840	2700	4.8%	< 10	110%	70%	130%	108%	90%	110%			
Manganese	9025012		171	158	8.1%	< 1	79%	70%	130%	105%	90%	110%			
Mercury	9025012		0.04	0.04	NA	< 0.01	98%	70%	130%	102%	90%	110%			
Molybdenum	9025012		1.8	1.6	9.6%	< 0.2	114%	70%	130%	99%	90%	110%			
Nickel	9025012		13.4	12.6	5.8%	< 0.5	106%	70%	130%	104%	90%	110%			
Phosphorus	9025012		511	500	2.4%	< 5	92%	70%	130%	95%	90%	110%			
Potassium	9025012		1380	1320	4.5%	< 5	108%	70%	130%	94%	90%	110%			
Selenium	9025012		0.6	0.5	14.4%	< 0.1				107%	90%	110%			
Silver	9025012		<0.5	<0.5	NA	< 0.5	128%	70%	130%	106%	90%	110%			
Sodium	9025012		54	49	9.1%	< 5	116%	70%	130%	100%	90%	110%			
Strontium	9025012		30	26	14.6%	< 1	124%	70%	130%	110%	90%	110%			
Thallium	9025012		0.2	0.2	NA	< 0.1	107%	70%	130%	104%	90%	110%			
Tin	9025012		0.8	0.7	NA	< 0.2	103%	70%	130%	99%	90%	110%			
Titanium	9025012		35	34	0.4%	< 1				92%	90%	110%			
Uranium	9025012		1.0	0.9	NA	< 0.2	129%	70%	130%	90%	90%	110%			
Vanadium	9025012		37	36	0.5%	< 1	110%	70%	130%	102%	90%	110%			
Zinc	9025012		58	59	0.4%	< 1	108%	70%	130%	102%	90%	110%			
Zirconium	9025012		0.4	0.3	NA	< 0.1				110%	90%	110%			
pH 1:2	9025012		7.68	7.69	0.1%		100%	90%	110%	100%	95%	105%			

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

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Quality Assurance

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA
AGAT WORK ORDER: 18N304491
PROJECT: 1657709-6000
ATTENTION TO: Erin O'Brien
SAMPLING SITE:
SAMPLED BY:

Trace Organics Analysis

RPT Date: Jan 29, 2018

PARAMETER	Batch	Sample Id	DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
			Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Public Works LEPH/HEPH in Soil Low Level															
Naphthalene	68653	9024976	0.678	0.571	17.1%	< 0.005	102%	80%	120%				104%	50%	130%
2-Methylnaphthalene	68653	9024976	1.10	1.17	6.2%	< 0.005	99%	80%	120%				96%	50%	130%
1-Methylnaphthalene	68653	9024976	1.22	1.24	1.6%	< 0.005	100%	80%	120%				102%	50%	130%
Acenaphthylene	68653	9024976	<0.005	<0.005	NA	< 0.005	100%	80%	120%				98%	50%	130%
Acenaphthene	68653	9024976	<0.005	<0.005	NA	< 0.005	100%	80%	120%				99%	50%	130%
Fluorene	68653	9024976	0.13	0.12	8.0%	< 0.02	100%	80%	120%				100%	50%	130%
Phenanthrene	68653	9024976	0.53	0.49	7.8%	< 0.02	99%	80%	120%				95%	60%	130%
Anthracene	68653	9024976	<0.004	<0.004	NA	< 0.004	100%	80%	120%				99%	60%	130%
Fluoranthene	68653	9024976	0.03	0.03	NA	< 0.01	98%	80%	120%				98%	60%	130%
Pyrene	68653	9024976	0.03	0.03	NA	< 0.01	99%	80%	120%				101%	60%	130%
Benzo(a)anthracene	68653	9024976	<0.03	<0.03	NA	< 0.03	101%	80%	120%				99%	60%	130%
Chrysene	68653	9024976	0.13	0.13	NA	< 0.05	99%	80%	120%				106%	60%	130%
Benzo(b)fluoranthene	68653	9024976	0.06	0.06	NA	< 0.02	97%	80%	120%				92%	60%	130%
Benzo(j)fluoranthene	68653	9024976	<0.02	<0.02	NA	< 0.02	98%	80%	120%				105%	60%	130%
Benzo(k)fluoranthene	68653	9024976	<0.02	<0.02	NA	< 0.02	103%	80%	120%				95%	60%	130%
Benzo(a)pyrene	68653	9024976	<0.03	<0.03	NA	< 0.03	100%	80%	120%				97%	60%	130%
Indeno(1,2,3-c,d)pyrene	68653	9024976	<0.02	<0.02	NA	< 0.02	100%	80%	120%				95%	60%	130%
Dibenzo(a,h)anthracene	68653	9024976	0.005	0.005	NA	< 0.005	101%	80%	120%				92%	60%	130%
Benzo(g,h,i)perylene	68653	9024976	0.11	0.11	NA	< 0.05	101%	80%	120%				98%	60%	130%
Quinoline	68653	9024976	<0.05	<0.05	NA	< 0.05	101%	80%	120%				105%	50%	130%
EPH C10-C19	68653	9024976	299	299	0.0%	< 20	111%	70%	130%				95%	65%	120%
EPH C19-C32	68653	9024976	84	82	NA	< 20	103%	70%	130%				101%	80%	120%
Naphthalene - d8	68653	9024976	76	67	12.6%		100%	80%	120%				100%	50%	130%
2-Fluorobiphenyl	68653	9024976	79	73	7.9%		101%	80%	120%				100%	50%	130%
P-Terphenyl - d14	68653	9024976	83	80	3.7%		99%	80%	120%				101%	60%	130%

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

Volatile Organic Compounds in Soil															
Chloromethane	68643	9024976	<0.05	<0.05	NA	< 0.05	98%	80%	120%				116%	60%	140%
Vinyl Chloride	68643	9024976	<0.05	<0.05	NA	< 0.05	98%	80%	120%				105%	60%	140%
Bromomethane	68643	9024976	<0.05	<0.05	NA	< 0.05	97%	80%	120%				118%	60%	140%
Chloroethane	68643	9024976	<0.05	<0.05	NA	< 0.05	100%	80%	120%				96%	60%	140%
Trichlorofluoromethane	68643	9024976	<0.05	<0.05	NA	< 0.05	99%	80%	120%				91%	70%	130%
Acetone	68643	9024976	<0.5	<0.5	NA	< 0.5	100%	80%	120%				90%	70%	130%
1,1-Dichloroethylene	68643	9024976	<0.05	<0.05	NA	< 0.05	100%	80%	120%				93%	70%	130%
Dichloromethane	68643	9024976	<0.05	<0.05	NA	< 0.05	100%	80%	120%				93%	70%	130%
Methyl tert-butyl ether (MTBE)	68643	9024976	<0.1	<0.1	NA	< 0.1	101%	80%	120%				89%	70%	130%
2-Butanone (MEK)	68643	9024976	<0.5	<0.5	NA	< 0.5	100%	80%	120%				88%	70%	130%
trans-1,2-Dichloroethene	68643	9024976	<0.05	<0.05	NA	< 0.05	100%	80%	120%				91%	70%	130%

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Quality Assurance

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AGAT WORK ORDER: 18N304491
PROJECT: 1657709-6000
ATTENTION TO: Erin O'Brien
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SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date: Jan 29, 2018

PARAMETER	Batch	Sample Id	DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
			Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
1,1-Dichloroethane	68643	9024976	<0.05	<0.05	NA	< 0.05	100%	80%	120%				91%	70%	130%
cis-1,2-Dichloroethene	68643	9024976	<0.05	<0.05	NA	< 0.05	101%	80%	120%				90%	70%	130%
Chloroform	68643	9024976	<0.05	<0.05	NA	< 0.05	100%	80%	120%				89%	70%	130%
1,2-Dichloroethane	68643	9024976	<0.05	<0.05	NA	< 0.05	100%	80%	120%				89%	70%	130%
1,1,1-Trichloroethane	68643	9024976	<0.05	<0.05	NA	< 0.05	100%	80%	120%				86%	70%	130%
Carbon Tetrachloride	68643	9024976	<0.02	<0.02	NA	< 0.02	101%	80%	120%				83%	70%	130%
Benzene	68643	9024976	0.17	0.17	0.0%	< 0.02	101%	80%	120%				90%	70%	130%
1,2-Dichloropropane	68643	9024976	<0.05	<0.05	NA	< 0.05	101%	80%	120%				89%	70%	130%
Trichloroethene	68643	9024976	<0.01	<0.01	NA	< 0.01	101%	80%	120%				87%	70%	130%
Bromodichloromethane	68643	9024976	<0.05	<0.05	NA	< 0.05	101%	80%	120%				87%	70%	130%
trans-1,3-Dichloropropene	68643	9024976	<0.05	<0.05	NA	< 0.05	102%	80%	120%				84%	60%	140%
4-Methyl-2-pentanone (MIBK)	68643	9024976	<0.5	<0.5	NA	< 0.5	101%	80%	120%				81%	70%	130%
cis-1,3-Dichloropropene	68643	9024976	<0.05	<0.05	NA	< 0.05	101%	80%	120%				85%	60%	140%
1,1,2-Trichloroethane	68643	9024976	<0.05	<0.05	NA	< 0.05	101%	80%	120%				86%	70%	130%
Toluene	68643	9024976	0.12	0.12	NA	< 0.05	101%	80%	120%				87%	70%	130%
Dibromochloromethane	68643	9024976	<0.05	<0.05	NA	< 0.05	101%	80%	120%				85%	70%	130%
1,2-Dibromoethane	68643	9024976	<0.05	<0.05	NA	< 0.05	101%	80%	120%				87%	70%	130%
Tetrachloroethylene	68643	9024976	<0.05	<0.05	NA	< 0.05	100%	80%	120%				75%	70%	130%
1,1,1,2-Tetrachloroethane	68643	9024976	<0.05	<0.05	NA	< 0.05	101%	80%	120%				87%	70%	130%
Chlorobenzene	68643	9024976	<0.05	<0.05	NA	< 0.05	100%	80%	120%				88%	70%	130%
Ethylbenzene	68643	9024976	0.09	0.10	NA	< 0.05	101%	80%	120%				86%	70%	130%
m&p-Xylene	68643	9024976	0.39	0.41	5.0%	< 0.05	101%	80%	120%				87%	70%	130%
Bromoform	68643	9024976	<0.05	<0.05	NA	< 0.05	101%	80%	120%				85%	70%	130%
Styrene	68643	9024976	<0.05	<0.05	NA	< 0.05	102%	80%	120%				86%	70%	130%
1,1,2,2-Tetrachloroethane	68643	9024976	<0.05	<0.05	NA	< 0.05	100%	80%	120%				89%	70%	130%
o-Xylene	68643	9024976	0.10	0.10	NA	< 0.05	101%	80%	120%				88%	70%	130%
1,3-Dichlorobenzene	68643	9024976	<0.05	<0.05	NA	< 0.05	100%	80%	120%				89%	70%	130%
1,4-Dichlorobenzene	68643	9024976	<0.05	<0.05	NA	< 0.05	100%	80%	120%				89%	70%	130%
1,2-Dichlorobenzene	68643	9024976	<0.05	<0.05	NA	< 0.05	101%	80%	120%				90%	70%	130%
1,2,4-Trichlorobenzene	68643	9024976	<0.05	<0.05	NA	< 0.05	101%	80%	120%				88%	70%	130%
Bromofluorobenzene	68643	9024976	109	110	0.9%		105%	60%	140%				105%	60%	140%
Dibromofluoromethane	68643	9024976	109	109	0.0%		105%	60%	140%				100%	60%	140%
Toluene - d8	68643	9024976	118	120	1.7%		101%	60%	140%				105%	60%	140%
VH	68643	9024976	19	19	NA	< 10									
VPH	68643	9024976	18	18	NA	< 10									

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

BTEX / VPH (C6-C10) Soil															
Methyl tert-butyl ether (MTBE)	68643	9025533	<0.1	<0.1	NA	< 0.1	100%	80%	120%				97%	70%	130%
Benzene	68643	9025533	<0.02	<0.02	NA	< 0.02	99%	80%	120%				95%	70%	130%

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Trace Organics Analysis (Continued)

RPT Date: Jan 29, 2018

PARAMETER	Batch	Sample Id	DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
			Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Toluene	68643	9025533	<0.05	<0.05	NA	< 0.05	100%	80%	120%				106%	70%	130%
Ethylbenzene	68643	9025533	<0.05	<0.05	NA	< 0.05	100%	80%	120%				107%	70%	130%
m&p-Xylene	68643	9025533	<0.05	<0.05	NA	< 0.05	100%	80%	120%				107%	70%	130%
o-Xylene	68643	9025533	<0.05	<0.05	NA	< 0.05	101%	80%	120%				104%	70%	130%
Styrene	68643	9025533	<0.05	<0.05	NA	< 0.05	100%	80%	120%				101%	70%	130%
VPH	68643	9025533	<10	<10	NA	< 10									
VH	68643	9025533	<10	<10	NA	< 10									
Bromofluorobenzene	68643	9025533	97	96	1.0%		100%	60%	140%				93%	60%	140%
Dibromofluoromethane	68643	9025533	108	109	0.9%		99%	60%	140%				102%	60%	140%
Toluene - d8	68643	9025533	118	117	0.9%		99%	60%	140%				113%	60%	140%
Public Works LEPH/HEPH in Water Low Level															
Naphthalene	68644	W-MS1	0.37	0.39	5.3%	< 0.05	100%	80%	120%				77%	50%	130%
Quinoline	68644	W-MS1	0.54	0.54	0.0%	< 0.05	100%	80%	120%				109%	50%	130%
Acenaphthylene	68644	W-MS1	0.41	0.42	2.4%	< 0.02	100%	80%	120%				83%	50%	130%
Acenaphthene	68644	W-MS1	0.43	0.44	2.3%	< 0.02	100%	80%	120%				86%	50%	130%
Fluorene	68644	W-MS1	0.43	0.43	0.0%	< 0.02	99%	80%	120%				86%	50%	130%
Phenanthrene	68644	W-MS1	0.37	0.36	2.7%	< 0.04	101%	80%	120%				78%	60%	130%
Anthracene	68644	W-MS1	0.47	0.49	4.2%	< 0.01	97%	80%	120%				95%	60%	130%
Acridine	68644	W-MS1	0.53	0.51	3.8%	< 0.05	101%	80%	120%				108%	50%	130%
Fluoranthene	68644	W-MS1	0.44	0.45	2.2%	< 0.02	99%	80%	120%				89%	60%	130%
Pyrene	68644	W-MS1	0.44	0.44	0.0%	< 0.02	100%	80%	120%				88%	60%	130%
Benzo(a)anthracene	68644	W-MS1	0.42	0.42	0.0%	< 0.01	99%	80%	120%				84%	60%	130%
Chrysene	68644	W-MS1	0.48	0.49	2.1%	< 0.01	100%	80%	120%				96%	60%	130%
Benzo(b)fluoranthene	68644	W-MS1	0.39	0.38	2.6%	< 0.01	97%	80%	120%				78%	60%	130%
Benzo(j)fluoranthene	68644	W-MS1	0.53	0.53	0.0%	< 0.01	102%	80%	120%				107%	60%	130%
Benzo(k)fluoranthene	68644	W-MS1	0.35	0.36	2.8%	< 0.01	99%	80%	120%				71%	60%	130%
Benzo(a)pyrene	68644	W-MS1	0.45	0.45	0.0%	< 0.01	100%	80%	120%				91%	60%	130%
Indeno(1,2,3-c,d)pyrene	68644	W-MS1	0.44	0.44	0.0%	< 0.01	100%	80%	120%				88%	60%	130%
Dibenzo(a,h)anthracene	68644	W-MS1	0.41	0.42	2.4%	< 0.01	99%	80%	120%				83%	60%	130%
Benzo(g,h,i)perylene	68644	W-MS1	0.43	0.45	4.5%	< 0.01	100%	80%	120%				89%	60%	130%
1-Methylnaphthalene	68644	W-MS1	0.36	0.38	5.4%	< 0.05	100%	80%	120%				73%	50%	130%
2-Methylnaphthalene	68644	W-MS1	0.31	0.33	6.2%	< 0.05	98%	80%	120%				63%	50%	130%
EPH C10-C19	68644	W-MS1	8480	8230	3.0%	< 100	111%	70%	130%				84%	70%	130%
EPH C19-C32	68644	W-MS1	13800	13600	1.5%	< 100	99%	70%	130%				90%	70%	130%
Naphthalene - d8	68644	W-MS1	83	82	1.2%		101%	80%	120%				83%	50%	130%
2-Fluorobiphenyl	68644	W-MS1	82	84	2.4%		100%	80%	120%				82%	50%	130%
P-Terphenyl - d14	68644	W-MS1	89	87	2.3%		100%	80%	120%				89%	60%	130%

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

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Quality Assurance

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA
AGAT WORK ORDER: 18N304491
PROJECT: 1657709-6000
ATTENTION TO: Erin O'Brien
SAMPLING SITE:
SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date: Jan 29, 2018

PARAMETER	Batch	Sample Id	DUPLICATE Dup #1	Dup #2	RPD	Method Blank	REFERENCE MATERIAL Measured Value	Acceptable Limits Lower	Upper	METHOD BLANK SPIKE Recovery	Acceptable Limits Lower	Upper	MATRIX SPIKE Recovery	Acceptable Limits Lower	Upper
Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.															
Volatile Organic Compounds in Water															
Chloromethane	68658	9025583	<1	<1	NA	< 1	98%	80%	120%				105%	70%	130%
Vinyl Chloride	68658	9025583	<1	<1	NA	< 1	98%	80%	120%				112%	70%	130%
Bromomethane	68658	9025583	<1	<1	NA	< 1	97%	80%	120%				83%	70%	130%
Chloroethane	68658	9025583	<1	<1	NA	< 1	100%	80%	120%				99%	70%	130%
Trichlorofluoromethane	68658	9025583	<1	<1	NA	< 1	99%	80%	120%				104%	70%	130%
Acetone	68658	9025583	10	<10	NA	< 10	100%	80%	120%						
1,1-Dichloroethylene	68658	9025583	<1	<1	NA	< 1	100%	80%	120%				111%	70%	130%
Dichloromethane	68658	9025583	<1	<1	NA	< 1	100%	80%	120%				96%	70%	130%
Methyl tert-butyl ether (MTBE)	68658	9025583	<1	<1	NA	< 1	101%	80%	120%				104%	70%	130%
2-Butanone (MEK)	68658	9025583	<10	<10	NA	< 10	100%	80%	120%						
trans-1,2-Dichloroethylene	68658	9025583	<1	<1	NA	< 1	100%	80%	120%				105%	70%	130%
1,1-Dichloroethane	68658	9025583	<1	<1	NA	< 1	100%	80%	120%				104%	70%	130%
cis-1,2-Dichloroethylene	68658	9025583	<1	<1	NA	< 1	101%	80%	120%				101%	70%	130%
Chloroform	68658	9025583	<1	<1	NA	< 1	100%	80%	120%				103%	70%	130%
1,2-Dichloroethane	68658	9025583	<1	<1	NA	< 1	100%	80%	120%				102%	70%	130%
1,1,1-Trichloroethane	68658	9025583	<1	<1	NA	< 1	100%	80%	120%				101%	70%	130%
Carbon Tetrachloride	68658	9025583	<0.5	<0.5	NA	< 0.5	101%	80%	120%				99%	70%	130%
Benzene	68658	9025583	<0.5	<0.5	NA	< 0.5	101%	80%	120%				102%	70%	130%
1,2-Dichloropropane	68658	9025583	<1	<1	NA	< 1	101%	80%	120%				105%	70%	130%
Trichloroethene	68658	9025583	<1	<1	NA	< 1	101%	80%	120%				102%	70%	130%
Bromodichloromethane	68658	9025583	<1	<1	NA	< 1	101%	80%	120%				100%	70%	130%
trans-1,3-Dichloropropene	68658	9025583	<1	<1	NA	< 1	102%	80%	120%				106%	70%	130%
4-Methyl-2-pentanone (MIBK)	68658	9025583	<10	<10	NA	< 10	101%	80%	120%						
cis-1,3-Dichloropropene	68658	9025583	<1	<1	NA	< 1	101%	80%	120%				101%	70%	130%
1,1,2-Trichloroethane	68658	9025583	<1	<1	NA	< 1	101%	80%	120%				105%	70%	130%
Toluene	68658	9025583	<0.5	<0.5	NA	< 0.5	101%	80%	120%				102%	70%	130%
Dibromochloromethane	68658	9025583	<1	<1	NA	< 1	101%	80%	120%				103%	70%	130%
1,2-Dibromoethane	68658	9025583	<0.3	<0.3	NA	< 0.3	101%	80%	120%				106%	70%	130%
Tetrachloroethylene	68658	9025583	<1	<1	NA	< 1	100%	80%	120%				85%	70%	130%
1,1,1,2-Tetrachloroethane	68658	9025583	<1	<1	NA	< 1	101%	80%	120%				99%	70%	130%
Chlorobenzene	68658	9025583	<1	<1	NA	< 1	100%	80%	120%				100%	70%	130%
Ethylbenzene	68658	9025583	<0.5	<0.5	NA	< 0.5	101%	80%	120%				100%	70%	130%
m&p-Xylene	68658	9025583	<0.5	<0.5	NA	< 0.5	101%	80%	120%				100%	70%	130%
Bromoform	68658	9025583	<1	<1	NA	< 1	101%	80%	120%				101%	70%	130%
Styrene	68658	9025583	<0.5	<0.5	NA	< 0.5	102%	80%	120%				100%	70%	130%
1,1,2,2-Tetrachloroethane	68658	9025583	<0.8	<0.8	NA	< 0.8	100%	80%	120%				101%	70%	130%
o-Xylene	68658	9025583	<0.5	<0.5	NA	< 0.5	101%	80%	120%				101%	70%	130%

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Quality Assurance

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA
AGAT WORK ORDER: 18N304491
PROJECT: 1657709-6000
ATTENTION TO: Erin O'Brien
SAMPLING SITE:
SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date: Jan 29, 2018			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
1,3-Dichlorobenzene	68658	9025583	<0.5	<0.5	NA	< 0.5	100%	80%	120%				97%	70%	130%
1,4-Dichlorobenzene	68658	9025583	<0.5	<0.5	NA	< 0.5	100%	80%	120%				97%	70%	130%
1,2-Dichlorobenzene	68658	9025583	<0.5	<0.5	NA	< 0.5	101%	80%	120%				99%	70%	130%
1,2,4-Trichlorobenzene	68658	9025583	<1	<1	NA	< 1	101%	80%	120%				97%	70%	130%
Bromofluorobenzene	68658	9025583	96	88	8.7%		105%	70%	130%				108%	70%	130%
Dibromofluoromethane	68658	9025583	102	94	8.2%		105%	70%	130%				104%	70%	130%
Toluene - d8	68658	9025583	110	102	7.5%		101%	70%	130%				111%	70%	130%
VH	68658	9025583	<100	<100	NA	< 100									
VPH	68658	9025583	<100	<100	NA	< 100									

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

CCME BTEX/F1-F4 (Water)															
Benzene	68649	9025003	<0.5	<0.5	NA	< 0.5	99%	80%	120%				92%	70%	130%
Ethylbenzene	68649	9025003	<0.5	<0.5	NA	< 0.5	100%	80%	120%				94%	70%	130%
Toluene	68649	9025003	<0.5	<0.5	NA	< 0.5	100%	80%	120%				93%	70%	130%
m&p-Xylene	68649	9025003	<0.5	<0.5	NA	< 0.5	100%	80%	120%				95%	70%	130%
o-Xylene	68649	9025003	<0.5	<0.5	NA	< 0.5	101%	80%	120%				96%	70%	130%
F1 (C6-C10)	68649	9025003	<100	<100	NA	< 100									
F1 minus BTEX (C6-C10)	68649	9025003	<100	<100	NA	< 100									
F2 (C10-C16)	68644	W-MS1	5820	5630	3.3%	< 100	110%	80%	120%				82%	70%	130%
F3 (C16-C34)	68644	W-MS1	18600	18300	1.6%	< 100	115%	80%	120%				90%	70%	130%
F4 (C34-C50)	68644	W-MS1	4610	4680	1.5%	< 100	102%	80%	120%				77%	70%	130%
Bromofluorobenzene	68649	9025003	93	96	3.2%		100%	70%	130%				100%	70%	130%
Dibromofluoromethane	68649	9025003	103	106	2.9%		99%	70%	130%				99%	70%	130%
Toluene - d8	68649	9025003	98	98	0.0%		99%	70%	130%				99%	70%	130%

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

BC Routine VOC package in Air (Canister) -ug/m3															
1,2,4-Trimethylbenzene	1	< 1.5	< 1.5	0.0%	< 1.5	128%	50%	140%	136%	50%	140%	NA	30%	140%
1,3,5-Trimethylbenzene	1	< 1.5	< 1.5	0.0%	< 1.5	108%	50%	140%	139%	50%	140%	NA	30%	140%
1,3-Butadiene	1	< 1.0	< 1.0	0.0%	< 1.0	131%	50%	140%	126%	50%	140%	NA	30%	140%
Isopropylbenzene	1	< 0.80	< 0.80	0.0%	< 0.80	136%	50%	140%	115%	50%	140%	NA	30%	140%
Methyl tert-Butyl ether (MTBE)	1	< 0.80	< 0.80	0.0%	< 0.80	67%	50%	140%	71%	50%	140%	NA	30%	140%
Naphthalene	1	< 2.0	< 2.0	0.0%	< 2.0	128%	50%	140%	111%	50%	140%	NA	30%	140%
n-Decane	1	< 1.3	< 1.3	0.0%	< 1.3	53%	50%	140%	60%	50%	140%	NA	30%	140%
n-Hexane	1	< 1.1	< 1.1	0.0%	< 1.1	109%	50%	140%	99%	50%	140%	NA	30%	140%

Public Works : BC VOCs in Air (Canister) - ug/m3															
Dichlorodifluoromethane	1	< 1.0	< 1.0	0.0%	< 1.0	133%	60%	140%	138%	50%	140%	NA	30%	140%
1,2-Dichlorotetrafluoroethane	1	< 1.4	< 1.4	0.0%	< 1.4	138%	60%	140%	122%	50%	140%	NA	30%	140%
1,1,2-Trichloro-1,2,2-trifluoroethane	1	< 1.5	< 1.5	0.0%	< 1.5	102%	60%	140%	107%	50%	140%	NA	30%	140%

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Quality Assurance

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA
AGAT WORK ORDER: 18N304491
PROJECT: 1657709-6000
ATTENTION TO: Erin O'Brien
SAMPLING SITE:
SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date: Jan 29, 2018

PARAMETER	Batch	Sample Id	DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
			Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Chloromethane	1		< 0.60	< 0.60	0.0%	< 0.60	140%	60%	140%	137%	50%	140%	NA	30%	140%
Vinyl Chloride	1		< 0.40	< 0.40	0.0%	< 0.40	139%	60%	140%	137%	50%	140%	NA	30%	140%
Bromomethane	1		< 1.9	< 1.9	0.0%	< 1.9	136%	60%	140%	133%	50%	140%	NA	30%	140%
Chloroethane	1		< 1.0	< 1.0	0.0%	< 1.0	140%	60%	140%	129%	50%	140%	NA	30%	140%
Vinyl Bromide	1		< 0.80	< 0.80	0.0%	< 0.80	NA	60%	140%	137%	50%	140%	NA	30%	140%
Trichlorofluoromethane	1		< 2.3	< 2.3	0.0%	< 2.3	138%	60%	140%	123%	50%	140%	NA	30%	140%
1,1-Dichloroethene	1		< 1.0	< 1.0	0.0%	< 1.0	95%	60%	140%	101%	50%	140%	NA	30%	140%
Methylene Chloride	1		< 1.0	< 1.0	0.0%	< 1.0	100%	60%	140%	104%	50%	140%	NA	30%	140%
trans-1,2-Dichloroethene	1		< 0.80	< 0.80	0.0%	< 0.80	87%	60%	140%	90%	50%	140%	NA	30%	140%
1,1-Dichloroethane	1		< 1.2	< 1.2	0.0%	< 1.2	104%	60%	140%	110%	50%	140%	NA	30%	140%
cis-1,2-Dichloroethene	1		< 0.80	< 0.80	0.0%	< 0.80	94%	60%	140%	98%	50%	140%	NA	30%	140%
Chloroform	1		< 1.0	< 1.0	0.0%	< 1.0	104%	60%	140%	109%	50%	140%	NA	30%	140%
1,2-Dichloroethane	1		< 0.30	< 0.30	0.0%	< 0.30	108%	60%	140%	113%	50%	140%	NA	30%	140%
1,1,1-Trichloroethane	1		< 1.6	< 1.6	0.0%	< 1.6	95%	60%	140%	101%	50%	140%	NA	30%	140%
Carbon Tetrachloride	1		< 2.0	< 2.0	0.0%	< 2.0	101%	60%	140%	108%	50%	140%	NA	30%	140%
Benzene	1		< 0.50	< 0.50	0.0%	< 0.50	100%	60%	140%	103%	50%	140%	NA	30%	140%
1,2-Dichloropropane	1		< 2.0	< 2.0	0.0%	< 2.0	104%	60%	140%	108%	50%	140%	NA	30%	140%
Trichloroethene	1		< 1.0	< 1.0	0.0%	< 1.0	101%	60%	140%	106%	50%	140%	NA	30%	140%
Bromodichloromethane	1		< 1.3	< 1.3	0.0%	< 1.3	105%	60%	140%	111%	50%	140%	NA	30%	140%
cis-1,3-Dichloropropene	1		< 1.0	< 1.0	0.0%	< 1.0	89%	60%	140%	95%	50%	140%	NA	30%	140%
trans-1,3-Dichloropropene	1		< 1.0	< 1.0	0.0%	< 1.0	86%	60%	140%	91%	50%	140%	NA	30%	140%
Methyl Isobutyl Ketone (MIBK)	1		< 2.0	< 2.0	0.0%	< 2.0	126%	60%	140%	133%	50%	140%	NA	30%	140%
1,1,2-Trichloroethane	1		< 1.6	< 1.6	0.0%	< 1.6	128%	60%	140%	135%	50%	140%	NA	30%	140%
Toluene	1		< 0.80	< 0.80	0.0%	< 0.80	121%	60%	140%	129%	50%	140%	NA	30%	140%
2-Hexanone	1		< 2.0	< 2.0	0.0%	< 2.0	134%	60%	140%	140%	50%	140%	NA	30%	140%
Dibromochloromethane	1		< 2.0	< 2.0	0.0%	< 2.0	126%	60%	140%	137%	50%	140%	NA	30%	140%
1,2-Dibromoethane	1		< 1.5	< 1.5	0.0%	< 1.5	118%	60%	140%	130%	50%	140%	NA	30%	140%
Tetrachloroethene	1		< 1.0	< 1.0	0.0%	< 1.0	114%	60%	140%	121%	50%	140%	NA	30%	140%
Chlorobenzene	1		< 1.0	< 1.0	0.0%	< 1.0	125%	60%	140%	132%	50%	140%	NA	30%	140%
Ethylbenzene	1		< 0.9	< 0.9	0.0%	< 0.9	118%	60%	140%	124%	50%	140%	NA	30%	140%
m&p-Xylene	1		< 1.5	< 1.5	0.0%	< 1.5	139%	60%	140%	140%	50%	140%	NA	30%	140%
Bromoform	1		< 2.0	< 2.0	0.0%	< 2.0	120%	60%	140%	131%	50%	140%	NA	30%	140%
Styrene	1		< 1.0	< 1.0	0.0%	< 1.0	120%	60%	140%	127%	50%	140%	NA	30%	140%
1,1,2,2-Tetrachloroethane	1		< 1.5	< 1.5	0.0%	< 1.5	108%	60%	140%	106%	50%	140%	NA	30%	140%
o-Xylene	1		< 0.9	< 0.9	0.0%	< 0.9	125%	60%	140%	118%	50%	140%	NA	30%	140%
1,3-Dichlorobenzene	1		< 2.5	< 2.5	0.0%	< 2.5	129%	60%	140%	135%	50%	140%	NA	30%	140%
1,4-Dichlorobenzene	1		< 2.5	< 2.5	0.0%	< 2.5	129%	60%	140%	138%	50%	140%	NA	30%	140%
1,2-Dichlorobenzene	1		< 2.5	< 2.5	0.0%	< 2.5	121%	60%	140%	103%	50%	140%	NA	30%	140%

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Quality Assurance

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date: Jan 29, 2018			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

Certified By:

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AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Water Analysis

RPT Date: Jan 29, 2018			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Public Works Dissolved Metals															
Aluminum Dissolved	9025583		27	28	2.5%	< 2	98%	90%	110%	99%	90%	110%			
Antimony Dissolved	9025583		1.8	1.8	2.3%	< 0.2	99%	90%	110%	104%	90%	110%			
Arsenic Dissolved	9025583		2.0	2.0	0.2%	< 0.1	94%	90%	110%	108%	90%	110%			
Barium Dissolved	9025583		94.4	91.5	3.1%	< 0.2	103%	90%	110%	106%	90%	110%			
Beryllium Dissolved	9025583		0.02	<0.01	NA	< 0.01	103%	90%	110%	103%	90%	110%			
Bismuth Dissolved	9025583		<0.05	<0.05	NA	< 0.05				100%	90%	110%			
Boron Dissolved	9025583		32	31	3.4%	< 2	94%	90%	110%	91%	90%	110%			
Cadmium Dissolved	9025583		0.12	0.11	6.9%	< 0.01	104%	90%	110%	100%	90%	110%			
Calcium Dissolved	9025583		90500	91800	1.3%	< 50	101%	90%	110%	102%	90%	110%			
Chromium Dissolved	9025583		<0.5	<0.5	NA	< 0.5	93%	90%	110%	95%	90%	110%			
Cobalt Dissolved	9025583		3.31	3.30	0.5%	< 0.05	95%	90%	110%	98%	90%	110%			
Copper Dissolved	9025583		3.1	3.3	4.5%	< 0.2	98%	90%	110%	99%	90%	110%			
Iron Dissolved	9025583		936	954	1.9%	< 10	100%	90%	110%	101%	90%	110%			
Lead Dissolved	9025583		<0.05	<0.05	NA	< 0.05	104%	90%	110%	103%	90%	110%			
Lithium Dissolved	9025583		2.0	2.1	NA	< 0.5				100%	90%	110%			
Magnesium Dissolved	9025583		7890	7860	0.4%	< 50	103%	90%	110%	104%	90%	110%			
Manganese Dissolved	9025583		400	400	0.1%	< 1	105%	90%	110%	104%	90%	110%			
Mercury Dissolved	9021813		<0.01	<0.01	NA	< 0.01	99%	90%	110%	100%	90%	110%			
Molybdenum Dissolved	9025583		1.69	1.72	1.6%	< 0.05	96%	90%	110%	99%	90%	110%			
Nickel Dissolved	9025583		6.0	6.0	1.0%	< 0.2	97%	90%	110%	100%	90%	110%			
Potassium Dissolved	9025583		5670	5700	0.5%	< 50	94%	90%	110%	97%	90%	110%			
Selenium Dissolved	9025583		1.1	1.0	NA	< 0.5	96%	90%	110%	99%	90%	110%			
Silicon Dissolved	9025583		4810	4830	0.3%	< 50				105%	90%	110%			
Silver Dissolved	9025583		<0.02	<0.02	NA	< 0.02				105%	90%	110%			
Sodium Dissolved	9025583		6320	6320	0.1%	< 50	98%	90%	110%	101%	90%	110%			
Strontium Dissolved	9025583		350	359	2.6%	< 0.1	99%	90%	110%	99%	90%	110%			
Sulphur Dissolved	9025583		30900	31200	1.1%	< 500				104%	90%	110%			
Thallium Dissolved	9025583		0.05	0.05	0.0%	< 0.01	95%	90%	110%	97%	90%	110%			
Tin Dissolved	9025583		0.12	0.12	NA	< 0.05				105%	90%	110%			
Titanium Dissolved	9025583		1.8	1.7	NA	< 0.5				100%	90%	110%			
Uranium Dissolved	9025583		0.62	0.60	3.6%	< 0.01	92%	90%	110%	97%	90%	110%			
Vanadium Dissolved	9025583		2.9	2.9	0.3%	< 0.5	100%	90%	110%	101%	90%	110%			
Zinc Dissolved	9025583		7	7	NA	< 2	105%	90%	110%	102%	90%	110%			
Zirconium Dissolved	9025583		0.2	0.2	NA	< 0.1				99%	70%	130%			
Chloride in Water															
Chloride	9014203		0.21	0.21	NA	< 0.05	99%	90%	110%	96%	90%	110%			

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

AGAT Laboratories

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Quality Assurance

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Water Analysis (Continued)

RPT Date: Jan 29, 2018			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

Certified By:

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Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA
AGAT WORK ORDER: 18N304491
PROJECT: 1657709-6000
ATTENTION TO: Erin O'Brien
SAMPLING SITE:
SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Aluminum	MET-181-6106, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP/OES
Antimony	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Arsenic	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Barium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Beryllium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Bismuth	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Cadmium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Calcium	MET-181-6106, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP/OES
Chromium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Cobalt	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Copper	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Iron	MET-181-6106, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP/OES
Lead	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Lithium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Magnesium	MET-181-6106, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP/OES
Manganese	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP-MS
Mercury	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Molybdenum	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Nickel	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Phosphorus	MET-181-6106, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP/OES
Potassium	MET-181-6106, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP/OES
Selenium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Silver	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Sodium	MET-181-6106, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP/OES
Strontium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP-MS
Thallium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Tin	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS

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Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

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SAMPLING SITE:

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PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Titanium	MET-181-6106, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP/OES
Uranium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Vanadium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Zinc	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Zirconium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
pH 1:2	INOR-181-6031	BC MOE Lab Manual B (pH, Electrometric, Soil)	PH METER

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SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Naphthalene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
2-Methylnaphthalene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
1-Methylnaphthalene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Acenaphthylene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Acenaphthene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Fluorene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Phenanthrene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Anthracene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Fluoranthene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Pyrene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(a)anthracene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Chrysene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(b)fluoranthene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(j)fluoranthene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(k)fluoranthene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(a)pyrene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Indeno(1,2,3-c,d)pyrene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Dibenzo(a,h)anthracene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(g,h,i)perylene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Quinoline	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
IACR CCME (Soil)	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
B[a]P TPE (Soil)	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
EPH C10-C19	ORG-180-5101	Modified from BCMOE Lab Manual Section D (EPH)	GC/FID
EPH C19-C32	ORG-180-5101	Modified from BCMOE Lab Manual Section D (EPH)	GC/FID
LEPH C10-C19	ORG-180-5101	Modified from BCMOE Lab Manual Section D (EPH)	GC/FID
HEPH C19-C32	ORG-180-5101	Modified from BCMOE Lab Manual Section D (EPH)	GC/FID
Naphthalene - d8	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS

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Method Summary

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SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
2-Fluorobiphenyl	ORG-180-5102	Modified form BCMOE Lab Manual Section D (PAH)	GC/MS
P-Terphenyl - d14	ORG-180-5102	Modified form BCMOE Lab Manual Section D (PAH)	GC/MS
1,2,4-Trimethylbenzene	AQM-91-16001	MASS APH	GC/MS
1,3,5-Trimethylbenzene	AQM-91-16001	MASS APH	GC/MS
1,3-Butadiene	AQM-91-16000	EPA TO15	GC/MS
Isopropylbenzene	AQM-91-16000	MASS APH	GC/MS
Methylcyclohexane	AQM-91-16000	EPA TO15	GC/MS
Methyl tert-Butyl ether (MTBE)	AQM-91-16000	EPA TO15	GC/MS
Naphthalene	AQM-91-16000	MASS APH	GC/MS
n-Decane	AQM-91-16000	MASS APH	GC/MS
n-Hexane	AQM-91-16000	EPA TO15	GC/MS
VPHv (C>6-C13)	AQM-91-16000	MASS APH	GC/MS
4-Bromofluorobenzene	AQM-91-16000	MASS APH	GC/MS
Methyl tert-butyl ether (MTBE)	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
Benzene	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
Toluene	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
Ethylbenzene	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
m&p-Xylene	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
o-Xylene	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
Styrene	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
VPH	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
VH	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
Bromofluorobenzene	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS
Dibromofluoromethane	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS
Toluene - d8	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS
Benzene	ORG-180-5130	EPA SW-846 8260	GC/MS/FID
Ethylbenzene	ORG-180-5130	EPA SW-846 8260	GC/MS/FID
Toluene	ORG-180-5130	EPA SW-846 8260	GC/MS/FID
m&p-Xylene	ORG-180-5130	EPA SW-846 8260	GC/MS/FID
o-Xylene	ORG-180-5130	EPA SW-846 8260	GC/MS/FID
F1 (C6-C10)	ORG-180-5130	CCME Tier 1 Method	GC/MS/FID
F1 minus BTEX (C6-C10)	ORG-180-5130	CCME Tier 1 Method	GC/MS/FID
F2 (C10-C16)	ORG-180-5134	CCME Tier 1 Method	GC/FID
F3 (C16-C34)	ORG-180-5134	CCME Tier 1 Method	GC/FID
F4 (C34-C50)	ORG-180-5134	CCME Tier 1 Method	GC/FID
Bromofluorobenzene			GC/MS
Dibromofluoromethane			GC/MS
Toluene - d8			GC/MS
Dichlorodifluoromethane	AQM-248-16000	EPA TO15	GC/MS

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Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA
AGAT WORK ORDER: 18N304491
PROJECT: 1657709-6000
ATTENTION TO: Erin O'Brien
SAMPLING SITE:
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PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
1,2-Dichlorotetrafluoroethane	AQM-248-16000	EPA TO15	GC/MS
1,1,2-Trichloro-1,2,2-trifluoroethane	AQM-248-16000	EPA TO15	GC/MS
Chloromethane	AQM-248-16000	EPA TO15	GC/MS
Vinyl Chloride	AQM-248-16000	EPA TO15	GC/MS
Bromomethane	AQM-248-16000	EPA TO15	GC/MS
Chloroethane	AQM-248-16000	EPA TO15	GC/MS
Vinyl Bromide	AQM-248-16000	EPA TO15	GC/MS
Trichlorofluoromethane	AQM-248-16000	EPA TO15	GC/MS
1,1-Dichloroethene	AQM-248-16000	EPA TO15	GC/MS
Methylene Chloride	AQM-248-16000	EPA TO15	GC/MS
trans-1,2-Dichloroethene	AQM-248-16000	EPA TO15	GC/MS
1,1-Dichloroethane	AQM-248-16000	EPA TO15	GC/MS
cis-1,2-Dichloroethene	AQM-248-16000	EPA TO15	GC/MS
Chloroform	AQM-248-16000	EPA TO15	GC/MS
1,2-Dichloroethane	AQM-248-16000	EPA TO15	GC/MS
1,1,1-Trichloroethane	AQM-248-16000	EPA TO15	GC/MS
Carbon Tetrachloride	AQM-248-16000	EPA TO15	GC/MS
Benzene	AQM-248-16000	EPA TO15	GC/MS
1,2-Dichloropropane	AQM-248-16000	EPA TO15	GC/MS
2,2-Dichloropropane	AQM-248-16000	EPA TO15	GC/MS
Trichloroethene	AQM-248-16000	EPA TO15	GC/MS
Bromodichloromethane	AQM-248-16000	EPA TO15	GC/MS
cis-1,3-Dichloropropene	AQM-248-16000	EPA TO15	GC/MS
trans-1,3-Dichloropropene	AQM-248-16000	EPA TO15	GC/MS
Methyl Isobutyl Ketone (MIBK)	AQM-248-16000	EPA TO15	GC/MS
1,1,2-Trichloroethane	AQM-248-16000	EPA TO15	GC/MS
Toluene	AQM-248-16000	EPA TO15	GC/MS
2-Hexanone	AQM-248-16000	EPA TO15	GC/MS
Dibromochloromethane	AQM-248-16000	EPA TO15	GC/MS
1,2-Dibromoethane	AQM-248-16000	EPA TO15	GC/MS
Tetrachloroethene	AQM-248-16000	EPA TO15	GC/MS
Chlorobenzene	AQM-248-16000	EPA TO15	GC/MS
Ethylbenzene	AQM-248-16000	EPA TO15	GC/MS
m&p-Xylene	AQM-248-16000	EPA TO15	GC/MS
Bromoform	AQM-248-16000	EPA TO15	GC/MS
Styrene	AQM-248-16000	EPA TO15	GC/MS
1,1,2,2-Tetrachloroethane	AQM-248-16000	EPA TO15	GC/MS
o-Xylene	AQM-248-16000	EPA TO15	GC/MS
1,3-Dichlorobenzene	AQM-248-16000	EPA TO15	GC/MS
1,4-Dichlorobenzene	AQM-248-16000	EPA TO15	GC/MS
1,2-Dichlorobenzene	AQM-248-16000	EPA TO15	GC/MS
Total Xylenes	AQM-248-16000	EPA TO15	GC/MS
4-Bromofluorobenzene	AQM-248-16000	EPA TO15	GC/MS
Quinoline	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Acenaphthylene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Acenaphthene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Fluorene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS

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Method Summary

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AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Phenanthrene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Anthracene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Acridine	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Fluoranthene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Pyrene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(a)anthracene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Chrysene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(b)fluoranthene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(j)fluoranthene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(k)fluoranthene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(a)pyrene	ORG-180-5133	Modified from BC MOE Lab Manual Section D	GC/MS
Indeno(1,2,3-c,d)pyrene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Dibenzo(a,h)anthracene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(g,h,i)perylene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
1-Methylnaphthalene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
2-Methylnaphthalene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
EPH C10-C19	ORG-180-5134	Modified from BC MOE Lab Manual Section D (EPH)	GC/FID
EPH C19-C32	ORG-180-5134	Modified from BC MOE Lab Manual Section D (EPH)	GC/FID
LEPH C10-C19	ORG-180-5134	Modified from BC MOE Lab Manual Section D (EPH)	GC/FID
HEPH C19-C32	ORG-180-5134	Modified from BC MOE Lab Manual Section D (EPH)	GC/FID
Naphthalene - d8			GC/MS
2-Fluorobiphenyl	ORG-180-5133	Modified form BCMOE Lab Manual Section D (PAH)	GC/MS
P-Terphenyl - d14	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Chloromethane	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Vinyl Chloride	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Bromomethane	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Chloroethane	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Trichlorofluoromethane	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS

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SAMPLING SITE:

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PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Acetone	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,1-Dichloroethylene	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Dichloromethane	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Methyl tert-butyl ether (MTBE)	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
2-Butanone (MEK)	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
trans-1,2-Dichloroethene	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,1-Dichloroethane	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
cis-1,2-Dichloroethene	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Chloroform	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,2-Dichloroethane	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,1,1-Trichloroethane	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Carbon Tetrachloride	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Benzene	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,2-Dichloropropane	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Trichloroethene	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Bromodichloromethane	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
trans-1,3-Dichloropropene	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
4-Methyl-2-pentanone (MIBK)	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
cis-1,3-Dichloropropene	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,1,2-Trichloroethane	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Toluene	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Dibromochloromethane	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,2-Dibromoethane	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Tetrachloroethylene	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,1,1,2-Tetrachloroethane	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Chlorobenzene	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Ethylbenzene	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
m&p-Xylene	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS

AGAT Laboratories
Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA
AGAT WORK ORDER: 18N304491
PROJECT: 1657709-6000
ATTENTION TO: Erin O'Brien
SAMPLING SITE:
SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Bromoform	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Styrene	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,1,2,2-Tetrachloroethane	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
o-Xylene	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,3-Dichlorobenzene	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,4-Dichlorobenzene	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,2-Dichlorobenzene	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,2,4-Trichlorobenzene	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Bromofluorobenzene	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Dibromofluoromethane	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Toluene - d8	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
VH	ORG-180-5103	Modified from BC MOE Lab Manual Sec D (VOC)	GC/MS/FID
VPH	ORG-180-5103	Modified from BC MOE Lab Manual Sec D (VOC)	GC/MS/FID
Chloromethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Vinyl Chloride	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Bromomethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Chloroethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Trichlorofluoromethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Acetone	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,1-Dichloroethylene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Dichloromethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Methyl tert-butyl ether (MTBE)	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
2-Butanone (MEK)	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
trans-1,2-Dichloroethylene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,1-Dichloroethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
cis-1,2-Dichloroethylene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Chloroform	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,2-Dichloroethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
1,1,1-Trichloroethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Carbon Tetrachloride	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Benzene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,2-Dichloropropane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Trichloroethene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Bromodichloromethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
trans-1,3-Dichloropropene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
4-Methyl-2-pentanone (MIBK)	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
cis-1,3-Dichloropropene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,1,2-Trichloroethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Toluene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Dibromochloromethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,2-Dibromoethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Tetrachloroethylene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,1,1,2-Tetrachloroethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D	GC/MS
Chlorobenzene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Ethylbenzene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
m&p-Xylene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Bromoform	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Styrene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,1,2,2-Tetrachloroethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
o-Xylene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,3-Dichlorobenzene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,4-Dichlorobenzene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,2-Dichlorobenzene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,2,4-Trichlorobenzene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Bromofluorobenzene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Dibromofluoromethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Toluene - d8	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
VH	ORG-180-5133	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS/FID
VPH	ORG-180-5131	Modified from BC MOE Lab Manual Sec D (VOC)	GC/MS/FID

AGAT Laboratories
Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
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TEL (778)452-4000
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Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA
AGAT WORK ORDER: 18N304491
PROJECT: 1657709-6000
ATTENTION TO: Erin O'Brien
SAMPLING SITE:
SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
Chloride	INOR-181-6002	Modified from SM 4110 B	ION CHROMATOGRAPH
Aluminum Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Antimony Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Arsenic Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Barium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Beryllium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Bismuth Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Boron Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Cadmium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Calcium Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Chromium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Cobalt Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Copper Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Iron Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Lead Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Lithium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Magnesium Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Manganese Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Mercury Dissolved	MET-181-6103, LAB-181-4015	Modified from EPA 245.7	CV/AA
Molybdenum Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Nickel Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Potassium Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Selenium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Silicon Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Silver Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Sodium Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Strontium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Sulphur Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Thallium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Tin Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Titanium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Uranium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Vanadium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Zinc Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Zirconium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS

CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

18N3044491

No. 04306 page 1 of 5

Golder Associates

200 – 2920 Virtual Way
Vancouver, British Columbia, Canada V5M 0C4
Telephone (604) 296-4200 Fax (604) 298-5253

Project Number: 1657709/6000			Laboratory Name: AGAT
Short Title: K19 Field Inv	Golder Contact: Erin O'Brien		Address: 120-4600 Glenlyon Pkwy
Golder E-mail Address 1: erin_o'brien @golder.com	Golder E-mail Address 2: kmara_dia-belair @golder.com		Telephone/Fax: 176-452-4009 Contact: Yasmine Galindo

Office Name: Vancouver

EQuIS Facility Code: 28433859
EQuIS upload: ☒

Turnaround Time: ☐ 24 hr ☐ 48 hr ☐ 72 hr ☒ Regular (5 Days)
Criteria: ☒ CSR ☒ CCME ☐ BC Water Quality ☐ Other

Note: Final Reports to be issued by e-mail

Quote No.:

Analyses Required

JAN 23 AM 10:19

Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D / M / Y)	Time Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	BTEX/VPH	LEPH/HEPH/PAH	VOCs	RUSH (Select TAT above)	Remarks (over)
04306 - 01	KM-MW18-1[illegible]	1	0.3-0.5	Soil	20/01/18	12:50	Discrete			2					9024971
- 02		2	2.0-2.5			13:10				4					973
- 03		3	3.5-4.0			13:20				4					975
- 04		4	5.5-6.0			13:40				4	X	X	X		976
- 05		5	7.0-7.5			14:00				4					977
- 06		6	8.5-9.0			14:20				2					978
- 07		7	10.1-10.6			14:50				4					979
- 08	KM-MW18-DS	1	5.5-6.0			16:00		FDA	04306-09	4					970
- 09	↓	1	5.5-6.0		↓	16:00		FD	04306-08	4					981
- 10															
- 11															
- 12															

AGAT Sample I.D.

Sampler's Signature:	Relinquished by: Signature	Company: Golder	Date: 22/01/18	Time: 09:45	Received by: Signature	Company: AGAT
Comments: Invoice Dan Osgathorpe	Method of Shipment:	Waybill No.:	Received for Lab by:	Date	Time: 9:50	
	Shipped by:	Shipment Condition: Seal Intact:	Temp (°C): 4	Cooler opened by:	Date	Time

WHITE: Golder Copy YELLOW: Lab Copy

ESED

18N304491

CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

No. 04305 page 2 of 5

Golder Associates
200 – 2920 Virtual Way
Vancouver, British Columbia, Canada V5M 0C4
Telephone (604) 296-4200 Fax (604) 298-5253

Project Number: 1657709/6000
Short Title: K19 Remediation
Golder Contact: Erin O'Brien
Golder E-mail Address 1: erin_obrien@golder.com
Golder E-mail Address 2: Konane-dim-Delar @golder.com
Laboratory Name: AGAT
Address: 120-4600 Glenlyon Pkwy
Telephone/Fax: 778-452-4009
Contact: Yasmine Galindo

Office Name: Vancouver
EQuIS Facility Code: 28433859
EQuIS upload: ☒

JAN 23 AM10:19

Turnaround Time: ☐ 24 hr ☐ 48 hr ☐ 72 hr ☒ Regular (5 Days)
Criteria: ☒ CSR ☒ CCME ☐ BC Water Quality ☐ Other
Note: Final Reports to be issued by e-mail
Quote No.:

Analyses Required

Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D / M / Y)	Time Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	LEPH/HEPH/PAH	BTEX/VPH	METALS								RUSH (Select TAT above)	Remarks (over)
04305 - 01	K19-MW18-08		7.0-7.6	SO	19/01/18	14:20	Discrete			4	X	X										984
- 02	↓		8.6-9.1	↓	↓	14:30	↓			4												986
- 03	↓		10.1-10.6	↓	↓	15:00	↓			2												987
- 04	K19-MW18-09	1	0.3-0.5	↓	20/01/18	10:10	↓			2			~~X~~									988
- 05	↓	2	2.0-2.5	↓	↓	10:20	↓			4												989
- 06	↓	3	3.5-4.0	↓	↓	10:30	↓			4												990
- 07	↓	4	5.0-5.5	↓	↓	10:50	↓			4	X	X	~~X~~									992
- 08	↓	5	7.0-7.5	↓	↓	11:10	↓			2												993
- 09	↓	6	8.5-9.0	↓	↓	11:40	↓			4												994
- 10	↓	7	10.0-10.5	↓	↓	12:00	↓			4												995
- 11	K19-AEC1C-Backfill		0.50	↓	↓	1300				2												996
- 12	K19-AEC1C-Backfill		0.30	↓	↓	1300				2												997

Sampler's Signature: [signature]
Relinquished by: Signature [signature]
Company: Golder
Date: 22/01/18
Time: 09:45
Received by: Signature [signature]
Company: AGAT
Comments: Invoice Dave Osganthorpe
Method of Shipment:
Waybill No.:
Received for Lab by: Cara [signature]
Date
Time 950
Shipped by:
Shipment Condition:
Seal Intact:
Temp (°C) 4
Cooler opened by:
Date
Time

WHITE: Golder Copy YELLOW: Lab Copy

ESED

18N 304491

CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

No. 04304 page 3 of 5

Golder Associates

200 – 2920 Virtual Way
Vancouver, British Columbia, Canada V5M 0C4
Telephone (604) 296-4200 Fax (604) 298-5253

Project Number: 1657709/6000		Laboratory Name: AGAT	
Short Title: K19 Field Inv	Golder Contact: Erin O'Brien	Address: 120-4600 Glenlyon Pky	
Golder E-mail Address 1: erin_o'brien @golder.com	Golder E-mail Address 2: [illegible] @golder.com	Telephone/Fax: 778-452-4009	Contact: Yasmine Galindo

Office Name: Vancouver

EQuIS Facility Code: 28433859
EQuIS upload: ☑

JAN 23 [illegible] 10:19

Turnaround Time: ☐ 24 hr ☐ 48 hr ☐ 72 hr ☒ Regular (5 Days)
Criteria: ☒ CSR ☐ CCME ☐ BC Water Quality ☐ Other

Note: Final Reports to be issued by e-mail

Quote No.:

Analyses Required

Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D / M / Y)	Time Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	LEPH/HEPH/PAH	BTEX/VPH	Metals							RUSH (Select TAT above)	Remarks (over)
04304 - 01	K19-MW18-07	4	3.5-4.0	So.1	18/01/18	15:00		FDA	04304-02	4	X	X									943
- 02	↓	4	3.5-4.0	↓	↓	15:00		FDA	04304-01	4											5000
- 03		5	5.0-5.5		↓	15:45		[illegible]		4											5002
- 04		6	6.5-7.0		19/01/19	09:40				4											5004
- 05		7	8.0-8.5			10:00				2											5005
- 06	↓	8	9.5-10.0		↓	10:45				4											5009
- 07		9	4.5-5.0			12:10		FDA	04304-08	4											5010
- 08	↓	9	4.5-5.0		↓	12:10		FD	04304-07	4											5011
- 09	K19-MW18-08	1	0.3-0.5			13:15				3			X								5012
- 10		2	2.0-2.5			13:30				4											5013
- 11		3	3.5-4.0			13:45				4											5014
- 12	↓	4	5.0-5.5	↓	↓	14:00				4											5015

Sampler's Signature: [signature]	Relinquished by: Signature [signature]	Company Golder	Date 22/01/18	Time 09:45	Received by: Signature [signature]	Company AGAT
Comments:	Method of Shipment:	Waybill No.:		Received for Lab by: Cara [illegible]	Date	Time 9:50
	Shipped by:	Shipment Condition: Seal Intact:		Temp (°C) 4	Cooler opened by:	Date	Time

WHITE: Golder Copy YELLOW: Lab Copy

ESED

19N 304491

CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

No. 04316 page 4 of 5

Golder Associates

200 – 2920 Virtual Way
Vancouver, British Columbia, Canada V5M 0C4
Telephone (604) 296-4200 Fax (604) 298-5253

Project Number: 1657709 / 6000		Laboratory Name: AGAT	
Short Title: K19 Field Inv.	Golder Contact: Erin O'Brien	Address: 120-4600 Oker Way Pky	
Golder E-mail Address 1: erin_o'brien@golder.com	Golder E-mail Address 2: Konane_Dion-Bela@golder.com	Telephone/Fax: 778-452-4006	Contact: Yasmine Galind

Office Name: Vancouver

EQuIS Facility Code: 28433859
EQuIS upload: ☒

JAN 23 AM10:20

Turnaround Time: ☐ 24 hr ☐ 48 hr ☐ 72 hr ☒ Regular (5 Days)
Criteria: ☒ CSR ☒ CCME ☐ BC Water Quality ☐ Other

Note: Final Reports to be issued by e-mail

Quote No.:

Analyses Required

Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D / M / Y)	Time Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	CWS PHC F1/F2	VOCs/VPH/BTEX	Hexane	Decane	Naphthalene	Chlorinated Solvents			AGAT Sample ID	RUSH (Select TAT above)	Remarks (over)
04316-01	K19-SV18-04			SV	19/01/18	12:31-12:40				1	X	X	X	X	X	X			032		Start: -24" End: -4"
-02	K19-MW18-02			↓	↓	~~[illegible]~~ 15:02-15:12				1	X	X	X	X	X	X			036		Start: -25.5" End: -3.5"
-03	K19-SV18-03					16:31-16:48		FDA	04316-04	1									038		Start: -25" End: -3.5"
-04	"					16:37-16:48		FD	04316-03	1									039		Start: -25" End: -3.5"
-05																					
-06	K19-SV18-05				21/01/18	12:30-12:40				1	X	X	X	X	X	X			040		Start: -26" End: -4"
-07	K19-SV18-10*					14:40-14:48				1	X	X	X	X	X	X			041		Start: -27" End: -3"
-08	K19-SV18-07			↓	↓	16:07-16:17				1	X	X	X	X	X	X			042		Start: -26" End: -4"
-09																					
-10																					
-11																					
-12																					

Sampler's Signature: [signature]	Relinquished by: Signature [signature]	Company Golder	Date 22/01/18	Time 09:45	Received by: Signature [signature]	Company AGAT
Comments: Invoice to Dave Osgnthorpe.	Method of Shipment:	Waybill No.:		Received for Lab by: Lara. [signature]	Date	Time 9:50
	Shipped by:	Shipment Condition: Seal Intact:		Temp (°C) 4	Cooler opened by:	Date	Time

WHITE: Golder Copy YELLOW: Lab Copy

ESED

CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

18W3044 91

No. 04319 page 5 of 5

Golder Associates

200 – 2920 Virtual Way
Vancouver, British Columbia, Canada V5M 0C4
Telephone (604) 296-4200 Fax (604) 298-5253

Project Number: 1657709 / 6000

Short Title: K19 Field Inv

Golder Contact: Erin O'Brien

Golder E-mail Address 1: erin_o'brien @golder.com

Golder E-mail Address 2: konane_dion-bebair@golder.com

Laboratory Name: AGAT

Address: 120 - 4600 Glenlyon Pkwy

Telephone/Fax: 778.452.4009

Contact: Yasmine Galin

Office Name: Vancouver

EQuIS Facility Code: 28433859

EQuIS upload: ☒

Turnaround Time: ☐ 24 hr ☐ 48 hr ☐ 72 hr ☒ Regular (5 Days)

Criteria: ☒ CSR ☒ CCME ☐ BC Water Quality ☐ Other

Note: Final Reports to be issued by e-mail

Quote No.: 10.3

Analyses Required

JAN 23 AM 10:20

11:12

Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D / M / Y)	Time Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	Dissolved Metals	BTEX/VPH	PAH/LEPH/HEPH	Cyanide	VOCs	F1	F2-F4			RUSH (Select TAT above)	Remarks (over)
04319 - 01	K19-MW18-01		10	WG	21/01/18	15:47	GRAB				X	X	X	X	X	X	X				057
- 02	K19-MW18-02		11.3	↓	↓	13:11	↓				X	X	X		X	X	X				067
- 03	K19-MW18-07D		10.3			11:12					X	X	X	X	X	X	X				068
- 04	K19-MW18-01		6.3	↓	↓	16:33	↓				X	X	X		X	X	X				069
- 05																					
- 06																					
- 07																					
- 08																					
- 09																					
- 10																					
- 11																					
- 12																					

AGAT Sample ID

Sampler's Signature:	Relinquished by: Signature	Company	Date	Time	Received by: Signature	Company
		Golder	22/01/18	09:45		AGAT

Comments:	Method of Shipment:	Waybill No.:	Received for Lab by:	Date	Time
Invoice Dave Osgthorpe			Lara Cam		9:50
	Shipped by:	Shipment Condition: Seal Intact:	Temp (°C) 4	Cooler opened by:	Date	Time

WHITE: Golder Copy YELLOW: Lab Copy

ESED

AGAT Laboratories

SAMPLE INTEGRITY RECEIPT FORM

RECEIVING BASICS - Shipping

Company/Consultant: GOLDER

Courier: _____ Prepaid Collect

Waybill# _____

Branch: EDM GP (FN) FM RD VAN LYD FSJ EST Other: _____

Custody Seal Intact: Yes (No) NA

TAT: <24hr 24-48hr 48-72hr (Reg) Other _____

Cooler Quantity: (5)

TIME SENSITIVE ISSUES - Shipping

ALREADY EXCEEDED HOLD TIME? Yes (No)

Inorganic Tests (Please Circle): Mibi , BOD , Nitrate/Nitrite , Turbidity , Microtox , Ortho PO4 , Tedlar Bag , Residual Chlorine , Chlorophyll* , Chloroamines*

Earliest Expiry: _____

Hydrocarbons: Earliest Expiry _____

SAMPLE INTEGRITY - Shipping

Hazardous Samples: YES (NO) Precaution Taken: _____

Legal Samples: Yes (No)

International Samples: Yes (No)

Tape Sealed: Yes (No)

Coolant Used: (Icepack) Bagged Ice Free Ice Free Water None

Temperature (Bottles/Jars only) N/A if only Soil Bags Received

FROZEN (Please Circle if samples received Frozen)

1 (Bottle/Jar) -14 + -14 + -15 = -14 °C

2 (Bottle/Jar) -1 + 0 + -2 = -1 °C

3 (Bottle/Jar) ___ + ___ + SUBMA °C

4 (Bottle/Jar) ___ + ___ + SUBMA °C

5 (Bottle/Jar) -11 + -9 + -10 = -10 °C

6 (Bottle/Jar) ___ + ___ + ___ = ___ °C

7 (Bottle/Jar) ___ + ___ + ___ = ___ °C

8 (Bottle/Jar) ___ + ___ + ___ = ___ °C

9 (Bottle/Jar) ___ + ___ + ___ = ___ °C

10 (Bottle/Jar) ___ + ___ + ___ = ___ °C

(If more than 10 coolers are received use another sheet of paper and attach)

LOGISTICS USE ONLY

Workorder No: _____

Samples Damaged: Yes No If YES why?

No Bubble Wrap Frozen Courier

Other: _____

Account Project Manager: _____ have they been notified of the above issues: Yes No

Whom spoken to: _____ Date/Time: _____

CPM Initial _____

General Comments: _____

* Subcontracted Analysis (See CPM)

Date issued: May 22, 2015

AGAT Laboratories

SAMPLE INTEGRITY RECEIPT FORM - BURNABY

Work Order # 18N304491

RECEIVING BASICS:

Received From: Courier Waybill #: _____

SAMPLE QUANTITIES:

Coolers: 4 Containers: 170

TIME SENSITIVE ISSUES:

Earliest Date Sampled: Jan 18, 2018 ALREADY EXCEEDED? Yes (No)

NON-CONFORMANCES:

3 temperatures of samples* and average of each cooler: (record differing temperatures on the CoC next to sample ID's) *use jars when available

(1) 1 + 1 + 2 = 1 °C (2) 7 + 7 + 6 = 7 °C (3) 6 + 6 + 6 = 6 °C (4) 6 + 5 + 5 = 5 °C

Was ice or ice pack present: (Yes) No

Integrity Issues:

Chloride received incorrectly preserved for Sample 04319-01.

Account Project Manager: _____ have they been notified of the above issues: Yes No

Whom spoken to: _____ Date and Time: _____

ADDITIONAL NOTES:

AGAT Laboratories

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CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA
219-800 BURRARD ST
VANCOUVER, BC V6Z 0B9
604-671-1831

ATTENTION TO: Erin O'Brien

PROJECT: K19 Field Inv 1657709-6000

AGAT WORK ORDER: 18V304890

SOIL ANALYSIS REVIEWED BY: Angela Bond, Technical Reviewer

TRACE ORGANICS REVIEWED BY: Andrew Garrard, B.Sc., General Manager

DATE REPORTED: Mar 01, 2018

PAGES (INCLUDING COVER): 21

VERSION*: 3

Should you require any information regarding this analysis please contact your client services representative at (778) 452-4000

*NOTES

VERSION 3: Sample receipt temperature 4°C.

Version 3 is issued on March 1st, 2018 to report arsenic analysis on samples "04302-01", "04302-03", "04302-10" and "04302-12" on February 27th, 2018 as requested by Alvaro Garrido Hernan-Gomez of Golder Associates. Version 3 is an amendment to all previous versions.

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 18V304890

PROJECT: K19 Field Inv 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Arsenic in Soil

DATE RECEIVED: 2018-01-24

DATE REPORTED: 2018-03-01

SAMPLE DESCRIPTION:				04302-01	04302-03	04302-10	04302-12
SAMPLE TYPE:				Soil	Soil	Soil	Soil
DATE SAMPLED:				2018-01-17	2018-01-17	2018-01-17	2018-01-17
Parameter	Unit	G / S	RDL	9027719	9027724	9027730	9027732
Arsenic	µg/g		0.1	8.8	8.3	9.2	11.7
pH 1:2	pH units		0.05	8.48	8.47	8.54	8.46

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9027719-9027732 Results are based on the dry weight of the sample

Certified By: Angela Bond

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Certificate of Analysis

AGAT WORK ORDER: 18V304890

PROJECT: K19 Field Inv 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works Metals in Soil

DATE RECEIVED: 2018-01-24

DATE REPORTED: 2018-03-01

		SAMPLE DESCRIPTION:		04303-04
		SAMPLE TYPE:		Soil
		DATE SAMPLED:		2018-01-18
Parameter	Unit	G / S	RDL	9027736
Aluminum	µg/g		10	8800
Antimony	µg/g		0.1	0.3
Arsenic	µg/g		0.1	5.3
Barium	µg/g		0.5	185
Beryllium	µg/g		0.1	0.4
Bismuth	µg/g		0.5	<0.5
Cadmium	µg/g		0.01	0.11
Calcium	µg/g		10	2030
Chromium	µg/g		1	14
Cobalt	µg/g		0.1	3.4
Copper	µg/g		0.2	9.1
Iron	µg/g		10	11600
Lead	µg/g		0.1	12.4
Lithium	µg/g		0.5	5.5
Magnesium	µg/g		10	1350
Manganese	µg/g		1	83
Mercury	µg/g		0.01	0.02
Molybdenum	µg/g		0.2	1.2
Nickel	µg/g		0.5	9.4
Phosphorus	µg/g		5	343
Potassium	µg/g		5	1470
Selenium	µg/g		0.1	0.2
Silver	µg/g		0.5	<0.5
Sodium	µg/g		5	60
Strontium	µg/g		1	22
Thallium	µg/g		0.1	0.2
Tin	µg/g		0.2	0.4
Titanium	µg/g		1	63
Uranium	µg/g		0.2	0.5
Vanadium	µg/g		1	37

Certified By: Angela Bond

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Certificate of Analysis

AGAT WORK ORDER: 18V304890

PROJECT: K19 Field Inv 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works Metals in Soil

DATE RECEIVED: 2018-01-24

DATE REPORTED: 2018-03-01

				SAMPLE DESCRIPTION:	04303-04
				SAMPLE TYPE:	Soil
				DATE SAMPLED:	2018-01-18
Parameter	Unit	G / S	RDL	9027736	
Zinc	µg/g		1	41	
Zirconium	µg/g		0.1	0.6	
pH 1:2	pH units		0.05	5.95	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9027736 Results are based on the dry weight of the sample

Certified By: Angela Bond

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 18V304890

PROJECT: K19 Field Inv 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works LEPH/HEPH in Soil Low Level

DATE RECEIVED: 2018-01-24

DATE REPORTED: 2018-03-01

		SAMPLE DESCRIPTION:		04302-04		04303-06	04303-07	04303-08	04315-01	04315-02	04315-03
		SAMPLE TYPE:		Soil		Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-01-17		2018-01-18	2018-01-18	2018-01-18	2018-01-18	2018-01-18	2018-01-18
Parameter	Unit	G / S	RDL	9027725	RDL	9027738	9027739	9027740	9027753	9027754	9027755
Naphthalene	µg/g		0.005	0.196	0.005	<0.005	0.017	0.021	0.075	<0.005	<0.005
2-Methylnaphthalene	µg/g		0.05	0.47	0.005	0.072	0.044	0.094	0.114	0.006	<0.005
1-Methylnaphthalene	µg/g		0.005	0.437	0.005	0.069	0.043	0.075	0.169	<0.005	<0.005
Acenaphthylene	µg/g		0.005	<0.005	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Acenaphthene	µg/g		0.005	<0.005	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Fluorene	µg/g		0.02	0.11	0.02	<0.02	<0.02	0.04	0.02	<0.02	<0.02
Phenanthrene	µg/g		0.02	0.30	0.02	0.05	0.15	0.21	0.07	<0.02	<0.02
Anthracene	µg/g		0.004	<0.004	0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Fluoranthene	µg/g		0.01	0.02	0.01	<0.01	0.01	0.03	<0.01	<0.01	<0.01
Pyrene	µg/g		0.01	0.04	0.01	<0.01	0.04	0.05	<0.01	<0.01	<0.01
Benzo(a)anthracene	µg/g		0.03	<0.03	0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Chrysene	µg/g		0.05	0.07	0.05	<0.05	0.07	0.08	<0.05	<0.05	<0.05
Benzo(b)fluoranthene	µg/g		0.02	0.04	0.02	0.03	0.04	0.04	<0.02	<0.02	<0.02
Benzo(j)fluoranthene	µg/g		0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Benzo(k)fluoranthene	µg/g		0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Benzo(a)pyrene	µg/g		0.03	<0.03	0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Indeno(1,2,3-c,d)pyrene	µg/g		0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Dibenzo(a,h)anthracene	µg/g		0.005	<0.005	0.005	<0.005	<0.005	0.005	<0.005	<0.005	<0.005
Benzo(g,h,i)perylene	µg/g		0.05	0.07	0.05	<0.05	0.09	0.14	<0.05	<0.05	<0.05
Quinoline	µg/g		0.05	<0.05	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
IACR CCME (Soil)	µg/g		0.6	<0.6	0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
B[a]P TPE (Soil)	µg/g		0.05	<0.05	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
EPH C10-C19	µg/g		20	61	20	82	38	58	129	<20	<20
EPH C19-C32	µg/g		20	72	20	59	55	84	93	55	56
LEPH C10-C19	µg/g		20	61	20	82	38	58	129	<20	<20
HEPH C19-C32	µg/g		20	72	20	59	55	84	93	55	55
Benzo(b+j)fluoranthene	µg/g		0.05	<0.05	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

Certified By:

AGAT Laboratories

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FAX (778)452-4074
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 18V304890

PROJECT: K19 Field Inv 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works LEPH/HEPH in Soil Low Level

DATE RECEIVED: 2018-01-24

DATE REPORTED: 2018-03-01

		SAMPLE DESCRIPTION:	04302-04	04303-06	04303-07	04303-08	04315-01	04315-02	04315-03
		SAMPLE TYPE:	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:	2018-01-17	2018-01-18	2018-01-18	2018-01-18	2018-01-18	2018-01-18	2018-01-18
Surrogate	Unit	Acceptable Limits	9027725	9027738	9027739	9027740	9027753	9027754	9027755
Naphthalene - d8	%	50-130	77	69	71	74	67	65	66
2-Fluorobiphenyl	%	50-130	80	76	70	73	73	67	66
P-Terphenyl - d14	%	60-130	95	92	82	88	88	88	89

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 18V304890

PROJECT: K19 Field Inv 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works LEPH/HEPH in Soil Low Level

DATE RECEIVED: 2018-01-24

DATE REPORTED: 2018-03-01

		SAMPLE DESCRIPTION:		04315-07	04315-08
		SAMPLE TYPE:		Soil	Soil
		DATE SAMPLED:		2018-01-18	2018-01-18
Parameter	Unit	G / S	RDL	9027762	9027763
Naphthalene	µg/g		0.005	0.008	0.006
2-Methylnaphthalene	µg/g		0.005	0.022	0.006
1-Methylnaphthalene	µg/g		0.005	0.014	0.006
Acenaphthylene	µg/g		0.005	<0.005	<0.005
Acenaphthene	µg/g		0.005	<0.005	<0.005
Fluorene	µg/g		0.02	<0.02	<0.02
Phenanthrene	µg/g		0.02	<0.02	<0.02
Anthracene	µg/g		0.004	<0.004	<0.004
Fluoranthene	µg/g		0.01	<0.01	<0.01
Pyrene	µg/g		0.01	<0.01	<0.01
Benzo(a)anthracene	µg/g		0.03	<0.03	<0.03
Chrysene	µg/g		0.05	<0.05	<0.05
Benzo(b)fluoranthene	µg/g		0.02	<0.02	<0.02
Benzo(j)fluoranthene	µg/g		0.02	<0.02	<0.02
Benzo(k)fluoranthene	µg/g		0.02	<0.02	<0.02
Benzo(a)pyrene	µg/g		0.03	<0.03	<0.03
Indeno(1,2,3-c,d)pyrene	µg/g		0.02	<0.02	<0.02
Dibenzo(a,h)anthracene	µg/g		0.005	<0.005	<0.005
Benzo(g,h,i)perylene	µg/g		0.05	<0.05	<0.05
Quinoline	µg/g		0.05	<0.05	<0.05
IACR CCME (Soil)	µg/g		0.6	<0.6	<0.6
B[a]P TPE (Soil)	µg/g		0.05	<0.05	<0.05
EPH C10-C19	µg/g		20	48	59
EPH C19-C32	µg/g		20	260	197
LEPH C10-C19	µg/g		20	48	59
HEPH C19-C32	µg/g		20	260	197
Benzo(b+j)fluoranthene	µg/g		0.05	<0.05	<0.05

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 18V304890

PROJECT: K19 Field Inv 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works LEPH/HEPH in Soil Low Level

DATE RECEIVED: 2018-01-24

DATE REPORTED: 2018-03-01

		SAMPLE DESCRIPTION:	04315-07	04315-08
		SAMPLE TYPE:	Soil	Soil
		DATE SAMPLED:	2018-01-18	2018-01-18
Surrogate	Unit	Acceptable Limits	9027762	9027763
Naphthalene - d8	%	50-130	71	73
2-Fluorobiphenyl	%	50-130	74	68
P-Terphenyl - d14	%	60-130	84	79

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9027725 Results are based on dry weight of sample.
LEPH & HEPH results have been corrected for PAH contributions.
Soil sample is visibly heterogeneous.
PAH detection limits increased due to sample matrix interference. Sample extract was diluted.

9027738-9027763 Results are based on dry weight of sample.
LEPH & HEPH results have been corrected for PAH contributions.
Soil sample is visibly heterogeneous.

Certified By:

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 18V304890

PROJECT: K19 Field Inv 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

BTEX / VPH (C6-C10) Soil

DATE RECEIVED: 2018-01-24

DATE REPORTED: 2018-03-01

		SAMPLE DESCRIPTION:		04302-04	04303-06	04315-01	04315-02	04315-03	04315-07	04315-08
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-01-17	2018-01-18	2018-01-18	2018-01-18	2018-01-18	2018-01-18	2018-01-18
Parameter	Unit	G / S	RDL	9027725	9027738	9027753	9027754	9027755	9027762	9027763
Methyl tert-butyl ether (MTBE)	µg/g		0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzene	µg/g		0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Toluene	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
m&p-Xylene	µg/g		0.05	<0.05	<0.05	<0.05	0.06	<0.05	<0.05	<0.05
o-Xylene	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Styrene	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
VPH	µg/g		10	16	<10	<10	<10	<10	<10	<10
VH	µg/g		10	17	<10	<10	<10	<10	<10	<10
Total Xylenes	ug/g		0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate	Unit	Acceptable Limits								
Bromofluorobenzene	%	60-140		94	96	95	96	93	96	95
Dibromofluoromethane	%	60-140		119	118	115	119	116	118	119
Toluene - d8	%	60-140		105	106	104	105	102	106	104

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9027725-9027763 Results are based on dry weight of sample.
VPH results have been corrected for BTEX contributions.

Certified By:

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Quality Assurance

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18V304890

PROJECT: K19 Field Inv 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Soil Analysis

RPT Date: Mar 01, 2018			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Public Works Metals in Soil															
Aluminum	9027736	9027736	8800	8810	0.1%	< 10	96%	70%	130%	94%	90%	110%			
Antimony	9027736	9027736	0.3	0.3	NA	< 0.1	114%	70%	130%	109%	90%	110%			
Arsenic	9027736	9027736	5.3	6.3	18.0%	< 0.1	122%	70%	130%	105%	90%	110%			
Barium	9027736	9027736	185	182	1.4%	< 0.5	106%	70%	130%	105%	90%	110%			
Beryllium	9027736	9027736	0.4	0.4	NA	< 0.1	103%	70%	130%	105%	90%	110%			
Bismuth	9027736	9027736	<0.5	<0.5	NA	< 0.5				105%	85%	115%			
Cadmium	9027736	9027736	0.11	0.12	9.6%	< 0.01	108%	70%	130%	104%	90%	110%			
Calcium	9027736	9027736	2030	2070	1.8%	< 10	110%	70%	130%	97%	90%	110%			
Chromium	9027736	9027736	14	14	1.0%	< 1	114%	70%	130%	105%	90%	110%			
Cobalt	9027736	9027736	3.4	3.9	12.9%	< 0.1	112%	70%	130%	104%	90%	110%			
Copper	9027736	9027736	9.1	9.5	4.7%	< 0.2	107%	70%	130%	106%	90%	110%			
Iron	9027736	9027736	11600	14400	21.5%	< 10	98%	70%	130%	96%	90%	110%			
Lead	9027736	9027736	12.4	13.3	6.6%	< 0.1	107%	70%	130%	110%	90%	110%			
Lithium	9027736	9027736	5.5	5.4	2.0%	< 0.5				105%	85%	115%			
Magnesium	9027736	9027736	1350	1360	0.7%	< 10	103%	70%	130%	101%	90%	110%			
Manganese	9027736	9027736	83	102	21.5%	< 1	103%	70%	130%	105%	90%	110%			
Mercury	9027736	9027736	0.02	0.01	NA	< 0.01	96%	70%	130%	110%	90%	110%			
Molybdenum	9027736	9027736	1.2	1.3	11.8%	< 0.2	108%	70%	130%	102%	90%	110%			
Nickel	9027736	9027736	9.4	10.2	8.4%	< 0.5	110%	70%	130%	106%	90%	110%			
Phosphorus	9027736	9027736	343	422	20.6%	< 5	106%	70%	130%	99%	90%	110%			
Potassium	9027736	9027736	1470	1490	0.8%	< 5	120%	70%	130%	98%	90%	110%			
Selenium	9027736	9027736	0.2	0.3	NA	< 0.1				103%	90%	110%			
Silver	9027736	9027736	<0.5	<0.5	NA	< 0.5	127%	70%	130%	106%	90%	110%			
Sodium	9027736	9027736	60	60	0.0%	< 5	126%	70%	130%	97%	90%	110%			
Strontium	9027736	9027736	22	24	9.6%	< 1	125%	70%	130%	105%	90%	110%			
Thallium	9027736	9027736	0.2	0.2	NA	< 0.1	117%	70%	130%	108%	90%	110%			
Tin	9027736	9027736	0.4	0.4	NA	< 0.2	105%	70%	130%	105%	90%	110%			
Titanium	9027736	9027736	63	71	10.6%	< 1	99%	70%	130%	96%	90%	110%			
Uranium	9027736	9027736	0.5	0.5	NA	< 0.2	107%	70%	130%	107%	90%	110%			
Vanadium	9027736	9027736	37	40	6.4%	< 1	116%	70%	130%	105%	90%	110%			
Zinc	9027736	9027736	41	42	2.2%	< 1	110%	70%	130%	103%	90%	110%			
Zirconium	9027736	9027736	0.6	0.3	NA	< 0.1	102%	70%	130%	99%	90%	110%			
pH 1:2	9027736	9027736	5.95	5.96	0.2%		98%	90%	110%	99%	95%	105%			
Arsenic in Soil															
Arsenic	9093386		5.5	4.4	20.8%	< 0.1	112%	70%	130%	103%	90%	110%			
pH 1:2	9018189		8.45	8.43	0.2%	< 0.1	98%	90%	110%	99%	95%	105%			

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

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Quality Assurance

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18V304890

PROJECT: K19 Field Inv 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Soil Analysis (Continued)

RPT Date: Mar 01, 2018			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

Certified By: Angela Bond

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SAMPLED BY:

Trace Organics Analysis

RPT Date: Mar 01, 2018			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Public Works LEPH/HEPH in Soil Low Level															
Naphthalene	68656	9027763	0.006	0.013	NA	< 0.005	102%	80%	120%				98%	50%	130%
2-Methylnaphthalene	68656	9027763	0.006	0.012	NA	< 0.005	99%	80%	120%				93%	50%	130%
1-Methylnaphthalene	68656	9027763	0.006	0.011	NA	< 0.005	100%	80%	120%				98%	50%	130%
Acenaphthylene	68656	9027763	<0.005	<0.005	NA	< 0.005	100%	80%	120%				99%	50%	130%
Acenaphthene	68656	9027763	<0.005	<0.005	NA	< 0.005	100%	80%	120%				99%	50%	130%
Fluorene	68656	9027763	<0.02	<0.02	NA	< 0.02	100%	80%	120%				98%	50%	130%
Phenanthrene	68656	9027763	<0.02	0.02	NA	< 0.02	99%	80%	120%				94%	60%	130%
Anthracene	68656	9027763	<0.004	<0.004	NA	< 0.004	100%	80%	120%				96%	60%	130%
Fluoranthene	68656	9027763	<0.01	<0.01	NA	< 0.01	98%	80%	120%				102%	60%	130%
Pyrene	68656	9027763	<0.01	<0.01	NA	< 0.01	99%	80%	120%				105%	60%	130%
Benzo(a)anthracene	68656	9027763	<0.03	<0.03	NA	< 0.03	101%	80%	120%				100%	60%	130%
Chrysene	68656	9027763	<0.05	<0.05	NA	< 0.05	99%	80%	120%				99%	60%	130%
Benzo(b)fluoranthene	68656	9027763	<0.02	<0.02	NA	< 0.02	97%	80%	120%				105%	60%	130%
Benzo(j)fluoranthene	68656	9027763	<0.02	<0.02	NA	< 0.02	98%	80%	120%				105%	60%	130%
Benzo(k)fluoranthene	68656	9027763	<0.02	<0.02	NA	< 0.02	103%	80%	120%				105%	60%	130%
Benzo(a)pyrene	68656	9027763	<0.03	<0.03	NA	< 0.03	100%	80%	120%				102%	60%	130%
Indeno(1,2,3-c,d)pyrene	68656	9027763	<0.02	<0.02	NA	< 0.02	100%	80%	120%				78%	60%	130%
Dibenzo(a,h)anthracene	68656	9027763	<0.005	<0.005	NA	< 0.005	101%	80%	120%				77%	60%	130%
Benzo(g,h,i)perylene	68656	9027763	<0.05	<0.05	NA	< 0.05	101%	80%	120%				71%	60%	130%
Quinoline	68656	9027763	<0.05	<0.05	NA	< 0.05	101%	80%	120%				99%	50%	130%
EPH C10-C19	68656	9027763	59	65	NA	< 20	109%	70%	130%				96%	65%	120%
EPH C19-C32	68656	9027763	197	193	2.1%	< 20	102%	70%	130%				101%	80%	120%
Naphthalene - d8	68656	9027763	73	69	5.6%		100%	80%	120%				97%	50%	130%
2-Fluorobiphenyl	68656	9027763	68	69	1.5%		101%	80%	120%				95%	50%	130%
P-Terphenyl - d14	68656	9027763	79	78	1.3%		99%	80%	120%				101%	60%	130%

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

BTEX / VPH (C6-C10) Soil															
Methyl tert-butyl ether (MTBE)	68652	9027725	<0.1	<0.1	NA	< 0.1	100%	80%	120%				95%	70%	130%
Benzene	68652	9027725	<0.02	<0.02	NA	< 0.02	99%	80%	120%				100%	70%	130%
Toluene	68652	9027725	<0.05	<0.05	NA	< 0.05	100%	80%	120%				96%	70%	130%
Ethylbenzene	68652	9027725	<0.05	<0.05	NA	< 0.05	100%	80%	120%				95%	70%	130%
m&p-Xylene	68652	9027725	<0.05	<0.05	NA	< 0.05	100%	80%	120%				94%	70%	130%
o-Xylene	68652	9027725	<0.05	<0.05	NA	< 0.05	101%	80%	120%				96%	70%	130%
Styrene	68652	9027725	<0.05	<0.05	NA	< 0.05	100%	80%	120%				101%	70%	130%
VPH	68652	9027725	16	12	NA	< 10									
VH	68652	9027725	17	12	NA	< 10									
Bromofluorobenzene	68652	9027725	94	97	3.1%		100%	60%	140%				90%	60%	140%
Dibromofluoromethane	68652	9027725	119	118	0.8%		99%	60%	140%				110%	60%	140%

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Quality Assurance

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA
AGAT WORK ORDER: 18V304890
PROJECT: K19 Field Inv 1657709-6000
ATTENTION TO: Erin O'Brien
SAMPLING SITE:
SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date: Mar 01, 2018			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Toluene - d8	68652	9027725	105	108	2.8%		99%	60%	140%				98%	60%	140%
Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.															
Public Works LEPH/HEPH in Soil Low Level															
Naphthalene	68698	9039639	<0.005	<0.005	NA	< 0.005	99%	80%	120%				112%	50%	130%
2-Methylnaphthalene	68698	9039639	21.2	24.4	14.0%	< 0.005	99%	80%	120%				84%	50%	130%
1-Methylnaphthalene	68698	9039639	13.3	15.3	14.0%	< 0.005	99%	80%	120%				102%	50%	130%
Acenaphthylene	68698	9039639	<0.005	<0.005	NA	< 0.005	99%	80%	120%				92%	50%	130%
Acenaphthene	68698	9039639	<0.005	<0.005	NA	< 0.005	100%	80%	120%				97%	50%	130%
Fluorene	68698	9039639	2.00	2.26	12.2%	< 0.02	99%	80%	120%				99%	50%	130%
Phenanthrene	68698	9039639	6.55	8.42	25.0%	< 0.02	99%	80%	120%				85%	60%	130%
Anthracene	68698	9039639	<0.004	<0.004	NA	< 0.004	100%	80%	120%				90%	60%	130%
Fluoranthene	68698	9039639	0.10	0.14	33.3%	< 0.01	98%	80%	120%				97%	60%	130%
Pyrene	68698	9039639	0.29	0.39	29.4%	< 0.01	101%	80%	120%				95%	60%	130%
Benzo(a)anthracene	68698	9039639	<0.03	<0.03	NA	< 0.03	98%	80%	120%				90%	60%	130%
Chrysene	68698	9039639	0.06	0.08	NA	< 0.05	99%	80%	120%				105%	60%	130%
Benzo(b)fluoranthene	68698	9039639	<0.02	<0.02	NA	< 0.02	104%	80%	120%				86%	60%	130%
Benzo(j)fluoranthene	68698	9039639	<0.02	<0.02	NA	< 0.02	101%	80%	120%				99%	60%	130%
Benzo(k)fluoranthene	68698	9039639	<0.02	<0.02	NA	< 0.02	93%	80%	120%				85%	60%	130%
Benzo(a)pyrene	68698	9039639	<0.03	<0.03	NA	< 0.03	99%	80%	120%				99%	60%	130%
Indeno(1,2,3-c,d)pyrene	68698	9039639	<0.02	<0.02	NA	< 0.02	98%	80%	120%				97%	60%	130%
Dibenzo(a,h)anthracene	68698	9039639	<0.005	<0.005	NA	< 0.005	98%	80%	120%				92%	60%	130%
Benzo(g,h,i)perylene	68698	9039639	<0.05	<0.05	NA	< 0.05	98%	80%	120%				102%	60%	130%
Quinoline	68698	9039639	<0.05	<0.05	NA	< 0.05	97%	80%	120%				89%	50%	130%
EPH C10-C19	68698	9039639	6340	7140	11.9%	< 20	112%	70%	130%				92%	65%	120%
EPH C19-C32	68698	9039639	1830	2090	13.3%	< 20	104%	70%	130%				92%	80%	120%
Naphthalene - d8	68698	9039639	70	84	18.2%		100%	80%	120%				108%	50%	130%
2-Fluorobiphenyl	68698	9039639	117	120	2.5%		99%	80%	120%				102%	50%	130%
P-Terphenyl - d14	68698	9039639	74	84	12.7%		99%	80%	120%				103%	60%	130%

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

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Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18V304890

PROJECT: K19 Field Inv 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Arsenic	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
pH 1:2	INOR-181-6031	BC MOE Lab Manual B (pH, Electrometric, Soil)	PH METER
Aluminum	MET-181-6106, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP/OES
Antimony	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Barium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Beryllium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Bismuth	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Cadmium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Calcium	MET-181-6106, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP/OES
Chromium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Cobalt	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Copper	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Iron	MET-181-6106, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP/OES
Lead	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Lithium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Magnesium	MET-181-6106, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP/OES
Manganese	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP-MS
Mercury	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Molybdenum	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Nickel	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Phosphorus	MET-181-6106, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP/OES
Potassium	MET-181-6106, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP/OES
Selenium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Silver	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Sodium	MET-181-6106, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP/OES
Strontium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP-MS
Thallium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS

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SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Tin	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Titanium	MET-181-6106, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP/OES
Uranium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Vanadium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Zinc	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Zirconium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18V304890

PROJECT: K19 Field Inv 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Naphthalene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
2-Methylnaphthalene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
1-Methylnaphthalene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Acenaphthylene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Acenaphthene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Fluorene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Phenanthrene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Anthracene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Fluoranthene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Pyrene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(a)anthracene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Chrysene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(b)fluoranthene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(j)fluoranthene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(k)fluoranthene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(a)pyrene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Indeno(1,2,3-c,d)pyrene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Dibenzo(a,h)anthracene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(g,h,i)perylene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Quinoline	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
IACR CCME (Soil)	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
B[a]P TPE (Soil)	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
EPH C10-C19	ORG-180-5101	Modified from BCMOE Lab Manual Section D (EPH)	GC/FID
EPH C19-C32	ORG-180-5101	Modified from BCMOE Lab Manual Section D (EPH)	GC/FID
LEPH C10-C19	ORG-180-5101	Modified from BCMOE Lab Manual Section D (EPH)	GC/FID
HEPH C19-C32	ORG-180-5101	Modified from BCMOE Lab Manual Section D (EPH)	GC/FID
Naphthalene - d8	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS

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http://www.agatlabs.com

Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18V304890

PROJECT: K19 Field Inv 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
2-Fluorobiphenyl	ORG-180-5102	Modified form BCMOE Lab Manual Section D (PAH)	GC/MS
P-Terphenyl - d14	ORG-180-5102	Modified form BCMOE Lab Manual Section D (PAH)	GC/MS
Methyl tert-butyl ether (MTBE)	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
Benzene	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
Toluene	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
Ethylbenzene	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
m&p-Xylene	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
o-Xylene	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
Styrene	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
VPH	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
VH	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
Bromofluorobenzene	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS
Dibromofluoromethane	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS
Toluene - d8	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS

18V304890

CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

No. 04302 page 1 of 3

Golder Associates
200 – 2920 Virtual Way
Vancouver, British Columbia, Canada V5M 0C4
Telephone (604) 296-4200 Fax (604) 298-5253

Project Number: 165 7709/6000			Laboratory Name: AGAT JAN 24 AM 10:42
Short Title: K19 Field Inv	Golder Contact: Erin O'Brien		Address: 120-4600 Glenlyon Pkway
Golder E-mail Address 1: erin-o'brien @golder.com	Golder E-mail Address 2: konae-dan-bda @golder.com		Telephone/Fax: [illegible] 778-49[illegible] Contact: Yasmin Galindo

Office Name: Vancouver

EQuIS Facility Code: 28433859
EQuIS upload: ☑

Turnaround Time: ☐ 24 hr ☐ 48 hr ☐ 72 hr ☒ Regular (5 Days)
Criteria: ☒ CSR ☐ CCME ☐ BC Water Quality ☐ Other

Note: Final Reports to be issued by e-mail

Quote No.:

Analyses Required

Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D / M / Y)	Time Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	BTEX/VPH	LEPH/HEPH/PAH	RUSH (Select TAT above)	Remarks (over)
04302 - 01	K19-MW18-02	1	0.3-0.5	Soil	17/01/17	10:20	Discrete			2				9027719
- 02		2	2.5-3.0			10:30				2				723
- 03		3	4.8-5.2			10:50				2				724
- 04		4	6.5-7.0			11:20				4	X	X		725
- 05		5	8.5-9.0			12:00				4				726
- 06		6	10.0-10.5			12:30				4				727
- 07		7	11.5-12.0			13:20				2				728
- 08	K19-SW18-03	1	2.5-3.0			14:40				2				729
- 09	"	2	4.8-5.2			~~15:00~~				4				
- 10	K19-SW18-03	2	4.8-5.2			15:00				4				730
- 11	K19-SW18-04	1	2.0-2.3			15:45				2				731
- 12	"	2	3.8-4.2			16:00				2				732

Sampler's Signature:	Relinquished by: Signature	Company: Golder	Date: 16/01/18	Time: 14:00	Received by: Signature	Company
Comments: Invoice Dave Osgathorpe	Method of Shipment:	Waybill No.:	Received for Lab by: Cara Lin	Date	Time	
	Shipped by:	Shipment Condition: Seal Intact:	Temp (°C): 4	Cooler opened by:	Date	Time

WHITE: Golder Copy YELLOW: Lab Copy

ESED

18V304890

CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

No. 04303 page 2 of 3

Golder Associates
200 – 2920 Virtual Way
Vancouver, British Columbia, Canada V5M 0C4
Telephone (604) 296-4200 Fax (604) 298-5253

Project Number: 167709/6000			Laboratory Name: ALS-AT JAN 24 AM 10:42
Short Title: Kigé Field Inv.	Golder Contact: Erin O'Brien		Address: 120-4600 Glenmore Rd
Golder E-mail Address 1: erin-o'brien@golder.com	Golder E-mail Address 2: [illegible]@golder.com		Telephone/Fax: 778-452-4000 Contact: [illegible]

Office Name: Vancouver

EQuIS Facility Code: 28433851
EQuIS upload: ☒

Turnaround Time: ☐ 24 hr ☐ 48 hr ☐ 72 hr ☒ Regular (5 Days)
Criteria: ☒ CSR ☒ CCME ☒ BC Water Quality ☐ Other

Note: Final Reports to be issued by e-mail

Quote No.:

Analyses Required

Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D / M / Y)	Time Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	BTEX/VPH	LEPH/HEPH/PAH	Metals	RUSH (Select TAT above)	Remarks (over)
04303 - 01	KG-SW18-05	1	0.3-0.5	Soil	18/01/18	10:10				4					9027733
- 02	↓	2	1.3-1.5	↓	↓	10:15				4					734
- 03	↓	3	2.2-2.5	↓	↓	10:40				4					735
- 04	KG-MW18-06	1	0.3-0.5	↓	↓	11:20				3			X		736
- 05	↓	2	1.5-2.0	↓	↓	11:40				4					737
- 06	↓	3	3.0-3.5	↓	↓	11:50				4	X	X			738
- 07	↓	4	5.0-5.5	↓	↓	12:10				4					739
- 08	↓	5	7.0-7.5	↓	↓	12:30				4					740
- 09	↓	6	8.5-9.0	↓	↓	13:00				2					741
- 10	↓	7	10.0-10.6	↓	↓	13:30				2					742
- 11	KG-MW18-07	1	0.3-0.5	↓	↓	15:00				2					743
- 12	↓	2	2.0-2.5	↓	↓	15:15				4					751

Sampler's Signature:	Relinquished by: Signature	Company: Golder	Date: 18/01/18	Time: 19:00	Received by: Signature	Company
Comments: Invoice Dave Osgathorpe	Method of Shipment:	Waybill No.:	Received for Lab by: Laura	Date	Time	
	Shipped by:	Shipment Condition: Seal Intact:	Temp (°C): 4	Cooler opened by:	Date	Time

WHITE: Golder Copy YELLOW: Lab Copy

ESED

18V304890

CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

No. 04315 page 33 of 33

Golder Associates

200 – 2920 Virtual Way
Vancouver, British Columbia, Canada V5M 0C4
Telephone (604) 296-4200 Fax (604) 298-5253

Project Number: 1657709 / 6000			Laboratory Name: ABA JAN 24 AM 10:42
Short Title: K19 Field INV	Golder Contact: Erin O'Brien		Address: 120 - 4600 Glenmore Pky BBY
Golder E-mail Address 1: erin_o'brien @golder.com	Golder E-mail Address 2: Ivonne_dion-belair @golder.com		Telephone/Fax: 778-452-4008 · Contact: Yasmine Galindo

Office Name: Vancouver

EQuIS Facility Code: 28433859
EQuIS upload: ☒

Turnaround Time: ☐ 24 hr ☐ 48 hr ☐ 72 hr ☒ Regular (5 Days)
Criteria: ☒ CSR ☒ CCME ☐ BC Water Quality ☐ Other

Note: Final Reports to be issued by e-mail

Quote No.:

Analyses Required

Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D / M / Y)	Time Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	LEPH/HEPH/PAH	BTEX/VPH	HOLD	RUSH (Select TAT above)	Remarks (over)
04315-01	K19-TP18-13		0.5	SO	18/01/18	1020	GRAB			4	X	X	X		9027753
-02			1.5			1045		FDA	04315-03	4	X	X			754
-03			2.5			↓		FD	04315-02	4	X	X			755
-04			2.5			1100				4			X		758
-05	↓		3.2			1120				12			X		760
-06	K19-TP18-14		0.5			1250				4			X		761
-07			1.5			1320				4	X	X			762
-08			2.5			1345				4	X	X			763
-09	↓		3.0	↓	↓	1430	↓			4	~~X~~	~~X~~ SS	18/01/18.		764
-10															
-11															
-12															

Sampler's Signature:	Relinquished by: Signature	Company: Golder	Date: 18/01/18	Time: 19:00	Received by: Signature	Company	
Comments: Bill to Dave Dsgnthorpe.	Method of Shipment:	Waybill No.:	Received for Lab by: Lara	Date	Time		
	Shipped by:	Shipment Condition: Seal Intact:	Temp (°C): 4	Cooler opened by:	Date	Time	

WHITE: Golder Copy YELLOW: Lab Copy

ESED

AGAT Laboratories

SAMPLE INTEGRITY RECEIPT FORM - BURNABY

Work Order # 18V304890

RECEIVING BASICS:

Received From: Courier Waybill #: _____

SAMPLE QUANTITIES:

Coolers: 3 Containers: 106

TIME SENSITIVE ISSUES:

Earliest Date Sampled: 17-JAN-18 ALREADY EXCEEDED? Yes (No)

NON-CONFORMANCES:

3 temperatures of samples* and average of each cooler: (record differing temperatures on the CoC next to sample ID's) *use jars when available

(1) 5 + 6 + 5 = 5 °C (2) 3 + 3 + 3 = 3 °C (3) 4 + 4 + 3 = 4 °C (4) ___ + ___ + ___ = ___ °C

Was ice or ice pack present: (Yes) No

Integrity Issues:

Account Project Manager: _____ have they been notified of the above issues: Yes No

Whom spoken to: _____ Date and Time: _____

ADDITIONAL NOTES:

One cooler has custody seal - intact.

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA
219-800 BURRARD ST
VANCOUVER, BC V6Z 0B9
604-671-1831

ATTENTION TO: Erin O'Brien

PROJECT: 1657709-6000

AGAT WORK ORDER: 18N304491

SOIL ANALYSIS REVIEWED BY: Andrew Garrard, B.Sc., General Manager

TRACE ORGANICS REVIEWED BY: Angela Bond, Technical Reviewer

WATER ANALYSIS REVIEWED BY: Andrew Garrard, B.Sc., General Manager

DATE REPORTED: Feb 05, 2018

PAGES (INCLUDING COVER): 51

VERSION*: 2

Should you require any information regarding this analysis please contact your client services representative at (778) 452-4000

*NOTES

VERSION 2: Sample receipt temperature 5°C.

Version 2 is issued on February 6th, 2018 to report PAH analysis on samples "04306-05" and "04306-06" as requested by Andrew Bruemmer on January 31st, 2018.

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

AGAT Laboratories

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http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works Metals in Soil

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-02-05

		SAMPLE DESCRIPTION:		04304-09
		SAMPLE TYPE:		Soil
		DATE SAMPLED:		2018-01-19
Parameter	Unit	G / S	RDL	9025012
Aluminum	µg/g		10	9800
Antimony	µg/g		0.1	0.6
Arsenic	µg/g		0.1	8.4
Barium	µg/g		0.5	168
Beryllium	µg/g		0.1	0.5
Bismuth	µg/g		0.5	<0.5
Cadmium	µg/g		0.01	0.34
Calcium	µg/g		10	9540
Chromium	µg/g		1	17
Cobalt	µg/g		0.1	6.3
Copper	µg/g		0.2	13.2
Iron	µg/g		10	17300
Lead	µg/g		0.1	25.7
Lithium	µg/g		0.5	8.4
Magnesium	µg/g		10	2840
Manganese	µg/g		1	171
Mercury	µg/g		0.01	0.04
Molybdenum	µg/g		0.2	1.8
Nickel	µg/g		0.5	13.4
Phosphorus	µg/g		5	511
Potassium	µg/g		5	1380
Selenium	µg/g		0.1	0.6
Silver	µg/g		0.5	<0.5
Sodium	µg/g		5	54
Strontium	µg/g		1	30
Thallium	µg/g		0.1	0.2
Tin	µg/g		0.2	0.8
Titanium	µg/g		1	35
Uranium	µg/g		0.2	1.0
Vanadium	µg/g		1	37

Certified By:

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works Metals in Soil

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-02-05

			SAMPLE DESCRIPTION:	04304-09
			SAMPLE TYPE:	Soil
			DATE SAMPLED:	2018-01-19
Parameter	Unit	G / S	RDL	9025012
Zinc	µg/g		1	58
Zirconium	µg/g		0.1	0.4
pH 1:2	pH units		0.05	7.68

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9025012 Results are based on the dry weight of the sample

Certified By:

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works LEPH/HEPH in Soil Low Level

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-02-05

		SAMPLE DESCRIPTION:		04306-04	04306-05	04306-06		04305-01	04305-07	04304-01
		SAMPLE TYPE:		Soil	Soil	Soil		Soil	Soil	Soil
		DATE SAMPLED:		2018-01-20	2018-01-20	2018-01-20		2018-01-19	2018-01-20	2018-01-18
Parameter	Unit	G / S	RDL	9024976	9024977	9024978	RDL	9024984	9024992	9024998
Naphthalene	µg/g		0.005	0.678	0.132	0.328	0.005	0.024	0.051	<0.005
2-Methylnaphthalene	µg/g		0.05	1.10	0.44	0.76	0.005	0.119	0.187	<0.005
1-Methylnaphthalene	µg/g		0.05	1.22	0.34	0.51	0.005	0.152	0.198	<0.005
Acenaphthylene	µg/g		0.005	<0.005	<0.005	<0.005	0.005	<0.005	<0.005	<0.005
Acenaphthene	µg/g		0.005	<0.005	<0.005	<0.005	0.005	<0.005	<0.005	<0.005
Fluorene	µg/g		0.02	0.13	0.07	0.11	0.02	<0.02	<0.02	<0.02
Phenanthrene	µg/g		0.02	0.53	0.30	0.34	0.02	0.33	0.39	0.02
Anthracene	µg/g		0.004	<0.004	<0.004	<0.004	0.004	<0.004	<0.004	<0.004
Fluoranthene	µg/g		0.01	0.03	0.02	0.03	0.01	0.04	0.03	<0.01
Pyrene	µg/g		0.01	0.03	0.05	0.05	0.01	0.08	0.06	<0.01
Benzo(a)anthracene	µg/g		0.03	<0.03	<0.03	<0.03	0.03	<0.03	<0.03	<0.03
Chrysene	µg/g		0.05	0.13	0.08	0.09	0.05	0.10	0.11	<0.05
Benzo(b)fluoranthene	µg/g		0.02	0.06	0.04	0.04	0.02	0.06	0.07	<0.02
Benzo(j)fluoranthene	µg/g		0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.02
Benzo(k)fluoranthene	µg/g		0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.02
Benzo(a)pyrene	µg/g		0.03	<0.03	<0.03	<0.03	0.03	<0.03	<0.03	<0.03
Indeno(1,2,3-c,d)pyrene	µg/g		0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.02
Dibenzo(a,h)anthracene	µg/g		0.005	0.005	<0.005	0.005	0.005	<0.005	<0.005	<0.005
Benzo(g,h,i)perylene	µg/g		0.05	0.11	0.13	0.14	0.05	0.07	0.07	<0.05
Quinoline	µg/g		0.05	<0.05	<0.05	<0.05	0.05	<0.05	<0.05	<0.05
IACR CCME (Soil)	µg/g		0.6	0.6	<0.6	<0.6	0.6	0.6	0.7	<0.6
B[a]P TPE (Soil)	µg/g		0.05	<0.05	<0.05	<0.05	0.05	<0.05	<0.05	<0.05
EPH C10-C19	µg/g		20	299	59	58	20	62	56	<20
EPH C19-C32	µg/g		20	84	66	70	20	84	78	<20
LEPH C10-C19	µg/g		20	298	59	57	20	62	56	<20
HEPH C19-C32	µg/g		20	84	66	70	20	83	77	<20
Benzo(b+j)fluoranthene	µg/g		0.05	0.06	<0.05	<0.05	0.05	0.06	0.07	<0.05

Certified By: Angela Bond

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works LEPH/HEPH in Soil Low Level

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-02-05

		SAMPLE DESCRIPTION:	04306-04	04306-05	04306-06	04305-01	04305-07	04304-01
		SAMPLE TYPE:	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:	2018-01-20	2018-01-20	2018-01-20	2018-01-19	2018-01-20	2018-01-18
Surrogate	Unit	Acceptable Limits	9024976	9024977	9024978	9024984	9024992	9024998
Naphthalene - d8	%	50-130	76	82	77	67	69	68
2-Fluorobiphenyl	%	50-130	79	81	77	68	67	71
P-Terphenyl - d14	%	60-130	83	99	93	82	84	83

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9024976 Results are based on dry weight of sample.
LEPH & HEPH results have been corrected for PAH contributions.
Soil sample is visibly heterogeneous.
PAH detection limits increased due to sample matrix interference. Sample extract was diluted.

9024977-9024978 Results are based on dry weight of sample.
LEPH & HEPH results have been corrected for PAH contributions.
Soil sample is visibly heterogeneous.

9024984-9024998 Results are based on dry weight of sample.
LEPH & HEPH results have been corrected for PAH contributions.
Soil sample is visibly heterogeneous.

Certified By: Angela Bond

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Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

BC Routine VOC package in Air (Canister) -ug/m3

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-02-05

		SAMPLE DESCRIPTION:		04316-01	04316-02		04316-06	04316-07	04316-08
		SAMPLE TYPE:		Air	Air		Air	Air	Air
		DATE SAMPLED:		2018-01-19	2018-01-19		2018-01-21	2018-01-21	2018-01-21
Parameter	Unit	G / S	RDL	9025032	9025036	RDL	9025040	9025041	9025042
1,2,4-Trimethylbenzene	ug/m3		6.0	<6.0	<6.0	15.0	<15.0	<15.0	<15.0
1,3,5-Trimethylbenzene	ug/m3		6.0	<6.0	<6.0	15.0	<15.0	<15.0	<15.0
1,3-Butadiene	ug/m3		4.0	<4.0	<4.0	10.0	<10.0	<10.0	<10.0
Isopropylbenzene	ug/m3		3.20	<3.20	<3.20	8.00	<8.00	<8.00	<8.00
Methylcyclohexane	ug/m3		2.80	51	21	7.00	<7.00	57	77
Methyl tert-Butyl ether (MTBE)	ug/m3		3.20	<3.20	<3.20	8.00	<8.00	<8.00	<8.00
Naphthalene	ug/m3		8.0	<8.0	<8.0	20.0	<20.0	<20.0	<20.0
n-Decane	ug/m3		5.2	15	<5.2	13.0	<13.0	210	160
n-Hexane	ug/m3		4.4	4.7	50	11.0	21	310	110
VPHv (C>6-C13)	ug/m3		60	3000	3000	150	25000	27000	25000
Surrogate	Unit	Acceptable Limits							
4-Bromofluorobenzene	%	70-130		110	109		112	112	123

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AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

BC Routine VOC package in Air (Canister) -ug/m3

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-02-05

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9025032-9025036 Air anaylsis was performed from an air canister sample, using a Cold Vapor Trap preconcentrator and GC/MSD.
Note: Methylcyclohexane is a non routine parameter, identification is done using the GC/MS and the appropriate m/z fragments. If the compound is present it will be quantitated using cyclohexane calibration standards and the TIC area.

Due to the presence of high levels of hydrocarbons the nominal volume could not be used, this is considered a dilution.
Dilution factor=4.
The Reporting Detection Limit has been adjusted accordingly.

Analysis done at AGAT 5623 McAdam Road Mississauga location.

9025040 Air anaylsis was performed from an air canister sample, using a Cold Vapor Trap preconcentrator and GC/MSD.
Note: Methylcyclohexane is a non routine parameter, identification is done using the GC/MS and the appropriate m/z fragments. If the compound is present it will be quantitated using cyclohexane calibration standards and the TIC area.

Due to the presence of high levels of hydrocarbons the nominal volume could not be used, this is considered a dilution.
Dilution factor=10.
The Reporting Detection Limit has been adjusted accordingly.

Analysis done at AGAT 5623 McAdam Road Mississauga location.

9025041-9025042 Air anaylsis was performed from an air canister sample, using a Cold Vapor Trap preconcentrator and GC/MSD.
Note: Methylcyclohexane is a non routine parameter, identification is done using the GC/MS and the appropriate m/z fragments. If the compound is present it will be quantitated using cyclohexane calibration standards and the TIC area.

Due to the presence of high levels of hydrocarbons the nominal volume could not be used, this is considered a dilution.
Dilution factor=10.
The Reporting Detection Limit has been adjusted accordingly.
Analysis done at AGAT 5623 McAdam Road Mississauga location.

Certified By: Angela Bond

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AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

BTEX / VPH (C6-C10) Soil

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-02-05

		SAMPLE DESCRIPTION:		04305-01	04305-07	04304-01
		SAMPLE TYPE:		Soil	Soil	Soil
		DATE SAMPLED:		2018-01-19	2018-01-20	2018-01-18
Parameter	Unit	G / S	RDL	9024984	9024992	9024998
Methyl tert-butyl ether (MTBE)	µg/g		0.1	<0.1	<0.1	<0.1
Benzene	µg/g		0.02	<0.02	<0.02	<0.02
Toluene	µg/g		0.05	<0.05	<0.05	<0.05
Ethylbenzene	µg/g		0.05	<0.05	<0.05	<0.05
m&p-Xylene	µg/g		0.05	<0.05	<0.05	<0.05
o-Xylene	µg/g		0.05	<0.05	<0.05	<0.05
Styrene	µg/g		0.05	<0.05	<0.05	<0.05
VPH	µg/g		10	<10	<10	<10
VH	µg/g		10	<10	<10	<10
Total Xylenes	ug/g		0.1	<0.1	<0.1	<0.1
Surrogate	Unit	Acceptable Limits				
Bromofluorobenzene	%	60-140		93	97	101
Dibromofluoromethane	%	60-140		113	118	121
Toluene - d8	%	60-140		105	108	113

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9024984-9024998 Results are based on dry weight of sample.
VPH results have been corrected for BTEX contributions.

Certified By: Angela Bond

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AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

CCME BTEX/F1-F4 (Water)

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-02-05

		SAMPLE DESCRIPTION:		04319-01	04319-02	04319-03	04319-04
		SAMPLE TYPE:		Water	Water	Water	Water
		DATE SAMPLED:		2018-01-21	2018-01-21	2018-01-21	2018-01-21
Parameter	Unit	G / S	RDL	9025059	9025067	9025068	9025069
Benzene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
Toluene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
m&p-Xylene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
o-Xylene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
F1 (C6-C10)	µg/L		100	<100	<100	<100	250
F1 minus BTEX (C6-C10)	µg/L		100	<100	<100	<100	250
F2 (C10-C16)	µg/L		100	<100	<100	<100	<100
F3 (C16-C34)	µg/L		100	<100	<100	<100	<100
F4 (C34-C50)	µg/L		100	<100	<100	<100	<100
Surrogate	Unit	Acceptable Limits					
Bromofluorobenzene	%	70-130		97	94	92	96
Dibromofluoromethane	%	70-130		107	106	104	103
Toluene - d8	%	70-130		101	99	95	102

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9025059-9025069 The F1 (C6 - C10) fraction is determined by integrating the FID chromatogram from the beginning of the n-C6 peak to the apex of the last n-C10 peak.
The C6 - C10 fraction is calculated from the FID toluene response factor.
Quality control for the calibration follows the guidelines set out in the CCME Contaminated Sites Method for Soils.
The (F1 minus BTEX) has been calculated by subtracting the BTEX concentration from Fraction 1.
The C10 - C16 (F2), C16 - C34 (F3), and C34 - C50 (F4) fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Quality control data is available upon request.
Assistance in the interpretation of data is available upon request.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
The chromatogram has returned to baseline by the retention time of nC50.
Extraction and holding times were met for this sample.

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Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works : BC VOCs in Air (Canister) - ug/m3

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-02-05

SAMPLE DESCRIPTION:				04316-01	04316-02		04316-06	04316-07	04316-08
SAMPLE TYPE:				Air	Air		Air	Air	Air
DATE SAMPLED:				2018-01-19	2018-01-19		2018-01-21	2018-01-21	2018-01-21
Parameter	Unit	G / S	RDL	9025032	9025036	RDL	9025040	9025041	9025042
Dichlorodifluoromethane	ug/m3		4.0	<4.0	<4.0	10.0	<10.0	<10.0	<10.0
1,2-Dichlorotetrafluoroethane	ug/m3		5.6	<5.6	<5.6	14.0	<14.0	<14.0	<14.0
1,1,2-Trichloro-1,2,2-trifluoroethane	ug/m3		6.0	<6.0	<6.0	15.0	<15.0	<15.0	<15.0
Chloromethane	ug/m3		2.40	<2.40	<2.40	6.00	<6.00	<6.00	<6.00
Vinyl Chloride	ug/m3		1.60	<1.60	<1.60	4.00	<4.00	<4.00	<4.00
Bromomethane	ug/m3		7.6	<7.6	<7.6	19.0	<19.0	<19.0	<19.0
Chloroethane	ug/m3		4.0	<4.0	<4.0	10.0	<10.0	<10.0	<10.0
Vinyl Bromide	ug/m3		3.20	<3.20	<3.20	8.00	<8.00	<8.00	<8.00
Trichlorofluoromethane	ug/m3		9.2	<9.2	<9.2	23.0	<23.0	<23.0	<23.0
1,1-Dichloroethene	ug/m3		4.0	<4.0	<4.0	10.0	<10.0	<10.0	<10.0
Methylene Chloride	ug/m3		4.0	<4.0	<4.0	10.0	<10.0	<10.0	<10.0
trans-1,2-Dichloroethene	ug/m3		3.20	<3.20	<3.20	8.00	<8.00	<8.00	<8.00
1,1-Dichloroethane	ug/m3		4.8	<4.8	<4.8	12.0	<12.0	<12.0	<12.0
cis-1,2-Dichloroethene	ug/m3		3.20	<3.20	<3.20	8.00	<8.00	<8.00	<8.00
Chloroform	ug/m3		4.0	<4.0	7.5	10.0	<10.0	<10.0	<10.0
1,2-Dichloroethane	ug/m3		1.20	<1.20	<1.20	3.00	<3.00	<3.00	<3.00
1,1,1-Trichloroethane	ug/m3		6.4	<6.4	<6.4	16.0	<16.0	<16.0	<16.0
Carbon Tetrachloride	ug/m3		8.0	<8.0	<8.0	20.0	<20.0	<20.0	<20.0
Benzene	ug/m3		2.00	2.7	3.2	5.00	<5.00	44	71
1,2-Dichloropropane	ug/m3		8.0	<8.0	<8.0	20.0	<20.0	<20.0	<20.0
2,2-Dichloropropane	ug/m3		8.0	<8.0	<8.0	20.0	<20.0	<20.0	<20.0
Trichloroethene	ug/m3		4.0	<4.0	<4.0	10.0	<10.0	<10.0	<10.0
Bromodichloromethane	ug/m3		5.2	<5.2	<5.2	13.0	<13.0	<13.0	<13.0
cis-1,3-Dichloropropene	ug/m3		4.0	<4.0	<4.0	10.0	<10.0	<10.0	<10.0
trans-1,3-Dichloropropene	ug/m3		4.0	<4.0	<4.0	10.0	<10.0	<10.0	<10.0
Methyl Isobutyl Ketone (MIBK)	ug/m3		8.0	<8.0	<8.0	20.0	<20.0	<20.0	<20.0
1,1,2-Trichloroethane	ug/m3		6.4	<6.4	<6.4	16.0	<16.0	<16.0	<16.0
Toluene	ug/m3		3.20	8.4	6.0	8.00	<8.00	9.2	<8.00
2-Hexanone	ug/m3		8.0	<8.0	<8.0	20.0	<20.0	<20.0	<20.0
Dibromochloromethane	ug/m3		8.0	<8.0	<8.0	20.0	<20.0	<20.0	<20.0

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Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works : BC VOCs in Air (Canister) - ug/m3

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-02-05

		SAMPLE DESCRIPTION:		04316-01	04316-02		04316-06	04316-07	04316-08
		SAMPLE TYPE:		Air	Air		Air	Air	Air
		DATE SAMPLED:		2018-01-19	2018-01-19		2018-01-21	2018-01-21	2018-01-21
Parameter	Unit	G / S	RDL	9025032	9025036	RDL	9025040	9025041	9025042
1,2-Dibromoethane	ug/m3		6.0	<6.0	<6.0	15.0	<15.0	<15.0	<15.0
Tetrachloroethene	ug/m3		4.0	17	20	10.0	<10.0	<10.0	<10.0
Chlorobenzene	ug/m3		4.0	<4.0	<4.0	10.0	<10.0	<10.0	<10.0
Ethylbenzene	ug/m3		3.6	<3.6	<3.6	9.0	<9.0	<9.0	<9.0
m&p-Xylene	ug/m3		6.0	8.1	6.6	15.0	35	<15.0	<15.0
Bromoform	ug/m3		8.0	<8.0	<8.0	20.0	<20.0	<20.0	<20.0
Styrene	ug/m3		4.0	<4.0	<4.0	10.0	<10.0	<10.0	<10.0
1,1,2,2-Tetrachloroethane	ug/m3		6.0	<6.0	<6.0	15.0	<15.0	<15.0	<15.0
o-Xylene	ug/m3		3.6	<3.6	<3.6	9.0	16	<9.0	<9.0
1,3-Dichlorobenzene	ug/m3		10.0	<10.0	<10.0	25.0	<25.0	<25.0	<25.0
1,4-Dichlorobenzene	ug/m3		10.0	<10.0	<10.0	25.0	<25.0	<25.0	<25.0
1,2-Dichlorobenzene	ug/m3		10.0	<10.0	<10.0	25.0	<25.0	<25.0	<25.0
Total Xylenes	ug/m3		8.0	8.1	<8.0	20.0	41	<20.0	<20.0
Surrogate	Unit	Acceptable Limits							
4-Bromofluorobenzene	%	70-130		110	114		113	112	123

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Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works : BC VOCs in Air (Canister) - ug/m3

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-02-05

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9025032 VOC anaylsis was performed from an air canister sample, using a Cold Vapor Trap preconcentrator and GC/MSD.
Pressure upon arrival to the lab = 11.35 psia.

Due to the presence of high levels of hydrocarbons the nominal volume could not be used, this is considered a dilution.
Dilution factor=4.
The Reporting Detection Limit has been adjusted accordingly.

Analysis done at AGAT 5623 McAdam Road Mississauga location.

2,2-Dichloropropane was analyzed using GC/MS full scan and the specific m/z fragments for this compound, if it is present in the sample quantitation was done using the TIC area and the TIC area of 1, 2-Dichloropropane in the calibration standards.

9025036 VOC anaylsis was performed from an air canister sample, using a Cold Vapor Trap preconcentrator and GC/MSD.
Pressure upon arrival to the lab = 12.80 psia.

Due to the presence of high levels of hydrocarbons the nominal volume could not be used, this is considered a dilution.
Dilution factor=4.
The Reporting Detection Limit has been adjusted accordingly.

Analysis done at AGAT 5623 McAdam Road Mississauga location.

2,2-Dichloropropane was analyzed using GC/MS full scan and the specific m/z fragments for this compound, if it is present in the sample quantitation was done using the TIC area and the TIC area of 1, 2-Dichloropropane in the calibration standards.

9025040 VOC anaylsis was performed from an air canister sample, using a Cold Vapor Trap preconcentrator and GC/MSD.
Pressure upon arrival to the lab = 12.66 psia.

Due to the presence of high levels of hydrocarbons the nominal volume could not be used, this is considered a dilution.
Dilution factor=10.
The Reporting Detection Limit has been adjusted accordingly.
Analysis done at AGAT 5623 McAdam Road Mississauga location.

2,2-Dichloropropane was analyzed using GC/MS full scan and the specific m/z fragments for this compound, if it is present in the sample quantitation was done using the TIC area and the TIC area of 1, 2-Dichloropropane in the calibration standards.

9025041 VOC anaylsis was performed from an air canister sample, using a Cold Vapor Trap preconcentrator and GC/MSD.
Pressure upon arrival to the lab = 13.69 psia.

Due to the presence of high levels of hydrocarbons the nominal volume could not be used, this is considered a dilution.
Dilution factor=10.
The Reporting Detection Limit has been adjusted accordingly.
Analysis done at AGAT 5623 McAdam Road Mississauga location.

2,2-Dichloropropane was analyzed using GC/MS full scan and the specific m/z fragments for this compound, if it is present in the sample quantitation was done using the TIC area and the TIC area of 1, 2-Dichloropropane in the calibration standards.

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AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works : BC VOCs in Air (Canister) - ug/m3

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-02-05

9025042

VOC anaylsis was performed from an air canister sample, using a Cold Vapor Trap preconcentrator and GC/MSD.
Pressure upon arrival to the lab = 12.32 psia.

Due to the presence of high levels of hydrocarbons the nominal volume could not be used, this is considered a dilution.
Dilution factor=10.
The Reporting Detection Limit has been adjusted accordingly.
Analysis done at AGAT 5623 McAdam Road Mississauga location.

2,2-Dichloropropane was analyzed using GC/MS full scan and the specific m/z fragments for this compound, if it is present in the sample quantitation was done using the TIC area and the TIC area of 1, 2-Dichloropropane in the calibration standards.

Certified By: Angela Bond

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AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works LEPH/HEPH in Water Low Level

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-02-05

		SAMPLE DESCRIPTION:		04319-01	04319-02	04319-03	04319-04
		SAMPLE TYPE:		Water	Water	Water	Water
		DATE SAMPLED:		2018-01-21	2018-01-21	2018-01-21	2018-01-21
Parameter	Unit	G / S	RDL	9025059	9025067	9025068	9025069
Naphthalene	µg/L		0.05	<0.05	<0.05	<0.05	0.14
Quinoline	µg/L		0.05	<0.05	<0.05	<0.05	<0.05
Acenaphthylene	µg/L		0.02	<0.02	<0.02	<0.02	<0.02
Acenaphthene	µg/L		0.02	<0.02	<0.02	<0.02	<0.02
Fluorene	µg/L		0.02	<0.02	<0.02	<0.02	0.04
Phenanthrene	µg/L		0.04	<0.04	<0.04	<0.04	0.11
Anthracene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01
Acridine	µg/L		0.05	<0.05	<0.05	<0.05	<0.05
Fluoranthene	µg/L		0.02	<0.02	<0.02	<0.02	<0.02
Pyrene	µg/L		0.02	<0.02	<0.02	<0.02	<0.02
Benzo(a)anthracene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01
Chrysene	µg/L		0.01	<0.01	<0.01	<0.01	0.03
Benzo(b)fluoranthene	µg/L		0.01	<0.01	<0.01	<0.01	0.01
Benzo(j)fluoranthene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01
Benzo(k)fluoranthene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)pyrene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01
Indeno(1,2,3-c,d)pyrene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01
Dibenzo(a,h)anthracene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01
Benzo(g,h,i)perylene	µg/L		0.01	<0.01	<0.01	<0.01	0.01
1-Methylnaphthalene	µg/L		0.05	<0.05	<0.05	<0.05	0.22
2-Methylnaphthalene	µg/L		0.05	<0.05	<0.05	<0.05	0.29
EPH C10-C19	µg/L		100	<100	<100	<100	<100
EPH C19-C32	µg/L		100	<100	<100	<100	<100
LEPH C10-C19	µg/L		100	<100	<100	<100	<100
HEPH C19-C32	µg/L		100	<100	<100	<100	<100
Benzo(b+j)fluoranthene	µg/L		0.01	<0.01	<0.01	<0.01	0.01
Surrogate	Unit	Acceptable Limits					
Naphthalene - d8	%	50-130		83	83	82	82
2-Fluorobiphenyl	%	50-130		84	83	83	74
P-Terphenyl - d14	%	60-130		81	81	79	77

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Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works LEPH/HEPH in Water Low Level

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-02-05

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9025059-9025069 LEPH & HEPH results have been corrected for PAH contributions.

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Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Volatile Organic Compounds in Soil

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-02-05

		SAMPLE DESCRIPTION:		04306-04
		SAMPLE TYPE:		Soil
		DATE SAMPLED:		2018-01-20
Parameter	Unit	G / S	RDL	9024976
Chloromethane	µg/g		0.05	<0.05
Vinyl Chloride	µg/g		0.05	<0.05
Bromomethane	µg/g		0.05	<0.05
Chloroethane	µg/g		0.05	<0.05
Trichlorofluoromethane	µg/g		0.05	<0.05
Acetone	µg/g		0.5	<0.5
1,1-Dichloroethylene	µg/g		0.05	<0.05
Dichloromethane	µg/g		0.05	<0.05
Methyl tert-butyl ether (MTBE)	µg/g		0.1	<0.1
2-Butanone (MEK)	µg/g		0.5	<0.5
trans-1,2-Dichloroethene	µg/g		0.05	<0.05
1,1-Dichloroethane	µg/g		0.05	<0.05
cis-1,2-Dichloroethene	µg/g		0.05	<0.05
Chloroform	µg/g		0.05	<0.05
1,2-Dichloroethane	µg/g		0.05	<0.05
1,1,1-Trichloroethane	µg/g		0.05	<0.05
Carbon Tetrachloride	µg/g		0.02	<0.02
Benzene	µg/g		0.02	0.17
1,2-Dichloropropane	µg/g		0.05	<0.05
Trichloroethene	µg/g		0.01	<0.01
Bromodichloromethane	µg/g		0.05	<0.05
trans-1,3-Dichloropropene	µg/g		0.05	<0.05
4-Methyl-2-pentanone (MIBK)	µg/g		0.5	<0.5
cis-1,3-Dichloropropene	µg/g		0.05	<0.05
1,1,2-Trichloroethane	µg/g		0.05	<0.05
Toluene	µg/g		0.05	0.12
Dibromochloromethane	µg/g		0.05	<0.05
1,2-Dibromoethane	µg/g		0.05	<0.05
Tetrachloroethylene	µg/g		0.05	<0.05
1,1,1,2-Tetrachloroethane	µg/g		0.05	<0.05

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Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Volatile Organic Compounds in Soil

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-02-05

		SAMPLE DESCRIPTION:		04306-04
		SAMPLE TYPE:		Soil
		DATE SAMPLED:		2018-01-20
Parameter	Unit	G / S	RDL	9024976
Chlorobenzene	µg/g		0.05	<0.05
Ethylbenzene	µg/g		0.05	0.09
m&p-Xylene	µg/g		0.05	0.39
Bromoform	µg/g		0.05	<0.05
Styrene	µg/g		0.05	<0.05
1,1,2,2-Tetrachloroethane	µg/g		0.05	<0.05
o-Xylene	µg/g		0.05	0.10
1,3-Dichlorobenzene	µg/g		0.05	<0.05
1,4-Dichlorobenzene	µg/g		0.05	<0.05
1,2-Dichlorobenzene	µg/g		0.05	<0.05
1,2,4-Trichlorobenzene	µg/g		0.05	<0.05
VH	µg/g		10	19
VPH	µg/g		10	18
1,3-Dichloropropene (cis + trans)	µg/g		0.05	<0.05
Total Xylenes	µg/g		0.2	0.5
Surrogate	Unit	Acceptable Limits		
Bromofluorobenzene	%	60-140		109
Dibromofluoromethane	%	60-140		109
Toluene - d8	%	60-140		118

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9024976 Results are based on dry weight of sample.

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AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Volatile Organic Compounds in Water

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-02-05

SAMPLE DESCRIPTION:				04319-01	04319-02	04319-03	04319-04
SAMPLE TYPE:				Water	Water	Water	Water
DATE SAMPLED:				2018-01-21	2018-01-21	2018-01-21	2018-01-21
Parameter	Unit	G / S	RDL	9025059	9025067	9025068	9025069
Chloromethane	µg/L		1	<1	<1	<1	<1
Vinyl Chloride	µg/L		1	<1	<1	<1	<1
Bromomethane	µg/L		1	<1	<1	<1	<1
Chloroethane	µg/L		1	<1	<1	<1	<1
Trichlorofluoromethane	µg/L		1	<1	<1	<1	<1
Acetone	µg/L		10	<10	<10	<10	<10
1,1-Dichloroethylene	µg/L		1	<1	<1	<1	<1
Dichloromethane	µg/L		1	<1	<1	<1	<1
Methyl tert-butyl ether (MTBE)	µg/L		1	<1	<1	<1	<1
2-Butanone (MEK)	µg/L		10	<10	<10	<10	<10
trans-1,2-Dichloroethylene	µg/L		1	<1	<1	<1	<1
1,1-Dichloroethane	µg/L		1	<1	<1	<1	<1
cis-1,2-Dichloroethylene	µg/L		1	<1	<1	<1	<1
Chloroform	µg/L		1	<1	<1	<1	<1
1,2-Dichloroethane	µg/L		1	<1	<1	<1	<1
1,1,1-Trichloroethane	µg/L		1	<1	<1	<1	<1
Carbon Tetrachloride	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
Benzene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	µg/L		1	<1	<1	<1	<1
Trichloroethene	µg/L		1	<1	<1	<1	<1
Bromodichloromethane	µg/L		1	<1	<1	<1	<1
trans-1,3-Dichloropropene	µg/L		1	<1	<1	<1	<1
4-Methyl-2-pentanone (MIBK)	µg/L		10	<10	<10	<10	<10
cis-1,3-Dichloropropene	µg/L		1	<1	<1	<1	<1
1,1,2-Trichloroethane	µg/L		1	<1	<1	<1	<1
Toluene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	µg/L		1	<1	<1	<1	<1
1,2-Dibromoethane	µg/L		0.3	<0.3	<0.3	<0.3	<0.3
Tetrachloroethylene	µg/L		1	<1	<1	<1	<1
1,1,1,2-Tetrachloroethane	µg/L		1	<1	<1	<1	<1

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Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Volatile Organic Compounds in Water

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-02-05

		SAMPLE DESCRIPTION:		04319-01	04319-02	04319-03	04319-04
		SAMPLE TYPE:		Water	Water	Water	Water
		DATE SAMPLED:		2018-01-21	2018-01-21	2018-01-21	2018-01-21
Parameter	Unit	G / S	RDL	9025059	9025067	9025068	9025069
Chlorobenzene	µg/L		1	<1	<1	<1	<1
Ethylbenzene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
m&p-Xylene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
Bromoform	µg/L		1	<1	<1	<1	<1
Styrene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
1,1,2,2-Tetrachloroethane	µg/L		0.8	<0.8	<0.8	<0.8	<0.8
o-Xylene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichlorobenzene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
1,2,4-Trichlorobenzene	µg/L		1	<1	<1	<1	<1
VH	µg/L		100	<100	<100	<100	<100
VPH	µg/L		100	<100	<100	<100	<100
1,3-Dichloropropene (cis + trans)	µg/L		1	<1	<1	<1	<1
Total Trihalomethanes	µg/L		2	<2	<2	<2	<2
Total Xylenes	µg/L		1	<1	<1	<1	<1
Surrogate	Unit	Acceptable Limits					
Bromofluorobenzene	%	70-130		99	86	90	100
Dibromofluoromethane	%	70-130		97	85	91	100
Toluene - d8	%	70-130		109	94	99	113

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Certified By: Angela Bond

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AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Chloride in Water

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-02-05

			SAMPLE DESCRIPTION:	04319-03
			SAMPLE TYPE:	Water
			DATE SAMPLED:	2018-01-21
Parameter	Unit	G / S	RDL	9025068
Chloride	mg/L		0.5	81.3

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

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AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works Dissolved Metals

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-02-05

		SAMPLE DESCRIPTION:		04319-01	04319-02	04319-03	04319-04
		SAMPLE TYPE:		Water	Water	Water	Water
		DATE SAMPLED:		2018-01-21	2018-01-21	2018-01-21	2018-01-21
Parameter	Unit	G / S	RDL	9025059	9025067	9025068	9025069
Aluminum Dissolved	µg/L		2	4	5	2	3
Antimony Dissolved	µg/L		0.2	<0.2	<0.2	<0.2	0.7
Arsenic Dissolved	µg/L		0.1	0.2	0.3	9.5	0.4
Barium Dissolved	µg/L		2	10100	1280	579	4720
Beryllium Dissolved	µg/L		0.01	0.02	0.02	<0.01	<0.01
Bismuth Dissolved	µg/L		0.05	<0.05	<0.05	<0.05	<0.05
Boron Dissolved	µg/L		2	138	138	110	92
Cadmium Dissolved	µg/L		0.01	<0.01	<0.01	0.03	<0.01
Calcium Dissolved	µg/L		50	100000	75400	84900	106000
Chromium Dissolved	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
Cobalt Dissolved	µg/L		0.05	0.09	1.28	0.84	2.16
Copper Dissolved	µg/L		0.2	0.2	0.3	0.4	0.2
Iron Dissolved	µg/L		10	2580	3920	5060	6640
Lead Dissolved	µg/L		0.05	<0.05	<0.05	<0.05	<0.05
Lithium Dissolved	µg/L		0.5	79.8	81.9	80.0	69.3
Magnesium Dissolved	µg/L		50	33700	29400	28800	32200
Manganese Dissolved	µg/L		1	959	651	742	575
Mercury Dissolved	µg/L		0.01	<0.01	<0.01	<0.01	<0.01
Molybdenum Dissolved	µg/L		0.05	0.79	0.49	0.61	0.80
Nickel Dissolved	µg/L		0.2	0.2	1.7	1.6	4.6
Potassium Dissolved	µg/L		50	1920	2840	2610	5270
Selenium Dissolved	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
Silicon Dissolved	µg/L		50	6180	5610	5900	6440
Silver Dissolved	µg/L		0.02	<0.02	<0.02	<0.02	<0.02
Sodium Dissolved	µg/L		50	12500	11200	11500	10100
Strontium Dissolved	µg/L		0.1	683	605	610	397
Sulphur Dissolved	µg/L		500	1400	1210	1840	2690
Thallium Dissolved	µg/L		0.01	<0.01	<0.01	0.01	<0.01
Tin Dissolved	µg/L		0.05	0.06	0.19	0.27	0.44
Titanium Dissolved	µg/L		0.5	2.1	1.7	1.8	2.1

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Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works Dissolved Metals

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-02-05

		SAMPLE DESCRIPTION:		04319-01	04319-02	04319-03	04319-04
		SAMPLE TYPE:		Water	Water	Water	Water
		DATE SAMPLED:		2018-01-21	2018-01-21	2018-01-21	2018-01-21
Parameter	Unit	G / S	RDL	9025059	9025067	9025068	9025069
Uranium Dissolved	µg/L		0.01	0.11	0.26	0.86	0.77
Vanadium Dissolved	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
Zinc Dissolved	µg/L		2	4	2	3	4
Zirconium Dissolved	µg/L		0.1	<0.1	<0.1	<0.1	0.3
Hardness (calc)	ug CaCO3/L		100	388000	309000	331000	397000

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Certified By:

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Quality Assurance

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA
AGAT WORK ORDER: 18N304491
PROJECT: 1657709-6000
ATTENTION TO: Erin O'Brien
SAMPLING SITE:
SAMPLED BY:

Soil Analysis

RPT Date: Feb 05, 2018			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Public Works Metals in Soil															
Aluminum	9025012		9800	9260	5.7%	< 10	105%	70%	130%	96%	90%	110%			
Antimony	9025012		0.6	0.5	5.9%	< 0.1	111%	70%	130%	107%	90%	110%			
Arsenic	9025012		8.4	7.6	10.3%	< 0.1	125%	70%	130%	106%	90%	110%			
Barium	9025012		168	161	4.2%	< 0.5	109%	70%	130%	103%	90%	110%			
Beryllium	9025012		0.5	0.5	NA	< 0.1	105%	70%	130%	102%	90%	110%			
Bismuth	9025012		<0.5	<0.5	NA	< 0.5				98%	85%	115%			
Cadmium	9025012		0.34	0.30	12.8%	< 0.01	106%	70%	130%	104%	90%	110%			
Calcium	9025012		9540	8700	9.2%	< 10	113%	70%	130%	94%	90%	110%			
Chromium	9025012		17	17	1.4%	< 1	108%	70%	130%	102%	90%	110%			
Cobalt	9025012		6.3	5.9	6.4%	< 0.1	107%	70%	130%	102%	90%	110%			
Copper	9025012		13.2	12.9	2.1%	< 0.2	101%	70%	130%	103%	90%	110%			
Iron	9025012		17300	16100	7.4%	< 10	101%	70%	130%	110%	90%	110%			
Lead	9025012		25.7	24.0	6.7%	< 0.1	106%	70%	130%	108%	90%	110%			
Lithium	9025012		8.4	8.3	1.1%	< 0.5				97%	85%	115%			
Magnesium	9025012		2840	2700	4.8%	< 10	110%	70%	130%	108%	90%	110%			
Manganese	9025012		171	158	8.1%	< 1	79%	70%	130%	105%	90%	110%			
Mercury	9025012		0.04	0.04	NA	< 0.01	98%	70%	130%	102%	90%	110%			
Molybdenum	9025012		1.8	1.6	9.6%	< 0.2	114%	70%	130%	99%	90%	110%			
Nickel	9025012		13.4	12.6	5.8%	< 0.5	106%	70%	130%	104%	90%	110%			
Phosphorus	9025012		511	500	2.4%	< 5	92%	70%	130%	95%	90%	110%			
Potassium	9025012		1380	1320	4.5%	< 5	108%	70%	130%	94%	90%	110%			
Selenium	9025012		0.6	0.5	14.4%	< 0.1				107%	90%	110%			
Silver	9025012		<0.5	<0.5	NA	< 0.5	128%	70%	130%	106%	90%	110%			
Sodium	9025012		54	49	9.1%	< 5	116%	70%	130%	100%	90%	110%			
Strontium	9025012		30	26	14.6%	< 1	124%	70%	130%	110%	90%	110%			
Thallium	9025012		0.2	0.2	NA	< 0.1	107%	70%	130%	104%	90%	110%			
Tin	9025012		0.8	0.7	NA	< 0.2	103%	70%	130%	99%	90%	110%			
Titanium	9025012		35	34	0.4%	< 1				92%	90%	110%			
Uranium	9025012		1.0	0.9	NA	< 0.2	129%	70%	130%	90%	90%	110%			
Vanadium	9025012		37	36	0.5%	< 1	110%	70%	130%	102%	90%	110%			
Zinc	9025012		58	59	0.4%	< 1	108%	70%	130%	102%	90%	110%			
Zirconium	9025012		0.4	0.3	NA	< 0.1				110%	90%	110%			
pH 1:2	9025012		7.68	7.69	0.1%		100%	90%	110%	100%	95%	105%			

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

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Quality Assurance

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA
AGAT WORK ORDER: 18N304491
PROJECT: 1657709-6000
ATTENTION TO: Erin O'Brien
SAMPLING SITE:
SAMPLED BY:

Trace Organics Analysis

RPT Date: Feb 05, 2018

PARAMETER	Batch	Sample Id	DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
			Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Public Works LEPH/HEPH in Soil Low Level															
Naphthalene	68653	9024976	0.678	0.571	17.1%	< 0.005	102%	80%	120%				104%	50%	130%
2-Methylnaphthalene	68653	9024976	1.10	1.17	6.2%	< 0.005	99%	80%	120%				96%	50%	130%
1-Methylnaphthalene	68653	9024976	1.22	1.24	1.6%	< 0.005	100%	80%	120%				102%	50%	130%
Acenaphthylene	68653	9024976	<0.005	<0.005	NA	< 0.005	100%	80%	120%				98%	50%	130%
Acenaphthene	68653	9024976	<0.005	<0.005	NA	< 0.005	100%	80%	120%				99%	50%	130%
Fluorene	68653	9024976	0.13	0.12	8.0%	< 0.02	100%	80%	120%				100%	50%	130%
Phenanthrene	68653	9024976	0.53	0.49	7.8%	< 0.02	99%	80%	120%				95%	60%	130%
Anthracene	68653	9024976	<0.004	<0.004	NA	< 0.004	100%	80%	120%				99%	60%	130%
Fluoranthene	68653	9024976	0.03	0.03	NA	< 0.01	98%	80%	120%				98%	60%	130%
Pyrene	68653	9024976	0.03	0.03	NA	< 0.01	99%	80%	120%				101%	60%	130%
Benzo(a)anthracene	68653	9024976	<0.03	<0.03	NA	< 0.03	101%	80%	120%				99%	60%	130%
Chrysene	68653	9024976	0.13	0.13	NA	< 0.05	99%	80%	120%				106%	60%	130%
Benzo(b)fluoranthene	68653	9024976	0.06	0.06	NA	< 0.02	97%	80%	120%				92%	60%	130%
Benzo(j)fluoranthene	68653	9024976	<0.02	<0.02	NA	< 0.02	98%	80%	120%				105%	60%	130%
Benzo(k)fluoranthene	68653	9024976	<0.02	<0.02	NA	< 0.02	103%	80%	120%				95%	60%	130%
Benzo(a)pyrene	68653	9024976	<0.03	<0.03	NA	< 0.03	100%	80%	120%				97%	60%	130%
Indeno(1,2,3-c,d)pyrene	68653	9024976	<0.02	<0.02	NA	< 0.02	100%	80%	120%				95%	60%	130%
Dibenzo(a,h)anthracene	68653	9024976	0.005	0.005	NA	< 0.005	101%	80%	120%				92%	60%	130%
Benzo(g,h,i)perylene	68653	9024976	0.11	0.11	NA	< 0.05	101%	80%	120%				98%	60%	130%
Quinoline	68653	9024976	<0.05	<0.05	NA	< 0.05	101%	80%	120%				105%	50%	130%
EPH C10-C19	68653	9024976	299	299	0.0%	< 20	111%	70%	130%				95%	65%	120%
EPH C19-C32	68653	9024976	84	82	NA	< 20	103%	70%	130%				101%	80%	120%
Naphthalene - d8	68653	9024976	76	67	12.6%		100%	80%	120%				100%	50%	130%
2-Fluorobiphenyl	68653	9024976	79	73	7.9%		101%	80%	120%				100%	50%	130%
P-Terphenyl - d14	68653	9024976	83	80	3.7%		99%	80%	120%				101%	60%	130%

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

Volatile Organic Compounds in Soil															
Chloromethane	68643	9024976	<0.05	<0.05	NA	< 0.05	98%	80%	120%				116%	60%	140%
Vinyl Chloride	68643	9024976	<0.05	<0.05	NA	< 0.05	98%	80%	120%				105%	60%	140%
Bromomethane	68643	9024976	<0.05	<0.05	NA	< 0.05	97%	80%	120%				118%	60%	140%
Chloroethane	68643	9024976	<0.05	<0.05	NA	< 0.05	100%	80%	120%				96%	60%	140%
Trichlorofluoromethane	68643	9024976	<0.05	<0.05	NA	< 0.05	99%	80%	120%				91%	70%	130%
Acetone	68643	9024976	<0.5	<0.5	NA	< 0.5	100%	80%	120%				90%	70%	130%
1,1-Dichloroethylene	68643	9024976	<0.05	<0.05	NA	< 0.05	100%	80%	120%				93%	70%	130%
Dichloromethane	68643	9024976	<0.05	<0.05	NA	< 0.05	100%	80%	120%				93%	70%	130%
Methyl tert-butyl ether (MTBE)	68643	9024976	<0.1	<0.1	NA	< 0.1	101%	80%	120%				89%	70%	130%
2-Butanone (MEK)	68643	9024976	<0.5	<0.5	NA	< 0.5	100%	80%	120%				88%	70%	130%
trans-1,2-Dichloroethene	68643	9024976	<0.05	<0.05	NA	< 0.05	100%	80%	120%				91%	70%	130%

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Quality Assurance

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA
AGAT WORK ORDER: 18N304491
PROJECT: 1657709-6000
ATTENTION TO: Erin O'Brien
SAMPLING SITE:
SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date: Feb 05, 2018

PARAMETER	Batch	Sample Id	DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
			Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
1,1-Dichloroethane	68643	9024976	<0.05	<0.05	NA	< 0.05	100%	80%	120%				91%	70%	130%
cis-1,2-Dichloroethene	68643	9024976	<0.05	<0.05	NA	< 0.05	101%	80%	120%				90%	70%	130%
Chloroform	68643	9024976	<0.05	<0.05	NA	< 0.05	100%	80%	120%				89%	70%	130%
1,2-Dichloroethane	68643	9024976	<0.05	<0.05	NA	< 0.05	100%	80%	120%				89%	70%	130%
1,1,1-Trichloroethane	68643	9024976	<0.05	<0.05	NA	< 0.05	100%	80%	120%				86%	70%	130%
Carbon Tetrachloride	68643	9024976	<0.02	<0.02	NA	< 0.02	101%	80%	120%				83%	70%	130%
Benzene	68643	9024976	0.17	0.17	0.0%	< 0.02	101%	80%	120%				90%	70%	130%
1,2-Dichloropropane	68643	9024976	<0.05	<0.05	NA	< 0.05	101%	80%	120%				89%	70%	130%
Trichloroethene	68643	9024976	<0.01	<0.01	NA	< 0.01	101%	80%	120%				87%	70%	130%
Bromodichloromethane	68643	9024976	<0.05	<0.05	NA	< 0.05	101%	80%	120%				87%	70%	130%
trans-1,3-Dichloropropene	68643	9024976	<0.05	<0.05	NA	< 0.05	102%	80%	120%				84%	60%	140%
4-Methyl-2-pentanone (MIBK)	68643	9024976	<0.5	<0.5	NA	< 0.5	101%	80%	120%				81%	70%	130%
cis-1,3-Dichloropropene	68643	9024976	<0.05	<0.05	NA	< 0.05	101%	80%	120%				85%	60%	140%
1,1,2-Trichloroethane	68643	9024976	<0.05	<0.05	NA	< 0.05	101%	80%	120%				86%	70%	130%
Toluene	68643	9024976	0.12	0.12	NA	< 0.05	101%	80%	120%				87%	70%	130%
Dibromochloromethane	68643	9024976	<0.05	<0.05	NA	< 0.05	101%	80%	120%				85%	70%	130%
1,2-Dibromoethane	68643	9024976	<0.05	<0.05	NA	< 0.05	101%	80%	120%				87%	70%	130%
Tetrachloroethylene	68643	9024976	<0.05	<0.05	NA	< 0.05	100%	80%	120%				75%	70%	130%
1,1,1,2-Tetrachloroethane	68643	9024976	<0.05	<0.05	NA	< 0.05	101%	80%	120%				87%	70%	130%
Chlorobenzene	68643	9024976	<0.05	<0.05	NA	< 0.05	100%	80%	120%				88%	70%	130%
Ethylbenzene	68643	9024976	0.09	0.10	NA	< 0.05	101%	80%	120%				86%	70%	130%
m&p-Xylene	68643	9024976	0.39	0.41	5.0%	< 0.05	101%	80%	120%				87%	70%	130%
Bromoform	68643	9024976	<0.05	<0.05	NA	< 0.05	101%	80%	120%				85%	70%	130%
Styrene	68643	9024976	<0.05	<0.05	NA	< 0.05	102%	80%	120%				86%	70%	130%
1,1,2,2-Tetrachloroethane	68643	9024976	<0.05	<0.05	NA	< 0.05	100%	80%	120%				89%	70%	130%
o-Xylene	68643	9024976	0.10	0.10	NA	< 0.05	101%	80%	120%				88%	70%	130%
1,3-Dichlorobenzene	68643	9024976	<0.05	<0.05	NA	< 0.05	100%	80%	120%				89%	70%	130%
1,4-Dichlorobenzene	68643	9024976	<0.05	<0.05	NA	< 0.05	100%	80%	120%				89%	70%	130%
1,2-Dichlorobenzene	68643	9024976	<0.05	<0.05	NA	< 0.05	101%	80%	120%				90%	70%	130%
1,2,4-Trichlorobenzene	68643	9024976	<0.05	<0.05	NA	< 0.05	101%	80%	120%				88%	70%	130%
Bromofluorobenzene	68643	9024976	109	110	0.9%		105%	60%	140%				105%	60%	140%
Dibromofluoromethane	68643	9024976	109	109	0.0%		105%	60%	140%				100%	60%	140%
Toluene - d8	68643	9024976	118	120	1.7%		101%	60%	140%				105%	60%	140%
VH	68643	9024976	19	19	NA	< 10									
VPH	68643	9024976	18	18	NA	< 10									

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

BTEX / VPH (C6-C10) Soil															
Methyl tert-butyl ether (MTBE)	68643	9025533	<0.1	<0.1	NA	< 0.1	100%	80%	120%				97%	70%	130%
Benzene	68643	9025533	<0.02	<0.02	NA	< 0.02	99%	80%	120%				95%	70%	130%

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Quality Assurance

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date: Feb 05, 2018			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Toluene	68643	9025533	<0.05	<0.05	NA	< 0.05	100%	80%	120%				106%	70%	130%
Ethylbenzene	68643	9025533	<0.05	<0.05	NA	< 0.05	100%	80%	120%				107%	70%	130%
m&p-Xylene	68643	9025533	<0.05	<0.05	NA	< 0.05	100%	80%	120%				107%	70%	130%
o-Xylene	68643	9025533	<0.05	<0.05	NA	< 0.05	101%	80%	120%				104%	70%	130%
Styrene	68643	9025533	<0.05	<0.05	NA	< 0.05	100%	80%	120%				101%	70%	130%
VPH	68643	9025533	<10	<10	NA	< 10									
VH	68643	9025533	<10	<10	NA	< 10									
Bromofluorobenzene	68643	9025533	97	96	1.0%		100%	60%	140%				93%	60%	140%
Dibromofluoromethane	68643	9025533	108	109	0.9%		99%	60%	140%				102%	60%	140%
Toluene - d8	68643	9025533	118	117	0.9%		99%	60%	140%				113%	60%	140%
Public Works LEPH/HEPH in Water Low Level															
Naphthalene	68644	W-MS1	0.37	0.39	5.3%	< 0.05	100%	80%	120%				77%	50%	130%
Quinoline	68644	W-MS1	0.54	0.54	0.0%	< 0.05	100%	80%	120%				109%	50%	130%
Acenaphthylene	68644	W-MS1	0.41	0.42	2.4%	< 0.02	100%	80%	120%				83%	50%	130%
Acenaphthene	68644	W-MS1	0.43	0.44	2.3%	< 0.02	100%	80%	120%				86%	50%	130%
Fluorene	68644	W-MS1	0.43	0.43	0.0%	< 0.02	99%	80%	120%				86%	50%	130%
Phenanthrene	68644	W-MS1	0.37	0.36	2.7%	< 0.04	101%	80%	120%				78%	60%	130%
Anthracene	68644	W-MS1	0.47	0.49	4.2%	< 0.01	97%	80%	120%				95%	60%	130%
Acridine	68644	W-MS1	0.53	0.51	3.8%	< 0.05	101%	80%	120%				108%	50%	130%
Fluoranthene	68644	W-MS1	0.44	0.45	2.2%	< 0.02	99%	80%	120%				89%	60%	130%
Pyrene	68644	W-MS1	0.44	0.44	0.0%	< 0.02	100%	80%	120%				88%	60%	130%
Benzo(a)anthracene	68644	W-MS1	0.42	0.42	0.0%	< 0.01	99%	80%	120%				84%	60%	130%
Chrysene	68644	W-MS1	0.48	0.49	2.1%	< 0.01	100%	80%	120%				96%	60%	130%
Benzo(b)fluoranthene	68644	W-MS1	0.39	0.38	2.6%	< 0.01	97%	80%	120%				78%	60%	130%
Benzo(j)fluoranthene	68644	W-MS1	0.53	0.53	0.0%	< 0.01	102%	80%	120%				107%	60%	130%
Benzo(k)fluoranthene	68644	W-MS1	0.35	0.36	2.8%	< 0.01	99%	80%	120%				71%	60%	130%
Benzo(a)pyrene	68644	W-MS1	0.45	0.45	0.0%	< 0.01	100%	80%	120%				91%	60%	130%
Indeno(1,2,3-c,d)pyrene	68644	W-MS1	0.44	0.44	0.0%	< 0.01	100%	80%	120%				88%	60%	130%
Dibenzo(a,h)anthracene	68644	W-MS1	0.41	0.42	2.4%	< 0.01	99%	80%	120%				83%	60%	130%
Benzo(g,h,i)perylene	68644	W-MS1	0.43	0.45	4.5%	< 0.01	100%	80%	120%				89%	60%	130%
1-Methylnaphthalene	68644	W-MS1	0.36	0.38	5.4%	< 0.05	100%	80%	120%				73%	50%	130%
2-Methylnaphthalene	68644	W-MS1	0.31	0.33	6.2%	< 0.05	98%	80%	120%				63%	50%	130%
EPH C10-C19	68644	W-MS1	8480	8230	3.0%	< 100	111%	70%	130%				84%	70%	130%
EPH C19-C32	68644	W-MS1	13800	13600	1.5%	< 100	99%	70%	130%				90%	70%	130%
Naphthalene - d8	68644	W-MS1	83	82	1.2%		101%	80%	120%				83%	50%	130%
2-Fluorobiphenyl	68644	W-MS1	82	84	2.4%		100%	80%	120%				82%	50%	130%
P-Terphenyl - d14	68644	W-MS1	89	87	2.3%		100%	80%	120%				89%	60%	130%

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

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Quality Assurance

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AGAT WORK ORDER: 18N304491
PROJECT: 1657709-6000
ATTENTION TO: Erin O'Brien
SAMPLING SITE:
SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date: Feb 05, 2018

PARAMETER	Batch	Sample Id	DUPLICATE Dup #1	DUPLICATE Dup #2	DUPLICATE RPD	Method Blank	REFERENCE MATERIAL Measured Value	REFERENCE MATERIAL Acceptable Limits Lower	REFERENCE MATERIAL Acceptable Limits Upper	METHOD BLANK SPIKE Recovery	METHOD BLANK SPIKE Acceptable Limits Lower	METHOD BLANK SPIKE Acceptable Limits Upper	MATRIX SPIKE Recovery	MATRIX SPIKE Acceptable Limits Lower	MATRIX SPIKE Acceptable Limits Upper
Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.															
Volatile Organic Compounds in Water															
Chloromethane	68658	9025583	<1	<1	NA	< 1	98%	80%	120%				105%	70%	130%
Vinyl Chloride	68658	9025583	<1	<1	NA	< 1	98%	80%	120%				112%	70%	130%
Bromomethane	68658	9025583	<1	<1	NA	< 1	97%	80%	120%				83%	70%	130%
Chloroethane	68658	9025583	<1	<1	NA	< 1	100%	80%	120%				99%	70%	130%
Trichlorofluoromethane	68658	9025583	<1	<1	NA	< 1	99%	80%	120%				104%	70%	130%
Acetone	68658	9025583	10	<10	NA	< 10	100%	80%	120%						
1,1-Dichloroethylene	68658	9025583	<1	<1	NA	< 1	100%	80%	120%				111%	70%	130%
Dichloromethane	68658	9025583	<1	<1	NA	< 1	100%	80%	120%				96%	70%	130%
Methyl tert-butyl ether (MTBE)	68658	9025583	<1	<1	NA	< 1	101%	80%	120%				104%	70%	130%
2-Butanone (MEK)	68658	9025583	<10	<10	NA	< 10	100%	80%	120%						
trans-1,2-Dichloroethylene	68658	9025583	<1	<1	NA	< 1	100%	80%	120%				105%	70%	130%
1,1-Dichloroethane	68658	9025583	<1	<1	NA	< 1	100%	80%	120%				104%	70%	130%
cis-1,2-Dichloroethylene	68658	9025583	<1	<1	NA	< 1	101%	80%	120%				101%	70%	130%
Chloroform	68658	9025583	<1	<1	NA	< 1	100%	80%	120%				103%	70%	130%
1,2-Dichloroethane	68658	9025583	<1	<1	NA	< 1	100%	80%	120%				102%	70%	130%
1,1,1-Trichloroethane	68658	9025583	<1	<1	NA	< 1	100%	80%	120%				101%	70%	130%
Carbon Tetrachloride	68658	9025583	<0.5	<0.5	NA	< 0.5	101%	80%	120%				99%	70%	130%
Benzene	68658	9025583	<0.5	<0.5	NA	< 0.5	101%	80%	120%				102%	70%	130%
1,2-Dichloropropane	68658	9025583	<1	<1	NA	< 1	101%	80%	120%				105%	70%	130%
Trichloroethene	68658	9025583	<1	<1	NA	< 1	101%	80%	120%				102%	70%	130%
Bromodichloromethane	68658	9025583	<1	<1	NA	< 1	101%	80%	120%				100%	70%	130%
trans-1,3-Dichloropropene	68658	9025583	<1	<1	NA	< 1	102%	80%	120%				106%	70%	130%
4-Methyl-2-pentanone (MIBK)	68658	9025583	<10	<10	NA	< 10	101%	80%	120%						
cis-1,3-Dichloropropene	68658	9025583	<1	<1	NA	< 1	101%	80%	120%				101%	70%	130%
1,1,2-Trichloroethane	68658	9025583	<1	<1	NA	< 1	101%	80%	120%				105%	70%	130%
Toluene	68658	9025583	<0.5	<0.5	NA	< 0.5	101%	80%	120%				102%	70%	130%
Dibromochloromethane	68658	9025583	<1	<1	NA	< 1	101%	80%	120%				103%	70%	130%
1,2-Dibromoethane	68658	9025583	<0.3	<0.3	NA	< 0.3	101%	80%	120%				106%	70%	130%
Tetrachloroethylene	68658	9025583	<1	<1	NA	< 1	100%	80%	120%				85%	70%	130%
1,1,1,2-Tetrachloroethane	68658	9025583	<1	<1	NA	< 1	101%	80%	120%				99%	70%	130%
Chlorobenzene	68658	9025583	<1	<1	NA	< 1	100%	80%	120%				100%	70%	130%
Ethylbenzene	68658	9025583	<0.5	<0.5	NA	< 0.5	101%	80%	120%				100%	70%	130%
m&p-Xylene	68658	9025583	<0.5	<0.5	NA	< 0.5	101%	80%	120%				100%	70%	130%
Bromoform	68658	9025583	<1	<1	NA	< 1	101%	80%	120%				101%	70%	130%
Styrene	68658	9025583	<0.5	<0.5	NA	< 0.5	102%	80%	120%				100%	70%	130%
1,1,2,2-Tetrachloroethane	68658	9025583	<0.8	<0.8	NA	< 0.8	100%	80%	120%				101%	70%	130%
o-Xylene	68658	9025583	<0.5	<0.5	NA	< 0.5	101%	80%	120%				101%	70%	130%

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Quality Assurance

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA
AGAT WORK ORDER: 18N304491
PROJECT: 1657709-6000
ATTENTION TO: Erin O'Brien
SAMPLING SITE:
SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date: Feb 05, 2018

PARAMETER	Batch	Sample Id	DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
			Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
1,3-Dichlorobenzene	68658	9025583	<0.5	<0.5	NA	< 0.5	100%	80%	120%				97%	70%	130%
1,4-Dichlorobenzene	68658	9025583	<0.5	<0.5	NA	< 0.5	100%	80%	120%				97%	70%	130%
1,2-Dichlorobenzene	68658	9025583	<0.5	<0.5	NA	< 0.5	101%	80%	120%				99%	70%	130%
1,2,4-Trichlorobenzene	68658	9025583	<1	<1	NA	< 1	101%	80%	120%				97%	70%	130%
Bromofluorobenzene	68658	9025583	96	88	8.7%		105%	70%	130%				108%	70%	130%
Dibromofluoromethane	68658	9025583	102	94	8.2%		105%	70%	130%				104%	70%	130%
Toluene - d8	68658	9025583	110	102	7.5%		101%	70%	130%				111%	70%	130%
VH	68658	9025583	<100	<100	NA	< 100									
VPH	68658	9025583	<100	<100	NA	< 100									

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

CCME BTEX/F1-F4 (Water)

Benzene	68649	9025003	<0.5	<0.5	NA	< 0.5	99%	80%	120%				92%	70%	130%
Ethylbenzene	68649	9025003	<0.5	<0.5	NA	< 0.5	100%	80%	120%				94%	70%	130%
Toluene	68649	9025003	<0.5	<0.5	NA	< 0.5	100%	80%	120%				93%	70%	130%
m&p-Xylene	68649	9025003	<0.5	<0.5	NA	< 0.5	100%	80%	120%				95%	70%	130%
o-Xylene	68649	9025003	<0.5	<0.5	NA	< 0.5	101%	80%	120%				96%	70%	130%
F1 (C6-C10)	68649	9025003	<100	<100	NA	< 100									
F1 minus BTEX (C6-C10)	68649	9025003	<100	<100	NA	< 100									
F2 (C10-C16)	68644	W-MS1	5820	5630	3.3%	< 100	110%	80%	120%				82%	70%	130%
F3 (C16-C34)	68644	W-MS1	18600	18300	1.6%	< 100	115%	80%	120%				90%	70%	130%
F4 (C34-C50)	68644	W-MS1	4610	4680	1.5%	< 100	102%	80%	120%				77%	70%	130%
Bromofluorobenzene	68649	9025003	93	96	3.2%		100%	70%	130%				100%	70%	130%
Dibromofluoromethane	68649	9025003	103	106	2.9%		99%	70%	130%				99%	70%	130%
Toluene - d8	68649	9025003	98	98	0.0%		99%	70%	130%				99%	70%	130%

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

BC Routine VOC package in Air (Canister) -ug/m3

1,2,4-Trimethylbenzene	1	< 1.5	< 1.5	0.0%	< 1.5	128%	50%	140%	136%	50%	140%	NA	30%	140%
1,3,5-Trimethylbenzene	1	< 1.5	< 1.5	0.0%	< 1.5	108%	50%	140%	139%	50%	140%	NA	30%	140%
1,3-Butadiene	1	< 1.0	< 1.0	0.0%	< 1.0	131%	50%	140%	126%	50%	140%	NA	30%	140%
Isopropylbenzene	1	< 0.80	< 0.80	0.0%	< 0.80	136%	50%	140%	115%	50%	140%	NA	30%	140%
Methyl tert-Butyl ether (MTBE)	1	< 0.80	< 0.80	0.0%	< 0.80	67%	50%	140%	71%	50%	140%	NA	30%	140%
Naphthalene	1	< 2.0	< 2.0	0.0%	< 2.0	128%	50%	140%	111%	50%	140%	NA	30%	140%
n-Decane	1	< 1.3	< 1.3	0.0%	< 1.3	53%	50%	140%	60%	50%	140%	NA	30%	140%
n-Hexane	1	< 1.1	< 1.1	0.0%	< 1.1	109%	50%	140%	99%	50%	140%	NA	30%	140%

Public Works : BC VOCs in Air (Canister) - ug/m3

Dichlorodifluoromethane	1	< 1.0	< 1.0	0.0%	< 1.0	133%	60%	140%	138%	50%	140%	NA	30%	140%
1,2-Dichlorotetrafluoroethane	1	< 1.4	< 1.4	0.0%	< 1.4	138%	60%	140%	122%	50%	140%	NA	30%	140%
1,1,2-Trichloro-1,2,2-trifluoroethane	1	< 1.5	< 1.5	0.0%	< 1.5	102%	60%	140%	107%	50%	140%	NA	30%	140%

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Quality Assurance

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA
AGAT WORK ORDER: 18N304491
PROJECT: 1657709-6000
ATTENTION TO: Erin O'Brien
SAMPLING SITE:
SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date: Feb 05, 2018

PARAMETER	Batch	Sample Id	DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
			Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Chloromethane	1		< 0.60	< 0.60	0.0%	< 0.60	140%	60%	140%	137%	50%	140%	NA	30%	140%
Vinyl Chloride	1		< 0.40	< 0.40	0.0%	< 0.40	139%	60%	140%	137%	50%	140%	NA	30%	140%
Bromomethane	1		< 1.9	< 1.9	0.0%	< 1.9	136%	60%	140%	133%	50%	140%	NA	30%	140%
Chloroethane	1		< 1.0	< 1.0	0.0%	< 1.0	140%	60%	140%	129%	50%	140%	NA	30%	140%
Vinyl Bromide	1		< 0.80	< 0.80	0.0%	< 0.80	NA	60%	140%	137%	50%	140%	NA	30%	140%
Trichlorofluoromethane	1		< 2.3	< 2.3	0.0%	< 2.3	138%	60%	140%	123%	50%	140%	NA	30%	140%
1,1-Dichloroethene	1		< 1.0	< 1.0	0.0%	< 1.0	95%	60%	140%	101%	50%	140%	NA	30%	140%
Methylene Chloride	1		< 1.0	< 1.0	0.0%	< 1.0	100%	60%	140%	104%	50%	140%	NA	30%	140%
trans-1,2-Dichloroethene	1		< 0.80	< 0.80	0.0%	< 0.80	87%	60%	140%	90%	50%	140%	NA	30%	140%
1,1-Dichloroethane	1		< 1.2	< 1.2	0.0%	< 1.2	104%	60%	140%	110%	50%	140%	NA	30%	140%
cis-1,2-Dichloroethene	1		< 0.80	< 0.80	0.0%	< 0.80	94%	60%	140%	98%	50%	140%	NA	30%	140%
Chloroform	1		< 1.0	< 1.0	0.0%	< 1.0	104%	60%	140%	109%	50%	140%	NA	30%	140%
1,2-Dichloroethane	1		< 0.30	< 0.30	0.0%	< 0.30	108%	60%	140%	113%	50%	140%	NA	30%	140%
1,1,1-Trichloroethane	1		< 1.6	< 1.6	0.0%	< 1.6	95%	60%	140%	101%	50%	140%	NA	30%	140%
Carbon Tetrachloride	1		< 2.0	< 2.0	0.0%	< 2.0	101%	60%	140%	108%	50%	140%	NA	30%	140%
Benzene	1		< 0.50	< 0.50	0.0%	< 0.50	100%	60%	140%	103%	50%	140%	NA	30%	140%
1,2-Dichloropropane	1		< 2.0	< 2.0	0.0%	< 2.0	104%	60%	140%	108%	50%	140%	NA	30%	140%
Trichloroethene	1		< 1.0	< 1.0	0.0%	< 1.0	101%	60%	140%	106%	50%	140%	NA	30%	140%
Bromodichloromethane	1		< 1.3	< 1.3	0.0%	< 1.3	105%	60%	140%	111%	50%	140%	NA	30%	140%
cis-1,3-Dichloropropene	1		< 1.0	< 1.0	0.0%	< 1.0	89%	60%	140%	95%	50%	140%	NA	30%	140%
trans-1,3-Dichloropropene	1		< 1.0	< 1.0	0.0%	< 1.0	86%	60%	140%	91%	50%	140%	NA	30%	140%
Methyl Isobutyl Ketone (MIBK)	1		< 2.0	< 2.0	0.0%	< 2.0	126%	60%	140%	133%	50%	140%	NA	30%	140%
1,1,2-Trichloroethane	1		< 1.6	< 1.6	0.0%	< 1.6	128%	60%	140%	135%	50%	140%	NA	30%	140%
Toluene	1		< 0.80	< 0.80	0.0%	< 0.80	121%	60%	140%	129%	50%	140%	NA	30%	140%
2-Hexanone	1		< 2.0	< 2.0	0.0%	< 2.0	134%	60%	140%	140%	50%	140%	NA	30%	140%
Dibromochloromethane	1		< 2.0	< 2.0	0.0%	< 2.0	126%	60%	140%	137%	50%	140%	NA	30%	140%
1,2-Dibromoethane	1		< 1.5	< 1.5	0.0%	< 1.5	118%	60%	140%	130%	50%	140%	NA	30%	140%
Tetrachloroethene	1		< 1.0	< 1.0	0.0%	< 1.0	114%	60%	140%	121%	50%	140%	NA	30%	140%
Chlorobenzene	1		< 1.0	< 1.0	0.0%	< 1.0	125%	60%	140%	132%	50%	140%	NA	30%	140%
Ethylbenzene	1		< 0.9	< 0.9	0.0%	< 0.9	118%	60%	140%	124%	50%	140%	NA	30%	140%
m&p-Xylene	1		< 1.5	< 1.5	0.0%	< 1.5	139%	60%	140%	140%	50%	140%	NA	30%	140%
Bromoform	1		< 2.0	< 2.0	0.0%	< 2.0	120%	60%	140%	131%	50%	140%	NA	30%	140%
Styrene	1		< 1.0	< 1.0	0.0%	< 1.0	120%	60%	140%	127%	50%	140%	NA	30%	140%
1,1,2,2-Tetrachloroethane	1		< 1.5	< 1.5	0.0%	< 1.5	108%	60%	140%	106%	50%	140%	NA	30%	140%
o-Xylene	1		< 0.9	< 0.9	0.0%	< 0.9	125%	60%	140%	118%	50%	140%	NA	30%	140%
1,3-Dichlorobenzene	1		< 2.5	< 2.5	0.0%	< 2.5	129%	60%	140%	135%	50%	140%	NA	30%	140%
1,4-Dichlorobenzene	1		< 2.5	< 2.5	0.0%	< 2.5	129%	60%	140%	138%	50%	140%	NA	30%	140%
1,2-Dichlorobenzene	1		< 2.5	< 2.5	0.0%	< 2.5	121%	60%	140%	103%	50%	140%	NA	30%	140%

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Quality Assurance

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date: Feb 05, 2018			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Public Works LEPH/HEPH in Soil Low Level															
Naphthalene	68688	9037253	<0.005	<0.005	NA	< 0.005	100%	80%	120%				103%	50%	130%
2-Methylnaphthalene	68688	9037253	0.042	0.044	4.7%	< 0.05	98%	80%	120%				95%	50%	130%
1-Methylnaphthalene	68688	9037253	0.034	0.038	11.1%	< 0.05	99%	80%	120%				99%	50%	130%
Acenaphthylene	68688	9037253	<0.005	<0.005	NA	< 0.005	99%	80%	120%				97%	50%	130%
Acenaphthene	68688	9037253	<0.005	<0.005	NA	< 0.005	99%	80%	120%				99%	50%	130%
Fluorene	68688	9037253	<0.02	<0.02	NA	< 0.02	100%	80%	120%				103%	50%	130%
Phenanthrene	68688	9037253	0.02	0.04	NA	< 0.02	98%	80%	120%				87%	60%	130%
Anthracene	68688	9037253	<0.004	<0.004	NA	< 0.004	99%	80%	120%				95%	60%	130%
Fluoranthene	68688	9037253	<0.01	<0.01	NA	< 0.01	98%	80%	120%				98%	60%	130%
Pyrene	68688	9037253	<0.01	<0.01	NA	< 0.01	100%	80%	120%				97%	60%	130%
Benzo(a)anthracene	68688	9037253	<0.03	<0.03	NA	< 0.03	99%	80%	120%				95%	60%	130%
Chrysene	68688	9037253	<0.05	<0.05	NA	< 0.05	100%	80%	120%				95%	60%	130%
Benzo(b)fluoranthene	68688	9037253	<0.02	<0.02	NA	< 0.02	100%	80%	120%				95%	60%	130%
Benzo(j)fluoranthene	68688	9037253	<0.02	<0.02	NA	< 0.02	101%	80%	120%				101%	60%	130%
Benzo(k)fluoranthene	68688	9037253	<0.02	<0.02	NA	< 0.02	97%	80%	120%				91%	60%	130%
Benzo(a)pyrene	68688	9037253	<0.03	<0.03	NA	< 0.03	99%	80%	120%				93%	60%	130%
Indeno(1,2,3-c,d)pyrene	68688	9037253	<0.02	<0.02	NA	< 0.02	97%	80%	120%				86%	60%	130%
Dibenzo(a,h)anthracene	68688	9037253	<0.005	<0.005	NA	< 0.005	97%	80%	120%				87%	60%	130%
Benzo(g,h,i)perylene	68688	9037253	<0.05	<0.05	NA	< 0.05	98%	80%	120%				94%	60%	130%
Quinoline	68688	9037253	<0.05	<0.05	NA	< 0.05	97%	80%	120%				106%	50%	130%
EPH C10-C19	68688	9037253	34	21	NA	< 20	110%	70%	130%				99%	65%	120%
EPH C19-C32	68688	9037253	<20	<20	NA	< 20	103%	70%	130%				100%	80%	120%
Naphthalene - d8	68688	9037253	95	89	6.5%		99%	80%	120%				100%	50%	130%
2-Fluorobiphenyl	68688	9037253	97	88	9.7%		101%	80%	120%				102%	50%	130%
P-Terphenyl - d14	68688	9037253	97	93	4.2%		100%	80%	120%				96%	60%	130%

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

Certified By: Angela Bond

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Quality Assurance

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Water Analysis

RPT Date: Feb 05, 2018			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Public Works Dissolved Metals															
Aluminum Dissolved	9025583		27	28	2.5%	< 2	98%	90%	110%	99%	90%	110%			
Antimony Dissolved	9025583		1.8	1.8	2.3%	< 0.2	99%	90%	110%	104%	90%	110%			
Arsenic Dissolved	9025583		2.0	2.0	0.2%	< 0.1	94%	90%	110%	108%	90%	110%			
Barium Dissolved	9025583		94.4	91.5	3.1%	< 0.2	103%	90%	110%	106%	90%	110%			
Beryllium Dissolved	9025583		0.02	<0.01	NA	< 0.01	103%	90%	110%	103%	90%	110%			
Bismuth Dissolved	9025583		<0.05	<0.05	NA	< 0.05				100%	90%	110%			
Boron Dissolved	9025583		32	31	3.4%	< 2	94%	90%	110%	91%	90%	110%			
Cadmium Dissolved	9025583		0.12	0.11	6.9%	< 0.01	104%	90%	110%	100%	90%	110%			
Calcium Dissolved	9025583		90500	91800	1.3%	< 50	101%	90%	110%	102%	90%	110%			
Chromium Dissolved	9025583		<0.5	<0.5	NA	< 0.5	93%	90%	110%	95%	90%	110%			
Cobalt Dissolved	9025583		3.31	3.30	0.5%	< 0.05	95%	90%	110%	98%	90%	110%			
Copper Dissolved	9025583		3.1	3.3	4.5%	< 0.2	98%	90%	110%	99%	90%	110%			
Iron Dissolved	9025583		936	954	1.9%	< 10	100%	90%	110%	101%	90%	110%			
Lead Dissolved	9025583		<0.05	<0.05	NA	< 0.05	104%	90%	110%	103%	90%	110%			
Lithium Dissolved	9025583		2.0	2.1	NA	< 0.5				100%	90%	110%			
Magnesium Dissolved	9025583		7890	7860	0.4%	< 50	103%	90%	110%	104%	90%	110%			
Manganese Dissolved	9025583		400	400	0.1%	< 1	105%	90%	110%	104%	90%	110%			
Mercury Dissolved	9021813		<0.01	<0.01	NA	< 0.01	99%	90%	110%	100%	90%	110%			
Molybdenum Dissolved	9025583		1.69	1.72	1.6%	< 0.05	96%	90%	110%	99%	90%	110%			
Nickel Dissolved	9025583		6.0	6.0	1.0%	< 0.2	97%	90%	110%	100%	90%	110%			
Potassium Dissolved	9025583		5670	5700	0.5%	< 50	94%	90%	110%	97%	90%	110%			
Selenium Dissolved	9025583		1.1	1.0	NA	< 0.5	96%	90%	110%	99%	90%	110%			
Silicon Dissolved	9025583		4810	4830	0.3%	< 50				105%	90%	110%			
Silver Dissolved	9025583		<0.02	<0.02	NA	< 0.02				105%	90%	110%			
Sodium Dissolved	9025583		6320	6320	0.1%	< 50	98%	90%	110%	101%	90%	110%			
Strontium Dissolved	9025583		350	359	2.6%	< 0.1	99%	90%	110%	99%	90%	110%			
Sulphur Dissolved	9025583		30900	31200	1.1%	< 500				104%	90%	110%			
Thallium Dissolved	9025583		0.05	0.05	0.0%	< 0.01	95%	90%	110%	97%	90%	110%			
Tin Dissolved	9025583		0.12	0.12	NA	< 0.05				105%	90%	110%			
Titanium Dissolved	9025583		1.8	1.7	NA	< 0.5				100%	90%	110%			
Uranium Dissolved	9025583		0.62	0.60	3.6%	< 0.01	92%	90%	110%	97%	90%	110%			
Vanadium Dissolved	9025583		2.9	2.9	0.3%	< 0.5	100%	90%	110%	101%	90%	110%			
Zinc Dissolved	9025583		7	7	NA	< 2	105%	90%	110%	102%	90%	110%			
Zirconium Dissolved	9025583		0.2	0.2	NA	< 0.1				99%	70%	130%			
Chloride in Water															
Chloride	9014203		0.21	0.21	NA	< 0.05	99%	90%	110%	96%	90%	110%			

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

AGAT Laboratories

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Quality Assurance

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Water Analysis (Continued)

RPT Date: Feb 05, 2018			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

Certified By:

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Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA
AGAT WORK ORDER: 18N304491
PROJECT: 1657709-6000
ATTENTION TO: Erin O'Brien
SAMPLING SITE:
SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Aluminum	MET-181-6106, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP/OES
Antimony	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Arsenic	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Barium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Beryllium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Bismuth	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Cadmium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Calcium	MET-181-6106, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP/OES
Chromium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Cobalt	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Copper	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Iron	MET-181-6106, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP/OES
Lead	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Lithium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Magnesium	MET-181-6106, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP/OES
Manganese	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP-MS
Mercury	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Molybdenum	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Nickel	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Phosphorus	MET-181-6106, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP/OES
Potassium	MET-181-6106, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP/OES
Selenium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Silver	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Sodium	MET-181-6106, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP/OES
Strontium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP-MS
Thallium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Tin	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS

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Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Titanium	MET-181-6106, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP/OES
Uranium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Vanadium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Zinc	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Zirconium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
pH 1:2	INOR-181-6031	BC MOE Lab Manual B (pH, Electrometric, Soil)	PH METER

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SAMPLING SITE:
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PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Naphthalene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
2-Methylnaphthalene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
1-Methylnaphthalene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Acenaphthylene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Acenaphthene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Fluorene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Phenanthrene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Anthracene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Fluoranthene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Pyrene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(a)anthracene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Chrysene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(b)fluoranthene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(j)fluoranthene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(k)fluoranthene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(a)pyrene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Indeno(1,2,3-c,d)pyrene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Dibenzo(a,h)anthracene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(g,h,i)perylene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Quinoline	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
IACR CCME (Soil)	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
B[a]P TPE (Soil)	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
EPH C10-C19	ORG-180-5101	Modified from BCMOE Lab Manual Section D (EPH)	GC/FID
EPH C19-C32	ORG-180-5101	Modified from BCMOE Lab Manual Section D (EPH)	GC/FID
LEPH C10-C19	ORG-180-5101	Modified from BCMOE Lab Manual Section D (EPH)	GC/FID
HEPH C19-C32	ORG-180-5101	Modified from BCMOE Lab Manual Section D (EPH)	GC/FID
Naphthalene - d8	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS

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SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
2-Fluorobiphenyl	ORG-180-5102	Modified form BCMOE Lab Manual Section D (PAH)	GC/MS
P-Terphenyl - d14	ORG-180-5102	Modified form BCMOE Lab Manual Section D (PAH)	GC/MS
1,2,4-Trimethylbenzene	AQM-91-16001	MASS APH	GC/MS
1,3,5-Trimethylbenzene	AQM-91-16001	MASS APH	GC/MS
1,3-Butadiene	AQM-91-16000	EPA TO15	GC/MS
Isopropylbenzene	AQM-91-16000	MASS APH	GC/MS
Methylcyclohexane	AQM-91-16000	EPA TO15	GC/MS
Methyl tert-Butyl ether (MTBE)	AQM-91-16000	EPA TO15	GC/MS
Naphthalene	AQM-91-16000	MASS APH	GC/MS
n-Decane	AQM-91-16000	MASS APH	GC/MS
n-Hexane	AQM-91-16000	EPA TO15	GC/MS
VPHv (C>6-C13)	AQM-91-16000	MASS APH	GC/MS
4-Bromofluorobenzene	AQM-91-16000	MASS APH	GC/MS
Methyl tert-butyl ether (MTBE)	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
Benzene	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
Toluene	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
Ethylbenzene	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
m&p-Xylene	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
o-Xylene	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
Styrene	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
VPH	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
VH	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
Bromofluorobenzene	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS
Dibromofluoromethane	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS
Toluene - d8	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS
Benzene	ORG-180-5130	EPA SW-846 8260	GC/MS/FID
Ethylbenzene	ORG-180-5130	EPA SW-846 8260	GC/MS/FID
Toluene	ORG-180-5130	EPA SW-846 8260	GC/MS/FID
m&p-Xylene	ORG-180-5130	EPA SW-846 8260	GC/MS/FID
o-Xylene	ORG-180-5130	EPA SW-846 8260	GC/MS/FID
F1 (C6-C10)	ORG-180-5130	CCME Tier 1 Method	GC/MS/FID
F1 minus BTEX (C6-C10)	ORG-180-5130	CCME Tier 1 Method	GC/MS/FID
F2 (C10-C16)	ORG-180-5134	CCME Tier 1 Method	GC/FID
F3 (C16-C34)	ORG-180-5134	CCME Tier 1 Method	GC/FID
F4 (C34-C50)	ORG-180-5134	CCME Tier 1 Method	GC/FID
Bromofluorobenzene		EPA SW-846 8260	GC/MS
Dibromofluoromethane		EPA SW-846 8260	GC/MS
Toluene - d8		EPA SW-846 8260	GC/MS
Dichlorodifluoromethane	AQM-248-16000	EPA TO15	GC/MS

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Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA
AGAT WORK ORDER: 18N304491
PROJECT: 1657709-6000
ATTENTION TO: Erin O'Brien
SAMPLING SITE:
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PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
1,2-Dichlorotetrafluoroethane	AQM-248-16000	EPA TO15	GC/MS
1,1,2-Trichloro-1,2,2-trifluoroethane	AQM-248-16000	EPA TO15	GC/MS
Chloromethane	AQM-248-16000	EPA TO15	GC/MS
Vinyl Chloride	AQM-248-16000	EPA TO15	GC/MS
Bromomethane	AQM-248-16000	EPA TO15	GC/MS
Chloroethane	AQM-248-16000	EPA TO15	GC/MS
Vinyl Bromide	AQM-248-16000	EPA TO15	GC/MS
Trichlorofluoromethane	AQM-248-16000	EPA TO15	GC/MS
1,1-Dichloroethene	AQM-248-16000	EPA TO15	GC/MS
Methylene Chloride	AQM-248-16000	EPA TO15	GC/MS
trans-1,2-Dichloroethene	AQM-248-16000	EPA TO15	GC/MS
1,1-Dichloroethane	AQM-248-16000	EPA TO15	GC/MS
cis-1,2-Dichloroethene	AQM-248-16000	EPA TO15	GC/MS
Chloroform	AQM-248-16000	EPA TO15	GC/MS
1,2-Dichloroethane	AQM-248-16000	EPA TO15	GC/MS
1,1,1-Trichloroethane	AQM-248-16000	EPA TO15	GC/MS
Carbon Tetrachloride	AQM-248-16000	EPA TO15	GC/MS
Benzene	AQM-248-16000	EPA TO15	GC/MS
1,2-Dichloropropane	AQM-248-16000	EPA TO15	GC/MS
2,2-Dichloropropane	AQM-248-16000	EPA TO15	GC/MS
Trichloroethene	AQM-248-16000	EPA TO15	GC/MS
Bromodichloromethane	AQM-248-16000	EPA TO15	GC/MS
cis-1,3-Dichloropropene	AQM-248-16000	EPA TO15	GC/MS
trans-1,3-Dichloropropene	AQM-248-16000	EPA TO15	GC/MS
Methyl Isobutyl Ketone (MIBK)	AQM-248-16000	EPA TO15	GC/MS
1,1,2-Trichloroethane	AQM-248-16000	EPA TO15	GC/MS
Toluene	AQM-248-16000	EPA TO15	GC/MS
2-Hexanone	AQM-248-16000	EPA TO15	GC/MS
Dibromochloromethane	AQM-248-16000	EPA TO15	GC/MS
1,2-Dibromoethane	AQM-248-16000	EPA TO15	GC/MS
Tetrachloroethene	AQM-248-16000	EPA TO15	GC/MS
Chlorobenzene	AQM-248-16000	EPA TO15	GC/MS
Ethylbenzene	AQM-248-16000	EPA TO15	GC/MS
m&p-Xylene	AQM-248-16000	EPA TO15	GC/MS
Bromoform	AQM-248-16000	EPA TO15	GC/MS
Styrene	AQM-248-16000	EPA TO15	GC/MS
1,1,2,2-Tetrachloroethane	AQM-248-16000	EPA TO15	GC/MS
o-Xylene	AQM-248-16000	EPA TO15	GC/MS
1,3-Dichlorobenzene	AQM-248-16000	EPA TO15	GC/MS
1,4-Dichlorobenzene	AQM-248-16000	EPA TO15	GC/MS
1,2-Dichlorobenzene	AQM-248-16000	EPA TO15	GC/MS
Total Xylenes	AQM-248-16000	EPA TO15	GC/MS
4-Bromofluorobenzene	AQM-248-16000	EPA TO15	GC/MS
Quinoline	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Acenaphthylene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Acenaphthene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Fluorene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS

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Method Summary

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AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Phenanthrene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Anthracene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Acridine	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Fluoranthene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Pyrene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(a)anthracene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Chrysene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(b)fluoranthene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(j)fluoranthene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(k)fluoranthene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(a)pyrene	ORG-180-5133	Modified from BC MOE Lab Manual Section D	GC/MS
Indeno(1,2,3-c,d)pyrene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Dibenzo(a,h)anthracene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(g,h,i)perylene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
1-Methylnaphthalene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
2-Methylnaphthalene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
EPH C10-C19	ORG-180-5134	Modified from BC MOE Lab Manual Section D (EPH)	GC/FID
EPH C19-C32	ORG-180-5134	Modified from BC MOE Lab Manual Section D (EPH)	GC/FID
LEPH C10-C19	ORG-180-5134	Modified from BC MOE Lab Manual Section D (EPH)	GC/FID
HEPH C19-C32	ORG-180-5134	Modified from BC MOE Lab Manual Section D (EPH)	GC/FID
Naphthalene - d8		Modified form BCMOE Lab Manual Section D (PAH)	GC/MS
2-Fluorobiphenyl	ORG-180-5133	Modified form BCMOE Lab Manual Section D (PAH)	GC/MS
P-Terphenyl - d14	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Chloromethane	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Vinyl Chloride	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Bromomethane	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Chloroethane	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Trichlorofluoromethane	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS

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SAMPLING SITE:

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PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Acetone	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,1-Dichloroethylene	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Dichloromethane	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Methyl tert-butyl ether (MTBE)	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
2-Butanone (MEK)	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
trans-1,2-Dichloroethene	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,1-Dichloroethane	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
cis-1,2-Dichloroethene	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Chloroform	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,2-Dichloroethane	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,1,1-Trichloroethane	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Carbon Tetrachloride	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Benzene	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,2-Dichloropropane	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Trichloroethene	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Bromodichloromethane	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
trans-1,3-Dichloropropene	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
4-Methyl-2-pentanone (MIBK)	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
cis-1,3-Dichloropropene	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,1,2-Trichloroethane	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Toluene	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Dibromochloromethane	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,2-Dibromoethane	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Tetrachloroethylene	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,1,1,2-Tetrachloroethane	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Chlorobenzene	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Ethylbenzene	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
m&p-Xylene	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Bromoform	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Styrene	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,1,2,2-Tetrachloroethane	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
o-Xylene	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,3-Dichlorobenzene	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,4-Dichlorobenzene	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,2-Dichlorobenzene	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,2,4-Trichlorobenzene	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Bromofluorobenzene	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Dibromofluoromethane	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Toluene - d8	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
VH	ORG-180-5103	Modified from BC MOE Lab Manual Sec D (VOC)	GC/MS/FID
VPH	ORG-180-5103	Modified from BC MOE Lab Manual Sec D (VOC)	GC/MS/FID
Chloromethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Vinyl Chloride	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Bromomethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Chloroethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Trichlorofluoromethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Acetone	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,1-Dichloroethylene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Dichloromethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Methyl tert-butyl ether (MTBE)	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
2-Butanone (MEK)	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
trans-1,2-Dichloroethylene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,1-Dichloroethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
cis-1,2-Dichloroethylene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Chloroform	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,2-Dichloroethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
1,1,1-Trichloroethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Carbon Tetrachloride	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Benzene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,2-Dichloropropane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Trichloroethene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Bromodichloromethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
trans-1,3-Dichloropropene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
4-Methyl-2-pentanone (MIBK)	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
cis-1,3-Dichloropropene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,1,2-Trichloroethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Toluene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Dibromochloromethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,2-Dibromoethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Tetrachloroethylene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,1,1,2-Tetrachloroethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D	GC/MS
Chlorobenzene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Ethylbenzene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
m&p-Xylene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Bromoform	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Styrene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,1,2,2-Tetrachloroethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
o-Xylene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,3-Dichlorobenzene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,4-Dichlorobenzene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,2-Dichlorobenzene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,2,4-Trichlorobenzene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Bromofluorobenzene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Dibromofluoromethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS

Unit 120, 8600 Glenlyon Parkway
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TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Toluene - d8	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
VH	ORG-180-5133	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS/FID
VPH	ORG-180-5131	Modified from BC MOE Lab Manual Sec D (VOC)	GC/MS/FID

Unit 120, 8600 Glenlyon Parkway
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Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
Chloride	INOR-181-6002	Modified from SM 4110 B	ION CHROMATOGRAPH
Aluminum Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Antimony Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Arsenic Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Barium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Beryllium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Bismuth Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Boron Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Cadmium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Calcium Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Chromium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Cobalt Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Copper Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Iron Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Lead Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Lithium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Magnesium Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Manganese Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Mercury Dissolved	MET-181-6103, LAB-181-4015	Modified from EPA 245.7	CV/AA
Molybdenum Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Nickel Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Potassium Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Selenium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Silicon Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Silver Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Sodium Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Strontium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Sulphur Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
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Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Thallium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Tin Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Titanium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Uranium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Vanadium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Zinc Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Zirconium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS

CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

18N3044491

No. 04306 page 1 of 5

Golder Associates

200 – 2920 Virtual Way
Vancouver, British Columbia, Canada V5M 0C4
Telephone (604) 296-4200 Fax (604) 298-5253

Project Number: 1657709/6000			Laboratory Name: AGAT
Short Title: K19 Field Inv	Golder Contact: Erin O'Brien		Address: 120-4600 Glenlyon Pkwy
Golder E-mail Address 1: erin_o'brien @golder.com	Golder E-mail Address 2: kmara_dia-belair @golder.com		Telephone/Fax: 176-452-4009 Contact: Yasmine Galindo

Office Name: Vancouver

EQuIS Facility Code: 28433859
EQuIS upload: ☒

Turnaround Time: ☐ 24 hr ☐ 48 hr ☐ 72 hr ☒ Regular (5 Days)
Criteria: ☒ CSR ☒ CCME ☐ BC Water Quality ☐ Other

Note: Final Reports to be issued by e-mail

Quote No.:

Analyses Required

JAN 23 AM 10:19

Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D / M / Y)	Time Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	BTEX/VPH	LEPH/HEPH/PAH	VOCs	RUSH (Select TAT above)	Remarks (over)
04306 - 01	KM-MW18-1[illegible]	1	0.3-0.5	Soil	20/01/18	12:50	Discrete			2					9024971
- 02		2	2.0-2.5			13:10				4					973
- 03		3	3.5-4.0			13:20				4					975
- 04		4	5.5-6.0			13:40				4	X	X	X		976
- 05		5	7.0-7.5			14:00				4					977
- 06		6	8.5-9.0			14:20				2					978
- 07		7	10.1-10.6			14:50				4					979
- 08	KM-MW18-DS	1	5.5-6.0			16:00		FDA	04306-09	4					970
- 09	↓	1	5.5-6.0		↓	16:00		FD	04306-08	4					981
- 10															
- 11															
- 12															

AGAT Sample I.D.

Sampler's Signature:	Relinquished by: Signature	Company: Golder	Date: 22/01/18	Time: 09:45	Received by: Signature	Company: AGAT
Comments: Invoice Dan Osgathorpe	Method of Shipment:	Waybill No.:	Received for Lab by:	Date	Time: 9:50	
	Shipped by:	Shipment Condition: Seal Intact:	Temp (°C): 4	Cooler opened by:	Date	Time

WHITE: Golder Copy YELLOW: Lab Copy

ESED

18N304491

CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

No. 04305 page 2 of 5

Golder Associates
200 – 2920 Virtual Way
Vancouver, British Columbia, Canada V5M 0C4
Telephone (604) 296-4200 Fax (604) 298-5253

Project Number: 1657709/6000		Laboratory Name: AGAT	
Short Title: K19 Remediation	Golder Contact: Erin O'Brien	Address: 120-4600 Glenlyon Pkwy	
Golder E-mail Address 1: erin_obrien @golder.com	Golder E-mail Address 2: Konane-dim-Delar @golder.com	Telephone/Fax: 778-452-4009	Contact: Yasmine Galindo

Office Name: Vancouver

EQuIS Facility Code: 28433859
EQuIS upload: ☒

JAN 23 AM10:19

Turnaround Time: ☐ 24 hr ☐ 48 hr ☐ 72 hr ☒ Regular (5 Days)
Criteria: ☒ CSR ☒ CCME ☐ BC Water Quality ☐ Other

Note: Final Reports to be issued by e-mail

Quote No.:

Analyses Required

Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D / M / Y)	Time Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	LEPH/HEPH/PAH	BTEX/VPH	METALS	RUSH (Select TAT above)	Remarks (over)
04305 - 01	K19-MW18-08		7.0-7.6	SO	19/01/18	14:20	Discrete			4	X	X			984
- 02	↓		8.6-9.1	↓	↓	14:30	↓			4					986
- 03	↓		10.1-10.6		↓	15:00				2					987
- 04	K19-MW18-09	1	0.3-0.5		20/01/18	10:10				2			~~X~~		988
- 05	↓	2	2.0-2.5		↓	10:20				4					989
- 06		3	3.5-4.0			10:30				4					990
- 07		4	5.0-5.5			10:50				4	X	X	~~X~~		992
- 08		5	7.0-7.5			11:10				2					993
- 09		6	8.5-9.0			11:40				4					994
- 10	↓	7	10.0-10.5			12:00	↓			4					995
- 11	K19-AEC C-Backfill		0.50			1300				2					996
- 12 ↓	K19-AEC C-Backfill		0.30	↓	↓	1300				2					997

Sampler's Signature: [signature]	Relinquished by: Signature [signature]	Company Golder	Date 22/01/18	Time 09:45	Received by: Signature [signature] Company AGAT
Comments: Invoice Dave Ossenthorpe	Method of Shipment:	Waybill No.:	Received for Lab by: Cera AM	Date	Time 9:50
	Shipped by:	Shipment Condition: Seal Intact:	Temp (°C) 4	Cooler opened by: Date	Time

WHITE: Golder Copy YELLOW: Lab Copy

ESED

Page 46 of 51

18N304491

CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

No. 04304 page 2 of 5

Golder Associates
200 – 2920 Virtual Way
Vancouver, British Columbia, Canada V5M 0C4
Telephone (604) 296-4200 Fax (604) 298-5253

Project Number: 1657709/6000
Short Title: K19 Field Inv
Golder Contact: Erin O'Brien
Golder E-mail Address 1: erin_o'brien @golder.com
Golder E-mail Address 2: [illegible] @golder.com
Laboratory Name: AGAT
Address: 120-4600 Glenlyon Pky
Telephone/Fax: 778-452-4009
Contact: Yasmine Galindo

Office Name: Vancouver
EQuIS Facility Code: 28433859
EQuIS upload: ☐

JAN 28 AM10:19

Turnaround Time: ☐ 24 hr ☐ 48 hr ☐ 72 hr ☒ Regular (5 Days)
Criteria: ☒ CSR ☐ CCME ☐ BC Water Quality ☐ Other

Note: Final Reports to be issued by e-mail

Quote No.:

Analyses Required

Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D / M / Y)	Time Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	LEPH/HEPH/PAH	BTEX/VPH	Metals	RUSH (Select TAT above)	Remarks (over)
04304 - 01	K19-MW18-07	4	3.5-4.0	So.l	18/01/18	15:00		FDA	04304-02	4	X	X			947
- 02	↓	4	3.5-4.0	↓	↓	15:00		FDA	04304-01	4					5000
- 03		5	5.0-5.5			15:45		[illegible]		4					5002
- 04		6	6.5-7.0		19/01/19	09:40				4					5004
- 05		7	8.0-8.5			10:00				2					5005
- 06		8	9.5-10.0			10:45				4					5009
- 07		9	4.5-5.0			12:10		FDA	04304-08	4					5010
- 08	↓	9	4.5-5.0		↓	12:10		FD	04304-07	4					5011
- 09	K19-MW18-08	1	0.3-0.5			13:15				3			X		5012
- 10		2	2.0-2.5			13:30				4					5013
- 11		3	3.5-4.0			13:45				4					5014
- 12	↓	4	5.0-5.5	↓	↓	14:00				4					5015

Sampler's Signature: [signature]	Relinquished by: Signature [signature]	Company Golder	Date 22/01/18	Time 09:45	Received by: Signature [signature] — Company AGAT
Comments:	Method of Shipment:	Waybill No.:	Received for Lab by: Cara Am	Date	Time 9:50
	Shipped by:	Shipment Condition: Seal Intact:	Temp (°C) 4	Cooler opened by: — Date	Time

WHITE: Golder Copy YELLOW: Lab Copy

ESED

17N 304491

CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

No. 04316 page 4 of 5

Golder Associates
200 – 2920 Virtual Way
Vancouver, British Columbia, Canada V5M 0C4
Telephone (604) 296-4200 Fax (604) 298-5253

Project Number: 1657709 / 6000
Short Title: K19 Field Inv.
Golder Contact: Erin O'Brien
Golder E-mail Address 1: erin_o'brien@golder.com
Golder E-mail Address 2: Konane_Dion-Bela@golder.com
Laboratory Name: AGAT
Address: 120-4600 Glenlyon Pkwy
Telephone/Fax: 778-452-4009
Contact: Yasmine Galindo

Office Name: Vancouver
EQuIS Facility Code: 28433859
EQuIS upload: ☒

JAN 23 AM10:20

Turnaround Time: ☐ 24 hr ☐ 48 hr ☐ 72 hr ☒ Regular (5 Days)
Criteria: ☒ CSR ☒ CCME ☐ BC Water Quality ☐ Other

Note: Final Reports to be issued by e-mail
Quote No.:

Analyses Required

Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D / M / Y)	Time Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	CWS PHC F1/F2	VOCs/VPH/BTEX	Hexane	Decane	Naphthalene	Chlorinated Solvents			AGAT Sample ID	RUSH (Select TAT above)	Vacuum Remarks (over)
04316-01	K19-SV18-04			SV	19/01/18	12:31-12:40				1	X	X	X	X	X	X			032		Start: -24" End: -4"
-02	K19-MW18-02			↓	↓	~~14:27~~ ~~14:38~~ 15:02-15:12				1	X	X	X	X	X	X			036		Start: -25.5" End: -3.5"
-03	K19-SV18-03					16:37-16:48		FDA	04316-04	1									038		Start: -25" End: -3.5"
-04	"					16:37-16:48		FD	04316-03	1									039		Start: -25" End: -3.5"
-05																					
-06	K19-SV18-05				21/01/18	12:30-12:40				1	X	X	X	X	X	X			040		Start: -26" End: -4"
-07	K19-SV18-10					14:40-14:48				1	X	X	X	X	X	X			041		Start: -27" End: -3"
-08	K19-SV18-07			↓	↓	16:07-16:17				1	X	X	X	X	X	X			042		Start: -26" End: -4"
-09																					
-10																					
-11																					
-12																					

Sampler's Signature: [signature]	Relinquished by: Signature [signature]	Company Golder	Date 22/01/18	Time 09:45	Received by: Signature [signature]	Company AGAT
Comments: Invoice to Dave Osgnthorpe.	Method of Shipment:	Waybill No.:	Received for Lab by: Lara . [signature]	Date	Time 9:50	
	Shipped by:	Shipment Condition: Seal Intact:	Temp (°C) 4	Cooler opened by:	Date	Time

WHITE: Golder Copy YELLOW: Lab Copy

ESED

CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

18W3044 91

No. 04319 page 5 of 5

Golder Associates

200 – 2920 Virtual Way
Vancouver, British Columbia, Canada V5M 0C4
Telephone (604) 296-4200 Fax (604) 298-5253

Project Number: 1657709 / 6000

Short Title: K19 Field Inv

Golder Contact: Erin O'Brien

Golder E-mail Address 1: erin_o'brien @golder.com

Golder E-mail Address 2: konane_dion-bebair@golder.com

Laboratory Name: AGAT

Address: 120 - 4600 Glenlyon Pkwy

Telephone/Fax: 778.452.4009

Contact: Yasmine Galin

Office Name: Vancouver

EQuIS Facility Code: 28433859

EQuIS upload: ☒

Turnaround Time: ☐ 24 hr ☐ 48 hr ☐ 72 hr ☒ Regular (5 Days)

Criteria: ☒ CSR ☒ CCME ☐ BC Water Quality ☐ Other

Note: Final Reports to be issued by e-mail

Quote No.: 10.3

Analyses Required

JAN 23 AM 10:20

11:12

Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D / M / Y)	Time Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	Dissolved Metals	BTEX/VPH	PAH/LEPH/HEPH	Cyanide	VOCs	F1	F2-F4			RUSH (Select TAT above)	Remarks (over)
04319 - 01	K19-MW18-01		10	WG	21/01/18	15:47	GRAB				X	X	X	X	X	X	X				057
- 02	K19-MW18-02		11.3	↓	↓	13:11	↓				X	X	X		X	X	X				067
- 03	K19-MW18-07D		10.3			11:12					X	X	X	X	X	X	X				068
- 04	K19-MW18-01		6.3	↓	↓	16:33	↓				X	X	X		X	X	X				069
- 05																					
- 06																					
- 07																					
- 08																					
- 09																					
- 10																					
- 11																					
- 12																					

AGAT Sample ID

Sampler's Signature:	Relinquished by: Signature	Company	Date	Time	Received by: Signature	Company
		Golder	22/01/18	09:45		AGAT

Comments:	Method of Shipment:	Waybill No.:	Received for Lab by:	Date	Time
Invoice Dave Osgthorpe			Lara Cam		9:50
	Shipped by:	Shipment Condition: Seal Intact:	Temp (°C) 4	Cooler opened by:	Date	Time

WHITE: Golder Copy YELLOW: Lab Copy

ESED

AGAT Laboratories

SAMPLE INTEGRITY RECEIPT FORM

RECEIVING BASICS - Shipping

Company/Consultant: GOLDER

Courier: _____ Prepaid Collect

Waybill# _____

Branch: EDM GP (FN) FM RD VAN LYD FSJ EST Other: _____

Custody Seal Intact: Yes (No) NA

TAT: <24hr 24-48hr 48-72hr (Reg) Other _____

Cooler Quantity: (5)

TIME SENSITIVE ISSUES - Shipping

ALREADY EXCEEDED HOLD TIME? Yes (No)

Inorganic Tests (Please Circle): Mibi , BOD , Nitrate/Nitrite , Turbidity , Microtox , Ortho PO4 , Tedlar Bag , Residual Chlorine , Chlorophyll* , Chloroamines*

Earliest Expiry: _____

Hydrocarbons: Earliest Expiry _____

SAMPLE INTEGRITY - Shipping

Hazardous Samples: YES (NO) Precaution Taken: _____

Legal Samples: Yes (No)

International Samples: Yes (No)

Tape Sealed: Yes (No)

Coolant Used: (Icepack) Bagged Ice Free Ice Free Water None

Temperature (Bottles/Jars only) N/A if only Soil Bags Received

FROZEN (Please Circle if samples received Frozen)

1 (Bottle/Jar) -14 + -14 + -15 = -14 °C

2 (Bottle/Jar) -1 + 0 + -2 = -1 °C

3 (Bottle/Jar) ___ + ___ + SUBMA °C

4 (Bottle/Jar) ___ + ___ + SUBMA °C

5 (Bottle/Jar) -11 + -9 + -10 = -10 °C

6 (Bottle/Jar) ___ + ___ + ___ = ___ °C

7 (Bottle/Jar) ___ + ___ + ___ = ___ °C

8 (Bottle/Jar) ___ + ___ + ___ = ___ °C

9 (Bottle/Jar) ___ + ___ + ___ = ___ °C

10 (Bottle/Jar) ___ + ___ + ___ = ___ °C

(If more than 10 coolers are received use another sheet of paper and attach)

LOGISTICS USE ONLY

Workorder No: _____

Samples Damaged: Yes No If YES why?

No Bubble Wrap Frozen Courier

Other: _____

Account Project Manager: _____ have they been notified of the above issues: Yes No

Whom spoken to: _____ Date/Time: _____

CPM Initial _____

General Comments: _____

* Subcontracted Analysis (See CPM)

Date issued: May 22, 2015

AGAT Laboratories

SAMPLE INTEGRITY RECEIPT FORM - BURNABY

Work Order # 18N304491

RECEIVING BASICS:

Received From: Courier Waybill #: _____

SAMPLE QUANTITIES:

Coolers: 4 Containers: 170

TIME SENSITIVE ISSUES:

Earliest Date Sampled: Jan 18, 2018 ALREADY EXCEEDED? Yes (No)

NON-CONFORMANCES:

3 temperatures of samples* and average of each cooler: (record differing temperatures on the CoC next to sample ID's) *use jars when available

(1) 1 + 1 + 2 = 1 °C (2) 7 + 7 + 6 = 7 °C (3) 6 + 6 + 6 = 6 °C (4) 6 + 5 + 5 = 5 °C

Was ice or ice pack present: (Yes) No

Integrity Issues:

Chloride received incorrectly preserved for Sample 04319-01.

Account Project Manager: _____ have they been notified of the above issues: Yes No

Whom spoken to: _____ Date and Time: _____

ADDITIONAL NOTES:

AGAT Laboratories

5835 COOPERS AVENUE
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CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA
219-800 BURRARD ST
VANCOUVER, BC V6Z 0B9
604-671-1831

ATTENTION TO: Erin O'Brien

PROJECT: 1657709/6000

AGAT WORK ORDER: 18N306644

TRACE ORGANICS REVIEWED BY: Jacky Takeuchi, BScH (Chem Eng), BSc (Bio), C.Chem, Laboratory Manager

DATE REPORTED: Feb 05, 2018

PAGES (INCLUDING COVER): 12

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 18N306644

PROJECT: 1657709/6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

BC Routine VOC package in Air (Canister) -ug/m3

DATE RECEIVED: 2018-01-30

DATE REPORTED: 2018-02-05

		SAMPLE DESCRIPTION:		04320-01	04320-02	04320-03	04320-04
		SAMPLE TYPE:		Air	Air	Air	Air
		DATE SAMPLED:		2018-01-22	2018-01-22	2018-01-22	2018-01-24
Parameter	Unit	G / S	RDL	9036418	9036421	9036422	9036423
1,2,4-Trimethylbenzene	ug/m3		1.5	1.6	<1.5	<1.5	4.5
1,3,5-Trimethylbenzene	ug/m3		1.5	<1.5	<1.5	<1.5	1.9
1,3-Butadiene	ug/m3		1.0	<1.0	<1.0	<1.0	<1.0
Isopropylbenzene	ug/m3		0.80	<0.80	<0.80	<0.80	<0.80
Methylcyclohexane	ug/m3		0.70	6.8	9.0	16	20
Methyl tert-Butyl ether (MTBE)	ug/m3		0.80	<0.80	<0.80	<0.80	<0.80
Naphthalene	ug/m3		2.0	<2.0	<2.0	<2.0	<2.0
n-Decane	ug/m3		1.3	32	1.5	<1.3	34
n-Hexane	ug/m3		1.1	45	3.1	4.6	12
VPHv (C>6-C13)	ug/m3		15	5100	1200	510	2300
Surrogate	Unit	Acceptable Limits					
4-Bromofluorobenzene	%	70-130		126	102	106	105

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9036418-9036423 Air anaylsis was performed from an air canister sample, using a Cold Vapor Trap preconcentrator and GC/MSD.
Note: Methylcyclohexane is a non routine parameter, identification is done using the GC/MS and the appropriate m/z fragments. If the compound is present it will be quantitated using cyclohexane calibration standards and the TIC area.

Analysis done at AGAT 5623 McAdam Road Mississauga location.

Certified By:

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 18N306644

PROJECT: 1657709/6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works : BC VOCs in Air (Canister) - ug/m3

DATE RECEIVED: 2018-01-30

DATE REPORTED: 2018-02-05

		SAMPLE DESCRIPTION:		04320-01	04320-02	04320-03	04320-04
		SAMPLE TYPE:		Air	Air	Air	Air
		DATE SAMPLED:		2018-01-22	2018-01-22	2018-01-22	2018-01-24
Parameter	Unit	G / S	RDL	9036418	9036421	9036422	9036423
Dichlorodifluoromethane	ug/m3		1.0	2.9	2.9	2.9	4.0
1,2-Dichlorotetrafluoroethane	ug/m3		1.4	<1.4	<1.4	<1.4	<1.4
1,1,2-Trichloro-1,2,2-trifluoroethane	ug/m3		1.5	<1.5	<1.5	<1.5	<1.5
Chloromethane	ug/m3		0.60	<0.60	<0.60	2.3	2.4
Vinyl Chloride	ug/m3		0.40	<0.40	<0.40	<0.40	<0.40
Bromomethane	ug/m3		1.9	<1.9	<1.9	<1.9	<1.9
Chloroethane	ug/m3		1.0	<1.0	<1.0	<1.0	<1.0
Vinyl Bromide	ug/m3		0.80	<0.80	<0.80	<0.80	<0.80
Trichlorofluoromethane	ug/m3		2.3	<2.3	<2.3	<2.3	<2.3
1,1-Dichloroethene	ug/m3		1.0	<1.0	<1.0	<1.0	<1.0
Methylene Chloride	ug/m3		1.0	<1.0	<1.0	<1.0	1.1
trans-1,2-Dichloroethene	ug/m3		0.80	<0.80	<0.80	<0.80	<0.80
1,1-Dichloroethane	ug/m3		1.2	<1.2	<1.2	<1.2	<1.2
cis-1,2-Dichloroethene	ug/m3		0.80	<0.80	<0.80	<0.80	<0.80
Chloroform	ug/m3		1.0	14	<1.0	<1.0	89
1,2-Dichloroethane	ug/m3		0.30	<0.30	<0.30	<0.30	<0.30
1,1,1-Trichloroethane	ug/m3		1.6	<1.6	<1.6	<1.6	<1.6
Carbon Tetrachloride	ug/m3		2.0	<2.0	<2.0	<2.0	<2.0
Benzene	ug/m3		0.50	3.1	0.82	2.6	5.5
1,2-Dichloropropane	ug/m3		2.0	<2.0	<2.0	<2.0	<2.0
2,2-Dichloropropane	ug/m3		2.0	<2.0	<2.0	<2.0	<2.0
Trichloroethene	ug/m3		1.0	<1.0	<1.0	<1.0	<1.0
Bromodichloromethane	ug/m3		1.3	<1.3	<1.3	<1.3	<1.3
cis-1,3-Dichloropropene	ug/m3		1.0	<1.0	<1.0	<1.0	<1.0
trans-1,3-Dichloropropene	ug/m3		1.0	<1.0	<1.0	<1.0	<1.0
Methyl Isobutyl Ketone (MIBK)	ug/m3		2.0	<2.0	<2.0	<2.0	<2.0
1,1,2-Trichloroethane	ug/m3		1.6	<1.6	<1.6	<1.6	<1.6
Toluene	ug/m3		0.80	2.6	<0.80	1.6	14
2-Hexanone	ug/m3		2.0	<2.0	<2.0	<2.0	<2.0
Dibromochloromethane	ug/m3		2.0	<2.0	<2.0	<2.0	<2.0

Certified By:

AGAT Laboratories
5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 18N306644

PROJECT: 1657709/6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works : BC VOCs in Air (Canister) - ug/m3

DATE RECEIVED: 2018-01-30

DATE REPORTED: 2018-02-05

		SAMPLE DESCRIPTION:		04320-01	04320-02	04320-03	04320-04
		SAMPLE TYPE:		Air	Air	Air	Air
		DATE SAMPLED:		2018-01-22	2018-01-22	2018-01-22	2018-01-24
Parameter	Unit	G / S	RDL	9036418	9036421	9036422	9036423
1,2-Dibromoethane	ug/m3		1.5	<1.5	<1.5	<1.5	<1.5
Tetrachloroethene	ug/m3		1.0	1.7	<1.0	<1.0	<1.0
Chlorobenzene	ug/m3		1.0	<1.0	<1.0	<1.0	<1.0
Ethylbenzene	ug/m3		0.9	<0.9	<0.9	<0.9	2.5
m&p-Xylene	ug/m3		1.5	1.9	<1.5	<1.5	10
Bromoform	ug/m3		2.0	<2.0	<2.0	<2.0	<2.0
Styrene	ug/m3		1.0	<1.0	<1.0	<1.0	<1.0
1,1,2,2-Tetrachloroethane	ug/m3		1.5	<1.5	<1.5	<1.5	<1.5
o-Xylene	ug/m3		0.9	1.2	<0.9	<0.9	6.2
1,3-Dichlorobenzene	ug/m3		2.5	4.1	2.6	<2.5	<2.5
1,4-Dichlorobenzene	ug/m3		2.5	<2.5	<2.5	<2.5	<2.5
1,2-Dichlorobenzene	ug/m3		2.5	<2.5	<2.5	<2.5	<2.5
Total Xylenes	ug/m3		2.0	3.1	<2.0	<2.0	16
Surrogate	Unit	Acceptable Limits					
4-Bromofluorobenzene	%	70-130		120	102	106	105

Certified By:

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 18N306644

PROJECT: 1657709/6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works : BC VOCs in Air (Canister) - ug/m3

DATE RECEIVED: 2018-01-30

DATE REPORTED: 2018-02-05

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9036418 VOC anaylsis was performed from an air canister sample, using a Cold Vapor Trap preconcentrator and GC/MSD.
Pressure upon arrival to the lab = 13.39 psia.

Analysis done at AGAT 5623 McAdam Road Mississauga location.

2,2-Dichloropropane was analyzed using GC/MS full scan and the specific m/z fragments for this compound, if it is present in the sample quantitation was done using the TIC area and the TIC area of 1, 2-Dichloropropane in the calibration standards.

9036421 VOC anaylsis was performed from an air canister sample, using a Cold Vapor Trap preconcentrator and GC/MSD.
Pressure upon arrival to the lab = 12.49 psia.

Analysis done at AGAT 5623 McAdam Road Mississauga location.

2,2-Dichloropropane was analyzed using GC/MS full scan and the specific m/z fragments for this compound, if it is present in the sample quantitation was done using the TIC area and the TIC area of 1, 2-Dichloropropane in the calibration standards.

9036422 VOC anaylsis was performed from an air canister sample, using a Cold Vapor Trap preconcentrator and GC/MSD.
Pressure upon arrival to the lab = 13.39 psia.

Analysis done at AGAT 5623 McAdam Road Mississauga location.

2,2-Dichloropropane was analyzed using GC/MS full scan and the specific m/z fragments for this compound, if it is present in the sample quantitation was done using the TIC area and the TIC area of 1, 2-Dichloropropane in the calibration standards.

9036423 VOC anaylsis was performed from an air canister sample, using a Cold Vapor Trap preconcentrator and GC/MSD.
Pressure upon arrival to the lab = 13.35 psia.

Analysis done at AGAT 5623 McAdam Road Mississauga location.

2,2-Dichloropropane was analyzed using GC/MS full scan and the specific m/z fragments for this compound, if it is present in the sample quantitation was done using the TIC area and the TIC area of 1, 2-Dichloropropane in the calibration standards.

Certified By:

AGAT Laboratories

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FAX (905)712-5122
http://www.agatlabs.com

Quality Assurance

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N306644

PROJECT: 1657709/6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis

RPT Date: Feb 05, 2018

PARAMETER	Batch	Sample Id	DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
			Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Public Works : BC VOCs in Air (Canister) - ug/m3															
Dichlorodifluoromethane	1		< 1.0	< 1.0	0.0%	< 1.0	136%	60%	140%	101%	50%	140%	NA	30%	140%
1,2-Dichlorotetrafluoroethane	1		< 1.4	< 1.4	0.0%	< 1.4	140%	60%	140%	95%	50%	140%	NA	30%	140%
1,1,2-Trichloro-1,2,2-trifluoroethane	1		< 1.5	< 1.5	0.0%	< 1.5	118%	60%	140%	102%	50%	140%	NA	30%	140%
Chloromethane	1		< 0.60	< 0.60	0.0%	< 0.60	129%	60%	140%	108%	50%	140%	NA	30%	140%
Vinyl Chloride	1		< 0.40	< 0.40	0.0%	< 0.40	132%	60%	140%	104%	50%	140%	NA	30%	140%
Bromomethane	1		< 1.9	< 1.9	0.0%	< 1.9	140%	60%	140%	97%	50%	140%	NA	30%	140%
Chloroethane	1		< 1.0	< 1.0	0.0%	< 1.0	135%	60%	140%	106%	50%	140%	NA	30%	140%
Vinyl Bromide	1		< 0.80	< 0.80	0.0%	< 0.80	NA	60%	140%	140%	50%	140%	NA	30%	140%
Trichlorofluoromethane	1		< 2.3	< 2.3	0.0%	< 2.3	138%	60%	140%	107%	50%	140%	NA	30%	140%
1,1-Dichloroethene	1		< 1.0	< 1.0	0.0%	< 1.0	69%	60%	140%	104%	50%	140%	NA	30%	140%
Methylene Chloride	1		< 1.0	< 1.0	0.0%	< 1.0	114%	60%	140%	104%	50%	140%	NA	30%	140%
trans-1,2-Dichloroethene	1		< 0.80	< 0.80	0.0%	< 0.80	100%	60%	140%	103%	50%	140%	NA	30%	140%
1,1-Dichloroethane	1		< 1.2	< 1.2	0.0%	< 1.2	116%	60%	140%	100%	50%	140%	NA	30%	140%
cis-1,2-Dichloroethene	1		< 0.80	< 0.80	0.0%	< 0.80	106%	60%	140%	100%	50%	140%	NA	30%	140%
Chloroform	1		< 1.0	< 1.0	0.0%	< 1.0	118%	60%	140%	103%	50%	140%	NA	30%	140%
1,2-Dichloroethane	1		< 0.30	< 0.30	0.0%	< 0.30	122%	60%	140%	102%	50%	140%	NA	30%	140%
1,1,1-Trichloroethane	1		< 1.6	< 1.6	0.0%	< 1.6	110%	60%	140%	95%	50%	140%	NA	30%	140%
Carbon Tetrachloride	1		< 2.0	< 2.0	0.0%	< 2.0	117%	60%	140%	100%	50%	140%	NA	30%	140%
Benzene	1		< 0.50	< 0.50	0.0%	< 0.50	113%	60%	140%	100%	50%	140%	NA	30%	140%
1,2-Dichloropropane	1		< 2.0	< 2.0	0.0%	< 2.0	116%	60%	140%	106%	50%	140%	NA	30%	140%
Trichloroethene	1		< 1.0	< 1.0	0.0%	< 1.0	117%	60%	140%	119%	50%	140%	NA	30%	140%
Bromodichloromethane	1		< 1.3	< 1.3	0.0%	< 1.3	118%	60%	140%	103%	50%	140%	NA	30%	140%
cis-1,3-Dichloropropene	1		< 1.0	< 1.0	0.0%	< 1.0	101%	60%	140%	111%	50%	140%	NA	30%	140%
trans-1,3-Dichloropropene	1		< 1.0	< 1.0	0.0%	< 1.0	99%	60%	140%	110%	50%	140%	NA	30%	140%
Methyl Isobutyl Ketone (MIBK)	1		< 2.0	< 2.0	0.0%	< 2.0	136%	60%	140%	104%	50%	140%	NA	30%	140%
1,1,2-Trichloroethane	1		< 1.6	< 1.6	0.0%	< 1.6	135%	60%	140%	105%	50%	140%	NA	30%	140%
Toluene	1		< 0.80	< 0.80	0.0%	< 0.80	134%	60%	140%	107%	50%	140%	NA	30%	140%
2-Hexanone	1		< 2.0	< 2.0	0.0%	< 2.0	135%	60%	140%	110%	50%	140%	NA	30%	140%
Dibromochloromethane	1		< 2.0	< 2.0	0.0%	< 2.0	134%	60%	140%	105%	50%	140%	NA	30%	140%
1,2-Dibromoethane	1		< 1.5	< 1.5	0.0%	< 1.5	132%	60%	140%	110%	50%	140%	NA	30%	140%
Tetrachloroethene	1		< 1.0	< 1.0	0.0%	< 1.0	128%	60%	140%	118%	50%	140%	NA	30%	140%
Chlorobenzene	1		< 1.0	< 1.0	0.0%	< 1.0	139%	60%	140%	110%	50%	140%	NA	30%	140%
Ethylbenzene	1		< 0.9	< 0.9	0.0%	< 0.9	130%	60%	140%	73%	50%	140%	NA	30%	140%
m&p-Xylene	1		< 1.5	< 1.5	0.0%	< 1.5	140%	60%	140%	68%	50%	140%	NA	30%	140%
Bromoform	1		< 2.0	< 2.0	0.0%	< 2.0	133%	60%	140%	68%	50%	140%	NA	30%	140%
Styrene	1		< 1.0	< 1.0	0.0%	< 1.0	133%	60%	140%	76%	50%	140%	NA	30%	140%
1,1,2,2-Tetrachloroethane	1		< 1.5	< 1.5	0.0%	< 1.5	88%	60%	140%	52%	50%	140%	NA	30%	140%
o-Xylene	1		< 0.9	< 0.9	0.0%	< 0.9	85%	60%	140%	62%	50%	140%	NA	30%	140%
1,3-Dichlorobenzene	1		< 2.5	< 2.5	0.0%	< 2.5	140%	60%	140%	62%	50%	140%	NA	30%	140%

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

Quality Assurance

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N306644

PROJECT: 1657709/6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date: Feb 05, 2018			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
1,4-Dichlorobenzene	1		< 2.5	< 2.5	0.0%	< 2.5	137%	60%	140%	61%	50%	140%	NA	30%	140%
1,2-Dichlorobenzene	1		< 2.5	< 2.5	0.0%	< 2.5	134%	60%	140%	64%	50%	140%	NA	30%	140%
BC Routine VOC package in Air (Canister) -ug/m3															
1,2,4-Trimethylbenzene	1		< 1.5	< 1.5	0.0%	< 1.5	137%	50%	140%	63%	50%	140%	NA	30%	140%
1,3,5-Trimethylbenzene	1		< 1.5	< 1.5	0.0%	< 1.5	140%	50%	140%	63%	50%	140%	NA	30%	140%
1,3-Butadiene	1		< 1.0	< 1.0	0.0%	< 1.0	128%	50%	140%	140%	50%	140%	NA	30%	140%
Isopropylbenzene	1		< 0.80	< 0.80	0.0%	< 0.80	135%	50%	140%	136%	50%	140%	NA	30%	140%
Methyl tert-Butyl ether (MTBE)	1		< 0.80	< 0.80	0.0%	< 0.80	131%	50%	140%	85%	50%	140%	NA	30%	140%
Naphthalene	1		< 2.0	< 2.0	0.0%	< 2.0	133%	50%	140%	79%	50%	140%	NA	30%	140%
n-Decane	1		< 1.3	< 1.3	0.0%	< 1.3	60%	50%	140%	85%	50%	140%	NA	30%	140%
n-Hexane	1		< 1.1	< 1.1	0.0%	< 1.1	96%	50%	140%	106%	50%	140%	NA	30%	140%

Certified By:

AGAT Laboratories

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Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N306644

PROJECT: 1657709/6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
1,2,4-Trimethylbenzene	AQM-91-16001	MASS APH	GC/MS
1,3,5-Trimethylbenzene	AQM-91-16001	MASS APH	GC/MS
1,3-Butadiene	AQM-91-16000	EPA TO15	GC/MS
Isopropylbenzene	AQM-91-16000	MASS APH	GC/MS
Methylcyclohexane	AQM-91-16000	EPA TO15	GC/MS
Methyl tert-Butyl ether (MTBE)	AQM-91-16000	EPA TO15	GC/MS
Naphthalene	AQM-91-16000	MASS APH	GC/MS
n-Decane	AQM-91-16000	MASS APH	GC/MS
n-Hexane	AQM-91-16000	EPA TO15	GC/MS
VPHv (C>6-C13)	AQM-91-16000	MASS APH	GC/MS
4-Bromofluorobenzene	AQM-91-16000	MASS APH	GC/MS
Dichlorodifluoromethane	AQM-248-16000	EPA TO15	GC/MS
1,2-Dichlorotetrafluoroethane	AQM-248-16000	EPA TO15	GC/MS
1,1,2-Trichloro-1,2,2-trifluoroethane	AQM-248-16000	EPA TO15	GC/MS
Chloromethane	AQM-248-16000	EPA TO15	GC/MS
Vinyl Chloride	AQM-248-16000	EPA TO15	GC/MS
Bromomethane	AQM-248-16000	EPA TO15	GC/MS
Chloroethane	AQM-248-16000	EPA TO15	GC/MS
Vinyl Bromide	AQM-248-16000	EPA TO15	GC/MS
Trichlorofluoromethane	AQM-248-16000	EPA TO15	GC/MS
1,1-Dichloroethene	AQM-248-16000	EPA TO15	GC/MS
Methylene Chloride	AQM-248-16000	EPA TO15	GC/MS
trans-1,2-Dichloroethene	AQM-248-16000	EPA TO15	GC/MS
1,1-Dichloroethane	AQM-248-16000	EPA TO15	GC/MS
cis-1,2-Dichloroethene	AQM-248-16000	EPA TO15	GC/MS
Chloroform	AQM-248-16000	EPA TO15	GC/MS
1,2-Dichloroethane	AQM-248-16000	EPA TO15	GC/MS
1,1,1-Trichloroethane	AQM-248-16000	EPA TO15	GC/MS
Carbon Tetrachloride	AQM-248-16000	EPA TO15	GC/MS
Benzene	AQM-248-16000	EPA TO15	GC/MS
1,2-Dichloropropane	AQM-248-16000	EPA TO15	GC/MS
2,2-Dichloropropane	AQM-248-16000	EPA TO15	GC/MS
Trichloroethene	AQM-248-16000	EPA TO15	GC/MS
Bromodichloromethane	AQM-248-16000	EPA TO15	GC/MS
cis-1,3-Dichloropropene	AQM-248-16000	EPA TO15	GC/MS
trans-1,3-Dichloropropene	AQM-248-16000	EPA TO15	GC/MS
Methyl Isobutyl Ketone (MIBK)	AQM-248-16000	EPA TO15	GC/MS
1,1,2-Trichloroethane	AQM-248-16000	EPA TO15	GC/MS
Toluene	AQM-248-16000	EPA TO15	GC/MS
2-Hexanone	AQM-248-16000	EPA TO15	GC/MS
Dibromochloromethane	AQM-248-16000	EPA TO15	GC/MS
1,2-Dibromoethane	AQM-248-16000	EPA TO15	GC/MS
Tetrachloroethene	AQM-248-16000	EPA TO15	GC/MS
Chlorobenzene	AQM-248-16000	EPA TO15	GC/MS
Ethylbenzene	AQM-248-16000	EPA TO15	GC/MS
m&p-Xylene	AQM-248-16000	EPA TO15	GC/MS
Bromoform	AQM-248-16000	EPA TO15	GC/MS
Styrene	AQM-248-16000	EPA TO15	GC/MS
1,1,2,2-Tetrachloroethane	AQM-248-16000	EPA TO15	GC/MS

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CANADA L4Z 1Y2
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Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N306644

PROJECT: 1657709/6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
o-Xylene	AQM-248-16000	EPA TO15	GC/MS
1,3-Dichlorobenzene	AQM-248-16000	EPA TO15	GC/MS
1,4-Dichlorobenzene	AQM-248-16000	EPA TO15	GC/MS
1,2-Dichlorobenzene	AQM-248-16000	EPA TO15	GC/MS
Total Xylenes	AQM-248-16000	EPA TO15	GC/MS
4-Bromofluorobenzene	AQM-248-16000	EPA TO15	GC/MS

SCN 306644

CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

No. 04320 page 1 of 1

Golder Associates

200 – 2920 Virtual Way
Vancouver, British Columbia, Canada V5M 0C4
Telephone (604) 296-4200 Fax (604) 298-5253

Project Number: 1657709/6000		Laboratory Name: AGAT	
Short Title: K19 Feild Investigation	Golder Contact: Erin O'Brien	Address: 120-8600 Glenlyon Parkway Burnaby, BC	
Golder E-mail Address 1: erin_obrien@golder.com	Golder E-mail Address 2: [illegible]@golder.com	Telephone/Fax: 778-452-4000	Contact: Yasmine Galindo

Office Name: Vancouver

EQuIS Facility Code: 28433859
EQuIS upload: ☒

JAN 30 PM 1:19

Turnaround Time: ☐ 24 hr ☐ 48 hr ☐ 72 hr ☒ Regular (5 Days)

Criteria: ☒ CSR ☐ CCME ☐ BC Water Quality ☐ Other

Note: Final Reports to be issued by e-mail

Quote No.:

Analyses Required

Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D / M / Y)	Time Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	AGAT sample ID Related SCN (over)	Number of Containers	F1/F2	BTEX/VPHv/Styrene	naphthalene, 1,3-butadiene, n-decane, n-hexane	isopropylbenzene	VOC's	chlorinated alkenes				RUSH (Select TAT above)	Remarks (over)
04320 - 01	K19-SV18-08			SV	22/01/18	11:49-11:56			9036418	1	X	X	X	X	X	X					Start: -25" End: -35"
- 02	K19-SV18-09			↓		13:27-13:36			421	1	↓	↓	↓	↓	↓	↓					Start: -25" End: -35"
- 03	K19-SV18-01			↓		15:05-15:13			422	1	↓	↓	↓	↓	↓	↓					Start: -23.5" End: -2.5"
- 04	K19-SV18-14			↓	24/01/18	15:38-15:48			423	1	↓	↓	↓	↓	↓	↓					Start: -26" End: -3"
- 05																					
- 06																					
- 07																					
- 08																					
- 09																					
- 10																					
- 11																					
- 12																					

Sampler's Signature: [signature]	Relinquished by: Signature [signature]	Company: Golder	Date: 25/01/2018	Time	Received by: Signature [signature]	Company: AGAT
Comments: Invoice to Dave Osguthorpe	Method of Shipment:	Waybill No.:	Received for Lab by: Ann [illegible]		Date	Time: 12:50pm
	Shipped by:	Shipment Condition: Seal Intact:	Temp (°C) 7	Cooler opened by:	Date	Time

WHITE: Golder Copy **YELLOW:** Lab Copy

ESED

AGAT Laboratories

SAMPLE INTEGRITY RECEIPT FORM

RECEIVING BASICS - Shipping

Company/Consultant: GOLDER

Courier: _____ (Prepaid) Collect

Waybill# _____

Branch: EDM GP (FN) FM RD VAN LYD FSJ EST Other: _____

Custody Seal Intact: Yes (No) NA

TAT: <24hr 24-48hr 48-72hr (Reg) Other _____

Cooler Quantity: 1

TIME SENSITIVE ISSUES - Shipping

ALREADY EXCEEDED HOLD TIME? Yes (No)

Inorganic Tests (Please Circle): Mibi , BOD , Nitrate/Nitrite , Turbidity , Microtox , Ortho PO4 , Tedlar Bag , Residual Chlorine , Chlorophyll* , Chloroamines*

Earliest Expiry: _____

Hydrocarbons: Earliest Expiry _____

SAMPLE INTEGRITY - Shipping

Hazardous Samples: YES (NO) Precaution Taken: _____

Legal Samples: Yes (No)

International Samples: Yes (No)

Tape Sealed: Yes (No)

Coolant Used: Icepack Bagged Ice Free Ice Free Water (None)

Temperature (Bottles/Jars only) N/A if only Soil Bags Received

FROZEN (Please Circle if samples received Frozen)

1 (Bottle/Jar)___+___+___=___°C 2(Bottle/Jar)___+___+___=___°C

3 (Bottle/Jar)___+___+___=___°C 4 (Bottle/Jar)___+___+___=___°C

5 (Bottle/Jar)___+___+___=___°C 6 (Bottle/Jar)___+___+___=___°C

7 (Bottle/Jar)___+___+___=___°C 8 (Bottle/Jar)___+___+___=___°C

9 (Bottle/Jar)___+___+___=___°C 10 (Bottle/Jar)___+___+___=___°C

(If more than 10 coolers are received use another sheet of paper and attach)

LOGISTICS USE ONLY

Workorder No: _____

Samples Damaged: Yes (No) If YES why?

No Bubble Wrap Frozen Courier

Other: _____

Account Project Manager: _____ have they been notified of the above issues: Yes No

Whom spoken to: _____ Date/Time: _____

CPM Initial____

General Comments: _____

SUMMA CANISTER SAMPLES.

* Subcontracted Analysis (See CPM)

Date issued: May 22, 2015

AGAT Laboratories

SAMPLE INTEGRITY RECEIPT FORM - BURNABY

Work Order # 18 W366644

RECEIVING BASICS:

Received From: NOVEX Waybill #: _____

SAMPLE QUANTITIES:

Coolers: 1 Containers: 4

TIME SENSITIVE ISSUES:

Earliest Date Sampled: Jan 22, 2018 ALREADY EXCEEDED? Yes (No)

NON-CONFORMANCES:

3 temperatures of samples* and average of each cooler: (record differing temperatures on the CoC next to sample ID's) *use jars when available

(1) 7 + 7 + 8 = 7 °C (2) ___ + ___ + ___ = ___ °C (3) ___ + ___ + ___ = ___ °C (4) ___ + ___ + ___ = ___ °C

Was ice or ice pack present: Yes (No)

Integrity Issues:

Account Project Manager: _____ have they been notified of the above issues: Yes No

Whom spoken to: _____ Date and Time: _____

ADDITIONAL NOTES:

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA
219-800 BURRARD ST
VANCOUVER, BC V6Z 0B9
604-671-1831

ATTENTION TO: Erin O'Brien

PROJECT: 1657709-6000 K19 Field Inv.

AGAT WORK ORDER: 18N306694

TRACE ORGANICS REVIEWED BY: Andrew Garrard, B.Sc., General Manager

DATE REPORTED: Feb 05, 2018

PAGES (INCLUDING COVER): 15

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (778) 452-4000

*NOTES

VERSION 1: Sample receipt temperature 5°C.

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

AGAT Laboratories

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TEL (778)452-4000
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http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 18N306694

PROJECT: 1657709-6000 K19 Field Inv.

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works LEPH/HEPH in Soil Low Level

DATE RECEIVED: 2018-01-30

DATE REPORTED: 2018-02-05

		SAMPLE DESCRIPTION:		04307-04	04307-05		04317-03	04318-01	04318-12	04321-07	04322-05
		SAMPLE TYPE:		Soil	Soil		Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-01-23	2018-01-23		2018-01-23	2018-01-24	2018-01-24	2018-01-25	2018-01-25
Parameter	Unit	G / S	RDL	9036831	9036834	RDL	9036862	9036890	9036901	9036908	9036919
Naphthalene	µg/g		0.005	0.021	0.149	0.05	1.25	1.08	1.12	0.74	1.18
2-Methylnaphthalene	µg/g		0.005	0.071	0.484	0.05	1.99	1.56	1.84	1.08	2.18
1-Methylnaphthalene	µg/g		0.005	0.066	0.321	0.05	1.39	1.14	1.29	0.77	1.51
Acenaphthylene	µg/g		0.005	<0.005	<0.005	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Acenaphthene	µg/g		0.005	<0.005	<0.005	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fluorene	µg/g		0.02	<0.02	0.08	0.02	0.18	0.18	0.20	0.12	0.19
Phenanthrene	µg/g		0.02	0.25	0.27	0.02	0.46	0.47	0.53	0.30	0.50
Anthracene	µg/g		0.004	<0.004	<0.004	0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Fluoranthene	µg/g		0.01	0.02	0.02	0.01	0.03	0.03	0.03	0.02	0.03
Pyrene	µg/g		0.01	0.03	0.05	0.01	0.06	0.06	0.06	0.04	0.06
Benzo(a)anthracene	µg/g		0.03	<0.03	<0.03	0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Chrysene	µg/g		0.05	0.10	0.08	0.05	0.09	0.10	0.10	0.05	0.08
Benzo(b)fluoranthene	µg/g		0.02	0.06	0.04	0.02	0.04	0.04	0.04	0.03	0.04
Benzo(j)fluoranthene	µg/g		0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Benzo(k)fluoranthene	µg/g		0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Benzo(a)pyrene	µg/g		0.03	<0.03	<0.03	0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Indeno(1,2,3-c,d)pyrene	µg/g		0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Dibenzo(a,h)anthracene	µg/g		0.005	0.006	<0.005	0.005	0.005	0.006	0.006	<0.005	0.005
Benzo(g,h,i)perylene	µg/g		0.05	0.09	0.12	0.05	0.17	0.17	0.18	0.10	0.15
Quinoline	µg/g		0.05	<0.05	<0.05	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
IACR CCME (Soil)	µg/g		0.6	0.6	<0.6	0.6	<0.6	<0.6	<0.6	<0.6	<0.6
B[a]P TPE (Soil)	µg/g		0.05	<0.05	<0.05	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
EPH C10-C19	µg/g		20	43	60	20	85	114	102	67	130
EPH C19-C32	µg/g		20	66	81	20	78	101	95	65	104
LEPH C10-C19	µg/g		20	43	60	20	83	112	101	66	128
HEPH C19-C32	µg/g		20	66	81	20	77	100	95	65	104
Benzo(b+j)fluoranthene	µg/g		0.05	0.06	<0.05	0.05	<0.05	<0.05	<0.05	<0.05	<0.05

Certified By:

AGAT Laboratories

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FAX (778)452-4074
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 18N306694

PROJECT: 1657709-6000 K19 Field Inv.

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works LEPH/HEPH in Soil Low Level

DATE RECEIVED: 2018-01-30

DATE REPORTED: 2018-02-05

		SAMPLE DESCRIPTION:	04307-04	04307-05	04317-03	04318-01	04318-12	04321-07	04322-05
		SAMPLE TYPE:	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:	2018-01-23	2018-01-23	2018-01-23	2018-01-24	2018-01-24	2018-01-25	2018-01-25
Surrogate	Unit	Acceptable Limits	9036831	9036834	9036862	9036890	9036901	9036908	9036919
Naphthalene - d8	%	50-130	67	80	71	58	63	63	54
2-Fluorobiphenyl	%	50-130	67	79	72	61	63	64	66
P-Terphenyl - d14	%	60-130	82	89	84	75	75	76	76

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9036831-9036834 Results are based on dry weight of sample.
LEPH & HEPH results have been corrected for PAH contributions.
Soil sample is visibly heterogeneous.

9036862-9036919 Results are based on dry weight of sample.
LEPH & HEPH results have been corrected for PAH contributions.
Soil sample is visibly heterogeneous.
PAH detection limits increased due to sample matrix interference. Sample extract was diluted.

Certified By:

AGAT Laboratories

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Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
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http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 18N306694

PROJECT: 1657709-6000 K19 Field Inv.

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

BTEX / VPH (C6-C10) Soil

DATE RECEIVED: 2018-01-30

DATE REPORTED: 2018-02-05

		SAMPLE DESCRIPTION:		04307-04	04317-03	04318-01	04318-12	04321-07	04322-05
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-01-23	2018-01-23	2018-01-24	2018-01-24	2018-01-25	2018-01-25
Parameter	Unit	G / S	RDL	9036831	9036862	9036890	9036901	9036908	9036919
Methyl tert-butyl ether (MTBE)	µg/g		0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzene	µg/g		0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Toluene	µg/g		0.05	<0.05	0.13	0.31	0.36	0.41	0.16
Ethylbenzene	µg/g		0.05	<0.05	0.36	0.58	0.49	0.40	0.51
m&p-Xylene	µg/g		0.05	<0.05	1.07	1.66	1.37	1.09	1.51
o-Xylene	µg/g		0.05	<0.05	0.51	0.80	0.68	0.55	0.69
Styrene	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
VPH	µg/g		10	<10	52	62	55	37	70
VH	µg/g		10	<10	54	65	58	39	73
Total Xylenes	ug/g		0.1	<0.1	1.6	2.5	2.1	1.6	2.2
Surrogate	Unit	Acceptable Limits							
Bromofluorobenzene	%	60-140		99	92	98	91	94	95
Dibromofluoromethane	%	60-140		124	114	120	111	115	115
Toluene - d8	%	60-140		118	110	116	110	111	113

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9036831-9036919 Results are based on dry weight of sample.
VPH results have been corrected for BTEX contributions.

Certified By:

AGAT Laboratories
Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Quality Assurance

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA
AGAT WORK ORDER: 18N306694
PROJECT: 1657709-6000 K19 Field Inv.
ATTENTION TO: Erin O'Brien
SAMPLING SITE:
SAMPLED BY:

Trace Organics Analysis

RPT Date: Feb 05, 2018			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Public Works LEPH/HEPH in Soil Low Level															
Naphthalene	68684	9036213	<0.005	<0.005	NA	< 0.005	100%	80%	120%				103%	50%	130%
2-Methylnaphthalene	68684	9036213	<0.005	<0.005	NA	< 0.005	98%	80%	120%				95%	50%	130%
1-Methylnaphthalene	68684	9036213	<0.005	<0.005	NA	< 0.005	99%	80%	120%				99%	50%	130%
Acenaphthylene	68684	9036213	<0.005	<0.005	NA	< 0.005	99%	80%	120%				97%	50%	130%
Acenaphthene	68684	9036213	<0.005	<0.005	NA	< 0.005	99%	80%	120%				99%	50%	130%
Fluorene	68684	9036213	<0.02	<0.02	NA	< 0.02	100%	80%	120%				103%	50%	130%
Phenanthrene	68684	9036213	<0.02	<0.02	NA	< 0.02	98%	80%	120%				87%	60%	130%
Anthracene	68684	9036213	<0.004	<0.004	NA	< 0.004	99%	80%	120%				95%	60%	130%
Fluoranthene	68684	9036213	<0.01	<0.01	NA	< 0.01	98%	80%	120%				98%	60%	130%
Pyrene	68684	9036213	<0.01	<0.01	NA	< 0.01	100%	80%	120%				97%	60%	130%
Benzo(a)anthracene	68684	9036213	<0.03	<0.03	NA	< 0.03	99%	80%	120%				95%	60%	130%
Chrysene	68684	9036213	<0.05	<0.05	NA	< 0.05	100%	80%	120%				95%	60%	130%
Benzo(b)fluoranthene	68684	9036213	<0.02	<0.02	NA	< 0.02	100%	80%	120%				95%	60%	130%
Benzo(j)fluoranthene	68684	9036213	<0.02	<0.02	NA	< 0.02	101%	80%	120%				101%	60%	130%
Benzo(k)fluoranthene	68684	9036213	<0.02	<0.02	NA	< 0.02	97%	80%	120%				91%	60%	130%
Benzo(a)pyrene	68684	9036213	<0.03	<0.03	NA	< 0.03	99%	80%	120%				93%	60%	130%
Indeno(1,2,3-c,d)pyrene	68684	9036213	<0.02	<0.02	NA	< 0.02	97%	80%	120%				86%	60%	130%
Dibenzo(a,h)anthracene	68684	9036213	<0.005	<0.005	NA	< 0.005	97%	80%	120%				87%	60%	130%
Benzo(g,h,i)perylene	68684	9036213	<0.05	<0.05	NA	< 0.05	98%	80%	120%				94%	60%	130%
Quinoline	68684	9036213	<0.05	<0.05	NA	< 0.05	97%	80%	120%				106%	50%	130%
EPH C10-C19	68684	9036213	<20	<20	NA	< 20	110%	70%	130%				98%	65%	120%
EPH C19-C32	68684	9036213	<20	<20	NA	< 20	103%	70%	130%				98%	80%	120%
Naphthalene - d8	68684	9036213	85	91	6.8%		99%	80%	120%				100%	50%	130%
2-Fluorobiphenyl	68684	9036213	86	93	7.8%		101%	80%	120%				102%	50%	130%
P-Terphenyl - d14	68684	9036213	92	97	5.3%		100%	80%	120%				96%	60%	130%

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

BTEX / VPH (C6-C10) Soil															
Methyl tert-butyl ether (MTBE)	68692	9037253	<0.1	<0.1	NA	< 0.1	100%	80%	120%				89%	70%	130%
Benzene	68692	9037253	<0.02	<0.02	NA	< 0.02	100%	80%	120%				95%	70%	130%
Toluene	68692	9037253	<0.05	<0.05	NA	< 0.05	100%	80%	120%				94%	70%	130%
Ethylbenzene	68692	9037253	<0.05	<0.05	NA	< 0.05	99%	80%	120%				94%	70%	130%
m&p-Xylene	68692	9037253	<0.05	<0.05	NA	< 0.05	99%	80%	120%				93%	70%	130%
o-Xylene	68692	9037253	<0.05	<0.05	NA	< 0.05	99%	80%	120%				94%	70%	130%
Styrene	68692	9037253	<0.05	<0.05	NA	< 0.05	99%	80%	120%				95%	70%	130%
VPH	68692	9037253	<10	<10	NA	< 10									
VH	68692	9037253	<10	<10	NA	< 10									
Bromofluorobenzene	68692	9037253	89	89	0.0%		100%	60%	140%				86%	60%	140%
Dibromofluoromethane	68692	9037253	109	109	0.0%		100%	60%	140%				97%	60%	140%

AGAT Laboratories

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CANADA V5J 0B6
TEL (778)452-4000
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http://www.agatlabs.com

Quality Assurance

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N306694

PROJECT: 1657709-6000 K19 Field Inv.

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date: Feb 05, 2018			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Toluene - d8	68692	9037253	106	107	0.9%		99%	60%	140%				95%	60%	140%
Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.															
Public Works LEPH/HEPH in Soil Low Level															
Naphthalene	68698	9039639	<0.005	<0.005	NA	< 0.005	99%	80%	120%				112%	50%	130%
2-Methylnaphthalene	68698	9039639	21.2	24.4	14.0%	< 0.005	99%	80%	120%				84%	50%	130%
1-Methylnaphthalene	68698	9039639	13.3	15.3	14.0%	< 0.005	99%	80%	120%				102%	50%	130%
Acenaphthylene	68698	9039639	<0.005	<0.005	NA	< 0.005	99%	80%	120%				92%	50%	130%
Acenaphthene	68698	9039639	<0.005	<0.005	NA	< 0.005	100%	80%	120%				97%	50%	130%
Fluorene	68698	9039639	2.00	2.26	12.2%	< 0.02	99%	80%	120%				99%	50%	130%
Phenanthrene	68698	9039639	6.55	8.42	25.0%	< 0.02	99%	80%	120%				85%	60%	130%
Anthracene	68698	9039639	<0.004	<0.004	NA	< 0.004	100%	80%	120%				90%	60%	130%
Fluoranthene	68698	9039639	0.10	0.14	33.3%	< 0.01	98%	80%	120%				97%	60%	130%
Pyrene	68698	9039639	0.29	0.39	29.4%	< 0.01	101%	80%	120%				95%	60%	130%
Benzo(a)anthracene	68698	9039639	<0.03	<0.03	NA	< 0.03	98%	80%	120%				90%	60%	130%
Chrysene	68698	9039639	0.06	0.08	NA	< 0.05	99%	80%	120%				105%	60%	130%
Benzo(b)fluoranthene	68698	9039639	<0.02	<0.02	NA	< 0.02	104%	80%	120%				86%	60%	130%
Benzo(j)fluoranthene	68698	9039639	<0.02	<0.02	NA	< 0.02	101%	80%	120%				99%	60%	130%
Benzo(k)fluoranthene	68698	9039639	<0.02	<0.02	NA	< 0.02	93%	80%	120%				85%	60%	130%
Benzo(a)pyrene	68698	9039639	<0.03	<0.03	NA	< 0.03	99%	80%	120%				99%	60%	130%
Indeno(1,2,3-c,d)pyrene	68698	9039639	<0.02	<0.02	NA	< 0.02	98%	80%	120%				97%	60%	130%
Dibenzo(a,h)anthracene	68698	9039639	<0.005	<0.005	NA	< 0.005	98%	80%	120%				92%	60%	130%
Benzo(g,h,i)perylene	68698	9039639	<0.05	<0.05	NA	< 0.05	98%	80%	120%				102%	60%	130%
Quinoline	68698	9039639	<0.05	<0.05	NA	< 0.05	97%	80%	120%				89%	50%	130%
EPH C10-C19	68698	9039639	6340	7140	11.9%	< 20	112%	70%	130%				92%	65%	120%
EPH C19-C32	68698	9039639	1830	2090	13.3%	< 20	104%	70%	130%				92%	80%	120%
Naphthalene - d8	68698	9039639	70	84	18.2%		100%	80%	120%				108%	50%	130%
2-Fluorobiphenyl	68698	9039639	117	120	2.5%		99%	80%	120%				102%	50%	130%
P-Terphenyl - d14	68698	9039639	74	84	12.7%		99%	80%	120%				103%	60%	130%

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

Certified By:

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Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N306694

PROJECT: 1657709-6000 K19 Field Inv.

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Naphthalene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
2-Methylnaphthalene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
1-Methylnaphthalene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Acenaphthylene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Acenaphthene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Fluorene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Phenanthrene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Anthracene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Fluoranthene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Pyrene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(a)anthracene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Chrysene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(b)fluoranthene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(j)fluoranthene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(k)fluoranthene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(a)pyrene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Indeno(1,2,3-c,d)pyrene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Dibenzo(a,h)anthracene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(g,h,i)perylene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Quinoline	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
IACR CCME (Soil)	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
B[a]P TPE (Soil)	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
EPH C10-C19	ORG-180-5101	Modified from BCMOE Lab Manual Section D (EPH)	GC/FID
EPH C19-C32	ORG-180-5101	Modified from BCMOE Lab Manual Section D (EPH)	GC/FID
LEPH C10-C19	ORG-180-5101	Modified from BCMOE Lab Manual Section D (EPH)	GC/FID
HEPH C19-C32	ORG-180-5101	Modified from BCMOE Lab Manual Section D (EPH)	GC/FID
Naphthalene - d8	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS

AGAT Laboratories

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Burnaby, British Columbia
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TEL (778)452-4000
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Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N306694

PROJECT: 1657709-6000 K19 Field Inv.

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
2-Fluorobiphenyl	ORG-180-5102	Modified form BCMOE Lab Manual Section D (PAH)	GC/MS
P-Terphenyl - d14	ORG-180-5102	Modified form BCMOE Lab Manual Section D (PAH)	GC/MS
Methyl tert-butyl ether (MTBE)	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
Benzene	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
Toluene	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
Ethylbenzene	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
m&p-Xylene	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
o-Xylene	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
Styrene	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
VPH	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
VH	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
Bromofluorobenzene	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS
Dibromofluoromethane	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS
Toluene - d8	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS

18N306694

CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

No. 04307 page 1 of 5

Golder Associates

200 – 2920 Virtual Way
Vancouver, British Columbia, Canada V5M 0C4
Telephone (604) 296-4200 Fax (604) 298-5253

Project Number: 1657709/6000

Short Title: K19 Field Inv.

Golder Contact: Erin O'Brien

Golder E-mail Address 1: erin_obrien@golder.com

Golder E-mail Address 2: Konare-Dontele@golder.com

Laboratory Name: AGAT

Address: 120-4600 Gladys Pkwy

Telephone/Fax: 778-452-4009

Contact: Yasmine Galeda

Office Name: Vancouver

EQuIS Facility Code: 28433859

EQuIS upload: ☑

JAN 30 AM 11:22

Turnaround Time: ☐ 24 hr ☐ 48 hr ☐ 72 hr ☒ Regular (5 Days)

Criteria: ☑ CSR ☑ CCME ☐ BC Water Quality ☐ Other

Note: Final Reports to be issued by e-mail

Quote No.:

Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D / M / Y)	Time Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	BTEX/VPH	LEPH/HEPH/PAH								RUSH (Select TAT above)	Remarks (over)
04307 - 01	K19-MW18-11	1	0.3-0.5	Soil	23/01/18	10:00	Discrete			2											9036767
- 02	↓	2	2.0-2.5	↓	↓	10:10	↓			4											824
- 03	↓	3	4.0-4.5	↓	↓	10:30	↓			4											827
- 04	↓	4	5.5-6.0	↓	↓	10:40	↓			4	X	X									831
- 05	↓	5	7.0-7.5	↓	↓	10:50	↓			4											834
- 06	↓	6	8.5-9.0	↓	↓	11:10	↓			2											852
- 07	↓	7	10.0-10.5	↓	↓	11:30	↓			4											853
- 08	K19-MW18-12	1	0.3-0.5	↓	↓	13:10	↓			2											854
- 09	↓	2	2.0-2.5	↓	↓	13:15	↓			2											855
- 10	↓	3	4.0-4.5	↓	↓	13:20	↓			2											856
- 11	↓	4	5.5-6.0	↓	↓	13:30	↓			4											857
- 12	↓	5	7.0-7.5	↓	↓	13:50	↓			4											858

Analyses Required

Sampler's Signature: [signature]

Relinquished by: Signature [signature]

Company: Golder

Date: 26/01/2018

Time: 8:00

Received by: Signature

Company

Comments: Invoice Dave Osguthorpe

Method of Shipment:

Waybill No.:

Received for Lab by: Ann [signature]

Date

Time

Shipped by:

Shipment Condition:

Seal Intact:

Temp (°C) 5

Cooler opened by:

Date

Time

WHITE: Golder Copy YELLOW: Lab Copy

ESED

CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

18N306694

No. 04317 page 2 of 5

Golder Associates

200 – 2920 Virtual Way
Vancouver, British Columbia, Canada V5M 0C4
Telephone (604) 296-4200 Fax (604) 298-5253

Project Number: 1657709/6000			Laboratory Name: ALS-AT
Short Title: K19 Field Inv	Golder Contact: Erin O'Brien		Address: 120-4600 Glenlyon Pkwy
Golder E-mail Address 1: erin-o'brien@golder.com	Golder E-mail Address 2: Vancouver_distribution@golder.com		Telephone/Fax: 778-452-4009 Contact: Yasmin Kalinda

Office Name: Vancouver

EQuIS Facility Code: 26433659
EQuIS upload: ☒

Turnaround Time: ☐ 24 hr ☐ 48 hr ☐ 72 hr ☑ Regular (5 Days)
Criteria: ☑ CSR ☑ CCME ☐ BC Water Quality ☐ Other

Note: Final Reports to be issued by e-mail

Quote No.:

Analyses Required

Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D / M / Y)	Time Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	BTEX / VPH	LEPH / HEPH / PAH	RUSH (Select TAT above)	Remarks (over)
04317 - 01	K19-MW18-12		8.5-9.0	Soil	23/01/18	14:10	Discrete			4				9036860
- 02			10.0-10.5			14:20				4				861
- 03			11.5-12.0			14:40				4	XX			862
- 04			13.2-13.7			15:10		FIA	04317-05	4				863
- 05			13.2-13.7			16:10		FD	04317-04	4				864
- 06	K19-BH18-13	1	0.3-0.5			16:25				2				866
- 07		2	2.0-2.5			16:30				2				867
- 08		3	4.0-4.5			16:40				2				868
- 09		4	5.5-6.0			16:52				2				869
- 10		5	7.0-7.5		24/01/18	09:30				4				870
- 11		6	8.5-9.0			09:50				4				871
- 12		7	10.0-10.5			10:10				4				872

Sampler's Signature:	Relinquished by: Signature	Company: Golder	Date: 26/01/2018	Time: 8:00	Received by: Signature	Company
Comments: Invoice Date O'Sullivan	Method of Shipment:	Waybill No.:	Received for Lab by: Ann Nu	Date	Time	
	Shipped by:	Shipment Condition: Seal Intact:	Temp (°C): 5	Cooler opened by:	Date	Time

WHITE: Golder Copy YELLOW: Lab Copy

ESED

CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

18N306694
No. 04318 page 3 of 5

Golder Associates
200 – 2920 Virtual Way
Vancouver, British Columbia, Canada V5M 0C4
Telephone (604) 296-4200 Fax (604) 298-5253

Project Number: 1657709/6000			Laboratory Name: HOAT
Short Title: K19 Field Inv.	Golder Contact: Erin O'Brien		Address: 120 Glenlyon Pkway
Golder E-mail Address 1: erin_o'brien @golder.com	Golder E-mail Address 2: kenzie-dian-balar @golder.com		Telephone/Fax: 778-452-4009
			Contact: Yasmine Galindo

Office Name: Vancouver

EQuIS Facility Code: 28433859
EQuIS upload: ☒

JAN 30 AM 11:22

Turnaround Time: ☐ 24 hr ☐ 48 hr ☐ 72 hr ☒ Regular (5 Days)
Criteria: ☒ CSR ☒ CCME ☐ BC Water Quality ☐ Other

Note: Final Reports to be issued by e-mail

Quote No.:

Analyses Required

Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D / M / Y)	Time Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	BTEX/VPH	LEPH/HEPH/PAH	RUSH (Select TAT above)	Remarks (over)
04318 - 01	K19-MW18-13 BH	8	11.5-12.0	Soil	24/01/18	10:40	Discrete			4	X	X		9036890
- 02	↓	9	13-13.7			11:20				4				891
- 03	K19-SW18-14	1	0.3-0.5			12:00				4				892
- 04	↓	2	1.3-1.5			12:10				4				893
- 05	K19-MW18-15	1	0.3-0.5			13:00				2				894
- 06	↓	2	1.3-1.5			13:10				2				895
- 07		3	4.0-4.5			13:30				2				896
- 08		4	5.5-6.0			13:50				4				897
- 09		5	7.0-7.5			14:10				4				898
- 10		6	8.5-9.0			14:30				4				899
- 11		7	10.0-10.5			14:50				4				900
- 12	↓	8	11.5-12.0		↓	15:00	↓	FD1	04321-01	4	X	X		901

Sampler's Signature:	Relinquished by: Signature	Company: Golder	Date: 26/01/2018	Time: 8:00	Received by: Signature	Company	
Comments: Invoice Dave Osguthorpe	Method of Shipment:	Waybill No.:	Received for Lab by:		Date	Time	
	Shipped by:	Shipment Condition: Seal Intact:	Temp (°C): 5°	Cooler opened by:	Date	Time	

WHITE: Golder Co... YELLOW: Lab Copy

ESED

CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

18N306694

No. 04321 page 1 of 5

Golder Associates

200 – 2920 Virtual Way
Vancouver, British Columbia, Canada V5M 0C4
Telephone (604) 296-4200 Fax (604) 298-5253

Project Number: 1657709/6000			Laboratory Name: AGAT
Short Title: K19 Field Inv	Golder Contact: Erin O'Brien		Address: 120-4600 Colonus Pkway
Golder E-mail Address 1: erin_o'brien @golder.com	Golder E-mail Address 2: vancouver_client_base@golder.com		Telephone/Fax: 778-452-4009 Contact: Yasmine Galindo

Office Name: Vancouver

EQuIS Facility Code: 28433859
EQuIS upload: ☒

Analyses Required JAN 30 AM 11:22

Turnaround Time: ☐ 24 hr ☐ 48 hr ☐ 72 hr ☒ Regular (5 Days)
Criteria: ☒ CSR ☐ CCME ☐ BC Water Quality ☐ Other

Note: Final Reports to be issued by e-mail

Quote No.:

Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D / M / Y)	Time Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	BTEX/VPH	LEP/HEPH/PAH	RUSH (Select TAT above)	Remarks (over)
04321 - 01	KH-MW18-15	8	11.5-12.0	Soil	25/01/18	14:40	Discrete	FD	04318-12	4				9036902
- 02	KH-MW18-16	1	0.3-0.5			09:40				2				903
- 03		2	2.0-2.5			09:50				2				904
- 04		3	4.0-4.5			10:00				2				905
- 05		4	5.5-6.0			10:15				4				906
- 06		5	7.0-7.5			10:30				4				907
- 07		6	8.5-9.0			10:50				4	XX			908
- 08	↓	7	10.0-10.5			11:10				4				909
- 09	KH-MW18-17	1	0.3-0.5			12:40				2				911
- 10		2	2.0-2.5			12:50				2				912
- 11		3	4.0-4.5			13:10				2				913
- 12	↓	4	5.5-6.0	↓	↓	13:30	↓			4				914

Sampler's Signature:	Relinquished by: Signature	Company: Golder	Date: 26/01/18	Time: 8:00	Received by: Signature	Company
Comments: Invoice David Osgathorpe	Method of Shipment:	Waybill No.:	Received for Lab by: Ann	Date	Time	
	Shipped by:	Shipment Condition: Seal Intact:	Temp (°C): 5	Cooler opened by:	Date	Time

WHITE: Golder Copy YELLOW: Lab Copy

ESED

18N306694

CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

No. 04322 page 5 of 5

Golder Associates
200 – 2920 Virtual Way
Vancouver, British Columbia, Canada V5M 0C4
Telephone (604) 296-4200 Fax (604) 298-5253

Project Number: 1657709/6000
Short Title: K19 Field Inv
Golder Contact: Erin O'Brien
Golder E-mail Address 1: erin_o'brien @golder.com
Golder E-mail Address 2: Kaere-dian-belair @golder.com
Laboratory Name: AGAT
Address: 120-4600 Glenlyon Pkway
Telephone/Fax: 778-452-4009
Contact: Yasmine Galindo

JAN 30 AM 11:22

Office Name: Vancouver
EQuIS Facility Code: 2843385-9
EQuIS upload: ☒

Turnaround Time: ☐ 24 hr ☐ 48 hr ☐ 72 hr ☒ Regular (5 Days)
Criteria: ☒ CSR ☒ CCME ☐ BC Water Quality ☐ Other

Note: Final Reports to be issued by e-mail
Quote No.:

Analyses Required

Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D / M / Y)	Time Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	BTEX/VPH	EPH/HEPH/PAH								RUSH (Select TAT above)	Remarks (over)
04322 - 01	K19-SV18-17	5	7.0-7.5	Soil	25/01/18	13:50	Discrete			4											9036915
↓ - 02	↓	6	8.5-9.0	↓	↓	14:10	↓			4											916
- 03		7	10.0-10.5			14:25				4											917
- 04		8	11.5-12.0			14:35				4											918
- 05		9	13.0-13.7			14:50				4	X	X									↓ 919
- 06																					
- 07																					
- 08																					
- 09																					
- 10																					
- 11																					
- 12																					

Sampler's Signature: [signature]	Relinquished by: Signature [signature]	Company Golder	Date 26/01/18	Time	Received by: Signature	Company
Comments:	Method of Shipment:	Waybill No.:		Received for Lab by: Ann [signature]	Date	Time
	Shipped by:	Shipment Condition: Seal Intact:		Temp (°C) 5	Cooler opened by:	Date	Time

WHITE: Golder Copy YELLOW: Lab Copy

ESED

AGAT Laboratories

SAMPLE INTEGRITY RECEIPT FORM

RECEIVING BASICS - Shipping

Company/Consultant: GOLDER

Courier: _____ (Prepaid) Collect

Waybill# _____

Branch: EDM GP (FN) FM RD VAN LYD FSJ EST Other: _____

Custody Seal Intact: Yes No NA

TAT: <24hr 24-48hr 48-72hr (Reg) Other _____

Cooler Quantity: 3

TIME SENSITIVE ISSUES - Shipping

ALREADY EXCEEDED HOLD TIME? Yes (No)

Inorganic Tests (Please Circle): Mibi , BOD , Nitrate/Nitrite , Turbidity , Microtox , Ortho PO4 , Tedlar Bag , Residual Chlorine , Chlorophyll* , Chloroamines*

Earliest Expiry: _____

Hydrocarbons: Earliest Expiry _____

SAMPLE INTEGRITY - Shipping

Hazardous Samples: YES (NO) Precaution Taken: _____

Legal Samples: Yes (No)

International Samples: Yes (No)

Tape Sealed: Yes (No)

Coolant Used: Icepack Bagged Ice Free Ice Free Water None

Temperature (Bottles/Jars only) N/A if only Soil Bags Received

FROZEN (Please Circle if samples received Frozen)

1 (Bottle/Jar) 1 + 0 + 6 = 3 °C
2 (Bottle/Jar) 0 + 0 + 1 = 0 °C
3 (Bottle/Jar) 8 + 2 + 0 = 9 °C
4 (Bottle/Jar) ___ + ___ + ___ = ___ °C
5 (Bottle/Jar) ___ + ___ + ___ = ___ °C
6 (Bottle/Jar) ___ + ___ + ___ = ___ °C
7 (Bottle/Jar) ___ + ___ + ___ = ___ °C
8 (Bottle/Jar) ___ + ___ + ___ = ___ °C
9 (Bottle/Jar) ___ + ___ + ___ = ___ °C
10 (Bottle/Jar) ___ + ___ + ___ = ___ °C

(If more than 10 coolers are received use another sheet of paper and attach)

LOGISTICS USE ONLY

Workorder No: _____

Samples Damaged: Yes (No) If YES why?

No Bubble Wrap Frozen Courier

Other: _____

Account Project Manager: _____ have they been notified of the above issues: Yes No

Whom spoken to: _____ Date/Time: _____

CPM Initial _____

General Comments: _____

* Subcontracted Analysis (See CPM)

AGAT Laboratories

SAMPLE INTEGRITY RECEIPT FORM - BURNABY

Work Order # 18N306694

RECEIVING BASICS:

Received From: NOVEX #2 Waybill #: _____

SAMPLE QUANTITIES:

Coolers: 3 Containers: 176

TIME SENSITIVE ISSUES:

Earliest Date Sampled: 23-JAN-18 ALREADY EXCEEDED? Yes (No)

NON-CONFORMANCES:

3 temperatures of samples* and average of each cooler: (record differing temperatures on the CoC next to sample ID's) *use jars when available

(1) 5 + 5 + 5 = 5 °C (2) 6 + 5 + 5 = 5 °C (3) 5 + 5 + 5 = 5 °C (4) ___ + ___ + ___ = ___ °C

Was ice or ice pack present: (Yes) No

Integrity Issues:

Account Project Manager: _____ have they been notified of the above issues: Yes No

Whom spoken to: _____ Date and Time: _____

ADDITIONAL NOTES:

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA
219-800 BURRARD ST
VANCOUVER, BC V6Z 0B9
604-671-1831

ATTENTION TO: Erin O'Brien

PROJECT: 1657709/6000

AGAT WORK ORDER: 18N306660

TRACE ORGANICS REVIEWED BY: Andrew Garrard, B.Sc., General Manager

WATER ANALYSIS REVIEWED BY: Andrew Garrard, B.Sc., General Manager

DATE REPORTED: Feb 06, 2018

PAGES (INCLUDING COVER): 28

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (778) 452-4000

*NOTES

VERSION 1: Sample receipt temperature 0°C.

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

AGAT Laboratories

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http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 18N306660

PROJECT: 1657709/6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

BC Routine VOC package in Air (Canister) -ug/m3

DATE RECEIVED: 2018-01-30

DATE REPORTED: 2018-02-06

		SAMPLE DESCRIPTION:		04323-01
		SAMPLE TYPE:		Air
		DATE SAMPLED:		2018-01-27
Parameter	Unit	G / S	RDL	9036523
1,2,4-Trimethylbenzene	ug/m3		1.5	<1.5
1,3,5-Trimethylbenzene	ug/m3		1.5	<1.5
1,3-Butadiene	ug/m3		1.0	<1.0
Isopropylbenzene	ug/m3		0.80	<0.80
Methylcyclohexane	ug/m3		0.70	6.0
Methyl tert-Butyl ether (MTBE)	ug/m3		0.80	<0.80
Naphthalene	ug/m3		2.0	<2.0
n-Decane	ug/m3		1.3	<1.3
n-Hexane	ug/m3		1.1	5.1
VPHv (C>6-C13)	ug/m3		15	57
Surrogate	Unit	Acceptable Limits		
4-Bromofluorobenzene	%	70-130		103

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9036523 Air anaylsis was performed from an air canister sample, using a Cold Vapor Trap preconcentrator and GC/MSD.
Note: Methylcyclohexane is a non routine parameter, identification is done using the GC/MS and the appropriate m/z fragments. If the compound is present it will be quantitated using cyclohexane calibration standards and the TIC area.

Analysis done at AGAT 5623 McAdam Road Mississauga location.

Certified By:

AGAT Laboratories
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Certificate of Analysis

AGAT WORK ORDER: 18N306660

PROJECT: 1657709/6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

CCME F1 (C6-C10) (Water)

DATE RECEIVED: 2018-01-30

DATE REPORTED: 2018-02-06

		SAMPLE DESCRIPTION:		04254-01	04254-02	04254-03	04254-04
		SAMPLE TYPE:		Water	Water	Water	Water
		DATE SAMPLED:		2018-01-26	2018-01-26	2018-01-27	2018-01-26
Parameter	Unit	G / S	RDL	9036496	9036512	9036513	9036514
F1 (C6-C10)	µg/L		100	<100	<100	<100	<100
F1 minus BTEX (C6-C10)	µg/L		100	<100	<100	<100	<100
Surrogate	Unit	Acceptable Limits					
Bromofluorobenzene	%	70-130		101	101	95	100
Dibromofluoromethane	%	70-130		94	95	88	94
Toluene - d8	%	70-130		97	97	91	96

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9036496-9036514 The F1 (C6 - C10) fraction is determined by integrating the FID chromatogram from the beginning of the n-C6 peak to the apex of the last n-C10 peak.
The C6 - C10 fraction is calculated from the FID toluene response factor.
Quality control for the calibration follows the guidelines set out in the CCME Contaminated Sites Method for Soils.
The (F1 minus BTEX) has been calculated by subtracting the BTEX concentration from Fraction 1.

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 18N306660

PROJECT: 1657709/6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

CCME F2-F4 (Water)

DATE RECEIVED: 2018-01-30

DATE REPORTED: 2018-02-06

SAMPLE DESCRIPTION:				04254-01	04254-02	04254-03	04254-04
SAMPLE TYPE:				Water	Water	Water	Water
DATE SAMPLED:				2018-01-26	2018-01-26	2018-01-27	2018-01-26
Parameter	Unit	G / S	RDL	9036496	9036512	9036513	9036514
F2 (C10-C16)	µg/L		100	<100	<100	<100	<100
F3 (C16-C34)	µg/L		100	<100	<100	<100	<100
F4 (C34-C50)	µg/L		100	<100	<100	<100	<100

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9036496-9036514 The C10 - C16 (F2), C16 - C34 (F3), and C34 - C50 (F4) fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Quality control data is available upon request.
Assistance in the interpretation of data is available upon request.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
The chromatogram has returned to baseline by the retention time of nC50.
Extraction and holding times were met for this sample.

Certified By:

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 18N306660

PROJECT: 1657709/6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works : BC VOCs in Air (Canister) - ug/m3

DATE RECEIVED: 2018-01-30

DATE REPORTED: 2018-02-06

		SAMPLE DESCRIPTION:		04323-01
		SAMPLE TYPE:		Air
		DATE SAMPLED:		2018-01-27
Parameter	Unit	G / S	RDL	9036523
Dichlorodifluoromethane	ug/m3		1.0	3.1
1,2-Dichlorotetrafluoroethane	ug/m3		1.4	<1.4
1,1,2-Trichloro-1,2,2-trifluoroethane	ug/m3		1.5	<1.5
Chloromethane	ug/m3		0.60	2.3
Vinyl Chloride	ug/m3		0.40	<0.40
Bromomethane	ug/m3		1.9	<1.9
Chloroethane	ug/m3		1.0	<1.0
Vinyl Bromide	ug/m3		0.80	<0.80
Trichlorofluoromethane	ug/m3		2.3	<2.3
1,1-Dichloroethene	ug/m3		1.0	<1.0
Methylene Chloride	ug/m3		1.0	<1.0
trans-1,2-Dichloroethene	ug/m3		0.80	<0.80
1,1-Dichloroethane	ug/m3		1.2	<1.2
cis-1,2-Dichloroethene	ug/m3		0.80	<0.80
Chloroform	ug/m3		1.0	<1.0
1,2-Dichloroethane	ug/m3		0.30	<0.30
1,1,1-Trichloroethane	ug/m3		1.6	<1.6
Carbon Tetrachloride	ug/m3		2.0	<2.0
Benzene	ug/m3		0.50	<0.50
1,2-Dichloropropane	ug/m3		2.0	<2.0
2,2-Dichloropropane	ug/m3		2.0	<2.0
Trichloroethene	ug/m3		1.0	<1.0
Bromodichloromethane	ug/m3		1.3	<1.3
cis-1,3-Dichloropropene	ug/m3		1.0	<1.0
trans-1,3-Dichloropropene	ug/m3		1.0	<1.0
Methyl Isobutyl Ketone (MIBK)	ug/m3		2.0	<2.0
1,1,2-Trichloroethane	ug/m3		1.6	<1.6
Toluene	ug/m3		0.80	<0.80
2-Hexanone	ug/m3		2.0	<2.0
Dibromochloromethane	ug/m3		2.0	<2.0

Certified By:

AGAT Laboratories
Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
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http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 18N306660

PROJECT: 1657709/6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works : BC VOCs in Air (Canister) - ug/m3

DATE RECEIVED: 2018-01-30

DATE REPORTED: 2018-02-06

		SAMPLE DESCRIPTION:		04323-01
		SAMPLE TYPE:		Air
		DATE SAMPLED:		2018-01-27
Parameter	Unit	G / S	RDL	9036523
1,2-Dibromoethane	ug/m3		1.5	<1.5
Tetrachloroethene	ug/m3		1.0	<1.0
Chlorobenzene	ug/m3		1.0	<1.0
Ethylbenzene	ug/m3		0.9	<0.9
m&p-Xylene	ug/m3		1.5	<1.5
Bromoform	ug/m3		2.0	<2.0
Styrene	ug/m3		1.0	<1.0
1,1,2,2-Tetrachloroethane	ug/m3		1.5	<1.5
o-Xylene	ug/m3		0.9	<0.9
1,3-Dichlorobenzene	ug/m3		2.5	<2.5
1,4-Dichlorobenzene	ug/m3		2.5	<2.5
1,2-Dichlorobenzene	ug/m3		2.5	<2.5
Total Xylenes	ug/m3		2.0	<2.0
Surrogate	Unit	Acceptable Limits		
4-Bromofluorobenzene	%	70-130		104

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9036523 VOC anaylsis was performed from an air canister sample, using a Cold Vapor Trap preconcentrator and GC/MSD.
Pressure upon arrival to the lab = 13.51 psia.

Analysis done at AGAT 5623 McAdam Road Mississauga location.

2,2-Dichloropropane was analyzed using GC/MS full scan and the specific m/z fragments for this compound, if it is present in the sample quantitation was done using the TIC area and the TIC area of 1, 2-Dichloropropane in the calibration standards.

Certified By:

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
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http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 18N306660

PROJECT: 1657709/6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works LEPH/HEPH in Water Low Level

DATE RECEIVED: 2018-01-30

DATE REPORTED: 2018-02-06

		SAMPLE DESCRIPTION:		04254-01	04254-02	04254-03	04254-04
		SAMPLE TYPE:		Water	Water	Water	Water
		DATE SAMPLED:		2018-01-26	2018-01-26	2018-01-27	2018-01-26
Parameter	Unit	G / S	RDL	9036496	9036512	9036513	9036514
Naphthalene	µg/L		0.05	<0.05	<0.05	<0.05	0.05
Quinoline	µg/L		0.05	<0.05	<0.05	<0.05	<0.05
Acenaphthylene	µg/L		0.02	<0.02	<0.02	<0.02	<0.02
Acenaphthene	µg/L		0.02	<0.02	<0.02	<0.02	<0.02
Fluorene	µg/L		0.02	<0.02	<0.02	<0.02	<0.02
Phenanthrene	µg/L		0.04	<0.04	<0.04	<0.04	<0.04
Anthracene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01
Acridine	µg/L		0.05	<0.05	<0.05	<0.05	<0.05
Fluoranthene	µg/L		0.02	<0.02	<0.02	<0.02	<0.02
Pyrene	µg/L		0.02	<0.02	<0.02	<0.02	<0.02
Benzo(a)anthracene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01
Chrysene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01
Benzo(b)fluoranthene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01
Benzo(j)fluoranthene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01
Benzo(k)fluoranthene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)pyrene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01
Indeno(1,2,3-c,d)pyrene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01
Dibenzo(a,h)anthracene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01
Benzo(g,h,i)perylene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01
1-Methylnaphthalene	µg/L		0.05	<0.05	<0.05	<0.05	<0.05
2-Methylnaphthalene	µg/L		0.05	<0.05	<0.05	<0.05	<0.05
EPH C10-C19	µg/L		100	<100	<100	<100	<100
EPH C19-C32	µg/L		100	<100	<100	<100	<100
LEPH C10-C19	µg/L		100	<100	<100	<100	<100
HEPH C19-C32	µg/L		100	<100	<100	<100	<100
Benzo(b+j)fluoranthene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01
Surrogate	Unit	Acceptable Limits					
Naphthalene - d8	%	50-130		85	84	83	88
2-Fluorobiphenyl	%	50-130		84	85	83	88
P-Terphenyl - d14	%	60-130		89	79	86	83

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Certificate of Analysis

AGAT WORK ORDER: 18N306660

PROJECT: 1657709/6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works LEPH/HEPH in Water Low Level

DATE RECEIVED: 2018-01-30

DATE REPORTED: 2018-02-06

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9036496-9036514 LEPH & HEPH results have been corrected for PAH contributions.

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Certificate of Analysis

AGAT WORK ORDER: 18N306660

PROJECT: 1657709/6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Volatile Organic Compounds in Water

DATE RECEIVED: 2018-01-30

DATE REPORTED: 2018-02-06

		SAMPLE DESCRIPTION:		04254-01	04254-02	04254-03	04254-04
		SAMPLE TYPE:		Water	Water	Water	Water
		DATE SAMPLED:		2018-01-26	2018-01-26	2018-01-27	2018-01-26
Parameter	Unit	G / S	RDL	9036496	9036512	9036513	9036514
Chloromethane	µg/L		1	<1	<1	<1	<1
Vinyl Chloride	µg/L		1	<1	<1	<1	<1
Bromomethane	µg/L		1	<1	<1	<1	<1
Chloroethane	µg/L		1	<1	<1	<1	<1
Trichlorofluoromethane	µg/L		1	<1	<1	<1	<1
Acetone	µg/L		10	<10	<10	<10	<10
1,1-Dichloroethylene	µg/L		1	<1	<1	<1	<1
Dichloromethane	µg/L		1	<1	<1	<1	<1
Methyl tert-butyl ether (MTBE)	µg/L		1	<1	<1	<1	<1
2-Butanone (MEK)	µg/L		10	<10	<10	<10	<10
trans-1,2-Dichloroethylene	µg/L		1	<1	<1	<1	<1
1,1-Dichloroethane	µg/L		1	<1	<1	<1	<1
cis-1,2-Dichloroethylene	µg/L		1	<1	<1	<1	<1
Chloroform	µg/L		1	<1	<1	<1	<1
1,2-Dichloroethane	µg/L		1	<1	<1	<1	<1
1,1,1-Trichloroethane	µg/L		1	<1	<1	<1	<1
Carbon Tetrachloride	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
Benzene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	µg/L		1	<1	<1	<1	<1
Trichloroethene	µg/L		1	<1	<1	<1	<1
Bromodichloromethane	µg/L		1	<1	<1	<1	<1
trans-1,3-Dichloropropene	µg/L		1	<1	<1	<1	<1
4-Methyl-2-pentanone (MIBK)	µg/L		10	<10	<10	<10	<10
cis-1,3-Dichloropropene	µg/L		1	<1	<1	<1	<1
1,1,2-Trichloroethane	µg/L		1	<1	<1	<1	<1
Toluene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	µg/L		1	<1	<1	<1	<1
1,2-Dibromoethane	µg/L		0.3	<0.3	<0.3	<0.3	<0.3
Tetrachloroethylene	µg/L		1	<1	<1	<1	<1
1,1,1,2-Tetrachloroethane	µg/L		1	<1	<1	<1	<1

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Certificate of Analysis

AGAT WORK ORDER: 18N306660

PROJECT: 1657709/6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Volatile Organic Compounds in Water

DATE RECEIVED: 2018-01-30

DATE REPORTED: 2018-02-06

		SAMPLE DESCRIPTION:		04254-01	04254-02	04254-03	04254-04
		SAMPLE TYPE:		Water	Water	Water	Water
		DATE SAMPLED:		2018-01-26	2018-01-26	2018-01-27	2018-01-26
Parameter	Unit	G / S	RDL	9036496	9036512	9036513	9036514
Chlorobenzene	µg/L		1	<1	<1	<1	<1
Ethylbenzene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
m&p-Xylene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
Bromoform	µg/L		1	<1	<1	<1	<1
Styrene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
1,1,2,2-Tetrachloroethane	µg/L		0.8	<0.8	<0.8	<0.8	<0.8
o-Xylene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichlorobenzene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
1,2,4-Trichlorobenzene	µg/L		1	<1	<1	<1	<1
1,3-Dichloropropene (cis + trans)	µg/L		1	<1	<1	<1	<1
Total Trihalomethanes	µg/L		2	<2	<2	<2	<2
Total Xylenes	µg/L		1	<1	<1	<1	<1
Surrogate	Unit	Acceptable Limits					
Bromofluorobenzene	%	70-130		93	90	85	89
Dibromofluoromethane	%	70-130		116	112	110	111
Toluene - d8	%	70-130		114	109	102	109

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

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AGAT WORK ORDER: 18N306660

PROJECT: 1657709/6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works Dissolved Metals

DATE RECEIVED: 2018-01-30

DATE REPORTED: 2018-02-06

		SAMPLE DESCRIPTION:		04254-01	04254-02	04254-03	04254-04
		SAMPLE TYPE:		Water	Water	Water	Water
		DATE SAMPLED:		2018-01-26	2018-01-26	2018-01-27	2018-01-26
Parameter	Unit	G / S	RDL	9036496	9036512	9036513	9036514
Aluminum Dissolved	µg/L		2	3	3	2	<2
Antimony Dissolved	µg/L		0.2	<0.2	<0.2	<0.2	<0.2
Arsenic Dissolved	µg/L		0.1	0.2	0.2	0.3	0.3
Barium Dissolved	µg/L		0.2	91.0	86.1	47.7	36.4
Beryllium Dissolved	µg/L		0.01	<0.01	0.01	<0.01	<0.01
Bismuth Dissolved	µg/L		0.05	<0.05	<0.05	<0.05	<0.05
Boron Dissolved	µg/L		2	326	325	246	313
Cadmium Dissolved	µg/L		0.01	<0.01	<0.01	0.02	<0.01
Calcium Dissolved	µg/L		50	75200	72700	71300	86600
Chromium Dissolved	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
Cobalt Dissolved	µg/L		0.05	0.13	0.14	0.37	0.21
Copper Dissolved	µg/L		0.2	<0.2	<0.2	<0.2	<0.2
Iron Dissolved	µg/L		10	531	535	852	834
Lead Dissolved	µg/L		0.05	<0.05	<0.05	<0.05	<0.05
Lithium Dissolved	µg/L		1.0	140	134	108	146
Magnesium Dissolved	µg/L		50	30600	29500	25300	26900
Manganese Dissolved	µg/L		1	275	281	747	436
Mercury Dissolved	µg/L		0.01	<0.01	<0.01	<0.01	<0.01
Molybdenum Dissolved	µg/L		0.05	0.13	0.09	0.14	0.08
Nickel Dissolved	µg/L		0.2	0.4	0.3	0.5	0.3
Potassium Dissolved	µg/L		50	2500	2380	2410	2380
Selenium Dissolved	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
Silicon Dissolved	µg/L		50	5200	4950	5840	5520
Silver Dissolved	µg/L		0.02	<0.02	<0.02	<0.02	<0.02
Sodium Dissolved	µg/L		50	36300	34700	18500	18800
Strontium Dissolved	µg/L		0.1	954	903	584	786
Sulphur Dissolved	µg/L		500	9340	9240	15600	21500
Thallium Dissolved	µg/L		0.01	<0.01	<0.01	0.02	0.01
Tin Dissolved	µg/L		0.05	0.15	0.12	0.31	0.10
Titanium Dissolved	µg/L		0.5	1.3	1.4	1.4	1.4

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Certificate of Analysis

AGAT WORK ORDER: 18N306660

PROJECT: 1657709/6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works Dissolved Metals

DATE RECEIVED: 2018-01-30

DATE REPORTED: 2018-02-06

		SAMPLE DESCRIPTION:		04254-01	04254-02	04254-03	04254-04
		SAMPLE TYPE:		Water	Water	Water	Water
		DATE SAMPLED:		2018-01-26	2018-01-26	2018-01-27	2018-01-26
Parameter	Unit	G / S	RDL	9036496	9036512	9036513	9036514
Uranium Dissolved	µg/L		0.01	0.07	0.06	0.22	0.12
Vanadium Dissolved	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
Zinc Dissolved	µg/L		2	3	3	<2	<2
Zirconium Dissolved	µg/L		0.1	<0.1	<0.1	<0.1	<0.1
Hardness (calc)	ug CaCO3/L		100	314000	303000	282000	327000

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

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Quality Assurance

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA
AGAT WORK ORDER: 18N306660
PROJECT: 1657709/6000
ATTENTION TO: Erin O'Brien
SAMPLING SITE:
SAMPLED BY:

Trace Organics Analysis

RPT Date: Feb 06, 2018

PARAMETER	Batch	Sample Id	DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
			Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Volatile Organic Compounds in Water															
Chloromethane	68708	9037125	<1	<1	NA	< 1	98%	80%	120%				95%	70%	130%
Vinyl Chloride	68708	9037125	<1	<1	NA	< 1	99%	80%	120%				102%	70%	130%
Bromomethane	68708	9037125	<1	<1	NA	< 1	97%	80%	120%				85%	70%	130%
Chloroethane	68708	9037125	<1	<1	NA	< 1	99%	80%	120%				101%	70%	130%
Trichlorofluoromethane	68708	9037125	<1	<1	NA	< 1	99%	80%	120%				97%	70%	130%
Acetone	68708	9037125	<10	<10	NA	< 10	99%	80%	120%						
1,1-Dichloroethylene	68708	9037125	<1	<1	NA	< 1	99%	80%	120%				102%	70%	130%
Dichloromethane	68708	9037125	<1	<1	NA	< 1	100%	80%	120%				90%	70%	130%
Methyl tert-butyl ether (MTBE)	68708	9037125	<1	<1	NA	< 1	100%	80%	120%				100%	70%	130%
2-Butanone (MEK)	68708	9037125	<10	<10	NA	< 10	100%	80%	120%						
trans-1,2-Dichloroethylene	68708	9037125	<1	<1	NA	< 1	100%	80%	120%				99%	70%	130%
1,1-Dichloroethane	68708	9037125	<1	<1	NA	< 1	100%	80%	120%				99%	70%	130%
cis-1,2-Dichloroethylene	68708	9037125	<1	<1	NA	< 1	100%	80%	120%				96%	70%	130%
Chloroform	68708	9037125	<1	<1	NA	< 1	99%	80%	120%				98%	70%	130%
1,2-Dichloroethane	68708	9037125	<1	<1	NA	< 1	99%	80%	120%				97%	70%	130%
1,1,1-Trichloroethane	68708	9037125	<1	<1	NA	< 1	100%	80%	120%				97%	70%	130%
Carbon Tetrachloride	68708	9037125	<0.5	<0.5	NA	< 0.5	100%	80%	120%				96%	70%	130%
Benzene	68708	9037125	<0.5	<0.5	NA	< 0.5	100%	80%	120%				97%	70%	130%
1,2-Dichloropropane	68708	9037125	<1	<1	NA	< 1	100%	80%	120%				100%	70%	130%
Trichloroethene	68708	9037125	<1	<1	NA	< 1	100%	80%	120%				98%	70%	130%
Bromodichloromethane	68708	9037125	<1	<1	NA	< 1	100%	80%	120%				96%	70%	130%
trans-1,3-Dichloropropene	68708	9037125	<1	<1	NA	< 1	101%	80%	120%				100%	70%	130%
4-Methyl-2-pentanone (MIBK)	68708	9037125	<10	<10	NA	< 10	100%	80%	120%						
cis-1,3-Dichloropropene	68708	9037125	<1	<1	NA	< 1	100%	80%	120%				96%	70%	130%
1,1,2-Trichloroethane	68708	9037125	<1	<1	NA	< 1	100%	80%	120%				98%	70%	130%
Toluene	68708	9037125	<0.5	<0.5	NA	< 0.5	100%	80%	120%				97%	70%	130%
Dibromochloromethane	68708	9037125	<1	<1	NA	< 1	100%	80%	120%				97%	70%	130%
1,2-Dibromoethane	68708	9037125	<0.3	<0.3	NA	< 0.3	100%	80%	120%				99%	70%	130%
Tetrachloroethylene	68708	9037125	<1	<1	NA	< 1	100%	80%	120%				83%	70%	130%
1,1,1,2-Tetrachloroethane	68708	9037125	<1	<1	NA	< 1	100%	80%	120%				92%	70%	130%
Chlorobenzene	68708	9037125	<1	<1	NA	< 1	100%	80%	120%				93%	70%	130%
Ethylbenzene	68708	9037125	<0.5	<0.5	NA	< 0.5	100%	80%	120%				94%	70%	130%
m&p-Xylene	68708	9037125	<0.5	<0.5	NA	< 0.5	100%	80%	120%				94%	70%	130%
Bromoform	68708	9037125	<1	<1	NA	< 1	100%	80%	120%				95%	70%	130%
Styrene	68708	9037125	<0.5	<0.5	NA	< 0.5	101%	80%	120%				93%	70%	130%
1,1,2,2-Tetrachloroethane	68708	9037125	<0.8	<0.8	NA	< 0.8	99%	80%	120%				96%	70%	130%
o-Xylene	68708	9037125	<0.5	<0.5	NA	< 0.5	100%	80%	120%				94%	70%	130%
1,3-Dichlorobenzene	68708	9037125	<0.5	<0.5	NA	< 0.5	100%	80%	120%				93%	70%	130%
1,4-Dichlorobenzene	68708	9037125	<0.5	<0.5	NA	< 0.5	100%	80%	120%				94%	70%	130%

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Quality Assurance

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA
AGAT WORK ORDER: 18N306660
PROJECT: 1657709/6000
ATTENTION TO: Erin O'Brien
SAMPLING SITE:
SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date: Feb 06, 2018			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
1,2-Dichlorobenzene	68708	9037125	<0.5	<0.5	NA	< 0.5	100%	80%	120%				96%	70%	130%
1,2,4-Trichlorobenzene	68708	9037125	<1	<1	NA	< 1	101%	80%	120%				93%	70%	130%
Bromofluorobenzene	68708	9037125	83	70	17.0%		103%	70%	130%				102%	70%	130%
Dibromofluoromethane	68708	9037125	104	90	14.4%		99%	70%	130%				102%	70%	130%
Toluene - d8	68708	9037125	95	80	17.1%		100%	70%	130%				108%	70%	130%
Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.															
CCME F1 (C6-C10) (Water)															
F1 (C6-C10)	68710	9036496	<100	<100	NA	< 100									
F1 minus BTEX (C6-C10)	68710	9036496	<100	<100	NA	< 100									
Bromofluorobenzene	68710	9036496	101	100	1.0%		100%	70%	130%				99%	70%	130%
Dibromofluoromethane	68710	9036496	94	93	1.1%		100%	70%	130%				98%	70%	130%
Toluene - d8	68710	9036496	97	96	1.0%		99%	70%	130%				99%	70%	130%
Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.															
CCME F2-F4 (Water)															
F2 (C10-C16)	68694	W-MS1	5530	6060	9.1%	< 100	111%	80%	120%				78%	70%	130%
F3 (C16-C34)	68694	W-MS1	17600	19800	11.8%	< 100	118%	80%	120%				85%	70%	130%
F4 (C34-C50)	68694	W-MS1	4480	5090	12.7%	< 100	104%	80%	120%				75%	70%	130%
Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.															
Public Works LEPH/HEPH in Water Low Level															
Naphthalene	68694	W-MS1	0.47	0.47	0.0%	< 0.05	99%	80%	120%				96%	50%	130%
Quinoline	68694	W-MS1	0.55	0.52	5.6%	< 0.05	99%	80%	120%				110%	50%	130%
Acenaphthylene	68694	W-MS1	0.46	0.47	2.2%	< 0.02	99%	80%	120%				93%	50%	130%
Acenaphthene	68694	W-MS1	0.46	0.46	0.0%	< 0.02	100%	80%	120%				92%	50%	130%
Fluorene	68694	W-MS1	0.49	0.51	4.0%	< 0.02	99%	80%	120%				100%	50%	130%
Phenanthrene	68694	W-MS1	0.42	0.43	2.4%	< 0.04	99%	80%	120%				88%	60%	130%
Anthracene	68694	W-MS1	0.46	0.45	2.2%	< 0.01	98%	80%	120%				93%	60%	130%
Acridine	68694	W-MS1	0.51	0.50	2.0%	< 0.05	98%	80%	120%				102%	50%	130%
Fluoranthene	68694	W-MS1	0.45	0.46	2.2%	< 0.02	98%	80%	120%				92%	60%	130%
Pyrene	68694	W-MS1	0.48	0.49	2.1%	< 0.02	98%	80%	120%				97%	60%	130%
Benzo(a)anthracene	68694	W-MS1	0.45	0.45	0.0%	< 0.01	99%	80%	120%				90%	60%	130%
Chrysene	68694	W-MS1	0.50	0.51	2.0%	< 0.01	99%	80%	120%				102%	60%	130%
Benzo(b)fluoranthene	68694	W-MS1	0.43	0.43	0.0%	< 0.01	104%	80%	120%				87%	60%	130%
Benzo(j)fluoranthene	68694	W-MS1	0.50	0.51	2.0%	< 0.01	99%	80%	120%				101%	60%	130%
Benzo(k)fluoranthene	68694	W-MS1	0.46	0.47	2.2%	< 0.01	94%	80%	120%				93%	60%	130%
Benzo(a)pyrene	68694	W-MS1	0.50	0.50	0.0%	< 0.01	99%	80%	120%				100%	60%	130%
Indeno(1,2,3-c,d)pyrene	68694	W-MS1	0.43	0.42	2.4%	< 0.01	98%	80%	120%				87%	60%	130%
Dibenzo(a,h)anthracene	68694	W-MS1	0.40	0.41	2.5%	< 0.01	98%	80%	120%				81%	60%	130%
Benzo(g,h,i)perylene	68694	W-MS1	0.46	0.46	0.0%	< 0.01	98%	80%	120%				92%	60%	130%

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Quality Assurance

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA
AGAT WORK ORDER: 18N306660
PROJECT: 1657709/6000
ATTENTION TO: Erin O'Brien
SAMPLING SITE:
SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date: Feb 06, 2018

PARAMETER	Batch	Sample Id	DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
			Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
1-Methylnaphthalene	68694	W-MS1	0.46	0.46	0.0%	< 0.05	99%	80%	120%				94%	50%	130%
2-Methylnaphthalene	68694	W-MS1	0.39	0.38	2.6%	< 0.05	99%	80%	120%				79%	50%	130%
EPH C10-C19	68694	W-MS1	7990	8810	9.8%	< 100	113%	70%	130%				79%	70%	130%
EPH C19-C32	68694	W-MS1	13100	14700	11.5%	< 100	101%	70%	130%				86%	70%	130%
Naphthalene - d8	68694	W-MS1	94	95	1.1%		99%	80%	120%				94%	50%	130%
2-Fluorobiphenyl	68694	W-MS1	94	96	2.1%		99%	80%	120%				94%	50%	130%
P-Terphenyl - d14	68694	W-MS1	93	93	0.0%		99%	80%	120%				94%	60%	130%
BC Routine VOC package in Air (Canister) -ug/m3															
1,2,4-Trimethylbenzene	1		< 6.0	< 6.0	0.0%	< 6.0	69%	50%	140%	137%	50%	140%	NA	30%	140%
1,3,5-Trimethylbenzene	1		< 6.0	< 6.0	0.0%	< 6.0	130%	50%	140%	133%	50%	140%	NA	30%	140%
1,3-Butadiene	1		< 4.0	< 4.0	0.0%	< 4.0	128%	50%	140%	140%	50%	140%	NA	30%	140%
Isopropylbenzene	1		< 3.20	< 3.20	0.0%	< 3.20	135%	50%	140%	136%	50%	140%	NA	30%	140%
Methyl tert-Butyl ether (MTBE)	1		< 3.20	< 3.20	0.0%	< 3.20	131%	50%	140%	85%	50%	140%	NA	30%	140%
Naphthalene	1		< 8.0	< 8.0	0.0%	< 8.0	133%	50%	140%	79%	50%	140%	NA	30%	140%
n-Decane	1		< 5.2	< 5.2	0.0%	< 5.2	60%	50%	140%	82%	50%	140%	NA	30%	140%
n-Hexane	1		< 4.4	< 4.4	0.0%	< 4.4	96%	50%	140%	106%	50%	140%	NA	30%	140%
Public Works : BC VOCs in Air (Canister) - ug/m3															
Dichlorodifluoromethane	1		< 4.0	< 4.0	0.0%	< 4.0	136%	60%	140%	101%	50%	140%	NA	30%	140%
1,2-Dichlorotetrafluoroethane	1		< 5.6	< 5.6	0.0%	< 5.6	140%	60%	140%	95%	50%	140%	NA	30%	140%
1,1,2-Trichloro-1,2,2-trifluoroethane	1		< 6.0	< 6.0	0.0%	< 6.0	118%	60%	140%	102%	50%	140%	NA	30%	140%
Chloromethane	1		< 2.40	< 2.40	0.0%	< 2.40	129%	60%	140%	108%	50%	140%	NA	30%	140%
Vinyl Chloride	1		< 1.60	< 1.60	0.0%	< 1.60	132%	60%	140%	104%	50%	140%	NA	30%	140%
Bromomethane	1		< 7.6	< 7.6	0.0%	< 7.6	140%	60%	140%	97%	50%	140%	NA	30%	140%
Chloroethane	1		< 4.0	< 4.0	0.0%	< 4.0	137%	60%	140%	106%	50%	140%	NA	30%	140%
Vinyl Bromide	1		< 3.20	< 3.20	0.0%	< 3.20	NA	60%	140%	140%	50%	140%	NA	30%	140%
Trichlorofluoromethane	1		< 9.2	< 9.2	0.0%	< 9.2	135%	60%	140%	107%	50%	140%	NA	30%	140%
1,1-Dichloroethene	1		< 4.0	< 4.0	0.0%	< 4.0	69%	60%	140%	104%	50%	140%	NA	30%	140%
Methylene Chloride	1		< 4.0	< 4.0	0.0%	< 4.0	114%	60%	140%	104%	50%	140%	NA	30%	140%
trans-1,2-Dichloroethene	1		< 3.20	< 3.20	0.0%	< 3.20	100%	60%	140%	103%	50%	140%	NA	30%	140%
1,1-Dichloroethane	1		< 4.8	< 4.8	0.0%	< 4.8	116%	60%	140%	100%	50%	140%	NA	30%	140%
cis-1,2-Dichloroethene	1		< 3.20	< 3.20	0.0%	< 3.20	106%	60%	140%	100%	50%	140%	NA	30%	140%
Chloroform	1		< 4.0	< 4.0	0.0%	< 4.0	118%	60%	140%	103%	50%	140%	NA	30%	140%
1,2-Dichloroethane	1		< 1.20	< 1.20	0.0%	< 1.20	122%	60%	140%	102%	50%	140%	NA	30%	140%
1,1,1-Trichloroethane	1		< 6.4	< 6.4	0.0%	< 6.4	110%	60%	140%	95%	50%	140%	NA	30%	140%
Carbon Tetrachloride	1		< 8.0	< 8.0	0.0%	< 8.0	117%	60%	140%	100%	50%	140%	NA	30%	140%
Benzene	1		< 2.00	< 2.00	0.0%	< 2.00	113%	60%	140%	100%	50%	140%	NA	30%	140%
1,2-Dichloropropane	1		< 8.0	< 8.0	0.0%	< 8.0	116%	60%	140%	106%	50%	140%	NA	30%	140%

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

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Quality Assurance

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA
AGAT WORK ORDER: 18N306660
PROJECT: 1657709/6000
ATTENTION TO: Erin O'Brien
SAMPLING SITE:
SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date: Feb 06, 2018			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Trichloroethene	1		< 4.0	< 4.0	0.0%	< 4.0	117%	60%	140%	119%	50%	140%	NA	30%	140%
Bromodichloromethane	1		< 5.2	< 5.2	0.0%	< 5.2	118%	60%	140%	103%	50%	140%	NA	30%	140%
cis-1,3-Dichloropropene	1		< 4.0	< 4.0	0.0%	< 4.0	101%	60%	140%	111%	50%	140%	NA	30%	140%
trans-1,3-Dichloropropene	1		< 4.0	< 4.0	0.0%	< 4.0	99%	60%	140%	110%	50%	140%	NA	30%	140%
Methyl Isobutyl Ketone (MIBK)	1		< 8.0	< 8.0	0.0%	< 8.0	136%	60%	140%	104%	50%	140%	NA	30%	140%
1,1,2-Trichloroethane	1		< 6.4	< 6.4	0.0%	< 6.4	135%	60%	140%	105%	50%	140%	NA	30%	140%
Toluene	1		< 3.20	< 3.20	0.0%	< 3.20	134%	60%	140%	107%	50%	140%	NA	30%	140%
2-Hexanone	1		< 8.0	< 8.0	0.0%	< 8.0	135%	60%	140%	110%	50%	140%	NA	30%	140%
Dibromochloromethane	1		< 8.0	< 8.0	0.0%	< 8.0	134%	60%	140%	105%	50%	140%	NA	30%	140%
1,2-Dibromoethane	1		< 6.0	< 6.0	0.0%	< 6.0	132%	60%	140%	110%	50%	140%	NA	30%	140%
Tetrachloroethene	1		< 4.0	< 4.0	0.0%	< 4.0	128%	60%	140%	118%	50%	140%	NA	30%	140%
Chlorobenzene	1		< 4.0	< 4.0	0.0%	< 4.0	139%	60%	140%	110%	50%	140%	NA	30%	140%
Ethylbenzene	1		< 3.6	< 3.6	0.0%	< 3.6	130%	60%	140%	73%	50%	140%	NA	30%	140%
m&p-Xylene	1		< 6.0	< 6.0	0.0%	< 6.0	140%	60%	140%	68%	50%	140%	NA	30%	140%
Bromoform	1		< 8.0	< 8.0	0.0%	< 8.0	133%	60%	140%	68%	50%	140%	NA	30%	140%
Styrene	1		< 4.0	< 4.0	0.0%	< 4.0	133%	60%	140%	76%	50%	140%	NA	30%	140%
1,1,2,2-Tetrachloroethane	1		< 6.0	< 6.0	0.0%	< 6.0	88%	60%	140%	52%	50%	140%	NA	30%	140%
o-Xylene	1		< 3.6	< 3.6	0.0%	< 3.6	85%	60%	140%	62%	50%	140%	NA	30%	140%
1,3-Dichlorobenzene	1		< 10.0	< 10.0	0.0%	< 10.0	135%	60%	140%	62%	50%	140%	NA	30%	140%
1,4-Dichlorobenzene	1		< 10.0	< 10.0	0.0%	< 10.0	137%	60%	140%	61%	50%	140%	NA	30%	140%
1,2-Dichlorobenzene	1		< 10.0	< 10.0	0.0%	< 10.0	134%	60%	140%	64%	50%	140%	NA	30%	140%

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Quality Assurance

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N306660

PROJECT: 1657709/6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Water Analysis

RPT Date: Feb 06, 2018			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Public Works Dissolved Metals															
Aluminum Dissolved	9042421		<2	<2	NA	< 2	98%	90%	110%	94%	90%	110%			
Antimony Dissolved	9042421		<0.2	<0.2	NA	< 0.2	104%	90%	110%	102%	90%	110%			
Arsenic Dissolved	9042421		0.1	0.1	NA	< 0.1	101%	90%	110%	99%	90%	110%			
Barium Dissolved	9042421		51.5	52.2	1.4%	< 0.2	95%	90%	110%	99%	90%	110%			
Beryllium Dissolved	9042421		0.01	0.02	NA	< 0.01	101%	90%	110%	104%	90%	110%			
Bismuth Dissolved	9042421		<0.05	<0.05	NA	< 0.05				99%	90%	110%			
Boron Dissolved	9042421		28	27	2.8%	< 2	98%	90%	110%	110%	90%	110%			
Cadmium Dissolved	9042421		<0.01	<0.01	NA	< 0.01	100%	90%	110%	102%	90%	110%			
Calcium Dissolved	9042421		103000	102000	0.9%	< 50	101%	90%	110%	100%	90%	110%			
Chromium Dissolved	9042421		<0.5	<0.5	NA	< 0.5	106%	90%	110%	100%	90%	110%			
Cobalt Dissolved	9042421		<0.05	<0.05	NA	< 0.05	97%	90%	110%	94%	90%	110%			
Copper Dissolved	9042421		<0.2	<0.2	NA	< 0.2	100%	90%	110%	97%	90%	110%			
Iron Dissolved	9042421		551	560	1.6%	< 10	102%	90%	110%	98%	90%	110%			
Lead Dissolved	9042421		<0.05	<0.05	NA	< 0.05	98%	90%	110%	94%	90%	110%			
Lithium Dissolved	9042421		75.3	70.0	7.3%	< 0.5				107%	90%	110%			
Magnesium Dissolved	9042421		21700	21500	0.6%	< 50	103%	90%	110%	101%	90%	110%			
Manganese Dissolved	9042421		35	36	1.5%	< 1	106%	90%	110%	101%	90%	110%			
Mercury Dissolved	9035793		<0.01	<0.01	NA	< 0.01	103%	90%	110%	104%	90%	110%			
Molybdenum Dissolved	9042421		1.24	1.22	2.1%	< 0.05	95%	90%	110%	99%	90%	110%			
Nickel Dissolved	9042421		0.3	0.3	NA	< 0.2	95%	90%	110%	109%	90%	110%			
Potassium Dissolved	9042421		3150	3100	1.7%	< 50	94%	90%	110%	98%	90%	110%			
Selenium Dissolved	9042421		<0.5	<0.5	NA	< 0.5	103%	90%	110%	100%	90%	110%			
Silicon Dissolved	9042421		13200	13000	1.0%	< 50				107%	90%	110%			
Silver Dissolved	9042421		<0.02	<0.02	NA	< 0.02				101%	90%	110%			
Sodium Dissolved	9042421		44600	44100	1.1%	< 50	96%	90%	110%	97%	90%	110%			
Strontium Dissolved	9042421		528	521	1.3%	< 0.1	99%	90%	110%	96%	90%	110%			
Sulphur Dissolved	9042421		26800	26900	0.5%	< 500				99%	90%	110%			
Thallium Dissolved	9042421		0.03	0.02	NA	< 0.01	101%	90%	110%	101%	90%	110%			
Tin Dissolved	9042421		<0.05	<0.05	NA	< 0.05				103%	90%	110%			
Titanium Dissolved	9042421		2.9	2.5	12.8%	< 0.5				92%	90%	110%			
Uranium Dissolved	9042421		0.60	0.60	0.7%	< 0.01	99%	90%	110%	99%	90%	110%			
Vanadium Dissolved	9042421		<0.5	<0.5	NA	< 0.5	109%	90%	110%	100%	90%	110%			
Zinc Dissolved	9042421		93	95	1.9%	< 2	97%	90%	110%	92%	90%	110%			
Zirconium Dissolved	9042421		<0.1	<0.1	NA	< 0.1				104%	70%	130%			

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

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Quality Assurance

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N306660

PROJECT: 1657709/6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Water Analysis (Continued)

RPT Date: Feb 06, 2018			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

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Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA
AGAT WORK ORDER: 18N306660
PROJECT: 1657709/6000
ATTENTION TO: Erin O'Brien
SAMPLING SITE:
SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
1,2,4-Trimethylbenzene	AQM-91-16001	MASS APH	GC/MS
1,3,5-Trimethylbenzene	AQM-91-16001	MASS APH	GC/MS
1,3-Butadiene	AQM-91-16000	EPA TO15	GC/MS
Isopropylbenzene	AQM-91-16000	MASS APH	GC/MS
Methylcyclohexane	AQM-91-16000	EPA TO15	GC/MS
Methyl tert-Butyl ether (MTBE)	AQM-91-16000	EPA TO15	GC/MS
Naphthalene	AQM-91-16000	MASS APH	GC/MS
n-Decane	AQM-91-16000	MASS APH	GC/MS
n-Hexane	AQM-91-16000	EPA TO15	GC/MS
VPHv (C>6-C13)	AQM-91-16000	MASS APH	GC/MS
4-Bromofluorobenzene	AQM-91-16000	MASS APH	GC/MS
F1 (C6-C10)	ORG-180-5130	CCME Tier 1 Method	GC/MS/FID
F1 minus BTEX (C6-C10)	ORG-180-5130	CCME Tier 1 Method	GC/MS/FID
Bromofluorobenzene			GC/MS
Dibromofluoromethane			GC/MS
Toluene - d8			GC/MS
F2 (C10-C16)	ORG-180-5134	CCME Tier 1 Method	GC/FID
F3 (C16-C34)	ORG-180-5134	CCME Tier 1 Method	GC/FID
F4 (C34-C50)	ORG-180-5134	CCME Tier 1 Method	GC/FID
Dichlorodifluoromethane	AQM-248-16000	EPA TO15	GC/MS
1,2-Dichlorotetrafluoroethane	AQM-248-16000	EPA TO15	GC/MS
1,1,2-Trichloro-1,2,2-trifluoroethane	AQM-248-16000	EPA TO15	GC/MS
Chloromethane	AQM-248-16000	EPA TO15	GC/MS
Vinyl Chloride	AQM-248-16000	EPA TO15	GC/MS
Bromomethane	AQM-248-16000	EPA TO15	GC/MS
Chloroethane	AQM-248-16000	EPA TO15	GC/MS
Vinyl Bromide	AQM-248-16000	EPA TO15	GC/MS
Trichlorofluoromethane	AQM-248-16000	EPA TO15	GC/MS
1,1-Dichloroethene	AQM-248-16000	EPA TO15	GC/MS
Methylene Chloride	AQM-248-16000	EPA TO15	GC/MS
trans-1,2-Dichloroethene	AQM-248-16000	EPA TO15	GC/MS
1,1-Dichloroethane	AQM-248-16000	EPA TO15	GC/MS
cis-1,2-Dichloroethene	AQM-248-16000	EPA TO15	GC/MS
Chloroform	AQM-248-16000	EPA TO15	GC/MS
1,2-Dichloroethane	AQM-248-16000	EPA TO15	GC/MS
1,1,1-Trichloroethane	AQM-248-16000	EPA TO15	GC/MS
Carbon Tetrachloride	AQM-248-16000	EPA TO15	GC/MS
Benzene	AQM-248-16000	EPA TO15	GC/MS
1,2-Dichloropropane	AQM-248-16000	EPA TO15	GC/MS
2,2-Dichloropropane	AQM-248-16000	EPA TO15	GC/MS
Trichloroethene	AQM-248-16000	EPA TO15	GC/MS
Bromodichloromethane	AQM-248-16000	EPA TO15	GC/MS
cis-1,3-Dichloropropene	AQM-248-16000	EPA TO15	GC/MS
trans-1,3-Dichloropropene	AQM-248-16000	EPA TO15	GC/MS
Methyl Isobutyl Ketone (MIBK)	AQM-248-16000	EPA TO15	GC/MS
1,1,2-Trichloroethane	AQM-248-16000	EPA TO15	GC/MS
Toluene	AQM-248-16000	EPA TO15	GC/MS
2-Hexanone	AQM-248-16000	EPA TO15	GC/MS
Dibromochloromethane	AQM-248-16000	EPA TO15	GC/MS

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Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N306660

PROJECT: 1657709/6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
1,2-Dibromoethane	AQM-248-16000	EPA TO15	GC/MS
Tetrachloroethene	AQM-248-16000	EPA TO15	GC/MS
Chlorobenzene	AQM-248-16000	EPA TO15	GC/MS
Ethylbenzene	AQM-248-16000	EPA TO15	GC/MS
m&p-Xylene	AQM-248-16000	EPA TO15	GC/MS
Bromoform	AQM-248-16000	EPA TO15	GC/MS
Styrene	AQM-248-16000	EPA TO15	GC/MS
1,1,2,2-Tetrachloroethane	AQM-248-16000	EPA TO15	GC/MS
o-Xylene	AQM-248-16000	EPA TO15	GC/MS
1,3-Dichlorobenzene	AQM-248-16000	EPA TO15	GC/MS
1,4-Dichlorobenzene	AQM-248-16000	EPA TO15	GC/MS
1,2-Dichlorobenzene	AQM-248-16000	EPA TO15	GC/MS
Total Xylenes	AQM-248-16000	EPA TO15	GC/MS
4-Bromofluorobenzene	AQM-248-16000	EPA TO15	GC/MS
Naphthalene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Quinoline	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Acenaphthylene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Acenaphthene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Fluorene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Phenanthrene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Anthracene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Acridine	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Fluoranthene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Pyrene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(a)anthracene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Chrysene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(b)fluoranthene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(j)fluoranthene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(k)fluoranthene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(a)pyrene	ORG-180-5133	Modified from BC MOE Lab Manual Section D	GC/MS
Indeno(1,2,3-c,d)pyrene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Dibenzo(a,h)anthracene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(g,h,i)perylene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
1-Methylnaphthalene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
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TEL (778)452-4000
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http://www.agatlabs.com

Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N306660

PROJECT: 1657709/6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
2-Methylnaphthalene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
EPH C10-C19	ORG-180-5134	Modified from BC MOE Lab Manual Section D (EPH)	GC/FID
EPH C19-C32	ORG-180-5134	Modified from BC MOE Lab Manual Section D (EPH)	GC/FID
LEPH C10-C19	ORG-180-5134	Modified from BC MOE Lab Manual Section D (EPH)	GC/FID
HEPH C19-C32	ORG-180-5134	Modified from BC MOE Lab Manual Section D (EPH)	GC/FID
Naphthalene - d8			GC/MS
2-Fluorobiphenyl	ORG-180-5133	Modified form BCMOE Lab Manual Section D (PAH)	GC/MS
P-Terphenyl - d14	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Chloromethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Vinyl Chloride	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Bromomethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Chloroethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Trichlorofluoromethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Acetone	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,1-Dichloroethylene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Dichloromethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Methyl tert-butyl ether (MTBE)	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
2-Butanone (MEK)	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
trans-1,2-Dichloroethylene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,1-Dichloroethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
cis-1,2-Dichloroethylene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Chloroform	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,2-Dichloroethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,1,1-Trichloroethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Carbon Tetrachloride	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Benzene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,2-Dichloropropane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Trichloroethene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS

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Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA
AGAT WORK ORDER: 18N306660
PROJECT: 1657709/6000
ATTENTION TO: Erin O'Brien
SAMPLING SITE:
SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Bromodichloromethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
trans-1,3-Dichloropropene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
4-Methyl-2-pentanone (MIBK)	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
cis-1,3-Dichloropropene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,1,2-Trichloroethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Toluene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Dibromochloromethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,2-Dibromoethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Tetrachloroethylene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,1,1,2-Tetrachloroethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D	GC/MS
Chlorobenzene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Ethylbenzene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
m&p-Xylene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Bromoform	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Styrene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,1,2,2-Tetrachloroethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
o-Xylene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,3-Dichlorobenzene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,4-Dichlorobenzene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,2-Dichlorobenzene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,2,4-Trichlorobenzene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Bromofluorobenzene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Dibromofluoromethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Toluene - d8	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS

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Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA
AGAT WORK ORDER: 18N306660
PROJECT: 1657709/6000
ATTENTION TO: Erin O'Brien
SAMPLING SITE:
SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
Aluminum Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Antimony Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Arsenic Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Barium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Beryllium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Bismuth Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Boron Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Cadmium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Calcium Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Chromium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Cobalt Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Copper Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Iron Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Lead Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Lithium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Magnesium Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Manganese Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Mercury Dissolved	MET-181-6103, LAB-181-4015	Modified from EPA 245.7	CV/AA
Molybdenum Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Nickel Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Potassium Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Selenium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Silicon Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Silver Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Sodium Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Strontium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Sulphur Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES

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http://www.agatlabs.com

Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N306660

PROJECT: 1657709/6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Thallium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Tin Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Titanium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Uranium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Vanadium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Zinc Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Zirconium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS

CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

19N306660

No. 04254 page 1 of 2

Golder Associates
200 – 2920 Virtual Way
Vancouver, British Columbia, Canada V5M 0C4
Telephone (604) 296-4200 Fax (604) 298-5253

Project Number: 1657709/6000			Laboratory Name: AGAT
Short Title: K19 Investigation	Golder Contact: Erin O'Brien		Address: 120-8600 Glenlyon Parkway
Golder E-mail Address 1: erin_o'brien@golder.com	Golder E-mail Address 2: agarrido@golder.com		Telephone/Fax: 7784524009
			Contact: Yasmine Galindo

Office Name: Vancouver

EQuIS Facility Code: 28433859
EQuIS upload: ☒

JAN 30 AM 11:06

Turnaround Time: ☐ 24 hr ☐ 48 hr ☐ 72 hr ☒ Regular (5 Days)
Criteria: ☒ CSR ☒ CCME ☐ BC Water Quality ☐ Other

Note: Final Reports to be issued by e-mail

Quote No.:

Analyses Required

Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D / M / Y)	Time Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	Diss. Metal	Diss Hg	VOC	LEPH/HEPH/PAH	Chloride	F1	F2-F4	Acid Extr. Leach	RUSH (Select TAT above)	Remarks (over)
04254-01	K19-MW18-12			WG	26/01/18		GRAB	FDA	04254-02	8	X	X	X	X		X	X	9036496		Hold Chloride
-02	K19-MW18-12							FD	04254-01	8	X	X	X	X		X	X		5/12	
-03	K19-MW18-16				27/01/18					8	X	X	X	X		X	X		5/13	
-04	K19-MW18-15				26/01/18					8	X	X	X	X		X	X		5/14	
~~-05~~	~~K19-MW18-17~~			SW	27/01/18															
-06																				
-07																				
-08																				
-09																				
-10																				
-11																				
-12																				

Sampler's Signature:	Relinquished by: Signature	Company: Golder	Date: 28/01/18	Time: 14:00	Received by: Signature	Company: AGAT	
Comments: Invoice Dave Osguthorpe	Method of Shipment:	Waybill No.:		Received for Lab by: Ann	Date	Time	
	Shipped by:	Shipment Condition: Seal Intact:		Temp (°C): 0	Cooler opened by:	Date	Time

WHITE: Golder Copy YELLOW: Lab Copy

ESED

18W306660

CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

No. 04323 page 2 of 2

Golder Associates

200 – 2920 Virtual Way
Vancouver, British Columbia, Canada V5M 0C4
Telephone (604) 296-4200 Fax (604) 298-5253

Project Number: 1657709 / 6000			Laboratory Name: AGAT
Short Title: K19 Investigation	Golder Contact: Erin O'Brien		Address: 120-8600 Glenlyon Parkway
Golder E-mail Address 1: erin_o'brien@golder.com	Golder E-mail Address 2: agarndo@golder.com	Telephone/Fax: 7784524009	Contact: Yasmine Galundo

Office Name: Vancouver

EQuIS Facility Code: 28433859
EQuIS upload: ☒

Turnaround Time: ☐ 24 hr ☐ 48 hr ☐ 72 hr ☒ Regular (5 Days)
Criteria: ☒ CSR ☒ CCME ☐ BC Water Quality ☐ Other

Note: Final Reports to be issued by e-mail

Quote No.:

Analyses Required

Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D / M / Y)	Time Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	CWS PHC F1/F2	VOCs/PAH/BTEX	Hexane	Decane	Naphthalene	Chlorinated Solvents				RUSH (Select TAT above)	Remarks (over)
04323-01	K19-SV	18-17		SV	27/01/18		GRAB			1	X	X	X	X	X	X					523
-02																					
-03																					
-04																					
-05																					
-06																					
-07																					
-08																					
-09																					
-10																					
-11																					
-12																					

JAN 30 2018

Agat sample BP

1 2

Sampler's Signature:	Relinquished by: Signature	Company: Golder	Date: 28/01/18	Time: 14:00	Received by: Signature	Company: AGAT
Comments: Invoice Dave osguthorpe	Method of Shipment:	Waybill No.:	Received for Lab by: Ann	Date	Time
	Shipped by:	Shipment Condition: Seal Intact:	Temp (°C): 0	Cooler opened by:	Date	Time

WHITE: Golder Copy YELLOW: Lab Copy

ESED

AGAT Laboratories

SAMPLE INTEGRITY RECEIPT FORM

RECEIVING BASICS - Shipping

Company/Consultant: Golder Associates

Courier: Drop off ~~Prepaid~~ ~~Collect~~

Waybill#: _____

Branch: EDM GP FN FM RD VAN LYD (FSJ) EST Other: _____

Custody Seal Intact: Yes No (NA)

TAT: <24hr 24-48hr 48-72hr (Reg) Other _____

Cooler Quantity: 2 SM

TIME SENSITIVE ISSUES - Shipping

ALREADY EXCEEDED HOLD TIME? Yes No

Inorganic Tests (Please Circle): Mibi , BOD , Nitrate/Nitrite , Turbidity , Microtox , Ortho PO4 , Tedlar Bag , Residual Chlorine , Chlorophyll* , Chloroamines*

Earliest Expiry: _____

Hydrocarbons: Earliest Expiry _____

SAMPLE INTEGRITY - Shipping

Hazardous Samples: YES (NO) Precaution Taken: _____

Legal Samples: Yes (No)

International Samples: Yes (No)

Tape Sealed: Yes (No)

Coolant Used: (Icepack) Bagged Ice Free Ice Free Water None

Temperature (Bottles/Jars only) N/A if only Soil Bags Received

FROZEN (Please Circle if samples received Frozen)

1 (Bottle/Jar) 3 + 5 + 4 = 4 °C 2(Bottle/Jar) ___ + ___ + ___ = ___ °C

3 (Bottle/Jar) ___ + ___ + ___ = ___ °C 4 (Bottle/Jar) ___ + ___ + ___ = ___ °C

5 (Bottle/Jar) ___ + ___ + ___ = ___ °C 6 (Bottle/Jar) ___ + ___ + ___ = ___ °C

7 (Bottle/Jar) ___ + ___ + ___ = ___ °C 8 (Bottle/Jar) ___ + ___ + ___ = ___ °C

9 (Bottle/Jar) ___ + ___ + ___ = ___ °C 10 (Bottle/Jar) ___ + ___ + ___ = ___ °C

(If more than 10 coolers are received use another sheet of paper and attach)

LOGISTICS USE ONLY

Workorder No: _____

Samples Damaged: Yes No If YES why?

No Bubble Wrap Frozen Courier

Other: _____

Account Project Manager: _____ have they been notified of the above issues: Yes No

Whom spoken to: _____ Date/Time: _____

CPM Initial _____

General Comments: _____

* Subcontracted Analysis (See CPM)

Date issued: May 22, 2015

AGAT Laboratories

SAMPLE INTEGRITY RECEIPT FORM - BURNABY

Work Order # 18N306660

RECEIVING BASICS:

Received From: NOVEX #1 AC Waybill #: _____

SAMPLE QUANTITIES:

Coolers: 1 Containers: 33

TIME SENSITIVE ISSUES:

Earliest Date Sampled: Jan 26, 2018 ALREADY EXCEEDED? Yes (No)

NON-CONFORMANCES:

3 temperatures of samples* and average of each cooler: (record differing temperatures on the CoC next to sample ID's) *use jars when available

(1) 0 + 0 + 0 = 0 °C (2) ___ + ___ + ___ = ___ °C (3) ___ + ___ + ___ = ___ °C (4) ___ + ___ + ___ = ___ °C

Was ice or ice pack present: (Yes) No

Integrity Issues:

Account Project Manager: _____ have they been notified of the above issues: Yes No

Whom spoken to: _____ Date and Time: _____

ADDITIONAL NOTES:

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA
219-800 BURRARD ST
VANCOUVER, BC V6Z 0B9
604-671-1831

ATTENTION TO: Erin O'brien

PROJECT: 1657709-6000

AGAT WORK ORDER: 18N306717

TRACE ORGANICS REVIEWED BY: Andrew Garrard, B.Sc., General Manager

WATER ANALYSIS REVIEWED BY: Andrew Garrard, B.Sc., General Manager

DATE REPORTED: Feb 06, 2018

PAGES (INCLUDING COVER): 27

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (778) 452-4000

*NOTES

VERSION 1: Sample receipt temperature 5°C.

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

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Certificate of Analysis

AGAT WORK ORDER: 18N306717

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'brien

SAMPLING SITE:

SAMPLED BY:

CCME F1 (C6-C10) (Water)

DATE RECEIVED: 2018-01-30

DATE REPORTED: 2018-02-06

SAMPLE DESCRIPTION:				04255-02	04255-03	04255-05	04255-01
SAMPLE TYPE:				Water	Water	Water	Water
DATE SAMPLED:				2018-01-22	2018-01-22	2018-01-22	2018-01-22
Parameter	Unit	G / S	RDL	9036990	9036992	9036994	9036996
F1 (C6-C10)	µg/L		100	<100	<100	<100	<100
F1 minus BTEX (C6-C10)	µg/L		100	<100	<100	<100	<100
Surrogate	Unit	Acceptable Limits					
Bromofluorobenzene	%	70-130		98	100	97	95
Dibromofluoromethane	%	70-130		92	94	99	102
Toluene - d8	%	70-130		95	97	100	99

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9036990-9036996 The F1 (C6 - C10) fraction is determined by integrating the FID chromatogram from the beginning of the n-C6 peak to the apex of the last n-C10 peak.
The C6 - C10 fraction is calculated from the FID toluene response factor.
Quality control for the calibration follows the guidelines set out in the CCME Contaminated Sites Method for Soils.
The (F1 minus BTEX) has been calculated by subtracting the BTEX concentration from Fraction 1.

Certified By:

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 18N306717

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'brien

SAMPLING SITE:

SAMPLED BY:

CCME F2-F4 (Water)

DATE RECEIVED: 2018-01-30

DATE REPORTED: 2018-02-06

SAMPLE DESCRIPTION:				04255-02	04255-03	04255-05
SAMPLE TYPE:				Water	Water	Water
DATE SAMPLED:				2018-01-22	2018-01-22	2018-01-22
Parameter	Unit	G / S	RDL	9036990	9036992	9036994
F2 (C10-C16)	µg/L		100	<100	<100	<100
F3 (C16-C34)	µg/L		100	<100	<100	<100
F4 (C34-C50)	µg/L		100	<100	<100	<100

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9036990-9036994 The C10 - C16 (F2), C16 - C34 (F3), and C34 - C50 (F4) fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Quality control data is available upon request.
Assistance in the interpretation of data is available upon request.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
The chromatogram has returned to baseline by the retention time of nC50.
Extraction and holding times were met for this sample.

Certified By:

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 18N306717

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'brien

SAMPLING SITE:

SAMPLED BY:

Public Works LEPH/HEPH in Water Low Level

DATE RECEIVED: 2018-01-30

DATE REPORTED: 2018-02-06

		SAMPLE DESCRIPTION:		04255-02	04255-03	04255-04	04255-05
		SAMPLE TYPE:		Water	Water	Water	Water
		DATE SAMPLED:		2018-01-22	2018-01-22	2018-01-24	2018-01-22
Parameter	Unit	G / S	RDL	9036990	9036992	9036993	9036994
Naphthalene	µg/L		0.05	0.09	<0.05	0.74	<0.05
Quinoline	µg/L		0.05	<0.05	<0.05	<0.05	<0.05
Acenaphthylene	µg/L		0.02	<0.02	<0.02	<0.02	<0.02
Acenaphthene	µg/L		0.02	<0.02	<0.02	<0.02	<0.02
Fluorene	µg/L		0.02	0.07	<0.02	0.19	<0.02
Phenanthrene	µg/L		0.04	0.26	<0.04	0.67	<0.04
Anthracene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01
Acridine	µg/L		0.05	<0.05	<0.05	<0.05	<0.05
Fluoranthene	µg/L		0.02	0.02	<0.02	0.04	<0.02
Pyrene	µg/L		0.02	0.03	<0.02	0.07	<0.02
Benzo(a)anthracene	µg/L		0.01	<0.01	<0.01	0.01	<0.01
Chrysene	µg/L		0.01	0.05	<0.01	0.11	<0.01
Benzo(b)fluoranthene	µg/L		0.01	0.01	<0.01	0.02	<0.01
Benzo(j)fluoranthene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01
Benzo(k)fluoranthene	µg/L		0.01	<0.01	<0.01	0.01	<0.01
Benzo(a)pyrene	µg/L		0.01	<0.01	<0.01	0.01	<0.01
Indeno(1,2,3-c,d)pyrene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01
Dibenzo(a,h)anthracene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01
Benzo(g,h,i)perylene	µg/L		0.01	0.02	<0.01	0.05	<0.01
1-Methylnaphthalene	µg/L		0.05	0.25	<0.05	1.14	0.05
2-Methylnaphthalene	µg/L		0.05	0.33	<0.05	1.58	0.05
EPH C10-C19	µg/L		100	<100	<100	120	<100
EPH C19-C32	µg/L		100	<100	<100	100	<100
LEPH C10-C19	µg/L		100	<100	<100	120	<100
HEPH C19-C32	µg/L		100	<100	<100	100	<100
Benzo(b+j)fluoranthene	µg/L		0.01	0.01	<0.01	0.02	<0.01
Surrogate	Unit	Acceptable Limits					
Naphthalene - d8	%	50-130		84	86	80	83
2-Fluorobiphenyl	%	50-130		81	87	82	82
P-Terphenyl - d14	%	60-130		75	76	92	87

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 18N306717

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'brien

SAMPLING SITE:

SAMPLED BY:

Public Works LEPH/HEPH in Water Low Level

DATE RECEIVED: 2018-01-30

DATE REPORTED: 2018-02-06

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9036990-9036994 LEPH & HEPH results have been corrected for PAH contributions.

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Certificate of Analysis

AGAT WORK ORDER: 18N306717

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'brien

SAMPLING SITE:

SAMPLED BY:

Volatile Organic Compounds in Water

DATE RECEIVED: 2018-01-30

DATE REPORTED: 2018-02-06

SAMPLE DESCRIPTION:				04255-02	04255-03	04255-05	04255-01
SAMPLE TYPE:				Water	Water	Water	Water
DATE SAMPLED:				2018-01-22	2018-01-22	2018-01-22	2018-01-22
Parameter	Unit	G / S	RDL	9036990	9036992	9036994	9036996
Chloromethane	µg/L		1	<1	<1	<1	<1
Vinyl Chloride	µg/L		1	<1	<1	<1	<1
Bromomethane	µg/L		1	<1	<1	<1	<1
Chloroethane	µg/L		1	<1	<1	<1	<1
Trichlorofluoromethane	µg/L		1	<1	<1	<1	<1
Acetone	µg/L		10	<10	<10	<10	<10
1,1-Dichloroethylene	µg/L		1	<1	<1	<1	<1
Dichloromethane	µg/L		1	<1	<1	<1	<1
Methyl tert-butyl ether (MTBE)	µg/L		1	<1	<1	<1	<1
2-Butanone (MEK)	µg/L		10	<10	<10	<10	<10
trans-1,2-Dichloroethylene	µg/L		1	<1	<1	<1	<1
1,1-Dichloroethane	µg/L		1	<1	<1	<1	<1
cis-1,2-Dichloroethylene	µg/L		1	<1	<1	<1	<1
Chloroform	µg/L		1	<1	<1	<1	<1
1,2-Dichloroethane	µg/L		1	<1	<1	<1	<1
1,1,1-Trichloroethane	µg/L		1	<1	<1	<1	<1
Carbon Tetrachloride	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
Benzene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	µg/L		1	<1	<1	<1	<1
Trichloroethene	µg/L		1	<1	<1	<1	<1
Bromodichloromethane	µg/L		1	<1	<1	<1	<1
trans-1,3-Dichloropropene	µg/L		1	<1	<1	<1	<1
4-Methyl-2-pentanone (MIBK)	µg/L		10	<10	<10	<10	<10
cis-1,3-Dichloropropene	µg/L		1	<1	<1	<1	<1
1,1,2-Trichloroethane	µg/L		1	<1	<1	<1	<1
Toluene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	µg/L		1	<1	<1	<1	<1
1,2-Dibromoethane	µg/L		0.3	<0.3	<0.3	<0.3	<0.3
Tetrachloroethylene	µg/L		1	<1	<1	<1	<1
1,1,1,2-Tetrachloroethane	µg/L		1	<1	<1	<1	<1

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Certificate of Analysis

AGAT WORK ORDER: 18N306717

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'brien

SAMPLING SITE:

SAMPLED BY:

Volatile Organic Compounds in Water

DATE RECEIVED: 2018-01-30

DATE REPORTED: 2018-02-06

		SAMPLE DESCRIPTION:		04255-02	04255-03	04255-05	04255-01
		SAMPLE TYPE:		Water	Water	Water	Water
		DATE SAMPLED:		2018-01-22	2018-01-22	2018-01-22	2018-01-22
Parameter	Unit	G / S	RDL	9036990	9036992	9036994	9036996
Chlorobenzene	µg/L		1	<1	<1	<1	<1
Ethylbenzene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
m&p-Xylene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
Bromoform	µg/L		1	<1	<1	<1	<1
Styrene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
1,1,2,2-Tetrachloroethane	µg/L		0.8	<0.8	<0.8	<0.8	<0.8
o-Xylene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichlorobenzene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
1,2,4-Trichlorobenzene	µg/L		1	<1	<1	<1	<1
1,3-Dichloropropene (cis + trans)	µg/L		1	<1	<1	<1	<1
Total Trihalomethanes	µg/L		2	<2	<2	<2	<2
Total Xylenes	µg/L		1	<1	<1	<1	<1
Surrogate	Unit	Acceptable Limits					
Bromofluorobenzene	%	70-130		91	90	90	95
Dibromofluoromethane	%	70-130		114	114	88	102
Toluene - d8	%	70-130		110	110	98	110

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

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AGAT WORK ORDER: 18N306717

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'brien

SAMPLING SITE:

SAMPLED BY:

Chloride in Water

DATE RECEIVED: 2018-01-30

DATE REPORTED: 2018-02-06

SAMPLE DESCRIPTION:				04255-02	04255-03
SAMPLE TYPE:				Water	Water
DATE SAMPLED:				2018-01-22	2018-01-22
Parameter	Unit	G / S	RDL	9036990	9036992
Chloride	mg/L		0.5	130	150

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

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AGAT WORK ORDER: 18N306717

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'brien

SAMPLING SITE:

SAMPLED BY:

Public Works Dissolved Metals

DATE RECEIVED: 2018-01-30

DATE REPORTED: 2018-02-06

		SAMPLE DESCRIPTION:		04255-02	04255-03	04255-05	04255-01
		SAMPLE TYPE:		Water	Water	Water	Water
		DATE SAMPLED:		2018-01-22	2018-01-22	2018-01-22	2018-01-22
Parameter	Unit	G / S	RDL	9036990	9036992	9036994	9036996
Aluminum Dissolved	µg/L		2	10	<2	4	3
Antimony Dissolved	µg/L		0.2	0.3	<0.2	0.3	0.3
Arsenic Dissolved	µg/L		0.1	0.6	3.6	0.6	0.8
Barium Dissolved	µg/L		2	4990	6110	558	435
Beryllium Dissolved	µg/L		0.01	<0.01	<0.01	0.01	<0.01
Bismuth Dissolved	µg/L		0.05	<0.05	<0.05	<0.05	<0.05
Boron Dissolved	µg/L		2	217	222	138	128
Cadmium Dissolved	µg/L		0.01	0.01	<0.01	<0.01	<0.01
Calcium Dissolved	µg/L		50	98200	96800	58500	66300
Chromium Dissolved	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
Cobalt Dissolved	µg/L		0.05	0.86	0.98	1.93	2.27
Copper Dissolved	µg/L		0.2	0.2	<0.2	<0.2	<0.2
Iron Dissolved	µg/L		10	1480	10300	1520	1180
Lead Dissolved	µg/L		0.05	<0.05	<0.05	<0.05	<0.05
Lithium Dissolved	µg/L		1.0	113	103	149	135
Magnesium Dissolved	µg/L		50	35400	37100	21700	23600
Manganese Dissolved	µg/L		1	654	800	772	899
Mercury Dissolved	µg/L		0.01	<0.01	<0.01	<0.01	<0.01
Molybdenum Dissolved	µg/L		0.05	0.50	0.51	0.40	0.57
Nickel Dissolved	µg/L		0.2	1.7	1.3	3.6	3.4
Potassium Dissolved	µg/L		50	4630	3250	3620	4260
Selenium Dissolved	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
Silicon Dissolved	µg/L		50	5330	5260	4210	4930
Silver Dissolved	µg/L		0.02	<0.02	<0.02	<0.02	<0.02
Sodium Dissolved	µg/L		50	26600	19200	11800	11900
Strontium Dissolved	µg/L		0.1	870	1000	486	455
Sulphur Dissolved	µg/L		500	1490	1340	1440	1770
Thallium Dissolved	µg/L		0.01	0.01	<0.01	<0.01	<0.01
Tin Dissolved	µg/L		0.05	0.45	0.37	0.07	0.14
Titanium Dissolved	µg/L		0.5	1.2	1.3	1.3	1.2

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Certificate of Analysis

AGAT WORK ORDER: 18N306717

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'brien

SAMPLING SITE:

SAMPLED BY:

Public Works Dissolved Metals

DATE RECEIVED: 2018-01-30

DATE REPORTED: 2018-02-06

		SAMPLE DESCRIPTION:		04255-02	04255-03	04255-05	04255-01
		SAMPLE TYPE:		Water	Water	Water	Water
		DATE SAMPLED:		2018-01-22	2018-01-22	2018-01-22	2018-01-22
Parameter	Unit	G / S	RDL	9036990	9036992	9036994	9036996
Uranium Dissolved	µg/L		0.01	1.16	0.55	0.37	0.57
Vanadium Dissolved	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
Zinc Dissolved	µg/L		2	4	5	2	<2
Zirconium Dissolved	µg/L		0.1	0.1	<0.1	<0.1	<0.1
Hardness (calc)	ug CaCO3/L		100	391000	394000	235000	263000

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

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Quality Assurance

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA
AGAT WORK ORDER: 18N306717
PROJECT: 1657709-6000
ATTENTION TO: Erin O'brien
SAMPLING SITE:
SAMPLED BY:

Trace Organics Analysis

RPT Date: Feb 06, 2018

PARAMETER	Batch	Sample Id	DUPLICATE Dup #1	DUPLICATE Dup #2	DUPLICATE RPD	Method Blank	REFERENCE MATERIAL Measured Value	REFERENCE MATERIAL Acceptable Limits Lower	REFERENCE MATERIAL Acceptable Limits Upper	METHOD BLANK SPIKE Recovery	METHOD BLANK SPIKE Acceptable Limits Lower	METHOD BLANK SPIKE Acceptable Limits Upper	MATRIX SPIKE Recovery	MATRIX SPIKE Acceptable Limits Lower	MATRIX SPIKE Acceptable Limits Upper
Volatile Organic Compounds in Water															
Chloromethane	68708	9037125	<1	<1	NA	< 1	98%	80%	120%				95%	70%	130%
Vinyl Chloride	68708	9037125	<1	<1	NA	< 1	99%	80%	120%				102%	70%	130%
Bromomethane	68708	9037125	<1	<1	NA	< 1	97%	80%	120%				85%	70%	130%
Chloroethane	68708	9037125	<1	<1	NA	< 1	99%	80%	120%				101%	70%	130%
Trichlorofluoromethane	68708	9037125	<1	<1	NA	< 1	99%	80%	120%				97%	70%	130%
Acetone	68708	9037125	<10	<10	NA	< 10	99%	80%	120%						
1,1-Dichloroethylene	68708	9037125	<1	<1	NA	< 1	99%	80%	120%				102%	70%	130%
Dichloromethane	68708	9037125	<1	<1	NA	< 1	100%	80%	120%				90%	70%	130%
Methyl tert-butyl ether (MTBE)	68708	9037125	<1	<1	NA	< 1	100%	80%	120%				100%	70%	130%
2-Butanone (MEK)	68708	9037125	<10	<10	NA	< 10	100%	80%	120%						
trans-1,2-Dichloroethylene	68708	9037125	<1	<1	NA	< 1	100%	80%	120%				99%	70%	130%
1,1-Dichloroethane	68708	9037125	<1	<1	NA	< 1	100%	80%	120%				99%	70%	130%
cis-1,2-Dichloroethylene	68708	9037125	<1	<1	NA	< 1	100%	80%	120%				96%	70%	130%
Chloroform	68708	9037125	<1	<1	NA	< 1	99%	80%	120%				98%	70%	130%
1,2-Dichloroethane	68708	9037125	<1	<1	NA	< 1	99%	80%	120%				97%	70%	130%
1,1,1-Trichloroethane	68708	9037125	<1	<1	NA	< 1	100%	80%	120%				97%	70%	130%
Carbon Tetrachloride	68708	9037125	<0.5	<0.5	NA	< 0.5	100%	80%	120%				96%	70%	130%
Benzene	68708	9037125	<0.5	<0.5	NA	< 0.5	100%	80%	120%				97%	70%	130%
1,2-Dichloropropane	68708	9037125	<1	<1	NA	< 1	100%	80%	120%				100%	70%	130%
Trichloroethene	68708	9037125	<1	<1	NA	< 1	100%	80%	120%				98%	70%	130%
Bromodichloromethane	68708	9037125	<1	<1	NA	< 1	100%	80%	120%				96%	70%	130%
trans-1,3-Dichloropropene	68708	9037125	<1	<1	NA	< 1	101%	80%	120%				100%	70%	130%
4-Methyl-2-pentanone (MIBK)	68708	9037125	<10	<10	NA	< 10	100%	80%	120%						
cis-1,3-Dichloropropene	68708	9037125	<1	<1	NA	< 1	100%	80%	120%				96%	70%	130%
1,1,2-Trichloroethane	68708	9037125	<1	<1	NA	< 1	100%	80%	120%				98%	70%	130%
Toluene	68708	9037125	<0.5	<0.5	NA	< 0.5	100%	80%	120%				97%	70%	130%
Dibromochloromethane	68708	9037125	<1	<1	NA	< 1	100%	80%	120%				97%	70%	130%
1,2-Dibromoethane	68708	9037125	<0.3	<0.3	NA	< 0.3	100%	80%	120%				99%	70%	130%
Tetrachloroethylene	68708	9037125	<1	<1	NA	< 1	100%	80%	120%				83%	70%	130%
1,1,1,2-Tetrachloroethane	68708	9037125	<1	<1	NA	< 1	100%	80%	120%				92%	70%	130%
Chlorobenzene	68708	9037125	<1	<1	NA	< 1	100%	80%	120%				93%	70%	130%
Ethylbenzene	68708	9037125	<0.5	<0.5	NA	< 0.5	100%	80%	120%				94%	70%	130%
m&p-Xylene	68708	9037125	<0.5	<0.5	NA	< 0.5	100%	80%	120%				94%	70%	130%
Bromoform	68708	9037125	<1	<1	NA	< 1	100%	80%	120%				95%	70%	130%
Styrene	68708	9037125	<0.5	<0.5	NA	< 0.5	101%	80%	120%				93%	70%	130%
1,1,2,2-Tetrachloroethane	68708	9037125	<0.8	<0.8	NA	< 0.8	99%	80%	120%				96%	70%	130%
o-Xylene	68708	9037125	<0.5	<0.5	NA	< 0.5	100%	80%	120%				94%	70%	130%
1,3-Dichlorobenzene	68708	9037125	<0.5	<0.5	NA	< 0.5	100%	80%	120%				93%	70%	130%
1,4-Dichlorobenzene	68708	9037125	<0.5	<0.5	NA	< 0.5	100%	80%	120%				94%	70%	130%

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Quality Assurance

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA
AGAT WORK ORDER: 18N306717
PROJECT: 1657709-6000
ATTENTION TO: Erin O'brien
SAMPLING SITE:
SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date: Feb 06, 2018			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
1,2-Dichlorobenzene	68708	9037125	<0.5	<0.5	NA	< 0.5	100%	80%	120%				96%	70%	130%
1,2,4-Trichlorobenzene	68708	9037125	<1	<1	NA	< 1	101%	80%	120%				93%	70%	130%
Bromofluorobenzene	68708	9037125	83	70	17.0%		103%	70%	130%				102%	70%	130%
Dibromofluoromethane	68708	9037125	104	90	14.4%		99%	70%	130%				102%	70%	130%
Toluene - d8	68708	9037125	95	80	17.1%		100%	70%	130%				108%	70%	130%
Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.															
Public Works LEPH/HEPH in Water Low Level															
Naphthalene	68694	W-MS1	0.47	0.47	0.0%	< 0.05	99%	80%	120%				96%	50%	130%
Quinoline	68694	W-MS1	0.55	0.52	5.6%	< 0.05	99%	80%	120%				110%	50%	130%
Acenaphthylene	68694	W-MS1	0.46	0.47	2.2%	< 0.02	99%	80%	120%				93%	50%	130%
Acenaphthene	68694	W-MS1	0.46	0.46	0.0%	< 0.02	100%	80%	120%				92%	50%	130%
Fluorene	68694	W-MS1	0.49	0.51	4.0%	< 0.02	99%	80%	120%				100%	50%	130%
Phenanthrene	68694	W-MS1	0.42	0.43	2.4%	< 0.04	99%	80%	120%				88%	60%	130%
Anthracene	68694	W-MS1	0.46	0.45	2.2%	< 0.01	98%	80%	120%				93%	60%	130%
Acridine	68694	W-MS1	0.51	0.50	2.0%	< 0.05	98%	80%	120%				102%	50%	130%
Fluoranthene	68694	W-MS1	0.45	0.46	2.2%	< 0.02	98%	80%	120%				92%	60%	130%
Pyrene	68694	W-MS1	0.48	0.49	2.1%	< 0.02	98%	80%	120%				97%	60%	130%
Benzo(a)anthracene	68694	W-MS1	0.45	0.45	0.0%	< 0.01	99%	80%	120%				90%	60%	130%
Chrysene	68694	W-MS1	0.50	0.51	2.0%	< 0.01	99%	80%	120%				102%	60%	130%
Benzo(b)fluoranthene	68694	W-MS1	0.43	0.43	0.0%	< 0.01	104%	80%	120%				87%	60%	130%
Benzo(j)fluoranthene	68694	W-MS1	0.50	0.51	2.0%	< 0.01	99%	80%	120%				101%	60%	130%
Benzo(k)fluoranthene	68694	W-MS1	0.46	0.47	2.2%	< 0.01	94%	80%	120%				93%	60%	130%
Benzo(a)pyrene	68694	W-MS1	0.50	0.50	0.0%	< 0.01	99%	80%	120%				100%	60%	130%
Indeno(1,2,3-c,d)pyrene	68694	W-MS1	0.43	0.42	2.4%	< 0.01	98%	80%	120%				87%	60%	130%
Dibenzo(a,h)anthracene	68694	W-MS1	0.40	0.41	2.5%	< 0.01	98%	80%	120%				81%	60%	130%
Benzo(g,h,i)perylene	68694	W-MS1	0.46	0.46	0.0%	< 0.01	98%	80%	120%				92%	60%	130%
1-Methylnaphthalene	68694	W-MS1	0.46	0.46	0.0%	< 0.05	99%	80%	120%				94%	50%	130%
2-Methylnaphthalene	68694	W-MS1	0.39	0.38	2.6%	< 0.05	99%	80%	120%				79%	50%	130%
EPH C10-C19	68694	W-MS1	7990	8810	9.8%	< 100	113%	70%	130%				79%	70%	130%
EPH C19-C32	68694	W-MS1	13100	14700	11.5%	< 100	101%	70%	130%				86%	70%	130%
Naphthalene - d8	68694	W-MS1	94	95	1.1%		99%	80%	120%				94%	50%	130%
2-Fluorobiphenyl	68694	W-MS1	94	96	2.1%		99%	80%	120%				94%	50%	130%
P-Terphenyl - d14	68694	W-MS1	93	93	0.0%		99%	80%	120%				94%	60%	130%
Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.															
CCME F1 (C6-C10) (Water)															
F1 (C6-C10)	68710	9036496	<100	<100	NA	< 100									
F1 minus BTEX (C6-C10)	68710	9036496	<100	<100	NA	< 100									
Bromofluorobenzene	68710	9036496	101	100	1.0%		100%	70%	130%				99%	70%	130%

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Quality Assurance

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA
AGAT WORK ORDER: 18N306717
PROJECT: 1657709-6000
ATTENTION TO: Erin O'brien
SAMPLING SITE:
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Trace Organics Analysis (Continued)

RPT Date: Feb 06, 2018			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Dibromofluoromethane	68710	9036496	94	93	1.1%		100%	70%	130%				98%	70%	130%
Toluene - d8	68710	9036496	97	96	1.0%		99%	70%	130%				99%	70%	130%
Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.															
CCME F2-F4 (Water)															
F2 (C10-C16)	68694	W-MS1	5530	6060	9.1	< 100	111%	80%	120%				78%	70%	130%
F3 (C16-C34)	68694	W-MS1	17600	19800	11.8	< 100	118%	80%	120%				85%	70%	130%
F4 (C34-C50)	68694	W-MS1	4480	5090	12.7	< 100	104%	80%	120%				75%	70%	130%
Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.															
Volatile Organic Compounds in Water															
Chloromethane	68715	9036994	<1	<1	NA	< 1	98%	80%	120%				101%	70%	130%
Vinyl Chloride	68715	9036994	<1	<1	NA	< 1	99%	80%	120%				98%	70%	130%
Bromomethane	68715	9036994	<1	<1	NA	< 1	96%	80%	120%				81%	70%	130%
Chloroethane	68715	9036994	<1	<1	NA	< 1	99%	80%	120%				107%	70%	130%
Trichlorofluoromethane	68715	9036994	<1	<1	NA	< 1	99%	80%	120%				89%	70%	130%
Acetone	68715	9036994	<10	<10	NA	< 10	106%	80%	120%						
1,1-Dichloroethylene	68715	9036994	<1	<1	NA	< 1	101%	80%	120%				106%	70%	130%
Dichloromethane	68715	9036994	<1	<1	NA	< 1	100%	80%	120%				108%	70%	130%
Methyl tert-butyl ether (MTBE)	68715	9036994	<1	<1	NA	< 1	101%	80%	120%				114%	70%	130%
2-Butanone (MEK)	68715	9036994	<10	<10	NA	< 10	101%	80%	120%						
trans-1,2-Dichloroethylene	68715	9036994	<1	<1	NA	< 1	101%	80%	120%				112%	70%	130%
1,1-Dichloroethane	68715	9036994	<1	<1	NA	< 1	112%	80%	120%				113%	70%	130%
cis-1,2-Dichloroethylene	68715	9036994	<1	<1	NA	< 1	101%	80%	120%				107%	70%	130%
Chloroform	68715	9036994	<1	<1	NA	< 1	101%	80%	120%				116%	70%	130%
1,2-Dichloroethane	68715	9036994	<1	<1	NA	< 1	101%	80%	120%				116%	70%	130%
1,1,1-Trichloroethane	68715	9036994	<1	<1	NA	< 1	101%	80%	120%				105%	70%	130%
Carbon Tetrachloride	68715	9036994	<0.5	<0.5	NA	< 0.5	101%	80%	120%				99%	70%	130%
Benzene	68715	9036994	<0.5	<0.5	NA	< 0.5	101%	80%	120%				112%	70%	130%
1,2-Dichloropropane	68715	9036994	<1	<1	NA	< 1	101%	80%	120%				117%	70%	130%
Trichloroethene	68715	9036994	<1	<1	NA	< 1	100%	80%	120%				107%	70%	130%
Bromodichloromethane	68715	9036994	<1	<1	NA	< 1	101%	80%	120%				110%	70%	130%
trans-1,3-Dichloropropene	68715	9036994	<1	<1	NA	< 1	102%	80%	120%				101%	70%	130%
4-Methyl-2-pentanone (MIBK)	68715	9036994	<10	<10	NA	< 10	102%	80%	120%						
cis-1,3-Dichloropropene	68715	9036994	<1	<1	NA	< 1	101%	80%	120%				95%	70%	130%
1,1,2-Trichloroethane	68715	9036994	<1	<1	NA	< 1	100%	80%	120%				114%	70%	130%
Toluene	68715	9036994	<0.5	<0.5	NA	< 0.5	101%	80%	120%				110%	70%	130%
Dibromochloromethane	68715	9036994	<1	<1	NA	< 1	101%	80%	120%				109%	70%	130%
1,2-Dibromoethane	68715	9036994	<0.3	<0.3	NA	< 0.3	101%	80%	120%				113%	70%	130%
Tetrachloroethylene	68715	9036994	<1	<1	NA	< 1	100%	80%	120%				84%	70%	130%

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Quality Assurance

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AGAT WORK ORDER: 18N306717
PROJECT: 1657709-6000
ATTENTION TO: Erin O'brien
SAMPLING SITE:
SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date: Feb 06, 2018			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
1,1,1,2-Tetrachloroethane	68715	9036994	<1	<1	NA	< 1	100%	80%	120%				107%	70%	130%
Chlorobenzene	68715	9036994	<1	<1	NA	< 1	100%	80%	120%				108%	70%	130%
Ethylbenzene	68715	9036994	<0.5	<0.5	NA	< 0.5	101%	80%	120%				107%	70%	130%
m&p-Xylene	68715	9036994	<0.5	<0.5	NA	< 0.5	100%	80%	120%				107%	70%	130%
Bromoform	68715	9036994	<1	<1	NA	< 1	100%	80%	120%				109%	70%	130%
Styrene	68715	9036994	<0.5	<0.5	NA	< 0.5	101%	80%	120%				107%	70%	130%
1,1,2,2-Tetrachloroethane	68715	9036994	<0.8	<0.8	NA	< 0.8	100%	80%	120%				112%	70%	130%
o-Xylene	68715	9036994	<0.5	<0.5	NA	< 0.5	100%	80%	120%				109%	70%	130%
1,3-Dichlorobenzene	68715	9036994	<0.5	<0.5	NA	< 0.5	100%	80%	120%				106%	70%	130%
1,4-Dichlorobenzene	68715	9036994	<0.5	<0.5	NA	< 0.5	100%	80%	120%				107%	70%	130%
1,2-Dichlorobenzene	68715	9036994	<0.5	<0.5	NA	< 0.5	100%	80%	120%				109%	70%	130%
1,2,4-Trichlorobenzene	68715	9036994	<1	<1	NA	< 1	101%	80%	120%				100%	70%	130%
Bromofluorobenzene	68715	9036994	90	83	8.1%		104%	70%	130%				96%	70%	130%
Dibromofluoromethane	68715	9036994	88	86	2.3%		109%	70%	130%				88%	70%	130%
Toluene - d8	68715	9036994	98	90	8.5%		101%	70%	130%				94%	70%	130%
Public Works LEPH/HEPH in Water Low Level															
Naphthalene	68703	W-MS1	0.49	0.46	6.3%	< 0.05	99%	80%	120%				101%	50%	130%
Quinoline	68703	W-MS1	0.54	0.47	13.9%	< 0.05	97%	80%	120%				110%	50%	130%
Acenaphthylene	68703	W-MS1	0.49	0.45	8.5%	< 0.02	99%	80%	120%				99%	50%	130%
Acenaphthene	68703	W-MS1	0.47	0.48	2.1%	< 0.02	100%	80%	120%				94%	50%	130%
Fluorene	68703	W-MS1	0.50	0.47	6.2%	< 0.02	99%	80%	120%				100%	50%	130%
Phenanthrene	68703	W-MS1	0.43	0.45	4.5%	< 0.04	99%	80%	120%				87%	60%	130%
Anthracene	68703	W-MS1	0.49	0.47	4.2%	< 0.01	100%	80%	120%				99%	60%	130%
Acridine	68703	W-MS1	0.50	0.48	4.1%	< 0.05	98%	80%	120%				100%	50%	130%
Fluoranthene	68703	W-MS1	0.46	0.46	0.0%	< 0.02	98%	80%	120%				93%	60%	130%
Pyrene	68703	W-MS1	0.46	0.46	0.0%	< 0.02	101%	80%	120%				94%	60%	130%
Benzo(a)anthracene	68703	W-MS1	0.45	0.45	0.0%	< 0.01	98%	80%	120%				91%	60%	130%
Chrysene	68703	W-MS1	0.47	0.48	2.1%	< 0.01	99%	80%	120%				96%	60%	130%
Benzo(b)fluoranthene	68703	W-MS1	0.43	0.44	2.3%	< 0.01	104%	80%	120%				87%	60%	130%
Benzo(j)fluoranthene	68703	W-MS1	0.46	0.48	4.3%	< 0.01	101%	80%	120%				94%	60%	130%
Benzo(k)fluoranthene	68703	W-MS1	0.41	0.47	13.6%	< 0.01	93%	80%	120%				83%	60%	130%
Benzo(a)pyrene	68703	W-MS1	0.45	0.47	4.3%	< 0.01	99%	80%	120%				91%	60%	130%
Indeno(1,2,3-c,d)pyrene	68703	W-MS1	0.46	0.48	4.3%	< 0.01	98%	80%	120%				94%	60%	130%
Dibenzo(a,h)anthracene	68703	W-MS1	0.45	0.46	2.2%	< 0.01	98%	80%	120%				91%	60%	130%
Benzo(g,h,i)perylene	68703	W-MS1	0.46	0.48	4.3%	< 0.01	98%	80%	120%				93%	60%	130%
1-Methylnaphthalene	68703	W-MS1	0.47	0.44	6.6%	< 0.05	99%	80%	120%				96%	50%	130%
2-Methylnaphthalene	68703	W-MS1	0.44	0.40	9.5%	< 0.05	99%	80%	120%				90%	50%	130%
EPH C10-C19	68703	W-MS1	8740	8630	1.3%	< 100	112%	70%	130%				86%	70%	130%

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

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Quality Assurance

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AGAT WORK ORDER: 18N306717
PROJECT: 1657709-6000
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Trace Organics Analysis (Continued)

RPT Date: Feb 06, 2018			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
EPH C19-C32	68703	W-MS1	13700	13800	0.7%	< 100	100%	70%	130%				89%	70%	130%
Naphthalene - d8	68703	W-MS1	93	86	7.8%		100%	80%	120%				94%	50%	130%
2-Fluorobiphenyl	68703	W-MS1	95	89	6.5%		99%	80%	120%				96%	50%	130%
P-Terphenyl - d14	68703	W-MS1	95	93	2.1%		99%	80%	120%				95%	60%	130%
Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.															
CCME F1 (C6-C10) (Water)															
F1 (C6-C10)	68713	9042247	<100	<100	NA	< 100									
F1 minus BTEX (C6-C10)	68713	9042247	<100	<100	NA	< 100									
Bromofluorobenzene	68713	9042247	98	97	1.0%		100%	70%	130%				101%	70%	130%
Dibromofluoromethane	68713	9042247	102	104	1.9%		99%	70%	130%				98%	70%	130%
Toluene - d8	68713	9042247	99	98	1.0%		100%	70%	130%				101%	70%	130%
Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.															
CCME F2-F4 (Water)															
F2 (C10-C16)	68703	W-MS1	6090	5960	2.2%	< 100	111%	80%	120%				85%	70%	130%
F3 (C16-C34)	68703	W-MS1	18500	18700	1.1%	< 100	116%	80%	120%				90%	70%	130%
F4 (C34-C50)	68703	W-MS1	4450	4630	4.0%	< 100	102%	80%	120%				75%	70%	130%
Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.															

Certified By:

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PROJECT: 1657709-6000

ATTENTION TO: Erin O'brien

SAMPLING SITE:

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Water Analysis

RPT Date: Feb 06, 2018			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Public Works Dissolved Metals															
Aluminum Dissolved	9031089		57	57	1.0%	< 2	107%	90%	110%	104%	90%	110%			
Antimony Dissolved	9031089		<0.2	<0.2	NA	< 0.2	104%	90%	110%	102%	90%	110%			
Arsenic Dissolved	9031089		<0.1	<0.1	NA	< 0.1	97%	90%	110%	103%	90%	110%			
Barium Dissolved	9031089		13.8	13.7	0.7%	< 0.2	105%	90%	110%	95%	90%	110%			
Beryllium Dissolved	9031089		<0.01	<0.01	NA	< 0.01	104%	90%	110%	102%	90%	110%			
Bismuth Dissolved	9031089		<0.05	<0.05	NA	< 0.05				105%	90%	110%			
Boron Dissolved	9031089		<2	<2	NA	< 2	102%	90%	110%	103%	90%	110%			
Cadmium Dissolved	9031089		<0.01	<0.01	NA	< 0.01	96%	90%	110%	100%	90%	110%			
Calcium Dissolved	9031089		6100	6110	0.1%	< 50	101%	90%	110%	101%	90%	110%			
Chromium Dissolved	9031089		<0.5	<0.5	NA	< 0.5	103%	90%	110%	92%	90%	110%			
Cobalt Dissolved	9031089		<0.05	<0.05	NA	< 0.05	92%	90%	110%	93%	90%	110%			
Copper Dissolved	9031089		0.5	0.5	NA	< 0.2	98%	90%	110%	100%	90%	110%			
Iron Dissolved	9031089		26	28	NA	< 10	101%	90%	110%	105%	90%	110%			
Lead Dissolved	9031089		<0.05	<0.05	NA	< 0.05	105%	90%	110%	106%	90%	110%			
Lithium Dissolved	9031089		< 0.5	< 0.5	NA	< 0.5				98%	90%	110%			
Magnesium Dissolved	9031089		553	546	1.2%	< 50	104%	90%	110%	106%	90%	110%			
Manganese Dissolved	9031089		2	2	NA	< 1	106%	90%	110%	108%	90%	110%			
Mercury Dissolved	9035793		<0.01	<0.01	NA	< 0.01	103%	90%	110%	104%	90%	110%			
Molybdenum Dissolved	9031089		< 0.05	< 0.05	NA	< 0.05	100%	90%	110%	98%	90%	110%			
Nickel Dissolved	9031089		<0.2	<0.2	NA	< 0.2	95%	90%	110%	98%	90%	110%			
Potassium Dissolved	9031089		224	213	NA	< 50	97%	90%	110%	97%	90%	110%			
Selenium Dissolved	9031089		<0.5	<0.5	NA	< 0.5	106%	90%	110%	94%	90%	110%			
Silicon Dissolved	9031089		1570	1570	0.4%	< 50				92%	90%	110%			
Silver Dissolved	9031089		<0.02	<0.02	NA	< 0.02				105%	90%	110%			
Sodium Dissolved	9031089		1930	1930	0.1%	< 50	99%	90%	110%	102%	90%	110%			
Strontium Dissolved	9031089		31.5	31.3	0.6%	< 0.1	106%	90%	110%	91%	90%	110%			
Sulphur Dissolved	9031089		1640	1610	NA	< 500				91%	90%	110%			
Thallium Dissolved	9031089		0.01	0.01	NA	< 0.01	102%	90%	110%	106%	90%	110%			
Tin Dissolved	9031089		0.22	0.12	NA	< 0.05				104%	90%	110%			
Titanium Dissolved	9031089		0.6	0.5	NA	< 0.5				99%	90%	110%			
Uranium Dissolved	9031089		0.01	0.01	NA	< 0.01	98%	90%	110%	100%	90%	110%			
Vanadium Dissolved	9031089		<0.5	<0.5	NA	< 0.5	96%	90%	110%	91%	90%	110%			
Zinc Dissolved	9031089		<2	<2	NA	< 2	95%	90%	110%	97%	90%	110%			
Zirconium Dissolved	9031089		<0.1	<0.1	NA	< 0.1				102%	70%	130%			

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

Chloride in Water															
Chloride	9040858		0.41	0.39	4.2%	< 0.05	102%	90%	110%	96%	90%	110%			

AGAT Laboratories

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Quality Assurance

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N306717

PROJECT: 1657709-6000

ATTENTION TO: Erin O'brien

SAMPLING SITE:

SAMPLED BY:

Water Analysis (Continued)

RPT Date: Feb 06, 2018			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Public Works Dissolved Metals															
Aluminum Dissolved	9036241		19	19	1.7%	< 2	100%	90%	110%	106%	90%	110%			
Antimony Dissolved	9036241		4.6	4.7	2.4%	< 0.2	93%	90%	110%	105%	90%	110%			
Arsenic Dissolved	9036241		0.4	0.4	NA	< 0.1	103%	90%	110%	99%	90%	110%			
Barium Dissolved	9036241		24.5	26.1	6.3%	< 0.2	108%	90%	110%	105%	90%	110%			
Beryllium Dissolved	9036241		<0.01	<0.01	NA	< 0.01	95%	90%	110%	98%	90%	110%			
Bismuth Dissolved	9036241		<0.05	<0.05	NA	< 0.05				102%	90%	110%			
Boron Dissolved	9036241		15	14	6.3%	< 2	96%	90%	110%	99%	90%	110%			
Cadmium Dissolved	9036241		<0.01	<0.01	NA	< 0.01	96%	90%	110%	99%	90%	110%			
Calcium Dissolved	9036241		29600	29600	NA	< 50	102%	90%	110%	100%	90%	110%			
Chromium Dissolved	9036241		<0.5	<0.5	NA	< 0.5	103%	90%	110%	98%	90%	110%			
Cobalt Dissolved	9036241		0.08	0.09	NA	< 0.05	98%	90%	110%	93%	90%	110%			
Copper Dissolved	9036241		0.8	0.8	NA	< 0.2	105%	90%	110%	103%	90%	110%			
Iron Dissolved	9036241		<10	<10	NA	< 10	105%	90%	110%	100%	90%	110%			
Lead Dissolved	9036241		<0.05	<0.05	NA	< 0.05	100%	90%	110%	96%	90%	110%			
Lithium Dissolved	9036241		2.0	1.8	NA	< 0.5				100%	90%	110%			
Magnesium Dissolved	9036241		3770	3760	0.2%	< 50	103%	90%	110%	99%	90%	110%			
Manganese Dissolved	9036241		51	50	1.5%	< 1	106%	90%	110%	101%	90%	110%			
Mercury Dissolved	9039001		<0.01	<0.01	NA	< 0.01	99%	90%	110%	102%	90%	110%			
Molybdenum Dissolved	9036241		5.37	5.34	0.7%	< 0.05	101%	90%	110%	99%	90%	110%			
Nickel Dissolved	9036241		0.3	0.4	NA	< 0.2	109%	90%	110%	105%	90%	110%			
Potassium Dissolved	9036241		2160	2180	1.0%	< 50	94%	90%	110%	103%	90%	110%			
Selenium Dissolved	9036241		<0.5	<0.5	NA	< 0.5	103%	90%	110%	99%	90%	110%			
Silicon Dissolved	9036241		1600	1580	1.3%	< 50				107%	90%	110%			
Silver Dissolved	9036241		<0.02	<0.02	NA	< 0.02				108%	90%	110%			
Sodium Dissolved	9036241		7470	7560	1.3%	< 50	97%	90%	110%	101%	90%	110%			
Strontium Dissolved	9036241		177	165	6.9%	< 0.1	96%	90%	110%	96%	90%	110%			
Sulphur Dissolved	9036241		5500	5460	0.7%	< 500				101%	90%	110%			
Thallium Dissolved	9036241		0.03	0.02	NA	< 0.01	102%	90%	110%	101%	90%	110%			
Tin Dissolved	9036241		<0.05	<0.05	NA	< 0.05				91%	90%	110%			
Titanium Dissolved	9036241		<0.5	<0.5	NA	< 0.5				101%	90%	110%			
Uranium Dissolved	9036241		0.34	0.35	4.0%	< 0.01	99%	90%	110%	105%	90%	110%			
Vanadium Dissolved	9036241		<0.5	<0.5	NA	< 0.5	107%	90%	110%	101%	90%	110%			
Zinc Dissolved	9036241		<2	<2	NA	< 2	107%	90%	110%	108%	90%	110%			
Zirconium Dissolved	9036241		<0.1	<0.1	NA	< 0.1				94%	90%	110%			

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

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Quality Assurance

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N306717

PROJECT: 1657709-6000

ATTENTION TO: Erin O'brien

SAMPLING SITE:

SAMPLED BY:

Water Analysis (Continued)

RPT Date: Feb 06, 2018			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

Certified By:

AGAT Laboratories

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Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N306717

PROJECT: 1657709-6000

ATTENTION TO: Erin O'brien

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
F1 (C6-C10)	ORG-180-5130	CCME Tier 1 Method	GC/MS/FID
F1 minus BTEX (C6-C10)	ORG-180-5130	CCME Tier 1 Method	GC/MS/FID
Bromofluorobenzene			GC/MS
Dibromofluoromethane			GC/MS
Toluene - d8			GC/MS
F2 (C10-C16)	ORG-180-5134	CCME Tier 1 Method	GC/FID
F3 (C16-C34)	ORG-180-5134	CCME Tier 1 Method	GC/FID
F4 (C34-C50)	ORG-180-5134	CCME Tier 1 Method	GC/FID
Naphthalene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Quinoline	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Acenaphthylene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Acenaphthene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Fluorene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Phenanthrene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Anthracene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Acridine	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Fluoranthene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Pyrene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(a)anthracene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Chrysene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(b)fluoranthene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(j)fluoranthene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(k)fluoranthene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(a)pyrene	ORG-180-5133	Modified from BC MOE Lab Manual Section D	GC/MS
Indeno(1,2,3-c,d)pyrene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Dibenzo(a,h)anthracene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(g,h,i)perylene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
1-Methylnaphthalene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
2-Methylnaphthalene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
EPH C10-C19	ORG-180-5134	Modified from BC MOE Lab Manual Section D (EPH)	GC/FID
EPH C19-C32	ORG-180-5134	Modified from BC MOE Lab Manual Section D (EPH)	GC/FID

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Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N306717

PROJECT: 1657709-6000

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SAMPLING SITE:

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PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
LEPH C10-C19	ORG-180-5134	Modified from BC MOE Lab Manual Section D (EPH)	GC/FID
HEPH C19-C32	ORG-180-5134	Modified from BC MOE Lab Manual Section D (EPH)	GC/FID
Naphthalene - d8			GC/MS
2-Fluorobiphenyl	ORG-180-5133	Modified form BCMOE Lab Manual Section D (PAH)	GC/MS
P-Terphenyl - d14	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Chloromethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Vinyl Chloride	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Bromomethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Chloroethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Trichlorofluoromethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Acetone	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,1-Dichloroethylene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Dichloromethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Methyl tert-butyl ether (MTBE)	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
2-Butanone (MEK)	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
trans-1,2-Dichloroethylene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,1-Dichloroethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
cis-1,2-Dichloroethylene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Chloroform	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,2-Dichloroethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,1,1-Trichloroethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Carbon Tetrachloride	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Benzene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,2-Dichloropropane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Trichloroethene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Bromodichloromethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
trans-1,3-Dichloropropene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
4-Methyl-2-pentanone (MIBK)	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS

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Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N306717

PROJECT: 1657709-6000

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SAMPLING SITE:

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PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
cis-1,3-Dichloropropene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,1,2-Trichloroethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Toluene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Dibromochloromethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,2-Dibromoethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Tetrachloroethylene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,1,1,2-Tetrachloroethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D	GC/MS
Chlorobenzene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Ethylbenzene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
m&p-Xylene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Bromoform	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Styrene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,1,2,2-Tetrachloroethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
o-Xylene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,3-Dichlorobenzene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,4-Dichlorobenzene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,2-Dichlorobenzene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,2,4-Trichlorobenzene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Bromofluorobenzene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Dibromofluoromethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Toluene - d8	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS

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Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA
AGAT WORK ORDER: 18N306717
PROJECT: 1657709-6000
ATTENTION TO: Erin O'brien
SAMPLING SITE:
SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
Chloride	INOR-181-6002	Modified from SM 4110 B	ION CHROMATOGRAPH
Aluminum Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Antimony Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Arsenic Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Barium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Beryllium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Bismuth Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Boron Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Cadmium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Calcium Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Chromium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Cobalt Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Copper Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Iron Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Lead Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Lithium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Magnesium Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Manganese Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Mercury Dissolved	MET-181-6103, LAB-181-4015	Modified from EPA 245.7	CV/AA
Molybdenum Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Nickel Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Potassium Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Selenium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Silicon Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Silver Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Sodium Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Strontium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Sulphur Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES

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Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N306717

PROJECT: 1657709-6000

ATTENTION TO: Erin O'brien

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Thallium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Tin Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Titanium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Uranium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Vanadium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Zinc Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Zirconium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS

CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

18N306717
No. 04255 page __ of __

Golder Associates
200 – 2920 Virtual Way
Vancouver, British Columbia, Canada V5M 0C4
Telephone (604) 296-4200 Fax (604) 298-5253

Project Number: 1657709 /6000		Laboratory Name: AGAT	
Short Title: K19 Investigation	Golder Contact: Erin O'Brien	Address: 120-6600 Glenlyon Parkway	
Golder E-mail Address 1: erin_o'brien @golder.com	Golder E-mail Address 2: agarrido @golder.com	Telephone/Fax: 778 452 4009	Contact: Yasmine Galindo

Office Name: Vancouver

EQuIS Facility Code: 28433859
EQuIS upload: ☒

Turnaround Time: ☐ 24 hr ☐ 48 hr ☐ 72 hr ☒ Regular (5 Days)
Criteria: ☒ CSR ☒ CCME ☐ BC Water Quality ☐ Other

Note: Final Reports to be issued by e-mail

Quote No.:

Analyses Required

JAN 30 AM 11:22

Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D / M / Y)	Time Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over) AGAT SAMPLE ID	Number of Containers	Diss. Metals	Diss. Hg	VOC	LEPH/HEPH/PAH	Chloride	F1	F2-F4			RUSH (Select TAT above)	Remarks (over)
04255 - 01	K19-MW18-10D		10.4	WG	22/01/18	12:23	GRAB		2036989	8	X	X	X	X		X	X				Hold chloride
- 02	K19-MW18-09					15:10			990	8	X	X	X	X		X	X				
- 03	K19-MW18-08D					16:46			992	8	X	X	X	X		X	X				
- 04	K19-MW18-10D		10.4		24/01/18	11:29			993	2				X							
- 05																					
- 06																					
- 07																					
- 08																					
- 09																					
- 10																					
- 11																					
- 12																					

part

resample 24/01/18 11:29

Sampler's Signature:	Relinquished by: Signature	Company: Golder	Date: 26/01/18	Time: 8:00	Received by: Signature	Company	
Comments: Invoice Dave Osguthorpe	Method of Shipment:	Waybill No.:	Received for Lab by: Ann Yx	Date	Time		
	Shipped by:	Shipment Condition: Seal Intact:	Temp (°C): 5.	Cooler opened by:	Date	Time	

WHITE: Golder Copy YELLOW: Lab Copy

ESED

CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

No. 04255 page _ of _

...ates
...olumbia, Canada V5M 0C4
...6-4200 Fax (604) 298-5253

Project Number: 1657709 /6000
Short Title: K19 Investigation
Golder Contact: Erin O'Brien
Golder E-mail Address 1: erin_o'brien @golder.com
Golder E-mail Address 2: agarrido @golder.com
Laboratory Name: AGAT
Address: 120-8600 Glenlyon Parkway
Telephone/Fax: 778 452 4009
Contact: Yasmine Galindo

...: Vancouver
EQuIS Facility Code: 28433859
EQuIS upload: X
...round Time: ☐ 24 hr ☐ 48 hr ☐ 72 hr ☒ Regular (5 Days)
...eria: ☒ CSR ☒ CCME ☐ BC Water Quality ☐ Other
Note: Final Reports to be issued by e-mail
Quote No.:

Analyses Required

Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D / M / Y)	Time Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	Diss. Metals	Diss. Hg	VOC	LEPH/HEPH/PAH	Chloride	F1	F2-F4			RUSH (Select TAT above)	Remarks (over)
04255 - 01	K19-MW18-10D		10.4	WG	22/01/18	12:23	GRAB			8	X	X	X	X	X	X	X				Hold chloride
- 02	K19-MW18-09			↓	↓	15:10	↓			8	X	X	X	X	X	X	X				↓
- 03	K19-MW18-08D			↓	↓	16:46	↓			8	X	X	X	X	X	X	X				
- 04	K19-MW18-10D		10.4	↓	24/01/18	11:29	↓			2				X							
- 05	K19-MW18-11		10.5	↓	↓					8	X	X	X	X	X	X	X				Added 01 FEB BM
- 06																					
- 07																					
- 08																					
- 09																					
- 10																					
- 11																					
- 12																					

Sampler's Signature:
Relinquished by: Signature
Company: Golder
Date: 26/01/18
Time: 8:00
Received by: Signature
Company

Comments: Invoice Dave O'Sgouthorpe
Method of Shipment:
Shipped by:
Waybill No.:
Received for Lab by:
Date
Time
Shipment Condition:
Seal Intact:
Temp (°C):
Cooler opened by:
Date
Time

WHITE: Golder Copy YELLOW: Lab Copy

ESED

AGAT Laboratories

SAMPLE INTEGRITY RECEIPT FORM

RECEIVING BASICS - Shipping

Company/Consultant: GOLDER

Courier: _____ (Prepaid) Collect

Waybill# _____

Branch: EDM GP (FN) FM RD VAN LYD FSJ EST Other: _____

Custody Seal Intact: Yes No NA

TAT: <24hr 24-48hr 48-72hr (Reg) Other _____

Cooler Quantity: 3

TIME SENSITIVE ISSUES - Shipping

ALREADY EXCEEDED HOLD TIME? Yes (No)

Inorganic Tests (Please Circle): Mibi , BOD , Nitrate/Nitrite , Turbidity , Microtox , Ortho PO4 , Tedlar Bag , Residual Chlorine , Chlorophyll* , Chloroamines*

Earliest Expiry: _____

Hydrocarbons: Earliest Expiry _____

SAMPLE INTEGRITY - Shipping

Hazardous Samples: YES (NO) Precaution Taken: _____

Legal Samples: Yes (No)

International Samples: Yes (No)

Tape Sealed: Yes (No)

Coolant Used: Icepack Bagged Ice Free Ice Free Water None

Temperature (Bottles/Jars only) N/A if only Soil Bags Received

FROZEN (Please Circle if samples received Frozen)

1 (Bottle/Jar) 1 + 0 + 6 = 3 °C
2 (Bottle/Jar) 0 + 0 + 1 = 0 °C
3 (Bottle/Jar) 8 + 2 + 0 = 9 °C
4 (Bottle/Jar) ___ + ___ + ___ = ___ °C
5 (Bottle/Jar) ___ + ___ + ___ = ___ °C
6 (Bottle/Jar) ___ + ___ + ___ = ___ °C
7 (Bottle/Jar) ___ + ___ + ___ = ___ °C
8 (Bottle/Jar) ___ + ___ + ___ = ___ °C
9 (Bottle/Jar) ___ + ___ + ___ = ___ °C
10 (Bottle/Jar) ___ + ___ + ___ = ___ °C

(If more than 10 coolers are received use another sheet of paper and attach)

LOGISTICS USE ONLY

Workorder No: _____

Samples Damaged: Yes (No) If YES why?

No Bubble Wrap Frozen Courier

Other: _____

Account Project Manager: _____ have they been notified of the above issues: Yes No

Whom spoken to: _____ Date/Time: _____

CPM Initial ____

General Comments: _____

Date issued: May 22, 2015

* Subcontracted Analysis (See CPM)

AGAT Laboratories

SAMPLE INTEGRITY RECEIPT FORM - BURNABY

Work Order # 18N306717

RECEIVING BASICS:
Received From: Nuvex #1 Waybill #: _____

SAMPLE QUANTITIES:
Coolers: 5 Containers: 40

TIME SENSITIVE ISSUES:
Earliest Date Sampled: Jan 22, 2018 ALREADY EXCEEDED? Yes No

NON-CONFORMANCES:
3 temperatures of samples* and average of each cooler: (record differing temperatures on the CoC next to sample ID's) ***use jars when available**

(1) 5 + 5 + 5 = 5 °C (2) 4 + 5 + 5 = 5 °C (3) 5 + 5 + 5 = 5 °C (4) ___ + ___ + ___ = ___ °C

Was ice or ice pack present: Yes No

Integrity Issues:

Account Project Manager: _____ have they been notified of the above issues: Yes No

Whom spoken to: _____ Date and Time: _____

ADDITIONAL NOTES:

AGAT Laboratories

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Burnaby, British Columbia
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TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA
219-800 BURRARD ST
VANCOUVER, BC V6Z 0B9
604-671-1831

ATTENTION TO: Erin O'Brien

PROJECT: 1657709-6000 K19 Investigation

AGAT WORK ORDER: 18N303338

TRACE ORGANICS REVIEWED BY: Andrew Garrard, B.Sc., General Manager

DATE REPORTED: Feb 14, 2018

PAGES (INCLUDING COVER): 20

VERSION*: 2

Should you require any information regarding this analysis please contact your client services representative at (778) 452-4000

*NOTES

VERSION 2: Sample receipt temperature 0°C.

Version 2 is issued on February 14th, 2018 to report BTEX/VPH analysis on sample "04301-05" as requested by Erin O'Brien of Golder Associates on February 7th, 2018. Version 2 is an amendment of Version 1.

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

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Certificate of Analysis

AGAT WORK ORDER: 18N303338

PROJECT: 1657709-6000 K19 Investigation

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works LEPH/HEPH in Soil Low Level

DATE RECEIVED: 2018-01-18

DATE REPORTED: 2018-02-14

		SAMPLE DESCRIPTION:		04308-02	04308-05	04308-07	04308-08	04308-11	04299-03	04299-05	04299-10
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-01-12	2018-01-12	2018-01-13	2018-01-13	2018-01-13	2018-01-13	2018-01-13	2018-01-14
Parameter	Unit	G / S	RDL	9018142	9018146	9018148	9018149	9018152	9018157	9018159	9018164
Naphthalene	µg/g		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.005	<0.005	<0.005
2-Methylnaphthalene	µg/g		0.005	0.009	<0.005	<0.005	<0.005	<0.005	0.008	0.009	0.022
1-Methylnaphthalene	µg/g		0.005	0.009	<0.005	<0.005	<0.005	<0.005	0.007	<0.005	0.032
Acenaphthylene	µg/g		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Acenaphthene	µg/g		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Fluorene	µg/g		0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Phenanthrene	µg/g		0.02	0.03	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	0.12
Anthracene	µg/g		0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Fluoranthene	µg/g		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02
Pyrene	µg/g		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.03
Benzo(a)anthracene	µg/g		0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Chrysene	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.09
Benzo(b)fluoranthene	µg/g		0.02	0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.06
Benzo(j)fluoranthene	µg/g		0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Benzo(k)fluoranthene	µg/g		0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Benzo(a)pyrene	µg/g		0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Indeno(1,2,3-c,d)pyrene	µg/g		0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Dibenzo(a,h)anthracene	µg/g		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Benzo(g,h,i)perylene	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.10
Quinoline	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
IACR CCME (Soil)	µg/g		0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	0.6
B[a]P TPE (Soil)	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
EPH C10-C19	µg/g		20	33	<20	<20	<20	<20	38	33	54
EPH C19-C32	µg/g		20	51	29	<20	28	31	51	228	86
LEPH C10-C19	µg/g		20	33	<20	<20	<20	<20	38	33	54
HEPH C19-C32	µg/g		20	51	29	<20	28	31	50	228	86
Benzo(b+j)fluoranthene	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.06

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 18N303338

PROJECT: 1657709-6000 K19 Investigation

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works LEPH/HEPH in Soil Low Level

DATE RECEIVED: 2018-01-18

DATE REPORTED: 2018-02-14

		SAMPLE DESCRIPTION:	04308-02	04308-05	04308-07	04308-08	04308-11	04299-03	04299-05	04299-10
		SAMPLE TYPE:	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:	2018-01-12	2018-01-12	2018-01-13	2018-01-13	2018-01-13	2018-01-13	2018-01-13	2018-01-14
Surrogate	Unit	Acceptable Limits	9018142	9018146	9018148	9018149	9018152	9018157	9018159	9018164
Naphthalene - d8	%	50-130	76	61	64	64	63	84	66	65
2-Fluorobiphenyl	%	50-130	80	62	71	69	70	86	66	69
P-Terphenyl - d14	%	60-130	86	75	77	77	75	93	69	76

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AGAT WORK ORDER: 18N303338

PROJECT: 1657709-6000 K19 Investigation

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works LEPH/HEPH in Soil Low Level

DATE RECEIVED: 2018-01-18

DATE REPORTED: 2018-02-14

		SAMPLE DESCRIPTION:		04299-11		04299-12		04300-03	04300-05	04300-10	04301-01
		SAMPLE TYPE:		Soil		Soil		Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-01-14		2018-01-14		2018-01-14	2018-01-14	2018-01-15	2018-01-15
Parameter	Unit	G / S	RDL	9018165	RDL	9018166	RDL	9018171	9018173	9018178	9018181
Naphthalene	µg/g		0.05	0.57	0.005	0.367	0.005	<0.005	0.005	0.025	<0.005
2-Methylnaphthalene	µg/g		0.05	1.33	0.05	0.72	0.005	0.020	0.007	0.070	0.006
1-Methylnaphthalene	µg/g		0.05	0.79	0.005	0.573	0.005	0.020	0.007	0.154	0.008
Acenaphthylene	µg/g		0.005	<0.005	0.005	<0.005	0.005	<0.005	<0.005	<0.005	<0.005
Acenaphthene	µg/g		0.005	<0.005	0.005	<0.005	0.005	<0.005	<0.005	<0.005	<0.005
Fluorene	µg/g		0.02	0.06	0.02	0.04	0.02	0.02	<0.02	0.03	<0.02
Phenanthrene	µg/g		0.02	0.18	0.02	0.15	0.02	0.16	0.03	0.03	0.02
Anthracene	µg/g		0.004	<0.004	0.004	<0.004	0.004	<0.004	<0.004	<0.004	<0.004
Fluoranthene	µg/g		0.01	0.02	0.01	0.02	0.01	0.01	<0.01	<0.01	<0.01
Pyrene	µg/g		0.01	0.05	0.01	0.04	0.01	0.03	<0.01	<0.01	<0.01
Benzo(a)anthracene	µg/g		0.03	<0.03	0.03	<0.03	0.03	<0.03	<0.03	<0.03	<0.03
Chrysene	µg/g		0.05	0.08	0.05	0.07	0.05	0.06	<0.05	<0.05	<0.05
Benzo(b)fluoranthene	µg/g		0.02	0.04	0.02	0.04	0.02	0.03	0.02	<0.02	0.03
Benzo(j)fluoranthene	µg/g		0.02	<0.02	0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02
Benzo(k)fluoranthene	µg/g		0.02	<0.02	0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02
Benzo(a)pyrene	µg/g		0.03	<0.03	0.03	<0.03	0.03	<0.03	<0.03	<0.03	<0.03
Indeno(1,2,3-c,d)pyrene	µg/g		0.02	<0.02	0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02
Dibenzo(a,h)anthracene	µg/g		0.005	<0.005	0.005	<0.005	0.005	<0.005	<0.005	<0.005	<0.005
Benzo(g,h,i)perylene	µg/g		0.05	0.10	0.05	0.08	0.05	0.08	<0.05	<0.05	<0.05
Quinoline	µg/g		0.05	<0.05	0.05	<0.05	0.05	<0.05	<0.05	<0.05	<0.05
IACR CCME (Soil)	µg/g		0.6	<0.6	0.6	<0.6	0.6	<0.6	<0.6	<0.6	<0.6
B[a]P TPE (Soil)	µg/g		0.05	<0.05	0.05	<0.05	0.05	<0.05	<0.05	<0.05	<0.05
EPH C10-C19	µg/g		20	383	20	324	20	103	28	134	<20
EPH C19-C32	µg/g		20	232	20	180	20	91	47	70	30
LEPH C10-C19	µg/g		20	382	20	323	20	103	28	134	<20
HEPH C19-C32	µg/g		20	232	20	180	20	91	46	70	30
Benzo(b+j)fluoranthene	µg/g		0.05	<0.05	0.05	<0.05	0.05	<0.05	<0.05	<0.05	<0.05

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 18N303338

PROJECT: 1657709-6000 K19 Investigation

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works LEPH/HEPH in Soil Low Level

DATE RECEIVED: 2018-01-18

DATE REPORTED: 2018-02-14

		SAMPLE DESCRIPTION:	04299-11	04299-12	04300-03	04300-05	04300-10	04301-01
		SAMPLE TYPE:	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:	2018-01-14	2018-01-14	2018-01-14	2018-01-14	2018-01-15	2018-01-15
Surrogate	Unit	Acceptable Limits	9018165	9018166	9018171	9018173	9018178	9018181
Naphthalene - d8	%	50-130	80	65	87	71	85	66
2-Fluorobiphenyl	%	50-130	84	69	87	68	81	71
P-Terphenyl - d14	%	60-130	85	74	98	67	84	84

Certified By:

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AGAT WORK ORDER: 18N303338

PROJECT: 1657709-6000 K19 Investigation

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works LEPH/HEPH in Soil Low Level

DATE RECEIVED: 2018-01-18

DATE REPORTED: 2018-02-14

		SAMPLE DESCRIPTION:		04301-06	04301-10
		SAMPLE TYPE:		Soil	Soil
		DATE SAMPLED:		2018-01-15	2018-01-16
Parameter	Unit	G / S	RDL	9018186	9018190
Naphthalene	µg/g		0.005	<0.005	0.101
2-Methylnaphthalene	µg/g		0.005	<0.005	0.493
1-Methylnaphthalene	µg/g		0.005	0.013	0.298
Acenaphthylene	µg/g		0.005	<0.005	<0.005
Acenaphthene	µg/g		0.005	<0.005	<0.005
Fluorene	µg/g		0.02	<0.02	0.09
Phenanthrene	µg/g		0.02	0.11	0.23
Anthracene	µg/g		0.004	<0.004	<0.004
Fluoranthene	µg/g		0.01	0.01	0.01
Pyrene	µg/g		0.01	0.02	0.03
Benzo(a)anthracene	µg/g		0.03	<0.03	<0.03
Chrysene	µg/g		0.05	0.05	<0.05
Benzo(b)fluoranthene	µg/g		0.02	0.03	0.03
Benzo(j)fluoranthene	µg/g		0.02	<0.02	<0.02
Benzo(k)fluoranthene	µg/g		0.02	<0.02	<0.02
Benzo(a)pyrene	µg/g		0.03	<0.03	<0.03
Indeno(1,2,3-c,d)pyrene	µg/g		0.02	<0.02	<0.02
Dibenzo(a,h)anthracene	µg/g		0.005	<0.005	0.005
Benzo(g,h,i)perylene	µg/g		0.05	0.06	0.07
Quinoline	µg/g		0.05	<0.05	<0.05
IACR CCME (Soil)	µg/g		0.6	<0.6	<0.6
B[a]P TPE (Soil)	µg/g		0.05	<0.05	<0.05
EPH C10-C19	µg/g		20	133	101
EPH C19-C32	µg/g		20	184	112
LEPH C10-C19	µg/g		20	133	101
HEPH C19-C32	µg/g		20	184	112
Benzo(b+j)fluoranthene	µg/g		0.05	<0.05	<0.05

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 18N303338

PROJECT: 1657709-6000 K19 Investigation

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works LEPH/HEPH in Soil Low Level

DATE RECEIVED: 2018-01-18

DATE REPORTED: 2018-02-14

		SAMPLE DESCRIPTION:	04301-06	04301-10
		SAMPLE TYPE:	Soil	Soil
		DATE SAMPLED:	2018-01-15	2018-01-16
Surrogate	Unit	Acceptable Limits	9018186	9018190
Naphthalene - d8	%	50-130	73	64
2-Fluorobiphenyl	%	50-130	69	65
P-Terphenyl - d14	%	60-130	68	65

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9018142-9018164 Results are based on dry weight of sample.
LEPH & HEPH results have been corrected for PAH contributions.
Soil sample is visibly heterogeneous.

9018165-9018166 Results are based on dry weight of sample.
LEPH & HEPH results have been corrected for PAH contributions.
Soil sample is visibly heterogeneous.
PAH detection limits increased due to sample matrix interference. Sample extract was diluted.

9018171-9018190 Results are based on dry weight of sample.
LEPH & HEPH results have been corrected for PAH contributions.
Soil sample is visibly heterogeneous.

Certified By:

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 18N303338

PROJECT: 1657709-6000 K19 Investigation

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

BTEX / VPH (C6-C10) Soil

DATE RECEIVED: 2018-01-18

DATE REPORTED: 2018-02-14

		SAMPLE DESCRIPTION:		04308-02	04308-05	04308-07	04308-08	04308-11	04299-03	04299-05	04299-10
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-01-12	2018-01-12	2018-01-13	2018-01-13	2018-01-13	2018-01-13	2018-01-13	2018-01-14
Parameter	Unit	G / S	RDL	9018142	9018146	9018148	9018149	9018152	9018157	9018159	9018164
Methyl tert-butyl ether (MTBE)	µg/g		0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzene	µg/g		0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Toluene	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
m&p-Xylene	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
o-Xylene	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Styrene	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
VPH	µg/g		10	<10	<10	<10	<10	<10	<10	<10	<10
VH	µg/g		10	<10	<10	<10	<10	<10	<10	<10	<10
Total Xylenes	ug/g		0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate	Unit	Acceptable Limits									
Bromofluorobenzene	%	60-140		95	97	100	99	97	99	93	97
Dibromofluoromethane	%	60-140		108	111	115	113	113	116	109	113
Toluene - d8	%	60-140		101	102	106	105	104	105	101	104

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 18N303338

PROJECT: 1657709-6000 K19 Investigation

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

BTEX / VPH (C6-C10) Soil

DATE RECEIVED: 2018-01-18

DATE REPORTED: 2018-02-14

		SAMPLE DESCRIPTION:		04299-11	04299-12	04300-03	04300-05	04300-10	04301-01	04301-05	04301-06
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-01-14	2018-01-14	2018-01-14	2018-01-14	2018-01-15	2018-01-15	2018-01-15	2018-01-15
Parameter	Unit	G / S	RDL	9018165	9018166	9018171	9018173	9018178	9018181	9018185	9018186
Methyl tert-butyl ether (MTBE)	µg/g		0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzene	µg/g		0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.04
Toluene	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
m&p-Xylene	µg/g		0.05	0.16	0.15	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
o-Xylene	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Styrene	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
VPH	µg/g		10	<10	<10	10	<10	<10	<10	<10	<10
VH	µg/g		10	<10	<10	10	<10	<10	<10	<10	<10
Total Xylenes	ug/g		0.1	0.2	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate	Unit	Acceptable Limits									
Bromofluorobenzene	%	60-140		95	94	94	94	95	95	109	95
Dibromofluoromethane	%	60-140		110	108	110	111	112	112	102	112
Toluene - d8	%	60-140		102	100	102	102	102	101	108	102

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 18N303338

PROJECT: 1657709-6000 K19 Investigation

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

BTEX / VPH (C6-C10) Soil

DATE RECEIVED: 2018-01-18

DATE REPORTED: 2018-02-14

		SAMPLE DESCRIPTION:		04301-10
		SAMPLE TYPE:		Soil
		DATE SAMPLED:		2018-01-16
Parameter	Unit	G / S	RDL	9018190
Methyl tert-butyl ether (MTBE)	µg/g		0.1	<0.1
Benzene	µg/g		0.02	<0.02
Toluene	µg/g		0.05	<0.05
Ethylbenzene	µg/g		0.05	<0.05
m&p-Xylene	µg/g		0.05	<0.05
o-Xylene	µg/g		0.05	<0.05
Styrene	µg/g		0.05	<0.05
VPH	µg/g		10	14
VH	µg/g		10	14
Total Xylenes	ug/g		0.1	<0.1
Surrogate	Unit	Acceptable Limits		
Bromofluorobenzene	%	60-140		94
Dibromofluoromethane	%	60-140		112
Toluene - d8	%	60-140		101

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9018142-9018190 Results are based on dry weight of sample.
VPH results have been corrected for BTEX contributions.

Certified By:

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Quality Assurance

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N303338

PROJECT: 1657709-6000 K19 Investigation

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis

RPT Date: Feb 14, 2018			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Public Works LEPH/HEPH in Soil Low Level															
Naphthalene	68612	9018190	0.101	0.099	2.0%	< 0.005	99%	80%	120%				105%	50%	130%
2-Methylnaphthalene	68612	9018190	0.493	0.435	12.5%	< 0.005	99%	80%	120%				85%	50%	130%
1-Methylnaphthalene	68612	9018190	0.298	0.263	12.5%	< 0.005	100%	80%	120%				98%	50%	130%
Acenaphthylene	68612	9018190	<0.005	<0.005	NA	< 0.005	100%	80%	120%				86%	50%	130%
Acenaphthene	68612	9018190	<0.005	<0.005	NA	< 0.005	101%	80%	120%				91%	50%	130%
Fluorene	68612	9018190	0.09	0.08	NA	< 0.02	100%	80%	120%				92%	50%	130%
Phenanthrene	68612	9018190	0.23	0.21	9.1%	< 0.02	98%	80%	120%				73%	60%	130%
Anthracene	68612	9018190	<0.004	<0.004	NA	< 0.004	102%	80%	120%				108%	60%	130%
Fluoranthene	68612	9018190	0.01	0.01	NA	< 0.01	101%	80%	120%				92%	60%	130%
Pyrene	68612	9018190	0.03	0.02	NA	< 0.01	100%	80%	120%				96%	60%	130%
Benzo(a)anthracene	68612	9018190	<0.03	<0.03	NA	< 0.03	99%	80%	120%				74%	60%	130%
Chrysene	68612	9018190	<0.05	<0.05	NA	< 0.05	100%	80%	120%				96%	60%	130%
Benzo(b)fluoranthene	68612	9018190	0.03	0.02	NA	< 0.02	98%	80%	120%				86%	60%	130%
Benzo(j)fluoranthene	68612	9018190	<0.02	<0.02	NA	< 0.02	102%	80%	120%				108%	60%	130%
Benzo(k)fluoranthene	68612	9018190	<0.02	<0.02	NA	< 0.02	102%	80%	120%				81%	60%	130%
Benzo(a)pyrene	68612	9018190	<0.03	<0.03	NA	< 0.03	99%	80%	120%				102%	60%	130%
Indeno(1,2,3-c,d)pyrene	68612	9018190	<0.02	<0.02	NA	< 0.02	100%	80%	120%				83%	60%	130%
Dibenzo(a,h)anthracene	68612	9018190	0.005	<0.005	NA	< 0.005	100%	80%	120%				79%	60%	130%
Benzo(g,h,i)perylene	68612	9018190	0.07	0.06	NA	< 0.05	100%	80%	120%				95%	60%	130%
Quinoline	68612	9018190	<0.05	<0.05	NA	< 0.05	101%	80%	120%				104%	50%	130%
EPH C10-C19	68612	9018190	101	106	4.8%	< 20	111%	70%	130%				88%	65%	120%
EPH C19-C32	68612	9018190	112	122	8.5%	< 20	103%	70%	130%				91%	80%	120%
Naphthalene - d8	68612	9018190	64	83	25.9%		99%	80%	120%				103%	50%	130%
2-Fluorobiphenyl	68612	9018190	65	84	25.5%		100%	80%	120%				101%	50%	130%
P-Terphenyl - d14	68612	9018190	65	96	38.5%		99%	80%	120%				100%	60%	130%

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

BTEX / VPH (C6-C10) Soil															
Methyl tert-butyl ether (MTBE)	68608	9018142	<0.1	<0.1	NA	< 0.1	97%	80%	120%				101%	70%	130%
Benzene	68608	9018142	<0.02	<0.02	NA	< 0.02	100%	80%	120%				101%	70%	130%
Toluene	68608	9018142	<0.05	<0.05	NA	< 0.05	99%	80%	120%				99%	70%	130%
Ethylbenzene	68608	9018142	<0.05	<0.05	NA	< 0.05	98%	80%	120%				97%	70%	130%
m&p-Xylene	68608	9018142	<0.05	<0.05	NA	< 0.05	98%	80%	120%				97%	70%	130%
o-Xylene	68608	9018142	<0.05	<0.05	NA	< 0.05	98%	80%	120%				99%	70%	130%
Styrene	68608	9018142	<0.05	<0.05	NA	< 0.05	100%	80%	120%				102%	70%	130%
VPH	68608	9018142	<10	<10	NA	< 10									
VH	68608	9018142	<10	<10	NA	< 10									
Bromofluorobenzene	68608	9018142	95	94	1.1%		100%	60%	140%				93%	60%	140%
Dibromofluoromethane	68608	9018142	108	109	0.9%		99%	60%	140%				104%	60%	140%

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Quality Assurance

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA
AGAT WORK ORDER: 18N303338
PROJECT: 1657709-6000 K19 Investigation
ATTENTION TO: Erin O'Brien
SAMPLING SITE:
SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date: Feb 14, 2018			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Toluene - d8	68608	9018142	101	100	1.0%		100%	60%	140%				95%	60%	140%
Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.															
BTEX / VPH (C6-C10) Soil															
Methyl tert-butyl ether (MTBE)	68737	9035952	<0.1	<0.1	NA	< 0.1	101%	80%	120%				99%	70%	130%
Benzene	68737	9035952	<0.02	<0.02	NA	< 0.02	100%	80%	120%				95%	70%	130%
Toluene	68737	9035952	<0.05	<0.05	NA	< 0.05	101%	80%	120%				107%	70%	130%
Ethylbenzene	68737	9035952	<0.05	<0.05	NA	< 0.05	102%	80%	120%				107%	70%	130%
m&p-Xylene	68737	9035952	<0.05	<0.05	NA	< 0.05	101%	80%	120%				107%	70%	130%
o-Xylene	68737	9035952	<0.05	<0.05	NA	< 0.05	101%	80%	120%				104%	70%	130%
Styrene	68737	9035952	<0.05	<0.05	NA	< 0.05	101%	80%	120%				100%	70%	130%
VPH	68737	9035952	<10	<10	NA	< 10									
VH	68737	9035952	<10	<10	NA	< 10									
Bromofluorobenzene	68737	9035952	98	100	2.0%		100%	60%	140%				90%	60%	140%
Dibromofluoromethane	68737	9035952	88	89	1.1%		99%	60%	140%				85%	60%	140%
Toluene - d8	68737	9035952	111	110	0.9%		100%	60%	140%				104%	60%	140%

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

Certified By:

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Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N303338

PROJECT: 1657709-6000 K19 Investigation

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Naphthalene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
2-Methylnaphthalene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
1-Methylnaphthalene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Acenaphthylene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Acenaphthene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Fluorene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Phenanthrene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Anthracene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Fluoranthene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Pyrene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(a)anthracene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Chrysene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(b)fluoranthene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(j)fluoranthene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(k)fluoranthene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(a)pyrene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Indeno(1,2,3-c,d)pyrene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Dibenzo(a,h)anthracene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(g,h,i)perylene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Quinoline	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
IACR CCME (Soil)	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
B[a]P TPE (Soil)	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
EPH C10-C19	ORG-180-5101	Modified from BCMOE Lab Manual Section D (EPH)	GC/FID
EPH C19-C32	ORG-180-5101	Modified from BCMOE Lab Manual Section D (EPH)	GC/FID
LEPH C10-C19	ORG-180-5101	Modified from BCMOE Lab Manual Section D (EPH)	GC/FID
HEPH C19-C32	ORG-180-5101	Modified from BCMOE Lab Manual Section D (EPH)	GC/FID
Naphthalene - d8	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS

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Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N303338

PROJECT: 1657709-6000 K19 Investigation

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
2-Fluorobiphenyl	ORG-180-5102	Modified form BCMOE Lab Manual Section D (PAH)	GC/MS
P-Terphenyl - d14	ORG-180-5102	Modified form BCMOE Lab Manual Section D (PAH)	GC/MS
Methyl tert-butyl ether (MTBE)	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
Benzene	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
Toluene	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
Ethylbenzene	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
m&p-Xylene	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
o-Xylene	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
Styrene	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
VPH	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
VH	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
Bromofluorobenzene	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS
Dibromofluoromethane	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS
Toluene - d8	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS

CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

1BN303338

No. 04308 page 1 of 4

Golder Associates

200 – 2920 Virtual Way
Vancouver, British Columbia, Canada V5M 0C4
Telephone (604) 296-4200 Fax (604) 298-5253

Project Number: 1657709/6000			Laboratory Name: AGAT
Short Title: K19 Investigation	Golder Contact: erin_o'brien		Address: 120-6744 Oldfield Rd Burnaby BC
Golder E-mail Address 1: erin_o'brien @golder.com	Golder E-mail Address 2: aggrude @golder.com		Telephone/Fax: 778-452-4009 Contact: Yasmine Galvez

Office Name: Vancouver

EQuIS Facility Code: 28933859
EQuIS upload: ☒

JAN 18 AM 9:57

Turnaround Time: ☐ 24 hr ☐ 48 hr ☐ 72 hr ☒ Regular (5 Days)
Criteria: ☒ CSR ☒ CCME ☐ BC Water Quality ☐ Other

Note: Final Reports to be issued by e-mail

Quote No.:

Analyses Required

Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D / M / Y)	Time Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	BTEX / VPH	LEPH / HEPH / PAHs	HOLD	RUSH (Select TAT above)	Remarks (over)
04308 - 01	K19-TP18-01	1	0.5	Soil	12/01/18	12:15	Discrete			4			X		9018141
- 02		2	1.5			12:30				4	X	X			142
- 03		3	2.5			12:50				4			X		143
K04308 - 04	K19-TP18-02	1	0.4			14:00				2			X		145
- 05		2	1.5			14:20				4	X	X			146
- 06		3	2.6			14:40				4			X		147
- 07	K19-TP18-03	1	0.5		13/01/18	10:30		FDA	04308-08	4	X	X			148
- 08		1	0.5			10:30		FD	04308-07	4	X	X			149
- 09		2	1.5			10:50				4			X		150
- 10		3	2.6			11:10				2			X		151
- 11	K19-TP18-04	1	0.5			11:50				4	X	X			152
- 12		2	1.5			12:10				4			X		153

Sampler's Signature:	Relinquished by: Signature	Company: Golder	Date: 17/01/18	Time: 0845.	Received by: Signature / Company: AGAT
Comments: Invoice Dave Osguthorpe.	Method of Shipment:	Waybill No.:	Received for Lab by: Ann Ly	Date	Time: 8:35
	Shipped by:	Shipment Condition: Seal Intact:	Temp (°C): 0	Cooler opened by:	Date / Time

WHITE: Golder Copy YELLOW: Lab Copy

ESED

18N303338

CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

No. 04299 page 2 of 4

Golder Associates
200 – 2920 Virtual Way
Vancouver, British Columbia, Canada V5M 0C4
Telephone (604) 296-4200 Fax (604) 298-5253

Project Number: 657709/6000			Laboratory Name: AGAT
Short Title: K19 Investigation	Golder Contact: Erin O'Brien		Address: 120-8600 Glenlyon Pkwy
Golder E-mail Address 1: erin_o'brien@golder.com	Golder E-mail Address 2: agarrido@golder.com	Telephone/Fax: 778-452-4009	Contact: Yasmine Golubov

Office Name: Vancouver

EQuIS Facility Code: 28433859
EQuIS upload: ☒

JAN 18 AM 8:57

Turnaround Time: ☐ 24 hr ☐ 48 hr ☐ 72 hr ☒ Regular (5 Days)
Criteria: ☒ CSR ☒ CCME ☐ BC Water Quality ☐ Other

Note: Final Reports to be issued by e-mail

Quote No.:

Analyses Required

Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D / M / Y)	Time Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	BTEX/VPH	LEPH/HEPH/PAH							HOLD.	RUSH (Select TAT above)	Remarks (over)
04299 - 01	K19-TP18-04	3	2.5	Soil	13/01/18	12:20	Discrete			2									X		9018155
- 02	K19-TP18-05	1	0.5			13:50	13:50			4									X		156
- 03		2	1.5			14:20	14:20			4	X	X									157
- 04		3	2.5			14:40	14:40			4									X		158
- 05	K19-TP18-06	1	0.5			15:20				4	X	X									159
- 06		2	1.5			15:30				4									X		160
- 07		3	2.5			15:40				2									X		161
- 08	K19-TP18-07	1	0.5		14/01/18	10:30				2									X		162
- 09		2	1.5			10:40				4									X		163
- 10		3	2.5			10:50				4	X	X									164
- 11		4	3.4			11:10		FDA	04299-12	4	X	X									165
- 12		4	3.4			11:10		FD	04299-11	4	X	X									166

Sampler's Signature:	Relinquished by: Signature	Company: Golder	Date: 17/01/18	Time: 0845.	Received by: Signature	Company: AGAT
Comments: Invoice Dave Osgnthorpe	Method of Shipment:	Waybill No.:	Received for Lab by: Ann	Date:	Time: 8:35	
	Shipped by:	Shipment Condition: Seal Intact:	Temp (°C): 5	Cooler opened by:	Date:	Time:

WHITE: Golder Copy YELLOW: Lab Copy

ESED

18N303338

CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

No. 04300 page 1 of 4

Golder Associates
200 – 2920 Virtual Way
Vancouver, British Columbia, Canada V5M 0C4
Telephone (604) 296-4200 Fax (604) 298-5253

Project Number: 1657709/6000
Short Title: K19 Investigation
Golder Contact: Erin O'Brien
Golder E-mail Address 1: erin_o'brien @golder.com
Golder E-mail Address 2: [illegible] @golder.com
Laboratory Name: AGAT
Address: 200-8600 Glenlyon Pky
Telephone/Fax: 778-452-4009
Contact: Yasmine Galindo

Office Name: Vancouver
EQuIS Facility Code: 28433859
EQuIS upload: ☒
JAN 18 AM 8:57

Turnaround Time: ☐ 24 hr ☐ 48 hr ☐ 72 hr ☒ Regular (5 Days)
Criteria: ☒ CSR ☒ CCME ☐ BC Water Quality ☐ Other
Note: Final Reports to be issued by e-mail
Quote No.:

Analyses Required

Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D / M / Y)	Time Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	BTEX/VPH	EPH/HEPH/PAH	HOLD	RUSH (Select TAT above)	Remarks (over)
04300-01	K19-TP18-08	1	0.5	Soil	14/01/18	12:20	Discrete			2			X		9018169
-02	↓	2	1.5	↓	↓	12:30	↓			4			X		170
-03	↓	3	2.5		↓	12:50				4	X	X			171
-04	K19-TP18-09	1	0.5			14:50				4			X		172
-05	↓	2	1.5			15:30				4	X	X			173
-06	↓	3	2.5		↓	15:50				4			X		174
-07	K19-TP18-10	1	0.5		15/01/18	10:00				4			X		175
-08		2	1.5			10:30		FDA	04300-09	4			X		176
-09		2	1.5			10:30		FD	04300-08	4			X		177
-10	↓	3	2.5			11:00				4	X	X			178
-11	↓	4	3.3			11:30				4			X		179
-12	K19-TP18-11	1	0.5	↓	↓	12:30	↓			4			X		180

Sampler's Signature: [signature]
Relinquished by: Signature [signature]
Company: Golder
Date: 17/01/18
Time: 0845
Received by: Signature [signature]
Company: AGAT
Comments: Invoice Dave Osguthorpe
Method of Shipment:
Waybill No.:
Received for Lab by: Ann [signature]
Date:
Time: 8:35
Shipped by:
Shipment Condition:
Seal Intact:
Temp (°C): 0
Cooler opened by:
Date:
Time:

WHITE: Golder Copy YELLOW: Lab Copy

ESED

18N303338

CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

No. 04301 page 4 of 4.

Golder Associates
200 – 2920 Virtual Way
Vancouver, British Columbia, Canada V5M 0C4
Telephone (604) 296-4200 Fax (604) 298-5253

Project Number: 1657709/6000
Short Title: K19 Field Investigation
Golder Contact: Erin O'brien
Golder E-mail Address 1: erin_o'brien @golder.com
Golder E-mail Address 2: Kavara_... @golder.com
Laboratory Name: AGAT
Address: 120-8600 Glenlyon Pky, Burnaby, BC
Telephone/Fax: 778-452-4009
Contact: Yasmine Galindo

Office Name: Vancouver
EQuIS Facility Code: 28433859
EQuIS upload: ☒

JAN 18 AM 8:57

Turnaround Time: ☐ 24 hr ☐ 48 hr ☐ 72 hr ☒ Regular (5 Days)
Criteria: ☒ CSR ☒ CCME ☐ BC Water Quality ☐ Other

Note: Final Reports to be issued by e-mail
Quote No.:

Analyses Required

Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D / M / Y)	Time Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	BTEX/VPH	LEPH/HEPH/PAH							HOLD	RUSH (Select TAT above)	Remarks (over)
04301 - 01	K19-TP16-11	2	1.5	Soil	15/01/17	13:00	Discrete			4	X	X									9018181
- 02	↓	3	2.5			13:10				2									X		182
- 03	K19-TP18-12	1	0.5			14:00				2									X		183
- 04		2	1.5			14:30				4									X		184
- 05		3	2.5			14:40				4									X		185
- 06	↓	4	3.0		↓	14:55				4	X	X									186
- 07	K19-MW18-01	1	0.3-0.5		16/01/17	13:10				2									X		187
- 08		2	2.0-2.3			13:20				2									X		188
- 09		3	5.5-5.8			13:30				2									X		189
- 10		4	6.5-7.0			16:00				4	X	X									190
- 11	↓	5	8.0-8.5	↓	↓	16:30	↓			4									X		191
- 12																					

SS 17/01/18

Sampler's Signature: [signature]	Relinquished by: Signature [signature]	Company Golder	Date 17/01/18	Time 0845	Received by: Signature [signature]	Company AGAT
Comments: Invoice Dave Osguthorpe	Method of Shipment:	Waybill No.:	Received for Lab by: Ann [signature]		Date	Time 8:35
	Shipped by:	Shipment Condition: Seal Intact:	Temp (°C) 0	Cooler opened by:	Date	Time

WHITE: Golder Copy YELLOW: Lab Copy

ESED

AGAT Laboratories

SAMPLE INTEGRITY RECEIPT FORM

RECEIVING BASICS - Shipping

Company/Consultant: GOLDER

Courier: _____ Prepaid Collect

Waybill# _____

Branch: EDM GP FN FM RD VAN LYD FSJ EST Other: _____

Custody Seal Intact: Yes No NA

TAT: <24hr 24-48hr 48-72hr Reg Other _____

Cooler Quantity: 2

TIME SENSITIVE ISSUES - Shipping

ALREADY EXCEEDED HOLD TIME? Yes No

Inorganic Tests (Please Circle): Mibi , BOD , Nitrate/Nitrite , Turbidity , Microtox , Ortho PO4 , Tedlar Bag , Residual Chlorine , Chlorophyll* , Chloroamines*

Earliest Expiry: _____

Hydrocarbons: Earliest Expiry _____

SAMPLE INTEGRITY - Shipping

Hazardous Samples: YES NO Precaution Taken: _____

Legal Samples: Yes No

International Samples: Yes No

Tape Sealed: Yes No

Coolant Used: Icepack Bagged Ice Free Ice Free Water None

Temperature (Bottles/Jars only) N/A if only Soil Bags Received

FROZEN (Please Circle if samples received Frozen)

1 (Bottle/Jar) 7 + 6 + 7 = 6 °C 2(Bottle/Jar) ~~7 + 6 + 7~~ = ___ °C

3 (Bottle/Jar) 4 + 4 + 4 = 5 °C 4 (Bottle/Jar) ___ + ___ + ___ = ___ °C

5 (Bottle/Jar) ___ + ___ + ___ = ___ °C 6 (Bottle/Jar) ___ + ___ + ___ = ___ °C

7 (Bottle/Jar) ___ + ___ + ___ = ___ °C 8 (Bottle/Jar) ___ + ___ + ___ = ___ °C

9 (Bottle/Jar) ___ + ___ + ___ = ___ °C 10 (Bottle/Jar) ___ + ___ + ___ = ___ °C

(If more than 10 coolers are received use another sheet of paper and attach)

LOGISTICS USE ONLY

Workorder No: _____

Samples Damaged: Yes No If YES why?

No Bubble Wrap Frozen Courier

Other: _____

Account Project Manager: _____ have they been notified of the above issues: Yes No

Whom spoken to: _____ Date/Time: _____

CPM Initial _____

General Comments: _____

* Subcontracted Analysis (See CPM)

Date issued: May 22, 2015

AGAT Laboratories

SAMPLE INTEGRITY RECEIPT FORM - BURNABY

Work Order # 18N303338

RECEIVING BASICS:

Received From: Novex Waybill #: _____

SAMPLE QUANTITIES:

Coolers: 2 Containers: 166

TIME SENSITIVE ISSUES:

Earliest Date Sampled: 17-JAN-18 ALREADY EXCEEDED? Yes (No)

NON-CONFORMANCES:

3 temperatures of samples* and average of each cooler: (record differing temperatures on the CoC next to sample ID's) *use jars when available

(1) 0 + 0 + 0 = 0 °C (2) 0 + 0 + 0 = 0 °C (3) ___ + ___ + ___ = ___ °C (4) ___ + ___ + ___ = ___ °C

Was ice or ice pack present: (Yes) No

Integrity Issues:

Account Project Manager: _____ have they been notified of the above issues: Yes No

Whom spoken to: _____ Date and Time: _____

ADDITIONAL NOTES:

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA
219-800 BURRARD ST
VANCOUVER, BC V6Z 0B9
604-671-1831

ATTENTION TO: Erin O'Brien

PROJECT: 1657709-6000

AGAT WORK ORDER: 18N304491

SOIL ANALYSIS REVIEWED BY: Andrew Garrard, B.Sc., General Manager

TRACE ORGANICS REVIEWED BY: Jacky Takeuchi, BScH (Chem Eng), BSc (Bio), C.Chem, Laboratory Manager

WATER ANALYSIS REVIEWED BY: Andrew Garrard, B.Sc., General Manager

DATE REPORTED: Feb 23, 2018

PAGES (INCLUDING COVER): 53

VERSION*: 2

Should you require any information regarding this analysis please contact your client services representative at (778) 452-4000

*NOTES

VERSION 2: Sample receipt temperature 5°C.

Version 2 is issued on February 6th, 2018 to report PAH analysis on samples "04306-05" and "04306-06" as requested by Andrew Bruemmer on January 31st, 2018.

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

AGAT Laboratories

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FAX (778)452-4074
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works Metals in Soil

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-02-23

		SAMPLE DESCRIPTION:		04304-09
		SAMPLE TYPE:		Soil
		DATE SAMPLED:		2018-01-19
Parameter	Unit	G / S	RDL	9025012
Aluminum	µg/g		10	9800
Antimony	µg/g		0.1	0.6
Arsenic	µg/g		0.1	8.4
Barium	µg/g		0.5	168
Beryllium	µg/g		0.1	0.5
Bismuth	µg/g		0.5	<0.5
Cadmium	µg/g		0.01	0.34
Calcium	µg/g		10	9540
Chromium	µg/g		1	17
Cobalt	µg/g		0.1	6.3
Copper	µg/g		0.2	13.2
Iron	µg/g		10	17300
Lead	µg/g		0.1	25.7
Lithium	µg/g		0.5	8.4
Magnesium	µg/g		10	2840
Manganese	µg/g		1	171
Mercury	µg/g		0.01	0.04
Molybdenum	µg/g		0.2	1.8
Nickel	µg/g		0.5	13.4
Phosphorus	µg/g		5	511
Potassium	µg/g		5	1380
Selenium	µg/g		0.1	0.6
Silver	µg/g		0.5	<0.5
Sodium	µg/g		5	54
Strontium	µg/g		1	30
Thallium	µg/g		0.1	0.2
Tin	µg/g		0.2	0.8
Titanium	µg/g		1	35
Uranium	µg/g		0.2	1.0
Vanadium	µg/g		1	37

Certified By:

AGAT Laboratories

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http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works Metals in Soil

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-02-23

			SAMPLE DESCRIPTION:	04304-09
			SAMPLE TYPE:	Soil
			DATE SAMPLED:	2018-01-19
Parameter	Unit	G / S	RDL	9025012
Zinc	µg/g		1	58
Zirconium	µg/g		0.1	0.4
pH 1:2	pH units		0.05	7.68

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9025012 Results are based on the dry weight of the sample

Certified By:

AGAT Laboratories

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Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
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http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works LEPH/HEPH in Soil Low Level

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-02-23

SAMPLE DESCRIPTION:				04306-04	04306-05	04306-06		04305-01	04305-07	04304-01
SAMPLE TYPE:				Soil	Soil	Soil		Soil	Soil	Soil
DATE SAMPLED:				2018-01-20	2018-01-20	2018-01-20		2018-01-19	2018-01-20	2018-01-18
Parameter	Unit	G / S	RDL	9024976	9024977	9024978	RDL	9024984	9024992	9024998
Naphthalene	µg/g		0.005	0.678	0.132	0.328	0.005	0.024	0.051	<0.005
2-Methylnaphthalene	µg/g		0.05	1.10	0.44	0.76	0.005	0.119	0.187	<0.005
1-Methylnaphthalene	µg/g		0.05	1.22	0.34	0.51	0.005	0.152	0.198	<0.005
Acenaphthylene	µg/g		0.005	<0.005	<0.005	<0.005	0.005	<0.005	<0.005	<0.005
Acenaphthene	µg/g		0.005	<0.005	<0.005	<0.005	0.005	<0.005	<0.005	<0.005
Fluorene	µg/g		0.02	0.13	0.07	0.11	0.02	<0.02	<0.02	<0.02
Phenanthrene	µg/g		0.02	0.53	0.30	0.34	0.02	0.33	0.39	0.02
Anthracene	µg/g		0.004	<0.004	<0.004	<0.004	0.004	<0.004	<0.004	<0.004
Fluoranthene	µg/g		0.01	0.03	0.02	0.03	0.01	0.04	0.03	<0.01
Pyrene	µg/g		0.01	0.03	0.05	0.05	0.01	0.08	0.06	<0.01
Benzo(a)anthracene	µg/g		0.03	<0.03	<0.03	<0.03	0.03	<0.03	<0.03	<0.03
Chrysene	µg/g		0.05	0.13	0.08	0.09	0.05	0.10	0.11	<0.05
Benzo(b)fluoranthene	µg/g		0.02	0.06	0.04	0.04	0.02	0.06	0.07	<0.02
Benzo(j)fluoranthene	µg/g		0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.02
Benzo(k)fluoranthene	µg/g		0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.02
Benzo(a)pyrene	µg/g		0.03	<0.03	<0.03	<0.03	0.03	<0.03	<0.03	<0.03
Indeno(1,2,3-c,d)pyrene	µg/g		0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.02
Dibenzo(a,h)anthracene	µg/g		0.005	0.005	<0.005	0.005	0.005	<0.005	<0.005	<0.005
Benzo(g,h,i)perylene	µg/g		0.05	0.11	0.13	0.14	0.05	0.07	0.07	<0.05
Quinoline	µg/g		0.05	<0.05	<0.05	<0.05	0.05	<0.05	<0.05	<0.05
IACR CCME (Soil)	µg/g		0.6	0.6	<0.6	<0.6	0.6	0.6	0.7	<0.6
B[a]P TPE (Soil)	µg/g		0.05	<0.05	<0.05	<0.05	0.05	<0.05	<0.05	<0.05
EPH C10-C19	µg/g		20	299	59	58	20	62	56	<20
EPH C19-C32	µg/g		20	84	66	70	20	84	78	<20
LEPH C10-C19	µg/g		20	298	59	57	20	62	56	<20
HEPH C19-C32	µg/g		20	84	66	70	20	83	77	<20
Benzo(b+j)fluoranthene	µg/g		0.05	0.06	<0.05	<0.05	0.05	0.06	0.07	<0.05

Certified By:

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works LEPH/HEPH in Soil Low Level

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-02-23

		SAMPLE DESCRIPTION:	04306-04	04306-05	04306-06	04305-01	04305-07	04304-01
		SAMPLE TYPE:	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:	2018-01-20	2018-01-20	2018-01-20	2018-01-19	2018-01-20	2018-01-18
Surrogate	Unit	Acceptable Limits	9024976	9024977	9024978	9024984	9024992	9024998
Naphthalene - d8	%	50-130	76	82	77	67	69	68
2-Fluorobiphenyl	%	50-130	79	81	77	68	67	71
P-Terphenyl - d14	%	60-130	83	99	93	82	84	83

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9024976 Results are based on dry weight of sample.
LEPH & HEPH results have been corrected for PAH contributions.
Soil sample is visibly heterogeneous.
PAH detection limits increased due to sample matrix interference. Sample extract was diluted.

9024977-9024978 Results are based on dry weight of sample.
LEPH & HEPH results have been corrected for PAH contributions.
Soil sample is visibly heterogeneous.

9024984-9024998 Results are based on dry weight of sample.
LEPH & HEPH results have been corrected for PAH contributions.
Soil sample is visibly heterogeneous.

Certified By:

AGAT Laboratories

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Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
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http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

BC Routine VOC package in Air (Canister) -ug/m3

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-02-23

		SAMPLE DESCRIPTION:		04316-01	04316-02		04316-03	04316-04		04316-06	04316-07
		SAMPLE TYPE:		Air	Air		Air	Air		Air	Air
		DATE SAMPLED:		2018-01-19	2018-01-19		2018-01-19	2018-01-19		2018-01-21	2018-01-21
Parameter	Unit	G / S	RDL	9025032	9025036	RDL	9025038	9025039	RDL	9025040	9025041
1,2,4-Trimethylbenzene	ug/m3		6.0	<6.0	<6.0	1.5	<1.5	<1.5	15.0	<15.0	<15.0
1,3,5-Trimethylbenzene	ug/m3		6.0	<6.0	<6.0	1.5	<1.5	<1.5	15.0	<15.0	<15.0
1,3-Butadiene	ug/m3		4.0	<4.0	<4.0	1.0	<1.0	<1.0	10.0	<10.0	<10.0
Isopropylbenzene	ug/m3		3.20	<3.20	<3.20	0.80	<0.80	<0.80	8.00	<8.00	<8.00
Methylcyclohexane	ug/m3		2.80	51	21	0.70	8.6	13	7.00	<7.00	57
Methyl tert-Butyl ether (MTBE)	ug/m3		3.20	<3.20	<3.20	0.80	<0.80	<0.80	8.00	<8.00	<8.00
Naphthalene	ug/m3		8.0	<8.0	<8.0	2.0	<2.0	<2.0	20.0	<20.0	<20.0
n-Decane	ug/m3		5.2	15	<5.2	1.3	7.4	40	13.0	<13.0	210
n-Hexane	ug/m3		4.4	4.7	50	1.1	2.8	1.7	11.0	21	310
VPHv (C>6-C13)	ug/m3		60	3000	3000	15	5700	2700	150	25000	27000
Surrogate	Unit	Acceptable Limits									
4-Bromofluorobenzene	%	70-130		110	109		107	100		112	112

		SAMPLE DESCRIPTION:		04316-08
		SAMPLE TYPE:		Air
		DATE SAMPLED:		2018-01-21
Parameter	Unit	G / S	RDL	9025042
1,2,4-Trimethylbenzene	ug/m3		15.0	<15.0
1,3,5-Trimethylbenzene	ug/m3		15.0	<15.0
1,3-Butadiene	ug/m3		10.0	<10.0
Isopropylbenzene	ug/m3		8.00	<8.00
Methylcyclohexane	ug/m3		7.00	77
Methyl tert-Butyl ether (MTBE)	ug/m3		8.00	<8.00
Naphthalene	ug/m3		20.0	<20.0
n-Decane	ug/m3		13.0	160
n-Hexane	ug/m3		11.0	110
VPHv (C>6-C13)	ug/m3		150	25000
Surrogate	Unit	Acceptable Limits		
4-Bromofluorobenzene	%	70-130		123

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

BC Routine VOC package in Air (Canister) -ug/m3

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-02-23

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9025032-9025036 Air anaylsis was performed from an air canister sample, using a Cold Vapor Trap preconcentrator and GC/MSD.
Note: Methylcyclohexane is a non routine parameter, identification is done using the GC/MS and the appropriate m/z fragments. If the compound is present it will be quantitated using cyclohexane calibration standards and the TIC area.

Due to the presence of high levels of hydrocarbons the nominal volume could not be used, this is considered a dilution.
Dilution factor=4.
The Reporting Detection Limit has been adjusted accordingly.

Analysis done at AGAT 5623 McAdam Road Mississauga location.

9025038-9025039 Air anaylsis was performed from an air canister sample, using a Cold Vapor Trap preconcentrator and GC/MSD.
Note: Methylcyclohexane is a non routine parameter, identification is done using the GC/MS and the appropriate m/z fragments. If the compound is present it will be quantitated using cyclohexane calibration standards and the TIC area.

Analysis done at AGAT 5623 McAdam Road Mississauga location.

9025040 Air anaylsis was performed from an air canister sample, using a Cold Vapor Trap preconcentrator and GC/MSD.
Note: Methylcyclohexane is a non routine parameter, identification is done using the GC/MS and the appropriate m/z fragments. If the compound is present it will be quantitated using cyclohexane calibration standards and the TIC area.

Due to the presence of high levels of hydrocarbons the nominal volume could not be used, this is considered a dilution.
Dilution factor=10.
The Reporting Detection Limit has been adjusted accordingly.

Analysis done at AGAT 5623 McAdam Road Mississauga location.

9025041-9025042 Air anaylsis was performed from an air canister sample, using a Cold Vapor Trap preconcentrator and GC/MSD.
Note: Methylcyclohexane is a non routine parameter, identification is done using the GC/MS and the appropriate m/z fragments. If the compound is present it will be quantitated using cyclohexane calibration standards and the TIC area.

Due to the presence of high levels of hydrocarbons the nominal volume could not be used, this is considered a dilution.
Dilution factor=10.
The Reporting Detection Limit has been adjusted accordingly.
Analysis done at AGAT 5623 McAdam Road Mississauga location.

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AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

BTEX / VPH (C6-C10) Soil

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-02-23

		SAMPLE DESCRIPTION:		04305-01	04305-07	04304-01
		SAMPLE TYPE:		Soil	Soil	Soil
		DATE SAMPLED:		2018-01-19	2018-01-20	2018-01-18
Parameter	Unit	G / S	RDL	9024984	9024992	9024998
Methyl tert-butyl ether (MTBE)	µg/g		0.1	<0.1	<0.1	<0.1
Benzene	µg/g		0.02	<0.02	<0.02	<0.02
Toluene	µg/g		0.05	<0.05	<0.05	<0.05
Ethylbenzene	µg/g		0.05	<0.05	<0.05	<0.05
m&p-Xylene	µg/g		0.05	<0.05	<0.05	<0.05
o-Xylene	µg/g		0.05	<0.05	<0.05	<0.05
Styrene	µg/g		0.05	<0.05	<0.05	<0.05
VPH	µg/g		10	<10	<10	<10
VH	µg/g		10	<10	<10	<10
Total Xylenes	ug/g		0.1	<0.1	<0.1	<0.1
Surrogate	Unit	Acceptable Limits				
Bromofluorobenzene	%	60-140		93	97	101
Dibromofluoromethane	%	60-140		113	118	121
Toluene - d8	%	60-140		105	108	113

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9024984-9024998 Results are based on dry weight of sample.
VPH results have been corrected for BTEX contributions.

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Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

CCME BTEX/F1-F4 (Water)

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-02-23

		SAMPLE DESCRIPTION:		04319-01	04319-02	04319-03	04319-04
		SAMPLE TYPE:		Water	Water	Water	Water
		DATE SAMPLED:		2018-01-21	2018-01-21	2018-01-21	2018-01-21
Parameter	Unit	G / S	RDL	9025059	9025067	9025068	9025069
Benzene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
Toluene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
m&p-Xylene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
o-Xylene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
F1 (C6-C10)	µg/L		100	<100	<100	<100	250
F1 minus BTEX (C6-C10)	µg/L		100	<100	<100	<100	250
F2 (C10-C16)	µg/L		100	<100	<100	<100	<100
F3 (C16-C34)	µg/L		100	<100	<100	<100	<100
F4 (C34-C50)	µg/L		100	<100	<100	<100	<100
Surrogate	Unit	Acceptable Limits					
Bromofluorobenzene	%	70-130		97	94	92	96
Dibromofluoromethane	%	70-130		107	106	104	103
Toluene - d8	%	70-130		101	99	95	102

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9025059-9025069 The F1 (C6 - C10) fraction is determined by integrating the FID chromatogram from the beginning of the n-C6 peak to the apex of the last n-C10 peak.
The C6 - C10 fraction is calculated from the FID toluene response factor.
Quality control for the calibration follows the guidelines set out in the CCME Contaminated Sites Method for Soils.
The (F1 minus BTEX) has been calculated by subtracting the BTEX concentration from Fraction 1.
The C10 - C16 (F2), C16 - C34 (F3), and C34 - C50 (F4) fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Quality control data is available upon request.
Assistance in the interpretation of data is available upon request.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
The chromatogram has returned to baseline by the retention time of nC50.
Extraction and holding times were met for this sample.

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Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works : BC VOCs in Air (Canister) - ug/m3

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-02-23

SAMPLE DESCRIPTION:				04316-01	04316-02		04316-03	04316-04		04316-06	04316-07
SAMPLE TYPE:				Air	Air		Air	Air		Air	Air
DATE SAMPLED:				2018-01-19	2018-01-19		2018-01-19	2018-01-19		2018-01-21	2018-01-21
Parameter	Unit	G / S	RDL	9025032	9025036	RDL	9025038	9025039	RDL	9025040	9025041
Dichlorodifluoromethane	ug/m3		4.0	<4.0	<4.0	1.0	2.2	2.1	10.0	<10.0	<10.0
1,2-Dichlorotetrafluoroethane	ug/m3		5.6	<5.6	<5.6	1.4	<1.4	<1.4	14.0	<14.0	<14.0
1,1,2-Trichloro-1,2,2-trifluoroethane	ug/m3		6.0	<6.0	<6.0	1.5	<1.5	<1.5	15.0	<15.0	<15.0
Chloromethane	ug/m3		2.40	<2.40	<2.40	0.60	<0.60	<0.60	6.00	<6.00	<6.00
Vinyl Chloride	ug/m3		1.60	<1.60	<1.60	0.40	<0.40	<0.40	4.00	<4.00	<4.00
Bromomethane	ug/m3		7.6	<7.6	<7.6	1.9	<1.9	<1.9	19.0	<19.0	<19.0
Chloroethane	ug/m3		4.0	<4.0	<4.0	1.0	3.3	<1.0	10.0	<10.0	<10.0
Vinyl Bromide	ug/m3		3.20	<3.20	<3.20	0.80	<0.80	<0.80	8.00	<8.00	<8.00
Trichlorofluoromethane	ug/m3		9.2	<9.2	<9.2	2.3	<2.3	<2.3	23.0	<23.0	<23.0
1,1-Dichloroethene	ug/m3		4.0	<4.0	<4.0	1.0	<1.0	<1.0	10.0	<10.0	<10.0
Methylene Chloride	ug/m3		4.0	<4.0	<4.0	1.0	<1.0	<1.0	10.0	<10.0	<10.0
trans-1,2-Dichloroethene	ug/m3		3.20	<3.20	<3.20	0.80	<0.80	<0.80	8.00	<8.00	<8.00
1,1-Dichloroethane	ug/m3		4.8	<4.8	<4.8	1.2	<1.2	<1.2	12.0	<12.0	<12.0
cis-1,2-Dichloroethene	ug/m3		3.20	<3.20	<3.20	0.80	<0.80	<0.80	8.00	<8.00	<8.00
Chloroform	ug/m3		4.0	<4.0	7.5	1.0	<1.0	1.8	10.0	<10.0	<10.0
1,2-Dichloroethane	ug/m3		1.20	<1.20	<1.20	0.30	<0.30	<0.30	3.00	<3.00	<3.00
1,1,1-Trichloroethane	ug/m3		6.4	<6.4	<6.4	1.6	<1.6	<1.6	16.0	<16.0	<16.0
Carbon Tetrachloride	ug/m3		8.0	<8.0	<8.0	2.0	<2.0	<2.0	20.0	<20.0	<20.0
Benzene	ug/m3		2.00	2.7	3.2	0.50	1.6	1.4	5.00	<5.00	44
1,2-Dichloropropane	ug/m3		8.0	<8.0	<8.0	2.0	<2.0	<2.0	20.0	<20.0	<20.0
2,2-Dichloropropane	ug/m3		8.0	<8.0	<8.0	2.0	<2.0	<2.0	20.0	<20.0	<20.0
Trichloroethene	ug/m3		4.0	<4.0	<4.0	1.0	<1.0	<1.0	10.0	<10.0	<10.0
Bromodichloromethane	ug/m3		5.2	<5.2	<5.2	1.3	<1.3	<1.3	13.0	<13.0	<13.0
cis-1,3-Dichloropropene	ug/m3		4.0	<4.0	<4.0	1.0	<1.0	<1.0	10.0	<10.0	<10.0
trans-1,3-Dichloropropene	ug/m3		4.0	<4.0	<4.0	1.0	<1.0	<1.0	10.0	<10.0	<10.0
Methyl Isobutyl Ketone (MIBK)	ug/m3		8.0	<8.0	<8.0	2.0	<2.0	<2.0	20.0	<20.0	<20.0
1,1,2-Trichloroethane	ug/m3		6.4	<6.4	<6.4	1.6	<1.6	<1.6	16.0	<16.0	<16.0
Toluene	ug/m3		3.20	8.4	6.0	0.80	1.3	2.8	8.00	<8.00	9.2
2-Hexanone	ug/m3		8.0	<8.0	<8.0	2.0	<2.0	<2.0	20.0	<20.0	<20.0
Dibromochloromethane	ug/m3		8.0	<8.0	<8.0	2.0	<2.0	<2.0	20.0	<20.0	<20.0

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Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works : BC VOCs in Air (Canister) - ug/m3

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-02-23

		SAMPLE DESCRIPTION:		04316-01	04316-02		04316-03	04316-04		04316-06	04316-07
		SAMPLE TYPE:		Air	Air		Air	Air		Air	Air
		DATE SAMPLED:		2018-01-19	2018-01-19		2018-01-19	2018-01-19		2018-01-21	2018-01-21
Parameter	Unit	G / S	RDL	9025032	9025036	RDL	9025038	9025039	RDL	9025040	9025041
1,2-Dibromoethane	ug/m3		6.0	<6.0	<6.0	1.5	<1.5	<1.5	15.0	<15.0	<15.0
Tetrachloroethene	ug/m3		4.0	17	20	1.0	2.1	11	10.0	<10.0	<10.0
Chlorobenzene	ug/m3		4.0	<4.0	<4.0	1.0	<1.0	<1.0	10.0	<10.0	<10.0
Ethylbenzene	ug/m3		3.6	<3.6	<3.6	0.9	1.2	1.1	9.0	<9.0	<9.0
m&p-Xylene	ug/m3		6.0	8.1	6.6	1.5	3.7	4.0	15.0	35	<15.0
Bromoform	ug/m3		8.0	<8.0	<8.0	2.0	<2.0	<2.0	20.0	<20.0	<20.0
Styrene	ug/m3		4.0	<4.0	<4.0	1.0	<1.0	<1.0	10.0	<10.0	<10.0
1,1,2,2-Tetrachloroethane	ug/m3		6.0	<6.0	<6.0	1.5	<1.5	<1.5	15.0	<15.0	<15.0
o-Xylene	ug/m3		3.6	<3.6	<3.6	0.9	2.4	1.6	9.0	16	<9.0
1,3-Dichlorobenzene	ug/m3		10.0	<10.0	<10.0	2.5	<2.5	<2.5	25.0	<25.0	<25.0
1,4-Dichlorobenzene	ug/m3		10.0	<10.0	<10.0	2.5	<2.5	<2.5	25.0	<25.0	<25.0
1,2-Dichlorobenzene	ug/m3		10.0	<10.0	<10.0	2.5	<2.5	<2.5	25.0	<25.0	<25.0
Total Xylenes	ug/m3		8.0	8.1	<8.0	2.0	6.1	5.6	20.0	41	<20.0
Surrogate	Unit	Acceptable Limits									
4-Bromofluorobenzene	%	70-130		110	114		104	96		113	112

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AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works : BC VOCs in Air (Canister) - ug/m3

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-02-23

		SAMPLE DESCRIPTION:		04316-08
		SAMPLE TYPE:		Air
		DATE SAMPLED:		2018-01-21
Parameter	Unit	G / S	RDL	9025042
Dichlorodifluoromethane	ug/m3		10.0	<10.0
1,2-Dichlorotetrafluoroethane	ug/m3		14.0	<14.0
1,1,2-Trichloro-1,2,2-trifluoroethane	ug/m3		15.0	<15.0
Chloromethane	ug/m3		6.00	<6.00
Vinyl Chloride	ug/m3		4.00	<4.00
Bromomethane	ug/m3		19.0	<19.0
Chloroethane	ug/m3		10.0	<10.0
Vinyl Bromide	ug/m3		8.00	<8.00
Trichlorofluoromethane	ug/m3		23.0	<23.0
1,1-Dichloroethene	ug/m3		10.0	<10.0
Methylene Chloride	ug/m3		10.0	<10.0
trans-1,2-Dichloroethene	ug/m3		8.00	<8.00
1,1-Dichloroethane	ug/m3		12.0	<12.0
cis-1,2-Dichloroethene	ug/m3		8.00	<8.00
Chloroform	ug/m3		10.0	<10.0
1,2-Dichloroethane	ug/m3		3.00	<3.00
1,1,1-Trichloroethane	ug/m3		16.0	<16.0
Carbon Tetrachloride	ug/m3		20.0	<20.0
Benzene	ug/m3		5.00	71
1,2-Dichloropropane	ug/m3		20.0	<20.0
2,2-Dichloropropane	ug/m3		20.0	<20.0
Trichloroethene	ug/m3		10.0	<10.0
Bromodichloromethane	ug/m3		13.0	<13.0
cis-1,3-Dichloropropene	ug/m3		10.0	<10.0
trans-1,3-Dichloropropene	ug/m3		10.0	<10.0
Methyl Isobutyl Ketone (MIBK)	ug/m3		20.0	<20.0
1,1,2-Trichloroethane	ug/m3		16.0	<16.0
Toluene	ug/m3		8.00	<8.00
2-Hexanone	ug/m3		20.0	<20.0
Dibromochloromethane	ug/m3		20.0	<20.0

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Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works : BC VOCs in Air (Canister) - ug/m3

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-02-23

		SAMPLE DESCRIPTION:		04316-08
		SAMPLE TYPE:		Air
		DATE SAMPLED:		2018-01-21
Parameter	Unit	G / S	RDL	9025042
1,2-Dibromoethane	ug/m3		15.0	<15.0
Tetrachloroethene	ug/m3		10.0	<10.0
Chlorobenzene	ug/m3		10.0	<10.0
Ethylbenzene	ug/m3		9.0	<9.0
m&p-Xylene	ug/m3		15.0	<15.0
Bromoform	ug/m3		20.0	<20.0
Styrene	ug/m3		10.0	<10.0
1,1,2,2-Tetrachloroethane	ug/m3		15.0	<15.0
o-Xylene	ug/m3		9.0	<9.0
1,3-Dichlorobenzene	ug/m3		25.0	<25.0
1,4-Dichlorobenzene	ug/m3		25.0	<25.0
1,2-Dichlorobenzene	ug/m3		25.0	<25.0
Total Xylenes	ug/m3		20.0	<20.0
Surrogate	Unit	Acceptable Limits		
4-Bromofluorobenzene	%	70-130		123

Certified By:

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AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works : BC VOCs in Air (Canister) - ug/m3

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-02-23

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9025032 VOC anaylsis was performed from an air canister sample, using a Cold Vapor Trap preconcentrator and GC/MSD.
Pressure upon arrival to the lab = 11.35 psia.

Due to the presence of high levels of hydrocarbons the nominal volume could not be used, this is considered a dilution.
Dilution factor=4.
The Reporting Detection Limit has been adjusted accordingly.

Analysis done at AGAT 5623 McAdam Road Mississauga location.

2,2-Dichloropropane was analyzed using GC/MS full scan and the specific m/z fragments for this compound, if it is present in the sample quantitation was done using the TIC area and the TIC area of 1, 2-Dichloropropane in the calibration standards.

9025036 VOC anaylsis was performed from an air canister sample, using a Cold Vapor Trap preconcentrator and GC/MSD.
Pressure upon arrival to the lab = 12.80 psia.

Due to the presence of high levels of hydrocarbons the nominal volume could not be used, this is considered a dilution.
Dilution factor=4.
The Reporting Detection Limit has been adjusted accordingly.

Analysis done at AGAT 5623 McAdam Road Mississauga location.

2,2-Dichloropropane was analyzed using GC/MS full scan and the specific m/z fragments for this compound, if it is present in the sample quantitation was done using the TIC area and the TIC area of 1, 2-Dichloropropane in the calibration standards.

9025038 VOC anaylsis was performed from an air canister sample, using a Cold Vapor Trap preconcentrator and GC/MSD.
Pressure upon arrival to the lab = 13.18 psia.

Analysis done at AGAT 5623 McAdam Road Mississauga location.

2,2-Dichloropropane was analyzed using GC/MS full scan and the specific m/z fragments for this compound, if it is present in the sample quantitation was done using the TIC area and the TIC area of 1, 2-Dichloropropane in the calibration standards.

9025039 VOC anaylsis was performed from an air canister sample, using a Cold Vapor Trap preconcentrator and GC/MSD.
Pressure upon arrival to the lab = 12.79 psia.

Analysis done at AGAT 5623 McAdam Road Mississauga location.

2,2-Dichloropropane was analyzed using GC/MS full scan and the specific m/z fragments for this compound, if it is present in the sample quantitation was done using the TIC area and the TIC area of 1, 2-Dichloropropane in the calibration standards.

9025040 VOC anaylsis was performed from an air canister sample, using a Cold Vapor Trap preconcentrator and GC/MSD.
Pressure upon arrival to the lab = 12.66 psia.

Due to the presence of high levels of hydrocarbons the nominal volume could not be used, this is considered a dilution.
Dilution factor=10.

Certified By:

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CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works : BC VOCs in Air (Canister) - ug/m3

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-02-23

The Reporting Detection Limit has been adjusted accordingly.
Analysis done at AGAT 5623 McAdam Road Mississauga location.

2,2-Dichloropropane was analyzed using GC/MS full scan and the specific m/z fragments for this compound, if it is present in the sample quantitation was done using the TIC area and the TIC area of 1, 2-Dichloropropane in the calibration standards.

9025041 VOC anaylsis was performed from an air canister sample, using a Cold Vapor Trap preconcentrator and GC/MSD.
Pressure upon arrival to the lab = 13.69 psia.

Due to the presence of high levels of hydrocarbons the nominal volume could not be used, this is considered a dilution.
Dilution factor=10.
The Reporting Detection Limit has been adjusted accordingly.
Analysis done at AGAT 5623 McAdam Road Mississauga location.

2,2-Dichloropropane was analyzed using GC/MS full scan and the specific m/z fragments for this compound, if it is present in the sample quantitation was done using the TIC area and the TIC area of 1, 2-Dichloropropane in the calibration standards.

9025042 VOC anaylsis was performed from an air canister sample, using a Cold Vapor Trap preconcentrator and GC/MSD.
Pressure upon arrival to the lab = 12.32 psia.

Due to the presence of high levels of hydrocarbons the nominal volume could not be used, this is considered a dilution.
Dilution factor=10.
The Reporting Detection Limit has been adjusted accordingly.
Analysis done at AGAT 5623 McAdam Road Mississauga location.

2,2-Dichloropropane was analyzed using GC/MS full scan and the specific m/z fragments for this compound, if it is present in the sample quantitation was done using the TIC area and the TIC area of 1, 2-Dichloropropane in the calibration standards.

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Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works LEPH/HEPH in Water Low Level

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-02-23

		SAMPLE DESCRIPTION:		04319-01	04319-02	04319-03	04319-04
		SAMPLE TYPE:		Water	Water	Water	Water
		DATE SAMPLED:		2018-01-21	2018-01-21	2018-01-21	2018-01-21
Parameter	Unit	G / S	RDL	9025059	9025067	9025068	9025069
Naphthalene	µg/L		0.05	<0.05	<0.05	<0.05	0.14
Quinoline	µg/L		0.05	<0.05	<0.05	<0.05	<0.05
Acenaphthylene	µg/L		0.02	<0.02	<0.02	<0.02	<0.02
Acenaphthene	µg/L		0.02	<0.02	<0.02	<0.02	<0.02
Fluorene	µg/L		0.02	<0.02	<0.02	<0.02	0.04
Phenanthrene	µg/L		0.04	<0.04	<0.04	<0.04	0.11
Anthracene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01
Acridine	µg/L		0.05	<0.05	<0.05	<0.05	<0.05
Fluoranthene	µg/L		0.02	<0.02	<0.02	<0.02	<0.02
Pyrene	µg/L		0.02	<0.02	<0.02	<0.02	<0.02
Benzo(a)anthracene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01
Chrysene	µg/L		0.01	<0.01	<0.01	<0.01	0.03
Benzo(b)fluoranthene	µg/L		0.01	<0.01	<0.01	<0.01	0.01
Benzo(j)fluoranthene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01
Benzo(k)fluoranthene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)pyrene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01
Indeno(1,2,3-c,d)pyrene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01
Dibenzo(a,h)anthracene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01
Benzo(g,h,i)perylene	µg/L		0.01	<0.01	<0.01	<0.01	0.01
1-Methylnaphthalene	µg/L		0.05	<0.05	<0.05	<0.05	0.22
2-Methylnaphthalene	µg/L		0.05	<0.05	<0.05	<0.05	0.29
EPH C10-C19	µg/L		100	<100	<100	<100	<100
EPH C19-C32	µg/L		100	<100	<100	<100	<100
LEPH C10-C19	µg/L		100	<100	<100	<100	<100
HEPH C19-C32	µg/L		100	<100	<100	<100	<100
Benzo(b+j)fluoranthene	µg/L		0.01	<0.01	<0.01	<0.01	0.01
Surrogate	Unit	Acceptable Limits					
Naphthalene - d8	%	50-130		83	83	82	82
2-Fluorobiphenyl	%	50-130		84	83	83	74
P-Terphenyl - d14	%	60-130		81	81	79	77

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works LEPH/HEPH in Water Low Level

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-02-23

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9025059-9025069 LEPH & HEPH results have been corrected for PAH contributions.

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Volatile Organic Compounds in Soil

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-02-23

		SAMPLE DESCRIPTION:		04306-04
		SAMPLE TYPE:		Soil
		DATE SAMPLED:		2018-01-20
Parameter	Unit	G / S	RDL	9024976
Chloromethane	µg/g		0.05	<0.05
Vinyl Chloride	µg/g		0.05	<0.05
Bromomethane	µg/g		0.05	<0.05
Chloroethane	µg/g		0.05	<0.05
Trichlorofluoromethane	µg/g		0.05	<0.05
Acetone	µg/g		0.5	<0.5
1,1-Dichloroethylene	µg/g		0.05	<0.05
Dichloromethane	µg/g		0.05	<0.05
Methyl tert-butyl ether (MTBE)	µg/g		0.1	<0.1
2-Butanone (MEK)	µg/g		0.5	<0.5
trans-1,2-Dichloroethene	µg/g		0.05	<0.05
1,1-Dichloroethane	µg/g		0.05	<0.05
cis-1,2-Dichloroethene	µg/g		0.05	<0.05
Chloroform	µg/g		0.05	<0.05
1,2-Dichloroethane	µg/g		0.05	<0.05
1,1,1-Trichloroethane	µg/g		0.05	<0.05
Carbon Tetrachloride	µg/g		0.02	<0.02
Benzene	µg/g		0.02	0.17
1,2-Dichloropropane	µg/g		0.05	<0.05
Trichloroethene	µg/g		0.01	<0.01
Bromodichloromethane	µg/g		0.05	<0.05
trans-1,3-Dichloropropene	µg/g		0.05	<0.05
4-Methyl-2-pentanone (MIBK)	µg/g		0.5	<0.5
cis-1,3-Dichloropropene	µg/g		0.05	<0.05
1,1,2-Trichloroethane	µg/g		0.05	<0.05
Toluene	µg/g		0.05	0.12
Dibromochloromethane	µg/g		0.05	<0.05
1,2-Dibromoethane	µg/g		0.05	<0.05
Tetrachloroethylene	µg/g		0.05	<0.05
1,1,1,2-Tetrachloroethane	µg/g		0.05	<0.05

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Volatile Organic Compounds in Soil

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-02-23

		SAMPLE DESCRIPTION:		04306-04
		SAMPLE TYPE:		Soil
		DATE SAMPLED:		2018-01-20
Parameter	Unit	G / S	RDL	9024976
Chlorobenzene	µg/g		0.05	<0.05
Ethylbenzene	µg/g		0.05	0.09
m&p-Xylene	µg/g		0.05	0.39
Bromoform	µg/g		0.05	<0.05
Styrene	µg/g		0.05	<0.05
1,1,2,2-Tetrachloroethane	µg/g		0.05	<0.05
o-Xylene	µg/g		0.05	0.10
1,3-Dichlorobenzene	µg/g		0.05	<0.05
1,4-Dichlorobenzene	µg/g		0.05	<0.05
1,2-Dichlorobenzene	µg/g		0.05	<0.05
1,2,4-Trichlorobenzene	µg/g		0.05	<0.05
VH	µg/g		10	19
VPH	µg/g		10	18
1,3-Dichloropropene (cis + trans)	µg/g		0.05	<0.05
Total Xylenes	µg/g		0.2	0.5
Surrogate	Unit	Acceptable Limits		
Bromofluorobenzene	%	60-140		109
Dibromofluoromethane	%	60-140		109
Toluene - d8	%	60-140		118

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9024976 Results are based on dry weight of sample.

Certified By:

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AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Volatile Organic Compounds in Water

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-02-23

SAMPLE DESCRIPTION:				04319-01	04319-02	04319-03	04319-04
SAMPLE TYPE:				Water	Water	Water	Water
DATE SAMPLED:				2018-01-21	2018-01-21	2018-01-21	2018-01-21
Parameter	Unit	G / S	RDL	9025059	9025067	9025068	9025069
Chloromethane	µg/L		1	<1	<1	<1	<1
Vinyl Chloride	µg/L		1	<1	<1	<1	<1
Bromomethane	µg/L		1	<1	<1	<1	<1
Chloroethane	µg/L		1	<1	<1	<1	<1
Trichlorofluoromethane	µg/L		1	<1	<1	<1	<1
Acetone	µg/L		10	<10	<10	<10	<10
1,1-Dichloroethylene	µg/L		1	<1	<1	<1	<1
Dichloromethane	µg/L		1	<1	<1	<1	<1
Methyl tert-butyl ether (MTBE)	µg/L		1	<1	<1	<1	<1
2-Butanone (MEK)	µg/L		10	<10	<10	<10	<10
trans-1,2-Dichloroethylene	µg/L		1	<1	<1	<1	<1
1,1-Dichloroethane	µg/L		1	<1	<1	<1	<1
cis-1,2-Dichloroethylene	µg/L		1	<1	<1	<1	<1
Chloroform	µg/L		1	<1	<1	<1	<1
1,2-Dichloroethane	µg/L		1	<1	<1	<1	<1
1,1,1-Trichloroethane	µg/L		1	<1	<1	<1	<1
Carbon Tetrachloride	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
Benzene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	µg/L		1	<1	<1	<1	<1
Trichloroethene	µg/L		1	<1	<1	<1	<1
Bromodichloromethane	µg/L		1	<1	<1	<1	<1
trans-1,3-Dichloropropene	µg/L		1	<1	<1	<1	<1
4-Methyl-2-pentanone (MIBK)	µg/L		10	<10	<10	<10	<10
cis-1,3-Dichloropropene	µg/L		1	<1	<1	<1	<1
1,1,2-Trichloroethane	µg/L		1	<1	<1	<1	<1
Toluene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	µg/L		1	<1	<1	<1	<1
1,2-Dibromoethane	µg/L		0.3	<0.3	<0.3	<0.3	<0.3
Tetrachloroethylene	µg/L		1	<1	<1	<1	<1
1,1,1,2-Tetrachloroethane	µg/L		1	<1	<1	<1	<1

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Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Volatile Organic Compounds in Water

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-02-23

		SAMPLE DESCRIPTION:		04319-01	04319-02	04319-03	04319-04
		SAMPLE TYPE:		Water	Water	Water	Water
		DATE SAMPLED:		2018-01-21	2018-01-21	2018-01-21	2018-01-21
Parameter	Unit	G / S	RDL	9025059	9025067	9025068	9025069
Chlorobenzene	µg/L		1	<1	<1	<1	<1
Ethylbenzene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
m&p-Xylene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
Bromoform	µg/L		1	<1	<1	<1	<1
Styrene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
1,1,2,2-Tetrachloroethane	µg/L		0.8	<0.8	<0.8	<0.8	<0.8
o-Xylene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichlorobenzene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
1,2,4-Trichlorobenzene	µg/L		1	<1	<1	<1	<1
VH	µg/L		100	<100	<100	<100	<100
VPH	µg/L		100	<100	<100	<100	<100
1,3-Dichloropropene (cis + trans)	µg/L		1	<1	<1	<1	<1
Total Trihalomethanes	µg/L		2	<2	<2	<2	<2
Total Xylenes	µg/L		1	<1	<1	<1	<1
Surrogate	Unit	Acceptable Limits					
Bromofluorobenzene	%	70-130		99	86	90	100
Dibromofluoromethane	%	70-130		97	85	91	100
Toluene - d8	%	70-130		109	94	99	113

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Chloride in Water

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-02-23

				SAMPLE DESCRIPTION:	04319-03
				SAMPLE TYPE:	Water
				DATE SAMPLED:	2018-01-21
Parameter	Unit	G / S	RDL	9025068	
Chloride	mg/L		0.5	81.3	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works Dissolved Metals

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-02-23

		SAMPLE DESCRIPTION:		04319-01	04319-02	04319-03	04319-04
		SAMPLE TYPE:		Water	Water	Water	Water
		DATE SAMPLED:		2018-01-21	2018-01-21	2018-01-21	2018-01-21
Parameter	Unit	G / S	RDL	9025059	9025067	9025068	9025069
Aluminum Dissolved	µg/L		2	4	5	2	3
Antimony Dissolved	µg/L		0.2	<0.2	<0.2	<0.2	0.7
Arsenic Dissolved	µg/L		0.1	0.2	0.3	9.5	0.4
Barium Dissolved	µg/L		2	10100	1280	579	4720
Beryllium Dissolved	µg/L		0.01	0.02	0.02	<0.01	<0.01
Bismuth Dissolved	µg/L		0.05	<0.05	<0.05	<0.05	<0.05
Boron Dissolved	µg/L		2	138	138	110	92
Cadmium Dissolved	µg/L		0.01	<0.01	<0.01	0.03	<0.01
Calcium Dissolved	µg/L		50	100000	75400	84900	106000
Chromium Dissolved	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
Cobalt Dissolved	µg/L		0.05	0.09	1.28	0.84	2.16
Copper Dissolved	µg/L		0.2	0.2	0.3	0.4	0.2
Iron Dissolved	µg/L		10	2580	3920	5060	6640
Lead Dissolved	µg/L		0.05	<0.05	<0.05	<0.05	<0.05
Lithium Dissolved	µg/L		0.5	79.8	81.9	80.0	69.3
Magnesium Dissolved	µg/L		50	33700	29400	28800	32200
Manganese Dissolved	µg/L		1	959	651	742	575
Mercury Dissolved	µg/L		0.01	<0.01	<0.01	<0.01	<0.01
Molybdenum Dissolved	µg/L		0.05	0.79	0.49	0.61	0.80
Nickel Dissolved	µg/L		0.2	0.2	1.7	1.6	4.6
Potassium Dissolved	µg/L		50	1920	2840	2610	5270
Selenium Dissolved	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
Silicon Dissolved	µg/L		50	6180	5610	5900	6440
Silver Dissolved	µg/L		0.02	<0.02	<0.02	<0.02	<0.02
Sodium Dissolved	µg/L		50	12500	11200	11500	10100
Strontium Dissolved	µg/L		0.1	683	605	610	397
Sulphur Dissolved	µg/L		500	1400	1210	1840	2690
Thallium Dissolved	µg/L		0.01	<0.01	<0.01	0.01	<0.01
Tin Dissolved	µg/L		0.05	0.06	0.19	0.27	0.44
Titanium Dissolved	µg/L		0.5	2.1	1.7	1.8	2.1

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Public Works Dissolved Metals

DATE RECEIVED: 2018-01-23

DATE REPORTED: 2018-02-23

		SAMPLE DESCRIPTION:		04319-01	04319-02	04319-03	04319-04
		SAMPLE TYPE:		Water	Water	Water	Water
		DATE SAMPLED:		2018-01-21	2018-01-21	2018-01-21	2018-01-21
Parameter	Unit	G / S	RDL	9025059	9025067	9025068	9025069
Uranium Dissolved	µg/L		0.01	0.11	0.26	0.86	0.77
Vanadium Dissolved	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
Zinc Dissolved	µg/L		2	4	2	3	4
Zirconium Dissolved	µg/L		0.1	<0.1	<0.1	<0.1	0.3
Hardness (calc)	ug CaCO3/L		100	388000	309000	331000	397000

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Certified By:

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Quality Assurance

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Soil Analysis

RPT Date: Feb 23, 2018			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Public Works Metals in Soil															
Aluminum	9025012		9800	9260	5.7%	< 10	105%	70%	130%	96%	90%	110%			
Antimony	9025012		0.6	0.5	5.9%	< 0.1	111%	70%	130%	107%	90%	110%			
Arsenic	9025012		8.4	7.6	10.3%	< 0.1	125%	70%	130%	106%	90%	110%			
Barium	9025012		168	161	4.2%	< 0.5	109%	70%	130%	103%	90%	110%			
Beryllium	9025012		0.5	0.5	NA	< 0.1	105%	70%	130%	102%	90%	110%			
Bismuth	9025012		<0.5	<0.5	NA	< 0.5				98%	85%	115%			
Cadmium	9025012		0.34	0.30	12.8%	< 0.01	106%	70%	130%	104%	90%	110%			
Calcium	9025012		9540	8700	9.2%	< 10	113%	70%	130%	94%	90%	110%			
Chromium	9025012		17	17	1.4%	< 1	108%	70%	130%	102%	90%	110%			
Cobalt	9025012		6.3	5.9	6.4%	< 0.1	107%	70%	130%	102%	90%	110%			
Copper	9025012		13.2	12.9	2.1%	< 0.2	101%	70%	130%	103%	90%	110%			
Iron	9025012		17300	16100	7.4%	< 10	101%	70%	130%	110%	90%	110%			
Lead	9025012		25.7	24.0	6.7%	< 0.1	106%	70%	130%	108%	90%	110%			
Lithium	9025012		8.4	8.3	1.1%	< 0.5				97%	85%	115%			
Magnesium	9025012		2840	2700	4.8%	< 10	110%	70%	130%	108%	90%	110%			
Manganese	9025012		171	158	8.1%	< 1	79%	70%	130%	105%	90%	110%			
Mercury	9025012		0.04	0.04	NA	< 0.01	98%	70%	130%	102%	90%	110%			
Molybdenum	9025012		1.8	1.6	9.6%	< 0.2	114%	70%	130%	99%	90%	110%			
Nickel	9025012		13.4	12.6	5.8%	< 0.5	106%	70%	130%	104%	90%	110%			
Phosphorus	9025012		511	500	2.4%	< 5	92%	70%	130%	95%	90%	110%			
Potassium	9025012		1380	1320	4.5%	< 5	108%	70%	130%	94%	90%	110%			
Selenium	9025012		0.6	0.5	14.4%	< 0.1				107%	90%	110%			
Silver	9025012		<0.5	<0.5	NA	< 0.5	128%	70%	130%	106%	90%	110%			
Sodium	9025012		54	49	9.1%	< 5	116%	70%	130%	100%	90%	110%			
Strontium	9025012		30	26	14.6%	< 1	124%	70%	130%	110%	90%	110%			
Thallium	9025012		0.2	0.2	NA	< 0.1	107%	70%	130%	104%	90%	110%			
Tin	9025012		0.8	0.7	NA	< 0.2	103%	70%	130%	99%	90%	110%			
Titanium	9025012		35	34	0.4%	< 1				92%	90%	110%			
Uranium	9025012		1.0	0.9	NA	< 0.2	129%	70%	130%	90%	90%	110%			
Vanadium	9025012		37	36	0.5%	< 1	110%	70%	130%	102%	90%	110%			
Zinc	9025012		58	59	0.4%	< 1	108%	70%	130%	102%	90%	110%			
Zirconium	9025012		0.4	0.3	NA	< 0.1				110%	90%	110%			
pH 1:2	9025012		7.68	7.69	0.1%		100%	90%	110%	100%	95%	105%			

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

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Quality Assurance

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA
AGAT WORK ORDER: 18N304491
PROJECT: 1657709-6000
ATTENTION TO: Erin O'Brien
SAMPLING SITE:
SAMPLED BY:

Trace Organics Analysis

RPT Date: Feb 23, 2018

PARAMETER	Batch	Sample Id	DUPLICATE Dup #1	DUPLICATE Dup #2	DUPLICATE RPD	Method Blank	REFERENCE MATERIAL Measured Value	REFERENCE MATERIAL Acceptable Limits Lower	REFERENCE MATERIAL Acceptable Limits Upper	METHOD BLANK SPIKE Recovery	METHOD BLANK SPIKE Acceptable Limits Lower	METHOD BLANK SPIKE Acceptable Limits Upper	MATRIX SPIKE Recovery	MATRIX SPIKE Acceptable Limits Lower	MATRIX SPIKE Acceptable Limits Upper
Public Works LEPH/HEPH in Soil Low Level															
Naphthalene	68653	9024976	0.678	0.571	17.1%	< 0.005	102%	80%	120%				104%	50%	130%
2-Methylnaphthalene	68653	9024976	1.10	1.17	6.2%	< 0.005	99%	80%	120%				96%	50%	130%
1-Methylnaphthalene	68653	9024976	1.22	1.24	1.6%	< 0.005	100%	80%	120%				102%	50%	130%
Acenaphthylene	68653	9024976	<0.005	<0.005	NA	< 0.005	100%	80%	120%				98%	50%	130%
Acenaphthene	68653	9024976	<0.005	<0.005	NA	< 0.005	100%	80%	120%				99%	50%	130%
Fluorene	68653	9024976	0.13	0.12	8.0%	< 0.02	100%	80%	120%				100%	50%	130%
Phenanthrene	68653	9024976	0.53	0.49	7.8%	< 0.02	99%	80%	120%				95%	60%	130%
Anthracene	68653	9024976	<0.004	<0.004	NA	< 0.004	100%	80%	120%				99%	60%	130%
Fluoranthene	68653	9024976	0.03	0.03	NA	< 0.01	98%	80%	120%				98%	60%	130%
Pyrene	68653	9024976	0.03	0.03	NA	< 0.01	99%	80%	120%				101%	60%	130%
Benzo(a)anthracene	68653	9024976	<0.03	<0.03	NA	< 0.03	101%	80%	120%				99%	60%	130%
Chrysene	68653	9024976	0.13	0.13	NA	< 0.05	99%	80%	120%				106%	60%	130%
Benzo(b)fluoranthene	68653	9024976	0.06	0.06	NA	< 0.02	97%	80%	120%				92%	60%	130%
Benzo(j)fluoranthene	68653	9024976	<0.02	<0.02	NA	< 0.02	98%	80%	120%				105%	60%	130%
Benzo(k)fluoranthene	68653	9024976	<0.02	<0.02	NA	< 0.02	103%	80%	120%				95%	60%	130%
Benzo(a)pyrene	68653	9024976	<0.03	<0.03	NA	< 0.03	100%	80%	120%				97%	60%	130%
Indeno(1,2,3-c,d)pyrene	68653	9024976	<0.02	<0.02	NA	< 0.02	100%	80%	120%				95%	60%	130%
Dibenzo(a,h)anthracene	68653	9024976	0.005	0.005	NA	< 0.005	101%	80%	120%				92%	60%	130%
Benzo(g,h,i)perylene	68653	9024976	0.11	0.11	NA	< 0.05	101%	80%	120%				98%	60%	130%
Quinoline	68653	9024976	<0.05	<0.05	NA	< 0.05	101%	80%	120%				105%	50%	130%
EPH C10-C19	68653	9024976	299	299	0.0%	< 20	111%	70%	130%				95%	65%	120%
EPH C19-C32	68653	9024976	84	82	NA	< 20	103%	70%	130%				101%	80%	120%
Naphthalene - d8	68653	9024976	76	67	12.6%		100%	80%	120%				100%	50%	130%
2-Fluorobiphenyl	68653	9024976	79	73	7.9%		101%	80%	120%				100%	50%	130%
P-Terphenyl - d14	68653	9024976	83	80	3.7%		99%	80%	120%				101%	60%	130%

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

Volatile Organic Compounds in Soil															
Chloromethane	68643	9024976	<0.05	<0.05	NA	< 0.05	98%	80%	120%				116%	60%	140%
Vinyl Chloride	68643	9024976	<0.05	<0.05	NA	< 0.05	98%	80%	120%				105%	60%	140%
Bromomethane	68643	9024976	<0.05	<0.05	NA	< 0.05	97%	80%	120%				118%	60%	140%
Chloroethane	68643	9024976	<0.05	<0.05	NA	< 0.05	100%	80%	120%				96%	60%	140%
Trichlorofluoromethane	68643	9024976	<0.05	<0.05	NA	< 0.05	99%	80%	120%				91%	70%	130%
Acetone	68643	9024976	<0.5	<0.5	NA	< 0.5	100%	80%	120%				90%	70%	130%
1,1-Dichloroethylene	68643	9024976	<0.05	<0.05	NA	< 0.05	100%	80%	120%				93%	70%	130%
Dichloromethane	68643	9024976	<0.05	<0.05	NA	< 0.05	100%	80%	120%				93%	70%	130%
Methyl tert-butyl ether (MTBE)	68643	9024976	<0.1	<0.1	NA	< 0.1	101%	80%	120%				89%	70%	130%
2-Butanone (MEK)	68643	9024976	<0.5	<0.5	NA	< 0.5	100%	80%	120%				88%	70%	130%
trans-1,2-Dichloroethene	68643	9024976	<0.05	<0.05	NA	< 0.05	100%	80%	120%				91%	70%	130%

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Quality Assurance

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA
AGAT WORK ORDER: 18N304491
PROJECT: 1657709-6000
ATTENTION TO: Erin O'Brien
SAMPLING SITE:
SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date: Feb 23, 2018

PARAMETER	Batch	Sample Id	DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
			Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
1,1-Dichloroethane	68643	9024976	<0.05	<0.05	NA	< 0.05	100%	80%	120%				91%	70%	130%
cis-1,2-Dichloroethene	68643	9024976	<0.05	<0.05	NA	< 0.05	101%	80%	120%				90%	70%	130%
Chloroform	68643	9024976	<0.05	<0.05	NA	< 0.05	100%	80%	120%				89%	70%	130%
1,2-Dichloroethane	68643	9024976	<0.05	<0.05	NA	< 0.05	100%	80%	120%				89%	70%	130%
1,1,1-Trichloroethane	68643	9024976	<0.05	<0.05	NA	< 0.05	100%	80%	120%				86%	70%	130%
Carbon Tetrachloride	68643	9024976	<0.02	<0.02	NA	< 0.02	101%	80%	120%				83%	70%	130%
Benzene	68643	9024976	0.17	0.17	0.0%	< 0.02	101%	80%	120%				90%	70%	130%
1,2-Dichloropropane	68643	9024976	<0.05	<0.05	NA	< 0.05	101%	80%	120%				89%	70%	130%
Trichloroethene	68643	9024976	<0.01	<0.01	NA	< 0.01	101%	80%	120%				87%	70%	130%
Bromodichloromethane	68643	9024976	<0.05	<0.05	NA	< 0.05	101%	80%	120%				87%	70%	130%
trans-1,3-Dichloropropene	68643	9024976	<0.05	<0.05	NA	< 0.05	102%	80%	120%				84%	60%	140%
4-Methyl-2-pentanone (MIBK)	68643	9024976	<0.5	<0.5	NA	< 0.5	101%	80%	120%				81%	70%	130%
cis-1,3-Dichloropropene	68643	9024976	<0.05	<0.05	NA	< 0.05	101%	80%	120%				85%	60%	140%
1,1,2-Trichloroethane	68643	9024976	<0.05	<0.05	NA	< 0.05	101%	80%	120%				86%	70%	130%
Toluene	68643	9024976	0.12	0.12	NA	< 0.05	101%	80%	120%				87%	70%	130%
Dibromochloromethane	68643	9024976	<0.05	<0.05	NA	< 0.05	101%	80%	120%				85%	70%	130%
1,2-Dibromoethane	68643	9024976	<0.05	<0.05	NA	< 0.05	101%	80%	120%				87%	70%	130%
Tetrachloroethylene	68643	9024976	<0.05	<0.05	NA	< 0.05	100%	80%	120%				75%	70%	130%
1,1,1,2-Tetrachloroethane	68643	9024976	<0.05	<0.05	NA	< 0.05	101%	80%	120%				87%	70%	130%
Chlorobenzene	68643	9024976	<0.05	<0.05	NA	< 0.05	100%	80%	120%				88%	70%	130%
Ethylbenzene	68643	9024976	0.09	0.10	NA	< 0.05	101%	80%	120%				86%	70%	130%
m&p-Xylene	68643	9024976	0.39	0.41	5.0%	< 0.05	101%	80%	120%				87%	70%	130%
Bromoform	68643	9024976	<0.05	<0.05	NA	< 0.05	101%	80%	120%				85%	70%	130%
Styrene	68643	9024976	<0.05	<0.05	NA	< 0.05	102%	80%	120%				86%	70%	130%
1,1,2,2-Tetrachloroethane	68643	9024976	<0.05	<0.05	NA	< 0.05	100%	80%	120%				89%	70%	130%
o-Xylene	68643	9024976	0.10	0.10	NA	< 0.05	101%	80%	120%				88%	70%	130%
1,3-Dichlorobenzene	68643	9024976	<0.05	<0.05	NA	< 0.05	100%	80%	120%				89%	70%	130%
1,4-Dichlorobenzene	68643	9024976	<0.05	<0.05	NA	< 0.05	100%	80%	120%				89%	70%	130%
1,2-Dichlorobenzene	68643	9024976	<0.05	<0.05	NA	< 0.05	101%	80%	120%				90%	70%	130%
1,2,4-Trichlorobenzene	68643	9024976	<0.05	<0.05	NA	< 0.05	101%	80%	120%				88%	70%	130%
Bromofluorobenzene	68643	9024976	109	110	0.9%		105%	60%	140%				105%	60%	140%
Dibromofluoromethane	68643	9024976	109	109	0.0%		105%	60%	140%				100%	60%	140%
Toluene - d8	68643	9024976	118	120	1.7%		101%	60%	140%				105%	60%	140%
VH	68643	9024976	19	19	NA	< 10									
VPH	68643	9024976	18	18	NA	< 10									

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

BTEX / VPH (C6-C10) Soil															
Methyl tert-butyl ether (MTBE)	68643	9025533	<0.1	<0.1	NA	< 0.1	100%	80%	120%				97%	70%	130%
Benzene	68643	9025533	<0.02	<0.02	NA	< 0.02	99%	80%	120%				95%	70%	130%

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Quality Assurance

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date: Feb 23, 2018			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Toluene	68643	9025533	<0.05	<0.05	NA	< 0.05	100%	80%	120%				106%	70%	130%
Ethylbenzene	68643	9025533	<0.05	<0.05	NA	< 0.05	100%	80%	120%				107%	70%	130%
m&p-Xylene	68643	9025533	<0.05	<0.05	NA	< 0.05	100%	80%	120%				107%	70%	130%
o-Xylene	68643	9025533	<0.05	<0.05	NA	< 0.05	101%	80%	120%				104%	70%	130%
Styrene	68643	9025533	<0.05	<0.05	NA	< 0.05	100%	80%	120%				101%	70%	130%
VPH	68643	9025533	<10	<10	NA	< 10									
VH	68643	9025533	<10	<10	NA	< 10									
Bromofluorobenzene	68643	9025533	97	96	1.0%		100%	60%	140%				93%	60%	140%
Dibromofluoromethane	68643	9025533	108	109	0.9%		99%	60%	140%				102%	60%	140%
Toluene - d8	68643	9025533	118	117	0.9%		99%	60%	140%				113%	60%	140%
Public Works LEPH/HEPH in Water Low Level															
Naphthalene	68644	W-MS1	0.37	0.39	5.3%	< 0.05	100%	80%	120%				77%	50%	130%
Quinoline	68644	W-MS1	0.54	0.54	0.0%	< 0.05	100%	80%	120%				109%	50%	130%
Acenaphthylene	68644	W-MS1	0.41	0.42	2.4%	< 0.02	100%	80%	120%				83%	50%	130%
Acenaphthene	68644	W-MS1	0.43	0.44	2.3%	< 0.02	100%	80%	120%				86%	50%	130%
Fluorene	68644	W-MS1	0.43	0.43	0.0%	< 0.02	99%	80%	120%				86%	50%	130%
Phenanthrene	68644	W-MS1	0.37	0.36	2.7%	< 0.04	101%	80%	120%				78%	60%	130%
Anthracene	68644	W-MS1	0.47	0.49	4.2%	< 0.01	97%	80%	120%				95%	60%	130%
Acridine	68644	W-MS1	0.53	0.51	3.8%	< 0.05	101%	80%	120%				108%	50%	130%
Fluoranthene	68644	W-MS1	0.44	0.45	2.2%	< 0.02	99%	80%	120%				89%	60%	130%
Pyrene	68644	W-MS1	0.44	0.44	0.0%	< 0.02	100%	80%	120%				88%	60%	130%
Benzo(a)anthracene	68644	W-MS1	0.42	0.42	0.0%	< 0.01	99%	80%	120%				84%	60%	130%
Chrysene	68644	W-MS1	0.48	0.49	2.1%	< 0.01	100%	80%	120%				96%	60%	130%
Benzo(b)fluoranthene	68644	W-MS1	0.39	0.38	2.6%	< 0.01	97%	80%	120%				78%	60%	130%
Benzo(j)fluoranthene	68644	W-MS1	0.53	0.53	0.0%	< 0.01	102%	80%	120%				107%	60%	130%
Benzo(k)fluoranthene	68644	W-MS1	0.35	0.36	2.8%	< 0.01	99%	80%	120%				71%	60%	130%
Benzo(a)pyrene	68644	W-MS1	0.45	0.45	0.0%	< 0.01	100%	80%	120%				91%	60%	130%
Indeno(1,2,3-c,d)pyrene	68644	W-MS1	0.44	0.44	0.0%	< 0.01	100%	80%	120%				88%	60%	130%
Dibenzo(a,h)anthracene	68644	W-MS1	0.41	0.42	2.4%	< 0.01	99%	80%	120%				83%	60%	130%
Benzo(g,h,i)perylene	68644	W-MS1	0.43	0.45	4.5%	< 0.01	100%	80%	120%				89%	60%	130%
1-Methylnaphthalene	68644	W-MS1	0.36	0.38	5.4%	< 0.05	100%	80%	120%				73%	50%	130%
2-Methylnaphthalene	68644	W-MS1	0.31	0.33	6.2%	< 0.05	98%	80%	120%				63%	50%	130%
EPH C10-C19	68644	W-MS1	8480	8230	3.0%	< 100	111%	70%	130%				84%	70%	130%
EPH C19-C32	68644	W-MS1	13800	13600	1.5%	< 100	99%	70%	130%				90%	70%	130%
Naphthalene - d8	68644	W-MS1	83	82	1.2%		101%	80%	120%				83%	50%	130%
2-Fluorobiphenyl	68644	W-MS1	82	84	2.4%		100%	80%	120%				82%	50%	130%
P-Terphenyl - d14	68644	W-MS1	89	87	2.3%		100%	80%	120%				89%	60%	130%

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

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ATTENTION TO: Erin O'Brien
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SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date: Feb 23, 2018

PARAMETER	Batch	Sample Id	DUPLICATE Dup #1	DUPLICATE Dup #2	DUPLICATE RPD	Method Blank	REFERENCE MATERIAL Measured Value	REFERENCE MATERIAL Acceptable Limits Lower	REFERENCE MATERIAL Acceptable Limits Upper	METHOD BLANK SPIKE Recovery	METHOD BLANK SPIKE Acceptable Limits Lower	METHOD BLANK SPIKE Acceptable Limits Upper	MATRIX SPIKE Recovery	MATRIX SPIKE Acceptable Limits Lower	MATRIX SPIKE Acceptable Limits Upper
Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.															
Volatile Organic Compounds in Water															
Chloromethane	68658	9025583	<1	<1	NA	< 1	98%	80%	120%				105%	70%	130%
Vinyl Chloride	68658	9025583	<1	<1	NA	< 1	98%	80%	120%				112%	70%	130%
Bromomethane	68658	9025583	<1	<1	NA	< 1	97%	80%	120%				83%	70%	130%
Chloroethane	68658	9025583	<1	<1	NA	< 1	100%	80%	120%				99%	70%	130%
Trichlorofluoromethane	68658	9025583	<1	<1	NA	< 1	99%	80%	120%				104%	70%	130%
Acetone	68658	9025583	10	<10	NA	< 10	100%	80%	120%						
1,1-Dichloroethylene	68658	9025583	<1	<1	NA	< 1	100%	80%	120%				111%	70%	130%
Dichloromethane	68658	9025583	<1	<1	NA	< 1	100%	80%	120%				96%	70%	130%
Methyl tert-butyl ether (MTBE)	68658	9025583	<1	<1	NA	< 1	101%	80%	120%				104%	70%	130%
2-Butanone (MEK)	68658	9025583	<10	<10	NA	< 10	100%	80%	120%						
trans-1,2-Dichloroethylene	68658	9025583	<1	<1	NA	< 1	100%	80%	120%				105%	70%	130%
1,1-Dichloroethane	68658	9025583	<1	<1	NA	< 1	100%	80%	120%				104%	70%	130%
cis-1,2-Dichloroethylene	68658	9025583	<1	<1	NA	< 1	101%	80%	120%				101%	70%	130%
Chloroform	68658	9025583	<1	<1	NA	< 1	100%	80%	120%				103%	70%	130%
1,2-Dichloroethane	68658	9025583	<1	<1	NA	< 1	100%	80%	120%				102%	70%	130%
1,1,1-Trichloroethane	68658	9025583	<1	<1	NA	< 1	100%	80%	120%				101%	70%	130%
Carbon Tetrachloride	68658	9025583	<0.5	<0.5	NA	< 0.5	101%	80%	120%				99%	70%	130%
Benzene	68658	9025583	<0.5	<0.5	NA	< 0.5	101%	80%	120%				102%	70%	130%
1,2-Dichloropropane	68658	9025583	<1	<1	NA	< 1	101%	80%	120%				105%	70%	130%
Trichloroethene	68658	9025583	<1	<1	NA	< 1	101%	80%	120%				102%	70%	130%
Bromodichloromethane	68658	9025583	<1	<1	NA	< 1	101%	80%	120%				100%	70%	130%
trans-1,3-Dichloropropene	68658	9025583	<1	<1	NA	< 1	102%	80%	120%				106%	70%	130%
4-Methyl-2-pentanone (MIBK)	68658	9025583	<10	<10	NA	< 10	101%	80%	120%						
cis-1,3-Dichloropropene	68658	9025583	<1	<1	NA	< 1	101%	80%	120%				101%	70%	130%
1,1,2-Trichloroethane	68658	9025583	<1	<1	NA	< 1	101%	80%	120%				105%	70%	130%
Toluene	68658	9025583	<0.5	<0.5	NA	< 0.5	101%	80%	120%				102%	70%	130%
Dibromochloromethane	68658	9025583	<1	<1	NA	< 1	101%	80%	120%				103%	70%	130%
1,2-Dibromoethane	68658	9025583	<0.3	<0.3	NA	< 0.3	101%	80%	120%				106%	70%	130%
Tetrachloroethylene	68658	9025583	<1	<1	NA	< 1	100%	80%	120%				85%	70%	130%
1,1,1,2-Tetrachloroethane	68658	9025583	<1	<1	NA	< 1	101%	80%	120%				99%	70%	130%
Chlorobenzene	68658	9025583	<1	<1	NA	< 1	100%	80%	120%				100%	70%	130%
Ethylbenzene	68658	9025583	<0.5	<0.5	NA	< 0.5	101%	80%	120%				100%	70%	130%
m&p-Xylene	68658	9025583	<0.5	<0.5	NA	< 0.5	101%	80%	120%				100%	70%	130%
Bromoform	68658	9025583	<1	<1	NA	< 1	101%	80%	120%				101%	70%	130%
Styrene	68658	9025583	<0.5	<0.5	NA	< 0.5	102%	80%	120%				100%	70%	130%
1,1,2,2-Tetrachloroethane	68658	9025583	<0.8	<0.8	NA	< 0.8	100%	80%	120%				101%	70%	130%
o-Xylene	68658	9025583	<0.5	<0.5	NA	< 0.5	101%	80%	120%				101%	70%	130%

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Quality Assurance

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA
AGAT WORK ORDER: 18N304491
PROJECT: 1657709-6000
ATTENTION TO: Erin O'Brien
SAMPLING SITE:
SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date: Feb 23, 2018			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
1,3-Dichlorobenzene	68658	9025583	<0.5	<0.5	NA	< 0.5	100%	80%	120%				97%	70%	130%
1,4-Dichlorobenzene	68658	9025583	<0.5	<0.5	NA	< 0.5	100%	80%	120%				97%	70%	130%
1,2-Dichlorobenzene	68658	9025583	<0.5	<0.5	NA	< 0.5	101%	80%	120%				99%	70%	130%
1,2,4-Trichlorobenzene	68658	9025583	<1	<1	NA	< 1	101%	80%	120%				97%	70%	130%
Bromofluorobenzene	68658	9025583	96	88	8.7%		105%	70%	130%				108%	70%	130%
Dibromofluoromethane	68658	9025583	102	94	8.2%		105%	70%	130%				104%	70%	130%
Toluene - d8	68658	9025583	110	102	7.5%		101%	70%	130%				111%	70%	130%
VH	68658	9025583	<100	<100	NA	< 100									
VPH	68658	9025583	<100	<100	NA	< 100									

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

CCME BTEX/F1-F4 (Water)															
Benzene	68649	9025003	<0.5	<0.5	NA	< 0.5	99%	80%	120%				92%	70%	130%
Ethylbenzene	68649	9025003	<0.5	<0.5	NA	< 0.5	100%	80%	120%				94%	70%	130%
Toluene	68649	9025003	<0.5	<0.5	NA	< 0.5	100%	80%	120%				93%	70%	130%
m&p-Xylene	68649	9025003	<0.5	<0.5	NA	< 0.5	100%	80%	120%				95%	70%	130%
o-Xylene	68649	9025003	<0.5	<0.5	NA	< 0.5	101%	80%	120%				96%	70%	130%
F1 (C6-C10)	68649	9025003	<100	<100	NA	< 100									
F1 minus BTEX (C6-C10)	68649	9025003	<100	<100	NA	< 100									
F2 (C10-C16)	68644	W-MS1	5820	5630	3.3%	< 100	110%	80%	120%				82%	70%	130%
F3 (C16-C34)	68644	W-MS1	18600	18300	1.6%	< 100	115%	80%	120%				90%	70%	130%
F4 (C34-C50)	68644	W-MS1	4610	4680	1.5%	< 100	102%	80%	120%				77%	70%	130%
Bromofluorobenzene	68649	9025003	93	96	3.2%		100%	70%	130%				100%	70%	130%
Dibromofluoromethane	68649	9025003	103	106	2.9%		99%	70%	130%				99%	70%	130%
Toluene - d8	68649	9025003	98	98	0.0%		99%	70%	130%				99%	70%	130%

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

BC Routine VOC package in Air (Canister) -ug/m3															
1,2,4-Trimethylbenzene	1	< 1.5	< 1.5	0.0%	< 1.5	128%	50%	140%	136%	50%	140%	NA	30%	140%
1,3,5-Trimethylbenzene	1	< 1.5	< 1.5	0.0%	< 1.5	108%	50%	140%	139%	50%	140%	NA	30%	140%
1,3-Butadiene	1	< 1.0	< 1.0	0.0%	< 1.0	131%	50%	140%	126%	50%	140%	NA	30%	140%
Isopropylbenzene	1	< 0.80	< 0.80	0.0%	< 0.80	136%	50%	140%	115%	50%	140%	NA	30%	140%
Methyl tert-Butyl ether (MTBE)	1	< 0.80	< 0.80	0.0%	< 0.80	67%	50%	140%	71%	50%	140%	NA	30%	140%
Naphthalene	1	< 2.0	< 2.0	0.0%	< 2.0	128%	50%	140%	111%	50%	140%	NA	30%	140%
n-Decane	1	< 1.3	< 1.3	0.0%	< 1.3	53%	50%	140%	60%	50%	140%	NA	30%	140%
n-Hexane	1	< 1.1	< 1.1	0.0%	< 1.1	109%	50%	140%	99%	50%	140%	NA	30%	140%

Public Works : BC VOCs in Air (Canister) - ug/m3															
Dichlorodifluoromethane	1	< 1.0	< 1.0	0.0%	< 1.0	133%	60%	140%	138%	50%	140%	NA	30%	140%
1,2-Dichlorotetrafluoroethane	1	< 1.4	< 1.4	0.0%	< 1.4	138%	60%	140%	122%	50%	140%	NA	30%	140%
1,1,2-Trichloro-1,2,2-trifluoroethane	1	< 1.5	< 1.5	0.0%	< 1.5	102%	60%	140%	107%	50%	140%	NA	30%	140%

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Quality Assurance

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA
AGAT WORK ORDER: 18N304491
PROJECT: 1657709-6000
ATTENTION TO: Erin O'Brien
SAMPLING SITE:
SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date: Feb 23, 2018

PARAMETER	Batch	Sample Id	DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
			Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Chloromethane	1		< 0.60	< 0.60	0.0%	< 0.60	140%	60%	140%	137%	50%	140%	NA	30%	140%
Vinyl Chloride	1		< 0.40	< 0.40	0.0%	< 0.40	139%	60%	140%	137%	50%	140%	NA	30%	140%
Bromomethane	1		< 1.9	< 1.9	0.0%	< 1.9	136%	60%	140%	133%	50%	140%	NA	30%	140%
Chloroethane	1		< 1.0	< 1.0	0.0%	< 1.0	140%	60%	140%	129%	50%	140%	NA	30%	140%
Vinyl Bromide	1		< 0.80	< 0.80	0.0%	< 0.80	NA	60%	140%	137%	50%	140%	NA	30%	140%
Trichlorofluoromethane	1		< 2.3	< 2.3	0.0%	< 2.3	138%	60%	140%	123%	50%	140%	NA	30%	140%
1,1-Dichloroethene	1		< 1.0	< 1.0	0.0%	< 1.0	95%	60%	140%	101%	50%	140%	NA	30%	140%
Methylene Chloride	1		< 1.0	< 1.0	0.0%	< 1.0	100%	60%	140%	104%	50%	140%	NA	30%	140%
trans-1,2-Dichloroethene	1		< 0.80	< 0.80	0.0%	< 0.80	87%	60%	140%	90%	50%	140%	NA	30%	140%
1,1-Dichloroethane	1		< 1.2	< 1.2	0.0%	< 1.2	104%	60%	140%	110%	50%	140%	NA	30%	140%
cis-1,2-Dichloroethene	1		< 0.80	< 0.80	0.0%	< 0.80	94%	60%	140%	98%	50%	140%	NA	30%	140%
Chloroform	1		< 1.0	< 1.0	0.0%	< 1.0	104%	60%	140%	109%	50%	140%	NA	30%	140%
1,2-Dichloroethane	1		< 0.30	< 0.30	0.0%	< 0.30	108%	60%	140%	113%	50%	140%	NA	30%	140%
1,1,1-Trichloroethane	1		< 1.6	< 1.6	0.0%	< 1.6	95%	60%	140%	101%	50%	140%	NA	30%	140%
Carbon Tetrachloride	1		< 2.0	< 2.0	0.0%	< 2.0	101%	60%	140%	108%	50%	140%	NA	30%	140%
Benzene	1		< 0.50	< 0.50	0.0%	< 0.50	100%	60%	140%	103%	50%	140%	NA	30%	140%
1,2-Dichloropropane	1		< 2.0	< 2.0	0.0%	< 2.0	104%	60%	140%	108%	50%	140%	NA	30%	140%
Trichloroethene	1		< 1.0	< 1.0	0.0%	< 1.0	101%	60%	140%	106%	50%	140%	NA	30%	140%
Bromodichloromethane	1		< 1.3	< 1.3	0.0%	< 1.3	105%	60%	140%	111%	50%	140%	NA	30%	140%
cis-1,3-Dichloropropene	1		< 1.0	< 1.0	0.0%	< 1.0	89%	60%	140%	95%	50%	140%	NA	30%	140%
trans-1,3-Dichloropropene	1		< 1.0	< 1.0	0.0%	< 1.0	86%	60%	140%	91%	50%	140%	NA	30%	140%
Methyl Isobutyl Ketone (MIBK)	1		< 2.0	< 2.0	0.0%	< 2.0	126%	60%	140%	133%	50%	140%	NA	30%	140%
1,1,2-Trichloroethane	1		< 1.6	< 1.6	0.0%	< 1.6	128%	60%	140%	135%	50%	140%	NA	30%	140%
Toluene	1		< 0.80	< 0.80	0.0%	< 0.80	121%	60%	140%	129%	50%	140%	NA	30%	140%
2-Hexanone	1		< 2.0	< 2.0	0.0%	< 2.0	134%	60%	140%	140%	50%	140%	NA	30%	140%
Dibromochloromethane	1		< 2.0	< 2.0	0.0%	< 2.0	126%	60%	140%	137%	50%	140%	NA	30%	140%
1,2-Dibromoethane	1		< 1.5	< 1.5	0.0%	< 1.5	118%	60%	140%	130%	50%	140%	NA	30%	140%
Tetrachloroethene	1		< 1.0	< 1.0	0.0%	< 1.0	114%	60%	140%	121%	50%	140%	NA	30%	140%
Chlorobenzene	1		< 1.0	< 1.0	0.0%	< 1.0	125%	60%	140%	132%	50%	140%	NA	30%	140%
Ethylbenzene	1		< 0.9	< 0.9	0.0%	< 0.9	118%	60%	140%	124%	50%	140%	NA	30%	140%
m&p-Xylene	1		< 1.5	< 1.5	0.0%	< 1.5	139%	60%	140%	140%	50%	140%	NA	30%	140%
Bromoform	1		< 2.0	< 2.0	0.0%	< 2.0	120%	60%	140%	131%	50%	140%	NA	30%	140%
Styrene	1		< 1.0	< 1.0	0.0%	< 1.0	120%	60%	140%	127%	50%	140%	NA	30%	140%
1,1,2,2-Tetrachloroethane	1		< 1.5	< 1.5	0.0%	< 1.5	108%	60%	140%	106%	50%	140%	NA	30%	140%
o-Xylene	1		< 0.9	< 0.9	0.0%	< 0.9	125%	60%	140%	118%	50%	140%	NA	30%	140%
1,3-Dichlorobenzene	1		< 2.5	< 2.5	0.0%	< 2.5	129%	60%	140%	135%	50%	140%	NA	30%	140%
1,4-Dichlorobenzene	1		< 2.5	< 2.5	0.0%	< 2.5	129%	60%	140%	138%	50%	140%	NA	30%	140%
1,2-Dichlorobenzene	1		< 2.5	< 2.5	0.0%	< 2.5	121%	60%	140%	103%	50%	140%	NA	30%	140%

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Quality Assurance

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date: Feb 23, 2018			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Public Works LEPH/HEPH in Soil Low Level															
Naphthalene	68688	9037253	<0.005	<0.005	NA	< 0.005	100%	80%	120%				103%	50%	130%
2-Methylnaphthalene	68688	9037253	0.042	0.044	4.7%	< 0.05	98%	80%	120%				95%	50%	130%
1-Methylnaphthalene	68688	9037253	0.034	0.038	11.1%	< 0.05	99%	80%	120%				99%	50%	130%
Acenaphthylene	68688	9037253	<0.005	<0.005	NA	< 0.005	99%	80%	120%				97%	50%	130%
Acenaphthene	68688	9037253	<0.005	<0.005	NA	< 0.005	99%	80%	120%				99%	50%	130%
Fluorene	68688	9037253	<0.02	<0.02	NA	< 0.02	100%	80%	120%				103%	50%	130%
Phenanthrene	68688	9037253	0.02	0.04	NA	< 0.02	98%	80%	120%				87%	60%	130%
Anthracene	68688	9037253	<0.004	<0.004	NA	< 0.004	99%	80%	120%				95%	60%	130%
Fluoranthene	68688	9037253	<0.01	<0.01	NA	< 0.01	98%	80%	120%				98%	60%	130%
Pyrene	68688	9037253	<0.01	<0.01	NA	< 0.01	100%	80%	120%				97%	60%	130%
Benzo(a)anthracene	68688	9037253	<0.03	<0.03	NA	< 0.03	99%	80%	120%				95%	60%	130%
Chrysene	68688	9037253	<0.05	<0.05	NA	< 0.05	100%	80%	120%				95%	60%	130%
Benzo(b)fluoranthene	68688	9037253	<0.02	<0.02	NA	< 0.02	100%	80%	120%				95%	60%	130%
Benzo(j)fluoranthene	68688	9037253	<0.02	<0.02	NA	< 0.02	101%	80%	120%				101%	60%	130%
Benzo(k)fluoranthene	68688	9037253	<0.02	<0.02	NA	< 0.02	97%	80%	120%				91%	60%	130%
Benzo(a)pyrene	68688	9037253	<0.03	<0.03	NA	< 0.03	99%	80%	120%				93%	60%	130%
Indeno(1,2,3-c,d)pyrene	68688	9037253	<0.02	<0.02	NA	< 0.02	97%	80%	120%				86%	60%	130%
Dibenzo(a,h)anthracene	68688	9037253	<0.005	<0.005	NA	< 0.005	97%	80%	120%				87%	60%	130%
Benzo(g,h,i)perylene	68688	9037253	<0.05	<0.05	NA	< 0.05	98%	80%	120%				94%	60%	130%
Quinoline	68688	9037253	<0.05	<0.05	NA	< 0.05	97%	80%	120%				106%	50%	130%
EPH C10-C19	68688	9037253	34	21	NA	< 20	110%	70%	130%				99%	65%	120%
EPH C19-C32	68688	9037253	<20	<20	NA	< 20	103%	70%	130%				100%	80%	120%
Naphthalene - d8	68688	9037253	95	89	6.5%		99%	80%	120%				100%	50%	130%
2-Fluorobiphenyl	68688	9037253	97	88	9.7%		101%	80%	120%				102%	50%	130%
P-Terphenyl - d14	68688	9037253	97	93	4.2%		100%	80%	120%				96%	60%	130%

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

Certified By:

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Quality Assurance

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Water Analysis

RPT Date: Feb 23, 2018			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Public Works Dissolved Metals															
Aluminum Dissolved	9025583		27	28	2.5%	< 2	98%	90%	110%	99%	90%	110%			
Antimony Dissolved	9025583		1.8	1.8	2.3%	< 0.2	99%	90%	110%	104%	90%	110%			
Arsenic Dissolved	9025583		2.0	2.0	0.2%	< 0.1	94%	90%	110%	108%	90%	110%			
Barium Dissolved	9025583		94.4	91.5	3.1%	< 0.2	103%	90%	110%	106%	90%	110%			
Beryllium Dissolved	9025583		0.02	<0.01	NA	< 0.01	103%	90%	110%	103%	90%	110%			
Bismuth Dissolved	9025583		<0.05	<0.05	NA	< 0.05				100%	90%	110%			
Boron Dissolved	9025583		32	31	3.4%	< 2	94%	90%	110%	91%	90%	110%			
Cadmium Dissolved	9025583		0.12	0.11	6.9%	< 0.01	104%	90%	110%	100%	90%	110%			
Calcium Dissolved	9025583		90500	91800	1.3%	< 50	101%	90%	110%	102%	90%	110%			
Chromium Dissolved	9025583		<0.5	<0.5	NA	< 0.5	93%	90%	110%	95%	90%	110%			
Cobalt Dissolved	9025583		3.31	3.30	0.5%	< 0.05	95%	90%	110%	98%	90%	110%			
Copper Dissolved	9025583		3.1	3.3	4.5%	< 0.2	98%	90%	110%	99%	90%	110%			
Iron Dissolved	9025583		936	954	1.9%	< 10	100%	90%	110%	101%	90%	110%			
Lead Dissolved	9025583		<0.05	<0.05	NA	< 0.05	104%	90%	110%	103%	90%	110%			
Lithium Dissolved	9025583		2.0	2.1	NA	< 0.5				100%	90%	110%			
Magnesium Dissolved	9025583		7890	7860	0.4%	< 50	103%	90%	110%	104%	90%	110%			
Manganese Dissolved	9025583		400	400	0.1%	< 1	105%	90%	110%	104%	90%	110%			
Mercury Dissolved	9021813		<0.01	<0.01	NA	< 0.01	99%	90%	110%	100%	90%	110%			
Molybdenum Dissolved	9025583		1.69	1.72	1.6%	< 0.05	96%	90%	110%	99%	90%	110%			
Nickel Dissolved	9025583		6.0	6.0	1.0%	< 0.2	97%	90%	110%	100%	90%	110%			
Potassium Dissolved	9025583		5670	5700	0.5%	< 50	94%	90%	110%	97%	90%	110%			
Selenium Dissolved	9025583		1.1	1.0	NA	< 0.5	96%	90%	110%	99%	90%	110%			
Silicon Dissolved	9025583		4810	4830	0.3%	< 50				105%	90%	110%			
Silver Dissolved	9025583		<0.02	<0.02	NA	< 0.02				105%	90%	110%			
Sodium Dissolved	9025583		6320	6320	0.1%	< 50	98%	90%	110%	101%	90%	110%			
Strontium Dissolved	9025583		350	359	2.6%	< 0.1	99%	90%	110%	99%	90%	110%			
Sulphur Dissolved	9025583		30900	31200	1.1%	< 500				104%	90%	110%			
Thallium Dissolved	9025583		0.05	0.05	0.0%	< 0.01	95%	90%	110%	97%	90%	110%			
Tin Dissolved	9025583		0.12	0.12	NA	< 0.05				105%	90%	110%			
Titanium Dissolved	9025583		1.8	1.7	NA	< 0.5				100%	90%	110%			
Uranium Dissolved	9025583		0.62	0.60	3.6%	< 0.01	92%	90%	110%	97%	90%	110%			
Vanadium Dissolved	9025583		2.9	2.9	0.3%	< 0.5	100%	90%	110%	101%	90%	110%			
Zinc Dissolved	9025583		7	7	NA	< 2	105%	90%	110%	102%	90%	110%			
Zirconium Dissolved	9025583		0.2	0.2	NA	< 0.1				99%	70%	130%			
Chloride in Water															
Chloride	9014203		0.21	0.21	NA	< 0.05	99%	90%	110%	96%	90%	110%			

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

AGAT Laboratories

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Quality Assurance

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

Water Analysis (Continued)

RPT Date: Feb 23, 2018			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

Certified By:

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Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA
AGAT WORK ORDER: 18N304491
PROJECT: 1657709-6000
ATTENTION TO: Erin O'Brien
SAMPLING SITE:
SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Aluminum	MET-181-6106, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP/OES
Antimony	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Arsenic	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Barium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Beryllium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Bismuth	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Cadmium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Calcium	MET-181-6106, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP/OES
Chromium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Cobalt	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Copper	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Iron	MET-181-6106, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP/OES
Lead	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Lithium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Magnesium	MET-181-6106, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP/OES
Manganese	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP-MS
Mercury	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Molybdenum	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Nickel	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Phosphorus	MET-181-6106, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP/OES
Potassium	MET-181-6106, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP/OES
Selenium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Silver	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Sodium	MET-181-6106, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP/OES
Strontium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP-MS
Thallium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Tin	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS

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Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

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PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Titanium	MET-181-6106, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP/OES
Uranium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Vanadium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Zinc	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Zirconium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
pH 1:2	INOR-181-6031	BC MOE Lab Manual B (pH, Electrometric, Soil)	PH METER

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SAMPLING SITE:
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PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Naphthalene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
2-Methylnaphthalene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
1-Methylnaphthalene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Acenaphthylene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Acenaphthene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Fluorene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Phenanthrene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Anthracene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Fluoranthene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Pyrene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(a)anthracene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Chrysene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(b)fluoranthene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(j)fluoranthene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(k)fluoranthene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(a)pyrene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Indeno(1,2,3-c,d)pyrene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Dibenzo(a,h)anthracene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(g,h,i)perylene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Quinoline	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
IACR CCME (Soil)	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
B[a]P TPE (Soil)	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
EPH C10-C19	ORG-180-5101	Modified from BCMOE Lab Manual Section D (EPH)	GC/FID
EPH C19-C32	ORG-180-5101	Modified from BCMOE Lab Manual Section D (EPH)	GC/FID
LEPH C10-C19	ORG-180-5101	Modified from BCMOE Lab Manual Section D (EPH)	GC/FID
HEPH C19-C32	ORG-180-5101	Modified from BCMOE Lab Manual Section D (EPH)	GC/FID
Naphthalene - d8	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS

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Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
2-Fluorobiphenyl	ORG-180-5102	Modified form BCMOE Lab Manual Section D (PAH)	GC/MS
P-Terphenyl - d14	ORG-180-5102	Modified form BCMOE Lab Manual Section D (PAH)	GC/MS
1,2,4-Trimethylbenzene	AQM-91-16001	MASS APH	GC/MS
1,3,5-Trimethylbenzene	AQM-91-16001	MASS APH	GC/MS
1,3-Butadiene	AQM-91-16000	EPA TO15	GC/MS
Isopropylbenzene	AQM-91-16000	MASS APH	GC/MS
Methylcyclohexane	AQM-91-16000	EPA TO15	GC/MS
Methyl tert-Butyl ether (MTBE)	AQM-91-16000	EPA TO15	GC/MS
Naphthalene	AQM-91-16000	MASS APH	GC/MS
n-Decane	AQM-91-16000	MASS APH	GC/MS
n-Hexane	AQM-91-16000	EPA TO15	GC/MS
VPHv (C>6-C13)	AQM-91-16000	MASS APH	GC/MS
4-Bromofluorobenzene	AQM-91-16000	MASS APH	GC/MS
Methyl tert-butyl ether (MTBE)	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
Benzene	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
Toluene	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
Ethylbenzene	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
m&p-Xylene	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
o-Xylene	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
Styrene	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
VPH	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
VH	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
Bromofluorobenzene	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS
Dibromofluoromethane	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS
Toluene - d8	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS
Benzene	ORG-180-5130	EPA SW-846 8260	GC/MS/FID
Ethylbenzene	ORG-180-5130	EPA SW-846 8260	GC/MS/FID
Toluene	ORG-180-5130	EPA SW-846 8260	GC/MS/FID
m&p-Xylene	ORG-180-5130	EPA SW-846 8260	GC/MS/FID
o-Xylene	ORG-180-5130	EPA SW-846 8260	GC/MS/FID
F1 (C6-C10)	ORG-180-5130	CCME Tier 1 Method	GC/MS/FID
F1 minus BTEX (C6-C10)	ORG-180-5130	CCME Tier 1 Method	GC/MS/FID
F2 (C10-C16)	ORG-180-5134	CCME Tier 1 Method	GC/FID
F3 (C16-C34)	ORG-180-5134	CCME Tier 1 Method	GC/FID
F4 (C34-C50)	ORG-180-5134	CCME Tier 1 Method	GC/FID
Bromofluorobenzene		EPA SW-846 8260	GC/MS
Dibromofluoromethane		EPA SW-846 8260	GC/MS
Toluene - d8		EPA SW-846 8260	GC/MS
Dichlorodifluoromethane	AQM-248-16000	EPA TO15	GC/MS

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Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA
AGAT WORK ORDER: 18N304491
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SAMPLING SITE:
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PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
1,2-Dichlorotetrafluoroethane	AQM-248-16000	EPA TO15	GC/MS
1,1,2-Trichloro-1,2,2-trifluoroethane	AQM-248-16000	EPA TO15	GC/MS
Chloromethane	AQM-248-16000	EPA TO15	GC/MS
Vinyl Chloride	AQM-248-16000	EPA TO15	GC/MS
Bromomethane	AQM-248-16000	EPA TO15	GC/MS
Chloroethane	AQM-248-16000	EPA TO15	GC/MS
Vinyl Bromide	AQM-248-16000	EPA TO15	GC/MS
Trichlorofluoromethane	AQM-248-16000	EPA TO15	GC/MS
1,1-Dichloroethene	AQM-248-16000	EPA TO15	GC/MS
Methylene Chloride	AQM-248-16000	EPA TO15	GC/MS
trans-1,2-Dichloroethene	AQM-248-16000	EPA TO15	GC/MS
1,1-Dichloroethane	AQM-248-16000	EPA TO15	GC/MS
cis-1,2-Dichloroethene	AQM-248-16000	EPA TO15	GC/MS
Chloroform	AQM-248-16000	EPA TO15	GC/MS
1,2-Dichloroethane	AQM-248-16000	EPA TO15	GC/MS
1,1,1-Trichloroethane	AQM-248-16000	EPA TO15	GC/MS
Carbon Tetrachloride	AQM-248-16000	EPA TO15	GC/MS
Benzene	AQM-248-16000	EPA TO15	GC/MS
1,2-Dichloropropane	AQM-248-16000	EPA TO15	GC/MS
2,2-Dichloropropane	AQM-248-16000	EPA TO15	GC/MS
Trichloroethene	AQM-248-16000	EPA TO15	GC/MS
Bromodichloromethane	AQM-248-16000	EPA TO15	GC/MS
cis-1,3-Dichloropropene	AQM-248-16000	EPA TO15	GC/MS
trans-1,3-Dichloropropene	AQM-248-16000	EPA TO15	GC/MS
Methyl Isobutyl Ketone (MIBK)	AQM-248-16000	EPA TO15	GC/MS
1,1,2-Trichloroethane	AQM-248-16000	EPA TO15	GC/MS
Toluene	AQM-248-16000	EPA TO15	GC/MS
2-Hexanone	AQM-248-16000	EPA TO15	GC/MS
Dibromochloromethane	AQM-248-16000	EPA TO15	GC/MS
1,2-Dibromoethane	AQM-248-16000	EPA TO15	GC/MS
Tetrachloroethene	AQM-248-16000	EPA TO15	GC/MS
Chlorobenzene	AQM-248-16000	EPA TO15	GC/MS
Ethylbenzene	AQM-248-16000	EPA TO15	GC/MS
m&p-Xylene	AQM-248-16000	EPA TO15	GC/MS
Bromoform	AQM-248-16000	EPA TO15	GC/MS
Styrene	AQM-248-16000	EPA TO15	GC/MS
1,1,2,2-Tetrachloroethane	AQM-248-16000	EPA TO15	GC/MS
o-Xylene	AQM-248-16000	EPA TO15	GC/MS
1,3-Dichlorobenzene	AQM-248-16000	EPA TO15	GC/MS
1,4-Dichlorobenzene	AQM-248-16000	EPA TO15	GC/MS
1,2-Dichlorobenzene	AQM-248-16000	EPA TO15	GC/MS
Total Xylenes	AQM-248-16000	EPA TO15	GC/MS
4-Bromofluorobenzene	AQM-248-16000	EPA TO15	GC/MS
Quinoline	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Acenaphthylene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Acenaphthene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Fluorene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS

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Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

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PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Phenanthrene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Anthracene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Acridine	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Fluoranthene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Pyrene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(a)anthracene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Chrysene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(b)fluoranthene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(j)fluoranthene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(k)fluoranthene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(a)pyrene	ORG-180-5133	Modified from BC MOE Lab Manual Section D	GC/MS
Indeno(1,2,3-c,d)pyrene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Dibenzo(a,h)anthracene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(g,h,i)perylene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
1-Methylnaphthalene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
2-Methylnaphthalene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
EPH C10-C19	ORG-180-5134	Modified from BC MOE Lab Manual Section D (EPH)	GC/FID
EPH C19-C32	ORG-180-5134	Modified from BC MOE Lab Manual Section D (EPH)	GC/FID
LEPH C10-C19	ORG-180-5134	Modified from BC MOE Lab Manual Section D (EPH)	GC/FID
HEPH C19-C32	ORG-180-5134	Modified from BC MOE Lab Manual Section D (EPH)	GC/FID
Naphthalene - d8		Modified form BCMOE Lab Manual Section D (PAH)	GC/MS
2-Fluorobiphenyl	ORG-180-5133	Modified form BCMOE Lab Manual Section D (PAH)	GC/MS
P-Terphenyl - d14	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Chloromethane	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Vinyl Chloride	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Bromomethane	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Chloroethane	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Trichlorofluoromethane	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Acetone	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,1-Dichloroethylene	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Dichloromethane	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Methyl tert-butyl ether (MTBE)	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
2-Butanone (MEK)	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
trans-1,2-Dichloroethene	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,1-Dichloroethane	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
cis-1,2-Dichloroethene	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Chloroform	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,2-Dichloroethane	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,1,1-Trichloroethane	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Carbon Tetrachloride	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Benzene	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,2-Dichloropropane	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Trichloroethene	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Bromodichloromethane	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
trans-1,3-Dichloropropene	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
4-Methyl-2-pentanone (MIBK)	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
cis-1,3-Dichloropropene	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,1,2-Trichloroethane	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Toluene	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Dibromochloromethane	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,2-Dibromoethane	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Tetrachloroethylene	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,1,1,2-Tetrachloroethane	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Chlorobenzene	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Ethylbenzene	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
m&p-Xylene	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS

AGAT Laboratories

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Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Bromoform	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Styrene	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,1,2,2-Tetrachloroethane	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
o-Xylene	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,3-Dichlorobenzene	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,4-Dichlorobenzene	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,2-Dichlorobenzene	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,2,4-Trichlorobenzene	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Bromofluorobenzene	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Dibromofluoromethane	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Toluene - d8	ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
VH	ORG-180-5103	Modified from BC MOE Lab Manual Sec D (VOC)	GC/MS/FID
VPH	ORG-180-5103	Modified from BC MOE Lab Manual Sec D (VOC)	GC/MS/FID
Chloromethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Vinyl Chloride	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Bromomethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Chloroethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Trichlorofluoromethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Acetone	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,1-Dichloroethylene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Dichloromethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Methyl tert-butyl ether (MTBE)	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
2-Butanone (MEK)	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
trans-1,2-Dichloroethylene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,1-Dichloroethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
cis-1,2-Dichloroethylene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Chloroform	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,2-Dichloroethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS

AGAT Laboratories

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Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
1,1,1-Trichloroethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Carbon Tetrachloride	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Benzene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,2-Dichloropropane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Trichloroethene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Bromodichloromethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
trans-1,3-Dichloropropene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
4-Methyl-2-pentanone (MIBK)	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
cis-1,3-Dichloropropene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,1,2-Trichloroethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Toluene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Dibromochloromethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,2-Dibromoethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Tetrachloroethylene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,1,1,2-Tetrachloroethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D	GC/MS
Chlorobenzene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Ethylbenzene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
m&p-Xylene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Bromoform	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Styrene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,1,2,2-Tetrachloroethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
o-Xylene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,3-Dichlorobenzene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,4-Dichlorobenzene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,2-Dichlorobenzene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
1,2,4-Trichlorobenzene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Bromofluorobenzene	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
Dibromofluoromethane	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS

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Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Toluene - d8	ORG-180-5131	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
VH	ORG-180-5133	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS/FID
VPH	ORG-180-5131	Modified from BC MOE Lab Manual Sec D (VOC)	GC/MS/FID

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Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA
AGAT WORK ORDER: 18N304491
PROJECT: 1657709-6000
ATTENTION TO: Erin O'Brien
SAMPLING SITE:
SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
Chloride	INOR-181-6002	Modified from SM 4110 B	ION CHROMATOGRAPH
Aluminum Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Antimony Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Arsenic Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Barium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Beryllium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Bismuth Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Boron Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Cadmium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Calcium Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Chromium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Cobalt Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Copper Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Iron Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Lead Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Lithium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Magnesium Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Manganese Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Mercury Dissolved	MET-181-6103, LAB-181-4015	Modified from EPA 245.7	CV/AA
Molybdenum Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Nickel Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Potassium Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Selenium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Silicon Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Silver Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Sodium Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Strontium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Sulphur Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Thallium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Tin Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Titanium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Uranium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Vanadium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Zinc Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Zirconium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS

CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

1BN3044491

No. 04306 page 1 of 5

Golder Associates

200 – 2920 Virtual Way
Vancouver, British Columbia, Canada V5M 0C4
Telephone (604) 296-4200 Fax (604) 298-5253

Project Number: 1657709/6000			Laboratory Name: AGAT
Short Title: K19 Field Inv	Golder Contact: Erin O'Brien		Address: 120-4600 Glenlyon Pkwy
Golder E-mail Address 1: erin_o'brien @golder.com	Golder E-mail Address 2: kmara_dia-belair @golder.com		Telephone/Fax: 176-452-4009 Contact: Yasmine Galindo

Office Name: Vancouver

EQuIS Facility Code: 28433859
EQuIS upload: ☒

Turnaround Time: ☐ 24 hr ☐ 48 hr ☐ 72 hr ☒ Regular (5 Days)
Criteria: ☒ CSR ☒ CCME ☐ BC Water Quality ☐ Other

Note: Final Reports to be issued by e-mail

Quote No.:

Analyses Required

JAN 23 AM 10:19

Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D / M / Y)	Time Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	BTEX/VPH	LEPH/HEPH/PAH	VOCs	RUSH (Select TAT above)	Remarks (over)
04306 - 01	KM-MW18-1[illegible]	1 [illegible]	0.3-0.5	Soil	20/01/18	12:50	Discrete			2					9024971
- 02		2 [illegible]	2.0-2.5			13:10				4					973
- 03		3 [illegible]	3.5-4.0			13:20				4					975
- 04		4 [illegible]	5.5-6.0			13:40				4	X	X	X		976
- 05		5 [illegible]	7.0-7.5			14:00				4					977
- 06		6 [illegible]	8.5-9.0			14:20				2					978
- 07		7 [illegible]	10.1-10.6			14:50				4					979
- 08	KM-MW18-DS	1	5.5-6.0			16:00		FDA	04306-09	4					970
- 09	↓	1	5.5-6.0		↓	16:00		FD	04306-08	4					981
- 10															
- 11															
- 12															

AGAT Sample I.D.

Sampler's Signature:	Relinquished by: Signature	Company: Golder	Date: 22/01/18	Time: 09:45	Received by: Signature	Company: AGAT
Comments: Invoice Dan Osgathorpe	Method of Shipment:	Waybill No.:	Received for Lab by:	Date	Time: 9:50	
	Shipped by:	Shipment Condition: Seal Intact:	Temp (°C): 4	Cooler opened by:	Date	Time

WHITE: Golder Copy YELLOW: Lab Copy

ESED

18N304491

CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

No. 04305 page 2 of 5

Golder Associates
200 – 2920 Virtual Way
Vancouver, British Columbia, Canada V5M 0C4
Telephone (604) 296-4200 Fax (604) 298-5253

Project Number: 1657709/6000
Short Title: K19 Remediation
Golder Contact: Erin O'Brien
Golder E-mail Address 1: erin_obrien @golder.com
Golder E-mail Address 2: Konane-dion-Dela... @golder.com
Laboratory Name: AGAT
Address: 120-4600 Glenlyon Pkwy
Telephone/Fax: 778-452-4009
Contact: Yasmine Galindo

Office Name: Vancouver
EQuIS Facility Code: 26433859
EQuIS upload: ☒

JAN 23 AM10:19

Turnaround Time: ☐ 24 hr ☐ 48 hr ☐ 72 hr ☒ Regular (5 Days)
Criteria: ☒ CSR ☒ CCME ☐ BC Water Quality ☐ Other
Note: Final Reports to be issued by e-mail
Quote No.:

Analyses Required

Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D / M / Y)	Time Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	LEPH/HEPH/PAH	BTEX/VPH	METALS								RUSH (Select TAT above)	Remarks (over)
04305 - 01	K19-MW18-08		7.0-7.6	SO	19/01/18	14:20	Discrete			4	X	X										984
- 02	↓		8.6-9.1	↓	↓	14:30	↓			4												986
- 03	↓		10.1-10.6	↓	↓	15:00	↓			2												987
- 04	K19-MW18-09	1	0.3-0.5	↓	20/01/18	10:10	↓			2			X									988
- 05	↓	2	2.0-2.5	↓	↓	10:20	↓			4												989
- 06	↓	3	3.5-4.0	↓	↓	10:30	↓			4												990
- 07	↓	4	5.0-5.5	↓	↓	10:50	↓			4	X	X	X									992
- 08	↓	5	7.0-7.5	↓	↓	11:10	↓			2												993
- 09	↓	6	8.5-9.0	↓	↓	11:40	↓			4												994
- 10	↓	7	10.0-10.5	↓	↓	12:00	↓			4												995
- 11	K19-AEC 1C-Backfill		0.50	↓	↓	1300				2												996
- 12	K19-AEC 1C-Backfill		0.30	↓	↓	1300				2												997

Sampler's Signature: [signature]	Relinquished by: Signature [signature]	Company Golder	Date 22/01/18	Time 09:45	Received by: Signature [signature]	Company AGAT
Comments: Invoice Dave Osguthorpe	Method of Shipment:	Waybill No.:		Received for Lab by: Ceira AM	Date	Time 950
	Shipped by:	Shipment Condition: Seal Intact:		Temp (°C) 4	Cooler opened by: Date	Time

WHITE: Golder Copy YELLOW: Lab Copy

ESED

CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

18N304491

No. 04304 page 2 of 5

Golder Associates

200 – 2920 Virtual Way
Vancouver, British Columbia, Canada V5M 0C4
Telephone (604) 296-4200 Fax (604) 298-5253

Project Number: 1657709/6000			Laboratory Name: AGAT
Short Title: K19 Field Inv	Golder Contact: Erin O'Brien		Address: 120-4600 Glenlyon Pky
Golder E-mail Address 1: erin-o'brien @golder.com	Golder E-mail Address 2: Yasmine-dion-taler @golder.com	Telephone/Fax: 778-452-4009	Contact: Yasmine Galadza

Office Name: Vancouver

EQuIS Facility Code: 28433859
EQuIS upload: ☑

JAN 23 AM 10:19

Turnaround Time: ☐ 24 hr ☐ 48 hr ☐ 72 hr ☒ Regular (5 Days)
Criteria: ☒ CSR ☒ CCME ☐ BC Water Quality ☐ Other

Note: Final Reports to be issued by e-mail

Quote No.:

Analyses Required

Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D / M / Y)	Time Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	LEAH/HEPH/PAH	BTEX/VPH	Metals	RUSH (Select TAT above)	Remarks (over)
04304 - 01	K19-MW18-07	4	3.5-4.0	Soil	18/01/18	15:00		FDA	04304-02	4	X	X			947
- 02		4	3.5-4.0			15:00		FDA	04304-01	4					5000
- 03		5	5.0-5.5			15:45		FDA		4					5002
- 04		6	6.5-7.0		19/01/19	09:40				4					5004
- 05		7	8.0-8.5			10:00				2					5005
- 06		8	9.5-10.0			10:45				4					5009
- 07		9	4.5-5.0			12:10		FDA	04304-08	4					5010
- 08		9	4.5-5.0			12:10		FD	04304-07	4					5011
- 09	K19-MW18-08	1	0.3-0.5			13:15				3			X		5012
- 10		2	2.0-2.5			13:30				4					5013
- 11		3	3.5-4.0			13:45				4					5014
- 12		4	5.0-5.5			14:00				4					5015

Sampler's Signature:	Relinquished by: Signature	Company: Golder	Date: 22/01/18	Time: 09:45	Received by: Signature	Company: AGAT	
Comments:	Method of Shipment:	Waybill No.:	Received for Lab by: Cara		Date	Time: 9:50	
	Shipped by:	Shipment Condition: Seal Intact:	Temp (°C): 4	Cooler opened by:	Date	Time	

WHITE: Golder Copy YELLOW: Lab Copy

ESED

19N304491

CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

No. 04316 page 4 of 5

Golder Associates
200 – 2920 Virtual Way
Vancouver, British Columbia, Canada V5M 0C4
Telephone (604) 296-4200 Fax (604) 298-5253

Project Number: 1657709 / 6000	Laboratory Name: AGAT
Short Title: K19 Field Inv. — Golder Contact: Erin O'Brien	Address: 120-4600 Glenlyon Pkwy
Golder E-mail Address 1: erin_o'brien@golder.com — Golder E-mail Address 2: Koraal_Dion-Belair@golder.com	Telephone/Fax: 778-452-4009 — Contact: Yasmine Galindo

Office Name: Vancouver

EQuIS Facility Code: 28433859
EQuIS upload: ☒

JAN 23 AM10:20

Turnaround Time: ☐ 24 hr ☐ 48 hr ☐ 72 hr ☒ Regular (5 Days)
Criteria: ☒ CSR ☒ CCME ☐ BC Water Quality ☐ Other

Note: Final Reports to be issued by e-mail

Quote No.:

Analyses Required

Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D / M / Y)	Time Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	CWS PHC F1/F2	VOCs/VPH/BTEX	Hexane	Decane	Naphthalene	Chlorinated Solvents			AGAT Sample ID	RUSH (Select TAT above)	Vacuum Remarks (over)
04316-01	K19-SV18-04			SV	19/01/18	12:31-12:40				1	X	X	X	X	X	X			032		Start: -24" End: -4"
-02	K19-MW18-02			↓	↓	~~[illegible]~~ 15:02-15:12				1	X	X	X	X	X	X			036		Start: -25.5" End: -3.5"
-03	K19-SV18-03			↓	↓	16:39-16:48		FDA	04316-04	1									038		Start: -25" End: -3.5"
-04	"			↓	↓	16:37-16:40		FD	04316-03	1									039		Start: -25" End: -3.5"
-05																					
-06	K19-SV18-05			↓	21/01/18	12:30-12:40				1	X	X	X	X	X	X			040		Start: -26" End: -4"
-07	K19-SV18-10*			↓	↓	14:40-14:48				1	X	X	X	X	X	X			041		Start: -27" End: -3"
-08	K19-SV18-07			↓	↓	16:07-16:17				1	X	X	X	X	X	X			042		Start: -26" End: -4"
-09																					
-10																					
-11																					
-12																					

Sampler's Signature: [signature]	Relinquished by: Signature [signature]	Company Golder	Date 22/01/18	Time 09:45	Received by: Signature [signature]	Company AGAT
Comments: Invoice to Dave Osgnthorpe.	Method of Shipment:	Waybill No.:		Received for Lab by: Cara. [signature]	Date	Time 9:50
	Shipped by:	Shipment Condition: Seal Intact:		Temp (°C) 4	Cooler opened by:	Date / Time

WHITE: Golder Copy YELLOW: Lab Copy

ESED

CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

18W3044991

No. 04319 page 5 of 5

Golder Associates

200 – 2920 Virtual Way
Vancouver, British Columbia, Canada V5M 0C4
Telephone (604) 296-4200 Fax (604) 298-5253

Project Number: 1657709/6000		Laboratory Name: AGAT	
Short Title: K19 Field Inv	Golder Contact: Erin O'Brien	Address: 120-4600 Glenlyon Pkwy	
Golder E-mail Address 1: erin_o'brien@golder.com	Golder E-mail Address 2: konane_dion-bebair@golder.com	Telephone/Fax: 778.452.4009	Contact: Yasmine Galin

Office Name: Vancouver

EQuIS Facility Code: 28433859
EQuIS upload: ☒

Turnaround Time: ☐ 24 hr ☐ 48 hr ☐ 72 hr ☒ Regular (5 Days)
Criteria: ☒ CSR ☒ CCME ☐ BC Water Quality ☐ Other

Note: Final Reports to be issued by e-mail

Quote No.: 10.3

Analyses Required

JAN 23 AM 10:20

11:12

Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D / M / Y)	Time Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	Dissolved Metals	BTEX/VPH	PAH/LEPH/HEPH	Cyanide	VOCs	F1	F2-F4	RUSH (Select TAT above)	Remarks (over)
04319 - 01	K19-MW18-01		10	WG	21/01/18	15:47	GRAB				X	X	X	X	X	X	X		AGAT Sample ID 057
- 02	K19-MW18-02		11.3			13:11					X	X	X		X	X	X		062
- 03	K19-MW18-07D		10.3			11:12					X	X	X	X	X	X	X		063
- 04	K19-MW18-01		6.3			16:33					X	X	X		X	X	X		069
- 05																			
- 06																			
- 07																			
- 08																			
- 09																			
- 10																			
- 11																			
- 12																			

Sampler's Signature:	Relinquished by: Signature	Company: Golder	Date: 22/01/18	Time: 09:45	Received by: Signature	Company: AGAT	
Comments: Invoice Dave Osgthorpe	Method of Shipment:	Waybill No.:	Received for Lab by: Lara Cam	Date	Time: 950		
	Shipped by:	Shipment Condition: Seal Intact:	Temp (°C): 4	Cooler opened by:	Date	Time	

WHITE: Golder Copy YELLOW: Lab Copy

ESED

AGAT Laboratories

SAMPLE INTEGRITY RECEIPT FORM

RECEIVING BASICS - Shipping

Company/Consultant: GOLDER

Courier: _____ Prepaid Collect

Waybill# _____

Branch: EDM GP (FN) FM RD VAN LYD FSJ EST Other: _____

Custody Seal Intact: Yes (No) NA

TAT: <24hr 24-48hr 48-72hr (Reg) Other _____

Cooler Quantity: (5)

TIME SENSITIVE ISSUES - Shipping

ALREADY EXCEEDED HOLD TIME? Yes (No)

Inorganic Tests (Please Circle): Mibi , BOD , Nitrate/Nitrite , Turbidity , Microtox , Ortho PO4 , Tedlar Bag , Residual Chlorine , Chlorophyll* , Chloroamines*

Earliest Expiry: _____

Hydrocarbons: Earliest Expiry _____

SAMPLE INTEGRITY - Shipping

Hazardous Samples: YES (NO) Precaution Taken: _____

Legal Samples: Yes (No)

International Samples: Yes (No)

Tape Sealed: Yes (No)

Coolant Used: (Icepack) Bagged Ice Free Ice Free Water None

Temperature (Bottles/Jars only) N/A if only Soil Bags Received

FROZEN (Please Circle if samples received Frozen)

1 (Bottle/Jar) -14 + -14 + -15 = -14 °C

2 (Bottle/Jar) -1 + 0 + -2 = -1 °C

3 (Bottle/Jar) ___ + ___ + SUMA °C

4 (Bottle/Jar) ___ + ___ + SUMA °C

5 (Bottle/Jar) -11 + -9 + -10 = -10 °C

6 (Bottle/Jar) ___ + ___ + ___ = ___ °C

7 (Bottle/Jar) ___ + ___ + ___ = ___ °C

8 (Bottle/Jar) ___ + ___ + ___ = ___ °C

9 (Bottle/Jar) ___ + ___ + ___ = ___ °C

10 (Bottle/Jar) ___ + ___ + ___ = ___ °C

(If more than 10 coolers are received use another sheet of paper and attach)

LOGISTICS USE ONLY

Workorder No: _____

Samples Damaged: Yes No If YES why?

No Bubble Wrap Frozen Courier

Other: _____

Account Project Manager: _____ have they been notified of the above issues: Yes No

Whom spoken to: _____ Date/Time: _____

CPM Initial _____

General Comments: _____

* Subcontracted Analysis (See CPM)

Date issued: May 22, 2015

AGAT Laboratories

SAMPLE INTEGRITY RECEIPT FORM - BURNABY

Work Order # 18N304491

RECEIVING BASICS:

Received From: Courier Waybill #: _____

SAMPLE QUANTITIES:

Coolers: 4 Containers: 170

TIME SENSITIVE ISSUES:

Earliest Date Sampled: Jan 18, 2018 ALREADY EXCEEDED? Yes (No)

NON-CONFORMANCES:

3 temperatures of samples* and average of each cooler: (record differing temperatures on the CoC next to sample ID's) *use jars when available

(1) 1 + 1 + 2 = 1 °C (2) 7 + 7 + 6 = 7 °C (3) 6 + 6 + 6 = 6 °C (4) 6 + 5 + 5 = 5 °C

Was ice or ice pack present: (Yes) No

Integrity Issues:

Chloride received incorrectly preserved for Sample 04319-01.

Account Project Manager: _____ have they been notified of the above issues: Yes No

Whom spoken to: _____ Date and Time: _____

ADDITIONAL NOTES:

APPENDIX G

Quality Assurance / Quality Control

1.0 QUALITY ASSURANCE AND QUALITY CONTROL PROGRAM METHODS

The review of data quality includes data obtained during soil, groundwater and soil vapour sampling and analysis for the post-remediation investigation conducted in January of 2018. The following section includes a description of quality control methods used during the work and a detailed report of the results of the Quality Assurance and Quality Control (QA/QC) program.

1.1 Golder Quality Assurance Program

To assess and document that the sampling and analytical data were interpretable, meaningful and reproducible, conformance to a Golder quality assurance and quality control (QA/QC) program was followed.

The quality assurance (QA) measures used in the collection, preservation and shipment of samples included the following management controls:

1) Sampling methods were consistent with established Golder protocols, industry standards and provincial/ federal requirements.

2) Field notes were recorded during all stages of the investigation.

3) Decontamination of sampling equipment using multiple rinses of Liquinox soap and distilled water between sampling events.

4) For the collection of soil vapour samples, a helium leak tracer test was conducted at each vapour probe to directly assess the integrity of the vapour probe installations and to determine if short circuiting of ambient air was occurring.

5) Chain-of-Custody procedures were used for the shipment of samples to the laboratories; samples included in a shipment were identified on a Golder Chain-of-Custody form, with one copy retained by Golder personnel, after sign-off.

6) Samples were stored in coolers and chilled with ice or ice packs, during transport and prior to submission to the analytical laboratory.

The quality control (QC) measures established for the field program included the following technical aspects:

- Submission of field duplicate samples (i.e., paired sample analyses). A field duplicate sample is a second sample of a certain media (e.g., soil or water) from the same location that is submitted to the analytical laboratory under a separate label such that the laboratory has no prior knowledge that it is a duplicate.
- The relative percent difference (RPD) between paired sample results was used to assess duplicate sample data. The RPD is a measure of the variability between two outcomes from the same procedure or process and is calculated by:

$$RPD\ (\%) = \frac{(X_1 - X_2)}{average(X_1, X_2)} x100$$

  where X_1 is the original sample result, and X_2 is the paired analysis result.

- Where the concentration of a given parameter is less than five times the reported detection limit (RDL), the laboratory results are considered to be less precise, and the RPD is not calculated. For parameters with concentrations less than five times the RDL, but still above the RDL, the difference factor (DF) between paired analyses results is calculated by:

$$DF = \frac{(X_1 - X_2)}{RDL}$$

  where X_1 is the original sample result, and X_2 is the paired analysis result.

In 2015, the BC Ministry of Environment updated the British Columbia Laboratory Manual which contains recommended Data Quality Objectives (DQOs) for laboratories duplicate RPDs. It is recognized that these DQOs are intended for laboratory duplicates and do not include provisions for additional variability in field duplicates. However, these DQOs are considered a conservative screen for assessing the quality of field duplicates.

The DQOs applied to this investigation are as follows:

- For parameters in soil except PAHs, a RPD of less than 35%.
- For PAH parameters in soil, a RPD of less than 50%.
- For parameters in soil vapour a RPD of less than 50%.
- For parameters in groundwater and surface water a RPD of less than 20%.
- For parameters with concentrations less than five times the RDL, the difference factor should be less than two (2).

Where the DQO was exceeded, further examination was conducted on a case-by-case basis.

1.2 Laboratory Quality Assurance Program

In addition to the field control procedures, the laboratories selected to conduct the analyses was based, in large part, on it having achieved proficiency certification by the Canadian Association for Laboratory Accreditation (CALA) for the analyses conducted. AGAT Laboratories (AGAT) performed the chemical analysis of soil and groundwater collected at the Site from 10 to 28 January 2018. AGAT is certified by CALA for the analytical methods used for this program. The analytical laboratory also incorporated and reported the results of internal checks to Golder. These were used to assess the reliability, accuracy and reproducibility of the data. Reports from the laboratory were reviewed internally prior to submission to Golder. If internal QA/QC problems were encountered, the field samples and internal QA/QC samples were re-analyzed. Data quality issues identified by the laboratory were communicated to Golder at the time of data delivery.

Copies of the analytical reports and the corresponding Chain-of-Custody forms are presented in Appendix D.

2.0 QUALITY ASSURANCE AND QUALITY CONTROL PROGRAM RESULTS

Golder QA/QC Program – Alaska Highway Project

Soil

A total of 51 soil samples were submitted for laboratory analysis during the post remediation program, carried out in January of 2018 at the Alaska Highway Project of Site K-19. The soil field QA/QC program consisted of field duplicate soil samples for the analysis of one or more of the following parameters (sample collected, and number of duplicate pairs): LEPH/ HEPH/PAH (43, 3); BTEX/ VPH (34, 3); Metals (12, 3). The QA/QC results for all duplicate pairs met the applicable DQOs for RPD and DF.

Ground Water

A total of 29 ground water samples were submitted for laboratory analysis during the post remediation program, carried out in January of 2018 at the Alaska Highway Project of Site K-19. The ground water field QA/QC program consisted of field duplicate ground water samples for the analysis of one or more of the following parameters (sample collected, and number of duplicate pairs): LEPH/ HEPH/PAH (29, 3); BTEX/ VPH (29, 3); Metals (29, 3). The QA/QC results for all duplicate pairs met the applicable DQOs for RPD and DF.

Soil Vapour

A total of 12 soil vapour samples were submitted for laboratory analysis during the post remediation program, carried out in January of 2018 at the Alaska Highway Project of Site K-19. The soil vapour field QA/QC program consisted of a field duplicate (sample pair 04316-3 and 04316-04) sampled for the analysis of the following parameters: PAH; BTEX/ VPH; VOC. The parameters that did not meet the DQOs for RPD and DF are listed below:

- The duplicate sample collected from probe K19-SV18-03 was not taken with a regulator designed for duplicate sampling. As such, the duplicate sample pair with COCs numbers 04316-03 and 04316-04 was collected at a higher flow-rate of 280 ml/min; rather than 140 ml/min. This resulted in a RPD value greater than 50% for VPH (C6-C10). However, given the soil type and low vacuum observed during purging, the increased flow-rate is not expected to compromise sample integrity. In addition, this does not have a material effect on the quality of the data as both samples had VPH (C6-C10) concentrations below the most conservative CSR standard.

Laboratory QA/QC Program

All samples were analyzed within the recommended hold times.

In general, each sample analysis batch included at least one method blank (MB), one matrix spike (MS), one laboratory duplicate (dup) and one reference or control sample (RCS). The results of the internal laboratory QA testing are provided in the laboratory reports included in Appendix D.

A review of the AGAT laboratory reports did not identify any QA/QC issues related to the reported data.

The results of the soil QA/QC analyses are provided in Tables G-1, G-2, G-3, G-4, G-5, and G-6 at the end of this Appendix.

3.0 CONCLUSION OF QA/QC ANALYSIS

Based on a review of the QA/QC program, the data recovered during the field investigation are considered reproducible and suitable for the purposes of the post remediation investigation program at the Site.

Tables (Attached)

Table E-1: Results of Soil Quality Control Analyses – Hydrocarbons and PAHs
Table E-2: Results of Soil Quality Control Analyses – Volatile Organic Compounds
Table E-3: Results of Soil Quality Control Analyses – Metals
Table E-4: Results of Ground Water Quality Control Analyses – Hydrocarbons and PAHs
Table E-5: Results of Ground Water Quality Control Analyses – Volatile Organic Compounds
Table E-6: Results of Ground Water Quality Control Analyses – Metals
Table E-7: Results of Soil Vapour Quality Control Analyses

Appendix G
Table G-1: Results of January 2018 Supplementary Investigation
QAQC Soil Analyses - PAHs
K19 - Trutch Former Townsite
Alaska Highway, BC

Sample Location	K19-TP18-03	K19-TP18-03				K19-TP18-07	K19-TP18-07				K19-TP18-13	K19-TP18-13			
Sample Name	04308-07	04308-08				04299-11	04299-12				04315-02	04315-03			
Sample Collection Date	2018-01-13	2018-01-13	**RDL**	**RPD (%)**	**DF**	2018-01-14	2018-01-14	**RDL**	**RPD (%)**	**DF**	2018-01-18	2018-01-18	**RDL**	**RPD (%)**	**DF**
Sample Matrix	SO	SO				SO	SO				SO	SO			
Sample Depth	0.5 - 0.5 m	0.5 - 0.5 m				3.4 - 3.4 m	3.4 - 3.4 m				1.5 - 1.5 m	1.5 - 1.5 m			
Polycyclic Aromatic Hydrocarbons (PAHs)															
1-Methylnaphthalene	< 0.005	< 0.005	0.005	n/c	0		0.573	0.005	n/c	n/c	< 0.005	< 0.005	0.005	n/c	0
2-methylnaphthalene	< 0.005	< 0.005	0.005	n/c	0	0.79		0.05	n/c	n/c	0.006	< 0.005	0.005	n/c	0.2
Acenaphthene	< 0.005	< 0.005	0.005	n/c	0	1.33	0.72	0.05	**60**	n/c	< 0.005	< 0.005	0.005	n/c	0
Acenaphthylene	< 0.005	< 0.005	0.005	n/c	0	< 0.005	< 0.005	0.005	n/c	0	< 0.005	< 0.005	0.005	n/c	0
Anthracene	< 0.004	< 0.004	0.004	n/c	0	< 0.005	< 0.005	0.005	n/c	0	< 0.004	< 0.004	0.004	n/c	0
Benzo(a)anthracene	< 0.03	< 0.03	0.03	n/c	0	< 0.004	< 0.004	0.004	n/c	0	< 0.03	< 0.03	0.03	n/c	0
Benzo(a)pyrene	< 0.03	< 0.03	0.03	n/c	0	< 0.03	< 0.03	0.03	n/c	0	< 0.03	< 0.03	0.03	n/c	0
Benzo(a)pyrene Total Potency Equivalence (TPE)	< 0.05	< 0.05	0.05	n/c	0	< 0.03	< 0.03	0.03	n/c	0	< 0.05	< 0.05	0.05	n/c	0
Benzo(b)fluoranthene	< 0.02	< 0.02	0.02	n/c	0	< 0.05	< 0.05	0.05	n/c	0	< 0.02	< 0.02	0.02	n/c	0
Benzo(b,j) fluoranthene	< 0.05	< 0.05	0.05	n/c	0	0.04	0.04	0.02	n/c	0	< 0.05	< 0.05	0.05	n/c	0
Benzo(g,h,i)perylene	< 0.05	< 0.05	0.05	n/c	0	< 0.05	< 0.05	0.05	n/c	0	< 0.05	< 0.05	0.05	n/c	0
Benzo(k)fluoranthene	< 0.02	< 0.02	0.02	n/c	0	0.10	0.08	0.05	n/c	0.4	< 0.02	< 0.02	0.02	n/c	0
Chrysene	< 0.05	< 0.05	0.05	n/c	0	< 0.02	< 0.02	0.02	n/c	0	< 0.05	< 0.05	0.05	n/c	0
Dibenzo(a,h)anthracene	< 0.005	< 0.005	0.005	n/c	0	0.08	0.07	0.05	n/c	0.2	< 0.005	< 0.005	0.005	n/c	0
EPH (C10-C19)	< 20	< 20	20	n/c	0	< 0.005	< 0.005	0.005	n/c	0	< 20	< 20	20	n/c	0
EPH (C19-C32)	< 20	28	20	n/c	0.4	383	324	20	17	n/c	55	56	20	n/c	0.05
Fluoranthene	< 0.01	< 0.01	0.01	n/c	0	232	180	20	25	n/c	< 0.01	< 0.01	0.01	n/c	0
Fluorene	< 0.02	< 0.02	0.02	n/c	0	0.02	0.02	0.01	n/c	0	< 0.02	< 0.02	0.02	n/c	0
Heavy Extractable Petroleum Hydrocarbons (BC Guidelines)	< 20	28	20	n/c	0.4	0.06	0.04	0.02	n/c	1	55	55	20	n/c	0
Indeno(1,2,3-c,d)pyrene	< 0.02	< 0.02	0.02	n/c	0	232	180	20	25	n/c	< 0.02	< 0.02	0.02	n/c	0
Index of Additive Cancer Risk (IACR)	< 0.6	< 0.6	0.6	n/c	0	< 0.02	< 0.02	0.02	n/c	0	< 0.6	< 0.6	0.6	n/c	0
Light Extractable Petroleum Hydrocarbons (BC Guidelines)	< 20	< 20	20	n/c	0	< 0.6	< 0.6	0.6	n/c	0	< 20	< 20	20	n/c	0
Naphthalene	< 0.005	< 0.005	0.005	n/c	0	382	323	20	17	n/c	< 0.005	< 0.005	0.005	n/c	0
Phenanthrene	< 0.02	< 0.02	0.02	n/c	0	0.57		0.05	n/c	n/c	< 0.02	< 0.02	0.02	n/c	0
Pyrene	< 0.01	< 0.01	0.01	n/c	0	0.18	0.15	0.02	18	n/c	< 0.01	< 0.01	0.01	n/c	0
Quinoline	< 0.05	< 0.05	0.05	n/c	0	0.05	0.04	0.01	n/c	1	< 0.05	< 0.05	0.05	n/c	0
Volatile Hydrocarbon Fraction	< 10	< 10	10	n/c	0	< 0.05	< 0.05	0.05	n/c	0	< 10	< 10	10	n/c	0
Volatile Petroleum Hydrocarbons: BTEX,VPH,LEPH & HEPH;PAH corrected	< 10	< 10	10	n/c	0	< 10	< 10	10	n/c	0	< 10	< 10	10	n/c	0

Notes:
Results are expressed in micrograms per kilogram (mg/kg), unless otherwise indicated.
m - metre
SO - soil
FDA = field duplicate available
FD = field duplicate
QA/QC = quality assurance/quality control
Reported Detection Limit (RDL) indicates the minimum concentration that could be measured by laboratory instrumentation for a specific sample.
Relative Percent Difference (RPD) is calculated when the mean value is greater than five times the method reporting limit; Golder's internal QA/QC target is less than 50%.
Difference Factor (DF) is calculated when the mean value is less than five times the method reporting limit; Golder's internal QA/QC target is less than 2.
n/c = not calculated
N/A = not applicable
BOLD font indicates the parameter analysed exceeds Golder's internal QA/QC targets.

Sample Location	K19-TP18-03	K19-TP18-03				K19-TP18-07	K19-TP18-07				K19-TP18-13	K19-TP18-13			
Sample Name	04308-07	04308-08				04299-11	04299-12				04315-02	04315-03			
Sample Collection Date	2018-01-13	2018-01-13	**RDL**	**RPD (%)**	**DF**	2018-01-14	2018-01-14	**RDL**	**RPD (%)**	**DF**	2018-01-18	2018-01-18	**RDL**	**RPD (%)**	**DF**
Sample Matrix	SO	SO				SO	SO				SO	SO			
Sample Depth	0.5 - 0.5 m	0.5 - 0.5 m				3.4 - 3.4 m	3.4 - 3.4 m				1.5 - 1.5 m	1.5 - 1.5 m			
Volatile Organic Compounds (VOCs)															
1-Methylnaphthalene	< 0.005	< 0.005	0.005	< 0.005	< 0.005	0.79	0.573	0.005	0.79	0.573	< 0.005	< 0.005	0.005	< 0.005	< 0.005
Benzene	< 0.02	< 0.02	0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.02	< 0.02	< 0.02
Benzo[j]fluoranthene	< 0.02	< 0.02	0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.02	< 0.02	< 0.02
Ethylbenzene	< 0.05	< 0.05	0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05	< 0.05	< 0.05
m,p-Xylenes	< 0.05	< 0.05	0.05	< 0.05	< 0.05	0.16	0.15	0.05	0.16	0.15	0.06	< 0.05	0.05	0.06	< 0.05
Methyl tert-Butyl Ether	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1
o-Xylene	< 0.05	< 0.05	0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05	< 0.05	< 0.05
Styrene	< 0.05	< 0.05	0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05	< 0.05	< 0.05
Toluene	< 0.05	< 0.05	0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05	< 0.05	< 0.05
Xylenes, Total	< 0.1	< 0.1	0.1	< 0.1	< 0.1	0.2	0.2	0.1	0.2	0.2	< 0.1	< 0.1	0.1	< 0.1	< 0.1

Notes:
Results are expressed in micrograms per kilogram (mg/kg), unless otherwise indicated.
m - metre
SO - soil
FDA = field duplicate available
FD = field duplicate
QA/QC = quality assurance/quality control
Reported Detection Limit (RDL) indicates the minimum concentration that could be measured by laboratory instrumentation for a specific sample.
Relative Percent Difference (RPD) is calculated when the mean value is greater than five times the method reporting limit; Golder's internal QA/QC target is less than 50%.
Difference Factor (DF) is calculated when the mean value is less than five times the method reporting limit; Golder's internal QA/QC target is less than 2.
n/c = not calculated
N/A = not applicable
BOLD font indicates the parameter analysed exceeds Golder's internal QA/QC targets.

Appendix G
Table G-3: Results of January 2018 Supplementary Investigation
QAQC Groundwater Analyses - Dissolved Metals
K19 - Trutch Former Townsite
Alaska Highway, BC

Sample Location	K19-MW16-01D	K19-MW16-01D				K19-MW17-35D	K19-MW17-35D				K19-MW18-12	K19-MW18-12			
Sample Name	04309-11	04309-12	**RDL**	**RPD (%)**	**DF**	04310-04	04310-05	**RDL**	**RPD (%)**	**DF**	04254-01	04254-02	**RDL**	**RPD (%)**	**DF**
Sample Collection Date	2018-01-14	2018-01-14				2018-01-16	2018-01-16				2018-01-26	2018-01-26			
Sample Matrix	WG	WG				WG	WG				WG	WG			
Dissolved Metals															
Aluminum	3	3	2	n/c	0	4	4	2	n/c	0	3	3	2	n/c	0
Antimony	< 0.2	< 0.2	0.2	n/c	0	< 0.2	< 0.2	0.2	n/c	0	< 0.2	< 0.2	0.2	n/c	0
Arsenic	1.8	1.8	0.1	0	n/c	0.8	0.8	0.1	0	n/c	0.2	0.2	0.1	n/c	0
Barium	2000	1990	2	1	n/c	1820	1780	2	2	n/c	91.0	86.1	0.2	6	n/c
Beryllium	< 0.01	< 0.01	0.01	n/c	0	< 0.01	0.01	0.01	n/c	0	< 0.01	0.01	0.01	n/c	0
Bismuth	< 0.05	< 0.05	0.05	n/c	0	< 0.05	< 0.05	0.05	n/c	0	< 0.05	< 0.05	0.05	n/c	0
Boron	101	93	2	8	n/c	73	68	2	7	n/c	326	325	2	0	n/c
Cadmium	< 0.01	< 0.01	0.01	n/c	0	< 0.01	< 0.01	0.01	n/c	0	< 0.01	< 0.01	0.01	n/c	0
Calcium	60600	59500	50	2	n/c	99100	97700	50	1	n/c	75200	72700	50	3	n/c
Chromium	< 0.5	< 0.5	0.5	n/c	0	< 0.5	< 0.5	0.5	n/c	0	< 0.5	< 0.5	0.5	n/c	0
Cobalt	0.31	0.30	0.05	3	n/c	0.15	0.16	0.05	n/c	0.2	0.13	0.14	0.05	n/c	0.2
Copper	< 0.2	< 0.2	0.2	n/c	0	< 0.2	< 0.2	0.2	n/c	0	< 0.2	< 0.2	0.2	n/c	0
Hardness	249000	244000	100	2	n/c	381000	375000	100	2	n/c	314000	303000	100	4	n/c
Iron	18200	17400	10	4	n/c	39900	39700	10	1	n/c	531	535	10	1	n/c
Lead	< 0.05	< 0.05	0.05	n/c	0	< 0.05	< 0.05	0.05	n/c	0	< 0.05	< 0.05	0.05	n/c	0
Lithium	63.1	60.8	0.5	4	n/c	57.6	57.5	0.5	0	n/c	140	134	1.0	4	n/c
Magnesium	23600	23100	50	2	n/c	32400	31800	50	2	n/c	30600	29500	50	4	n/c
Manganese	71	71	1	0	n/c	357	356	1	0	n/c	275	281	1	2	n/c
Mercury	< 0.01	< 0.01	0.01	n/c	0	< 0.01	< 0.01	0.01	n/c	0	< 0.01	< 0.01	0.01	n/c	0
Molybdenum	1.45	1.55	0.05	7	n/c	0.44	0.45	0.05	2	n/c	0.13	0.09	0.05	n/c	0.8
Nickel	1.2	1.2	0.2	0	n/c	0.6	0.6	0.2	n/c	0	0.4	0.3	0.2	n/c	0.5
Potassium	1910	1840	50	4	n/c	1460	1540	50	5	n/c	2500	2380	50	5	n/c
Selenium	< 0.5	< 0.5	0.5	n/c	0	< 0.5	< 0.5	0.5	n/c	0	< 0.5	< 0.5	0.5	n/c	0
Silicon	5870	5850	50	0	n/c	5260	5140	50	2	n/c	5200	4950	50	5	n/c
Silver	< 0.02	< 0.02	0.02	n/c	0	< 0.02	< 0.02	0.02	n/c	0	< 0.02	< 0.02	0.02	n/c	0
Sodium	6830	6810	50	0	n/c	11600	11800	50	2	n/c	36300	34700	50	5	n/c
Strontium	290	300	0.1	3	n/c	405	428	0.1	6	n/c	954	903	0.1	5	n/c
Sulphur (Colloidal)	2140	2110	500	n/c	0.06	2290	2230	500	n/c	0.12	9340	9240	500	1	n/c
Thallium	< 0.01	< 0.01	0.01	n/c	0	< 0.01	< 0.01	0.01	n/c	0	< 0.01	< 0.01	0.01	n/c	0
Tin	0.09	0.07	0.05	n/c	0.4	< 0.05	< 0.05	0.05	n/c	0	0.15	0.12	0.05	n/c	0.6
Titanium	2.3	2.3	0.5	n/c	0	3.2	2.8	0.5	13	n/c	1.3	1.4	0.5	n/c	0.2
Uranium	0.04	0.04	0.01	n/c	0	0.14	0.14	0.01	0	n/c	0.07	0.06	0.01	15	n/c
Vanadium	< 0.5	< 0.5	0.5	n/c	0	< 0.5	< 0.5	0.5	n/c	0	< 0.5	< 0.5	0.5	n/c	0
Zinc	4	3	2	n/c	0.5	< 2	< 2	2	n/c	0	3	3	2	n/c	0
Zirconium	< 0.1	< 0.1	0.1	n/c	0	0.1	0.1	0.1	n/c	0	< 0.1	< 0.1	0.1	n/c	0

Notes:
Results are expressed in micrograms per liter (ug/L), unless otherwise indicated.
WG - groundwater
FDA = field duplicate available
FD = field duplicate
QA/QC = quality assurance/quality control
Reported Detection Limit (RDL) indicates the minimum concentration that could be measured by laboratory instrumentation for a specific sample.
Relative Percent Difference (RPD) is calculated when the mean value is greater than five times the method reporting limit; Golder's internal QA/QC target is less than 50%.
Difference Factor (DF) is calculated when the mean value is less than five times the method reporting limit; Golder's internal QA/QC target is less than 2.
n/c = not calculated
N/A = not applicable
BOLD font indicates the parameter analysed exceeds Golder's internal QA/QC targets.

Table G-4: Results of January 2018 Supplementary Investigation
QAQC Groundwater Analyses - PAHs
K19 - Trutch Former Townsite
Alaska Highway, BC

Sample Location	K19-MW16-01D	K19-MW16-01D				K19-MW17-35D	K19-MW17-35D				K19-MW18-12	K19-MW18-12			
Sample Name	04309-11	04309-12	**RDL**	**RPD (%)**	**DF**	04310-04	04310-05	**RDL**	**RPD (%)**	**DF**	04254-01	04254-02	**RDL**	**RPD (%)**	**DF**
Sample Collection Date	2018-01-14	2018-01-14				2018-01-16	2018-01-16				2018-01-26	2018-01-26			
Sample Matrix	WG	WG				WG	WG				WG	WG			
Polycyclic Aromatic Hydrocarbons (PAHs)															
1-methylnaphthalene	< 0.05	< 0.05	0.05	n/c	0	< 0.05	< 0.05	0.05	n/c	0	< 0.05	< 0.05	0.05	n/c	0
2-methylnaphthalene	< 0.05	< 0.05	0.05	n/c	0	< 0.05	< 0.05	0.05	n/c	0	< 0.05	< 0.05	0.05	n/c	0
Acenaphthene	< 0.02	< 0.02	0.02	n/c	0	< 0.02	< 0.02	0.02	n/c	0	< 0.02	< 0.02	0.02	n/c	0
Acenaphthylene	< 0.02	< 0.02	0.02	n/c	0	< 0.02	< 0.02	0.02	n/c	0	< 0.02	< 0.02	0.02	n/c	0
Acridine	< 0.05	< 0.05	0.05	n/c	0	< 0.05	< 0.05	0.05	n/c	0	< 0.05	< 0.05	0.05	n/c	0
Anthracene	< 0.01	< 0.01	0.01	n/c	0	< 0.01	< 0.01	0.01	n/c	0	< 0.01	< 0.01	0.01	n/c	0
Benzo(a)anthracene	< 0.01	< 0.01	0.01	n/c	0	< 0.01	< 0.01	0.01	n/c	0	< 0.01	< 0.01	0.01	n/c	0
Benzo(a)pyrene	< 0.01	< 0.01	0.01	n/c	0	< 0.01	< 0.01	0.01	n/c	0	< 0.01	< 0.01	0.01	n/c	0
Benzo(b)fluoranthene	< 0.01	< 0.01	0.01	n/c	0	< 0.01	< 0.01	0.01	n/c	0	< 0.01	< 0.01	0.01	n/c	0
Benzo(b,j) fluoranthene	< 0.01	< 0.01	0.01	n/c	0	< 0.01	< 0.01	0.01	n/c	0	< 0.01	< 0.01	0.01	n/c	0
Benzo(g,h,i)perylene	< 0.01	< 0.01	0.01	n/c	0	< 0.01	< 0.01	0.01	n/c	0	< 0.01	< 0.01	0.01	n/c	0
Benzo(k)fluoranthene	< 0.01	< 0.01	0.01	n/c	0	< 0.01	< 0.01	0.01	n/c	0	< 0.01	< 0.01	0.01	n/c	0
Chrysene	< 0.01	< 0.01	0.01	n/c	0	< 0.01	< 0.01	0.01	n/c	0	< 0.01	< 0.01	0.01	n/c	0
Dibenzo(a,h)anthracene	< 0.01	< 0.01	0.01	n/c	0	< 0.01	< 0.01	0.01	n/c	0	< 0.01	< 0.01	0.01	n/c	0
Extractable Petroleum Hydrocarbons (C10-C19)	< 100	< 100	100	n/c	0	< 100	< 100	100	n/c	0	< 100	< 100	100	n/c	0
Extractable Petroleum Hydrocarbons (C19-C32)	< 100	< 100	100	n/c	0	< 100	< 100	100	n/c	0	< 100	< 100	100	n/c	0
Fluoranthene	< 0.02	< 0.02	0.02	n/c	0	< 0.02	< 0.02	0.02	n/c	0	< 0.02	< 0.02	0.02	n/c	0
Fluorene	< 0.02	< 0.02	0.02	n/c	0	< 0.02	< 0.02	0.02	n/c	0	< 0.02	< 0.02	0.02	n/c	0
Heavy Extractable Petroleum Hydrocarbons (BC Guidelines)	< 100	< 100	100	n/c	0	< 100	< 100	100	n/c	0	< 100	< 100	100	n/c	0
Indeno(1,2,3-c,d)pyrene	< 0.01	< 0.01	0.01	n/c	0	< 0.01	< 0.01	0.01	n/c	0	< 0.01	< 0.01	0.01	n/c	0
Light Extractable Petroleum Hydrocarbons (BC Guidelines)	< 100	< 100	100	n/c	0	< 100	< 100	100	n/c	0	< 100	< 100	100	n/c	0
Naphthalene	< 0.05	< 0.05	0.05	n/c	0	< 0.05	< 0.05	0.05	n/c	0	< 0.05	< 0.05	0.05	n/c	0
Petroleum Hydrocarbons - F1 (C6-C10)	-	-	-	-	-	840	880	100	5	n/c	< 100	< 100	100	n/c	0
Petroleum Hydrocarbons - F1 (C6-C10)-BTEX	-	-	-	-	-	560	630	100	12	n/c	< 100	< 100	100	n/c	0
Petroleum Hydrocarbons - F2 (C10-C16)	-	-	-	-	-	< 100	< 100	100	n/c	0	< 100	< 100	100	n/c	0
Petroleum Hydrocarbons - F3 (C16-C34)	-	-	-	-	-	110	< 100	100	n/c	0.1	< 100	< 100	100	n/c	0
Petroleum Hydrocarbons - F4 (C34-C50)	-	-	-	-	-	< 100	< 100	100	n/c	0	< 100	< 100	100	n/c	0
Phenanthrene	< 0.04	< 0.04	0.04	n/c	0	< 0.04	< 0.04	0.04	n/c	0	< 0.04	< 0.04	0.04	n/c	0
Pyrene	< 0.02	< 0.02	0.02	n/c	0	< 0.02	< 0.02	0.02	n/c	0	< 0.02	< 0.02	0.02	n/c	0
Quinoline	< 0.05	< 0.05	0.05	n/c	0	< 0.05	< 0.05	0.05	n/c	0	< 0.05	< 0.05	0.05	n/c	0
Volatile Hydrocarbon Fraction	< 100	< 100	100	n/c	0	380	410	100	n/c	0.3	-	-	-	-	-
Volatile Petroleum Hydrocarbons: BTEX, VPH, LEPH & HEPH; PAH Corrected	< 100	< 100	100	n/c	0	100	160	100	n/c	0.6	-	-	-	-	-

Notes:
Results are expressed in micrograms per liter (ug/L), unless otherwise indicated.
WG - groundwater
FDA = field duplicate available
FD = field duplicate
QA/QC = quality assurance/quality control
Reported Detection Limit (RDL) indicates the minimum concentration that could be measured by laboratory instrumentation for a specific sample.
Relative Percent Difference (RPD) is calculated when the mean value is greater than five times the method reporting limit; Golder's internal QA/QC target is less than 50%.
Difference Factor (DF) is calculated when the mean value is less than five times the method reporting limit; Golder's internal QA/QC target is less than 2.
n/c = not calculated
N/A = not applicable
BOLD font indicates the parameter analysed exceeds Golder's internal QA/QC targets.

Table G-5: Results of January 2018 Supplementary Investigation
QAQC Groundwater Analyses - VOCs
K19 - Trutch Former Townsite
Alaska Highway, BC

Sample Location	K19-MW16-01D	K19-MW16-01D				K19-MW17-35D	K19-MW17-35D				K19-MW18-12	K19-MW18-12			
Sample Name	04309-11	04309-12	**RDL**	**RPD (%)**	**DF**	04310-04	04310-05	**RDL**	**RPD (%)**	**DF**	04254-01	04254-02	**RDL**	**RPD (%)**	**DF**
Sample Collection Date	2018-01-14	2018-01-14				2018-01-16	2018-01-16				2018-01-26	2018-01-26			
Sample Matrix	WG	WG				WG	WG				WG	WG			
Volatile Organic Compounds (VOCs)															
1,1,1,2-tetrachloroethane	< 1	< 1	n/c	0	1	< 1	< 1	1	n/c	0	< 1	< 1	n/c	0	1
1,1,1-trichloroethane	< 1	< 1	n/c	0	1	< 1	< 1	1	n/c	0	< 1	< 1	n/c	0	1
1,1,2,2-tetrachloroethane	< 0.8	< 0.8	n/c	0	0.8	< 0.8	< 0.8	0.8	n/c	0	< 0.8	< 0.8	n/c	0	0.8
1,1,2-trichloroethane	< 1	< 1	n/c	0	1	< 1	< 1	1	n/c	0	< 1	< 1	n/c	0	1
1,1-dichloroethane	< 1	< 1	n/c	0	1	< 1	< 1	1	n/c	0	< 1	< 1	n/c	0	1
1,1-dichloroethene	< 1	< 1	n/c	0	1	< 1	< 1	1	n/c	0	< 1	< 1	n/c	0	1
1,2,4-Trichlorobenzene	< 1	< 1	n/c	0	1	< 1	< 1	1	n/c	0	< 1	< 1	n/c	0	1
1,2-dibromoethane (Ethylene Dibromide) (EDB)	< 0.3	< 0.3	n/c	0	0.3	< 0.3	< 0.3	0.3	n/c	0	< 0.3	< 0.3	n/c	0	0.3
1,2-dichlorobenzene	< 0.5	< 0.5	n/c	0	0.5	< 0.5	< 0.5	0.5	n/c	0	< 0.5	< 0.5	n/c	0	0.5
1,2-dichloroethane	< 1	< 1	n/c	0	1	52	49	1	6	n/c	< 1	< 1	n/c	0	1
1,2-dichloroethylene (cis) (1,2-dichloroethene) (cis)	< 1	< 1	n/c	0	1	< 1	< 1	1	n/c	0	< 1	< 1	n/c	0	1
1,2-dichloroethylene (trans) (1,2-dichloroethene) (trans)	< 1	< 1	n/c	0	1	< 1	< 1	1	n/c	0	< 1	< 1	n/c	0	1
1,2-dichloropropane (Propylene Dichloride)	< 1	< 1	n/c	0	1	< 1	< 1	1	n/c	0	< 1	< 1	n/c	0	1
1,3-dichlorobenzene	< 0.5	< 0.5	n/c	0	0.5	< 0.5	< 0.5	0.5	n/c	0	< 0.5	< 0.5	n/c	0	0.5
1,3-dichloropropene (cis)	< 1	< 1	n/c	0	1	< 1	< 1	1	n/c	0	< 1	< 1	n/c	0	1
1,3-dichloropropene (trans)	< 1	< 1	n/c	0	1	< 1	< 1	1	n/c	0	< 1	< 1	n/c	0	1
1,3-dichloropropene, total	< 1	< 1	n/c	0	1	< 1	< 1	1	n/c	0	< 1	< 1	n/c	0	1
1,4-dichlorobenzene	< 0.5	< 0.5	n/c	0	0.5	< 0.5	< 0.5	0.5	n/c	0	< 0.5	< 0.5	n/c	0	0.5
2-Butanone	< 10	< 10	n/c	0	10	< 10	< 10	10	n/c	0	< 10	< 10	n/c	0	10
4-Methyl-2-pentanone	< 10	< 10	n/c	0	10	< 10	< 10	10	n/c	0	< 10	< 10	n/c	0	10
Acetone	< 10	< 10	n/c	0	10	< 10	< 10	10	n/c	0	< 10	< 10	n/c	0	10
Benzene	< 0.5	< 0.5	n/c	0	0.5	271	237	0.5	13	n/c	< 0.5	< 0.5	n/c	0	0.5
Benzo[j]fluoranthene	< 0.01	< 0.01	n/c	0	0.01	< 0.01	< 0.01	0.01	n/c	0	< 0.01	< 0.01	n/c	0	0.01
Bromodichloromethane (BDCM)	< 1	< 1	n/c	0	1	< 1	< 1	1	n/c	0	< 1	< 1	n/c	0	1
Bromoform (Tribromomethane)	< 1	< 1	n/c	0	1	< 1	< 1	1	n/c	0	< 1	< 1	n/c	0	1
Bromomethane (Methyl Bromide)	< 1	< 1	n/c	0	1	< 1	< 1	1	n/c	0	< 1	< 1	n/c	0	1
Carbon Tetrachloride	< 0.5	< 0.5	n/c	0	0.5	< 0.5	< 0.5	0.5	n/c	0	< 0.5	< 0.5	n/c	0	0.5
Chlorobenzene	< 1	< 1	n/c	0	1	< 1	< 1	1	n/c	0	< 1	< 1	n/c	0	1
Chloroethane	< 1	< 1	n/c	0	1	< 1	< 1	1	n/c	0	< 1	< 1	n/c	0	1
Chloroform	< 1	< 1	n/c	0	1	< 1	< 1	1	n/c	0	< 1	< 1	n/c	0	1
Chloromethane	< 1	< 1	n/c	0	1	< 1	< 1	1	n/c	0	< 1	< 1	n/c	0	1
Dibromochloromethane (DBCM)	< 1	< 1	n/c	0	1	< 1	< 1	1	n/c	0	< 1	< 1	n/c	0	1
Dichloromethane (DCM) (Methylene Chloride)	< 1	< 1	n/c	0	1	< 1	< 1	1	n/c	0	< 1	< 1	n/c	0	1
Ethylbenzene	< 0.5	< 0.5	n/c	0	0.5	< 0.5	< 0.5	0.5	n/c	0	< 0.5	< 0.5	n/c	0	0.5
m,p-Xylenes	< 0.5	< 0.5	n/c	0	0.5	< 0.5	< 0.5	0.5	n/c	0	< 0.5	< 0.5	n/c	0	0.5
Methyl tert-Butyl Ether	< 1	< 1	n/c	0	1	< 1	< 1	1	n/c	0	< 1	< 1	n/c	0	1
o-Xylene	< 0.5	< 0.5	n/c	0	0.5	< 0.5	< 0.5	0.5	n/c	0	< 0.5	< 0.5	n/c	0	0.5
Styrene	< 0.5	< 0.5	n/c	0	0.5	< 0.5	< 0.5	0.5	n/c	0	< 0.5	< 0.5	n/c	0	0.5
Tetrachloroethylene (PCE/PERC)	< 1	< 1	n/c	0	1	< 1	< 1	1	n/c	0	< 1	< 1	n/c	0	1
Toluene	< 0.5	< 0.5	n/c	0	0.5	8.1	7.7	0.5	5	n/c	< 0.5	< 0.5	n/c	0	0.5
Trichloroethylene (TCE)	< 1	< 1	n/c	0	1	< 1	< 1	1	n/c	0	< 1	< 1	n/c	0	1
Trichlorofluoromethane (Freon 11)	< 1	< 1	n/c	0	1	< 1	< 1	1	n/c	0	< 1	< 1	n/c	0	1
Trihalomethanes (Total)	< 2	< 2	n/c	0	2	< 2	< 2	2	n/c	0	< 2	< 2	n/c	0	2
Vinyl Chloride (Chloroethene)	< 1	< 1	n/c	0	1	< 1	< 1	1	n/c	0	< 1	< 1	n/c	0	1
Xylenes, Total	< 1	< 1	n/c	0	1	< 1	< 1	1	n/c	0	< 1	< 1	n/c	0	1
Volatile Hydrocarbon Fraction	< 100	< 100	n/c	0	100	380	410	100	n/c	0.3					
Volatile Petroleum Hydrocarbons: BTEX, VPH, LEPH & HEPH; PAH corrected	< 100	< 100	n/c	0	100	100	160	100	n/c	0.6					
Groundwater Pesticides															
4,4-DDT	< 0.04	< 0.04	n/c	0	0.04	-	-	-	-	-	-	-	-	-	-

Notes:
Results are expressed in micrograms per liter (ug/L), unless otherwise indicated.
WG - groundwater
FDA = field duplicate available
FD = field duplicate
QA/QC = quality assurance/quality control
Reported Detection Limit (RDL) indicates the minimum concentration that could be measured by laboratory instrumentation for a specific sample.
Relative Percent Difference (RPD) is calculated when the mean value is greater than five times the method reporting limit; Golder's internal QA/QC target is less than 50%.
Difference Factor (DF) is calculated when the mean value is less than five times the method reporting limit; Golder's internal QA/QC target is less than 2.
n/c = not calculated
N/A = not applicable
BOLD font indicates the parameter analysed exceeds Golder's internal QA/QC targets.

Table G-6: Results of January 2018 Supplementary Investigation
QAQC Soil Vapour Analyses
K19 - Trutch Former Townsite
Alaska Highway, BC

Sample Location	K19-SV18-03	K19-SV18-03	RDL	RPD (%)	DF
Sample Name	04316-03	04316-04			
Sample Collection Date	2018-01-13	2018-01-13			
Sample Matrix	SV	SV			
Sample Depth	3.5-3.65	3.5-3.65			
Polycyclic Aromatic Hydrocarbons (PAHs)					
Naphthalene	<2.0	<2.0	20.0	0	n/c
VPH (C6-C10)	5700	2700	150	**71.00**	n/c
BTEX					
Benzene	1.6	1.4	5.00	n/c	0.04
Toluene	1.3	2.8	8.00	n/c	0.19
Ethylbenzene	1.2	1.1	9.0	n/c	0.01
Styrene	<1.0	<1.0	10.0	n/c	0.00
o-Xylene	2.4	1.6	9.0	n/c	0.09
m,p-Xylenes	3.7	4.0	15.0	n/c	0.02
Xylenes, Total	6.1	5.6	20.0	n/c	0.03
Volatile Organic Compounds (VOCs)					
Bromodichloromethane (BDCM)	<1.3	<1.3	13.0	n/c	0
Bromomethane (Methyl bromide)	<1.9	<1.9	19.0	n/c	0
Bromoform (Tribromomethane)	<2.0	<2.0	20.0	n/c	0
1,3-Butadiene	<1.0	<1.0	10.0	n/c	0
Carbon Tetrachloride	<2.0	<2.0	20.0	n/c	0
Chlorobenzene	<1.0	<1.0	10.0	n/c	0
Chloroethane	3.3	<1.0	10.0	n/c	0.23
Chloroform	<1.0	1.8	10.0	n/c	0.08
Chloromethane	<0.60	<0.60	6.0	n/c	0
Dichloromethane (DCM) (Methylene Chloride)	<1.0	<1.0	10.0	n/c	0
Dibromochloromethane (DBCM)	<2.0	<2.0	20.0	n/c	0
1,2-dibromoethane (Ethylene Dibromide) (EDB)	<1.5	<1.5	15.0	n/c	0
1,2-dichlorobenzene	<2.5	<2.5	25.0	n/c	0
1,3-dichlorobenzene	<2.5	<2.5	25.0	n/c	0
1,4-dichlorobenzene	<2.5	<2.5	25.0	n/c	0
Dichlorodifluoromethane (Freon 12)	2.2	2.1	10.0	n/c	0.01
1,1-dichloroethane	<1.2	<1.2	12.0	n/c	0
1,2-dichloroethane	<0.80	<0.80	3.0	n/c	0
1,1-dichloroethene	<0.80	<0.80	10.0	n/c	0
1,2-dichloroethylene (Cis) (1,2-dichloroethene)	<0.80	<0.80	8.0	n/c	0
1,2-dichloroethylene (Trans) (1,2-dichloroethene)	<0.80	<0.80	8.0	n/c	0
1,2-dichloropropane (Propylene Dichloride)	<2.0	<2.0	20.0	n/c	0
2,2-Dichloropropane	<2.0	<2.0	20.0	n/c	0
1,3-dichloropropene (Cis)	<1.0	<1.0	10.0	n/c	0
1,3-dichloropropene (Trans)	<1.0	<1.0	10.0	n/c	0
1,2-Dichlorotetrafluoroethane	<1.4	<1.4	14.0	n/c	0
1,1,2,2-tetrachloroethane	<1.5	<1.5	15.0	n/c	0
Freon 113	<1.5	<1.5	15.0	n/c	0
2-Hexanone	<2.0	<2.0	20.0	n/c	0
Isopropylbenzene	<0.80	<0.80	8.0	n/c	0
Methyl Cyclohexane	8.6	13	7.0	n/c	0.63
Methyl tert-Butyl Ether (MTBE)	<0.80	<0.80	8.0	n/c	0.00
n-Decane	7.4	40	13.0	n/c	2.51
n-Hexane	2.8	1.7	11.0	n/c	0.10
4-Methyl-2-pentanone	<2.0	<2.0	20.0	n/c	0.00
Tetrachloroethylene (PCE/PERC)	2.1	11	10.0	n/c	0.89
1,2,4-Trimethylbenzene	<1.5	<1.5	15.0	n/c	0
1,3,5-Trimethylbenzene	<1.5	<1.5	15.0	n/c	0
1,1,1-trichloroethane	<1.6	<1.6	16.0	n/c	0
1,1,2-trichloroethane	<1.6	<1.6	16.0	n/c	0
Trichloroethylene (TCE)	<1.0	<1.0	10.0	n/c	0
Trichlorofluoromethane (Freon 11)	<2.3	<2.3	23.0	n/c	0
Vinyl Bromide	<0.80	<0.80	8.0	n/c	0
Vinyl Chloride (Chloroethene)	<0.40	<0.40	4.0	n/c	0

Notes:
Results are expressed in micrograms per kilogram (mg/kg), unless otherwise indicated.
m - metre
SO - soil
FDA = field duplicate available
FD = field duplicate
QA/QC = quality assurance/quality control
Reported Detection Limit (RDL) indicates the minimum concentration that could be measured by laboratory instrumentation for a specific sample.
Relative Percent Difference (RPD) is calculated when the mean value is greater than five times the method reporting limit; Golder's internal QA/QC target is less than 50%.
Difference Factor (DF) is calculated when the mean value is less than five times the method reporting limit; Golder's internal QA/QC target is less than 2.
n/c = not calculated
N/A = not applicable
BOLD font indicates the parameter analysed exceeds Golder's internal QA/QC targets.

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